

Model Railroad System

Generated by Doxygen 1.9.4

1 Internals (developer) documentation.	1
1.1 Introduction	1
2 Module Index	3
2.1 Modules	3
3 Namespace Index	5
3.1 Namespace List	5
4 Hierarchical Index	7
4.1 Class Hierarchy	7
5 Class Index	13
5.1 Class List	13
6 File Index	21
6.1 File List	21
7 Module Documentation	23
7.1 Azatrax	23
7.1.1 Detailed Description	23
7.2 FCFSupportModule	24
7.3 ParserClasses	24
7.3.1 Detailed Description	25
7.3.2 Function Documentation	25
7.3.2.1 tcl_socketpair()	25
7.4 TimeTableSystem	25
7.4.1 Detailed Description	26
7.5 TimeTableSystemTcl	26
7.5.1 Detailed Description	27
7.5.2 Function Documentation	27
7.5.2.1 ForEveryCab()	27
7.5.2.2 ForEveryNote()	28
7.5.2.3 ForEveryPrintOption()	28
7.5.2.4 ForEveryStation()	29
7.5.2.5 ForEveryTrain()	29
7.5.2.6 NewCreateTimeTable()	30
7.5.2.7 OldCreateTimeTable()	30
7.5.2.8 TT_ListToStringListString()	30
7.5.2.9 TT_StringListToList()	31
7.5.3 Variable Documentation	31

7.5.3.1 Tcl_Result	31
7.6 Station 	31
7.6.1 Detailed Description	32
7.6.2 Typedef Documentation	32
7.6.2.1 OccupiedMap	32
7.6.2.2 StationVector	33
7.6.2.3 StorageTrackMap	33
7.7 Train and support classes.	33
7.7.1 Detailed Description	33
7.7.2 Typedef Documentation	34
7.7.2.1 StopVector	34
7.7.2.2 TrainNumberMap	34
7.8 Cab	34
7.8.1 Detailed Description	34
7.8.2 Typedef Documentation	35
7.8.2.1 CabNameMap	35
7.9 TclSocketCANModule	35
7.9.1 Detailed Description	35
7.9.2 Function Documentation	35
7.9.2.1 SocketCAN()	35
7.9.2.2 Tclsocketcan_SafeInit()	36
7.9.3 Variable Documentation	36
7.9.3.1 i	36
7.9.3.2 TclSocketCAN	36
7.10 TclwiringpiModule	37
7.11 Cmri	37
7.11.1 Detailed Description	37
7.12 CTIAcela	38
7.12.1 Detailed Description	41
7.12.2 Typedef Documentation	41
7.12.2.1 addresstype	41
7.12.2.2 filterthreshtype	41
7.12.2.3 momtype	41
7.12.2.4 speedtype	42
7.12.2.5 ubyte	42
7.12.3 Function Documentation	42
7.12.3.1 _handleSRQ()	42
7.12.3.2 _readbyte()	42
7.12.3.3 _readevent()	43

7.12.3.4 _transmit()	43
7.12.3.5 Activate()	43
7.12.3.6 Blink()	44
7.12.3.7 ConfigureSensor()	44
7.12.3.8 Control16()	44
7.12.3.9 Control4()	45
7.12.3.10 Control8()	46
7.12.3.11 CTIAcela()	46
7.12.3.12 Deactive()	47
7.12.3.13 EmergencyStop()	47
7.12.3.14 HaveData()	47
7.12.3.15 highbyte()	48
7.12.3.16 lowbyte()	49
7.12.3.17 NetworkOffline()	49
7.12.3.18 NetworkOnline()	49
7.12.3.19 OnlineP()	50
7.12.3.20 pack4()	50
7.12.3.21 pack8()	50
7.12.3.22 Poll()	51
7.12.3.23 PulseOff()	51
7.12.3.24 PulseOn()	52
7.12.3.25 Query()	52
7.12.3.26 Read()	52
7.12.3.27 Read16()	53
7.12.3.28 Read4()	53
7.12.3.29 Read8()	53
7.12.3.30 ReadAll()	54
7.12.3.31 ReadRevision()	54
7.12.3.32 ResetNetwork()	54
7.12.3.33 ReverseBlink()	54
7.12.3.34 Signal2()	55
7.12.3.35 Signal3()	55
7.12.3.36 Signal4()	56
7.12.3.37 SignalBrightness()	56
7.12.3.38 SignalSettings()	56
7.12.3.39 SRQControl()	57
7.12.3.40 Throttle()	57
7.12.3.41 validate()	58
7.12.3.42 ~CTIAcela()	58

7.12.4 Variable Documentation	58
7.12.4.1 _timeout	58
7.12.4.2 CTI_DeviceMap	58
7.12.4.3 ctiacela	59
7.12.4.4 dataavailable	59
7.12.4.5 FilterSelectBits	59
7.12.4.6 LampBits	59
7.12.4.7 maxtries	59
7.12.4.8 networkonline	59
7.12.4.9 Opcodes	60
7.12.4.10 Responses	60
7.12.4.11 ttyfd	60
7.13 LCCModule	60
7.13.1 Detailed Description	60
7.14 XPressNetModule	61
7.14.1 Detailed Description	61
7.15 NCEModule	61
7.15.1 Detailed Description	61
7.16 TclCommon	62
7.16.1 Detailed Description	62
7.17 LinuxGpio	63
7.17.1 Detailed Description	63
7.18 Cmri Support code	63
7.18.1 Detailed Description	63
7.19 RaildriverClientModule	63
7.19.1 Detailed Description	64
7.20 Graphics Support Code	64
7.21 GRSupportModule	64
7.21.1 Detailed Description	64
7.22 SatelliteModule	65
7.22.1 Detailed Description	65
7.23 FCFSupport	65
7.23.1 Detailed Description	65
8 Namespace Documentation	67
8.1 azatrax Namespace Reference	67
8.1.1 Detailed Description	67
8.1.2 Tcl Package Provided	67
8.1.3 Library Provided	68

8.2 CabWidgets Namespace Reference	68
8.2.1 Detailed Description	68
8.2.2 Package provided	68
8.3 cmri Namespace Reference	68
8.3.1 Detailed Description	69
8.3.2 Package provided	69
8.3.3 Typedef Documentation	69
8.3.3.1 ByteList	70
8.3.3.2 uatype	70
8.3.3.3 ubyte	70
8.3.4 Enumeration Type Documentation	70
8.3.4.1 CardType	70
8.4 CmriSupport Namespace Reference	71
8.4.1 Detailed Description	71
8.4.2 Package provided	71
8.5 CTCPanel Namespace Reference	71
8.5.1 Detailed Description	73
8.5.2 Package provided	73
8.5.3 Function Documentation	73
8.5.3.1 leverMethods()	73
8.5.3.2 standardMethods()	73
8.5.3.3 trackworkmethods()	74
8.5.3.4 verifyBoolMethod()	74
8.5.3.5 verifyColorMethod()	74
8.5.3.6 verifyDoubleMethod()	74
8.5.3.7 verifyOrientation8Method()	74
8.5.3.8 verifyPositionMethod()	75
8.6 ctiacela Namespace Reference	75
8.6.1 Detailed Description	75
8.6.2 Package provided	76
8.7 FCFSupport Namespace Reference	76
8.7.1 Detailed Description	78
8.7.2 Tcl Package Provided	78
8.7.3 Library Provided	78
8.7.4 Typedef Documentation	78
8.7.4.1 CarTypeMap	78
8.7.4.2 CarTypeOrderVector	78
8.7.4.3 CarVector	79
8.7.4.4 DivisionMap	79

8.7.4.5 DivisionSymbolMap	79
8.7.4.6 DivisionVector	79
8.7.4.7 IndustryMap	79
8.7.4.8 IndustryVector	79
8.7.4.9 OwnerMap	80
8.7.4.10 StationMap	80
8.7.4.11 StationVector	80
8.7.4.12 stringVector	80
8.7.4.13 SwitchListElementVector	80
8.7.4.14 TrainMap	81
8.7.4.15 TrainNameMap	81
8.7.5 Function Documentation	81
8.7.5.1 operator<<() [1/2]	81
8.7.5.2 operator<<() [2/2]	81
8.8 FCFSupport::PDFFileStructures Namespace Reference	82
8.8.1 Detailed Description	83
8.8.2 Typedef Documentation	83
8.8.2.1 NamedIndirectObjectMap	83
8.8.2.2 PageLabelDictionaryNumMap	84
8.8.2.3 PageLabelTreeKidVector	84
8.8.2.4 PDFStreamVector	84
8.8.3 Function Documentation	84
8.8.3.1 QuotePDFString()	84
8.9 FileEntry Namespace Reference	85
8.9.1 Detailed Description	85
8.9.2 Package provided	86
8.9.3 Function Documentation	87
8.9.3.1 _destroy()	87
8.9.3.2 _openFile()	87
8.9.3.3 _path_command()	87
8.9.3.4 bind()	88
8.9.3.5 cget()	88
8.9.3.6 configure()	89
8.9.3.7 create()	89
8.10 gettext Namespace Reference	89
8.10.1 Detailed Description	90
8.10.2 Package provided	90
8.10.3 Function Documentation	90
8.10.3.1 _()	90

8.10.3.2 _m()	90
8.10.3.3 _mx()	91
8.11 GRSupport Namespace Reference	91
8.11.1 Detailed Description	92
8.11.2 Package provided	92
8.11.3 Function Documentation	92
8.11.3.1 _ROPI()	92
8.11.3.2 _ROPI2()	92
8.11.3.3 DegreesToRadians()	92
8.11.3.4 RadiansToDegrees()	93
8.11.3.5 VerifyBooleanMethod()	93
8.11.3.6 VerifyColorMethod()	93
8.11.3.7 VerifyDoubleMethod()	93
8.11.3.8 VerifyIntegerMethod()	94
8.11.3.9 VerifyOrientationHVMMethod()	94
8.11.4 Variable Documentation	94
8.11.4.1 PI	94
8.11.4.2 PI2	94
8.12 HTMLHelp Namespace Reference	94
8.12.1 Detailed Description	95
8.12.2 Package provided	95
8.13 Instruments Namespace Reference	95
8.13.1 Detailed Description	95
8.13.2 Package provided	96
8.13.3 Function Documentation	96
8.13.3.1 CommonOptions()	96
8.14 LabelComboBox Namespace Reference	96
8.14.1 Detailed Description	97
8.14.2 Package provided	98
8.14.3 Function Documentation	98
8.14.3.1 _destroy()	98
8.14.3.2 _path_command()	99
8.14.3.3 bind()	99
8.14.3.4 cget()	99
8.14.3.5 configure()	100
8.14.3.6 create()	100
8.14.3.7 get()	100
8.14.3.8 getlistbox()	101
8.14.3.9 getvalue()	101

8.14.3.10 icursor()	101
8.14.3.11 post()	102
8.14.3.12 setvalue()	102
8.14.3.13 unpost()	102
8.15 LabelSelectColor Namespace Reference	103
8.15.1 Detailed Description	103
8.15.2 Package provided	104
8.15.3 Function Documentation	104
8.15.3.1 _destroy()	104
8.15.3.2 _path_command()	105
8.15.3.3 cget()	105
8.15.3.4 ColorPopup()	105
8.15.3.5 configure()	107
8.15.3.6 create()	107
8.16 LabelSpinBox Namespace Reference	107
8.16.1 Detailed Description	108
8.16.2 Package provided	109
8.16.3 Function Documentation	109
8.16.3.1 _destroy()	109
8.16.3.2 _path_command()	109
8.16.3.3 bind()	110
8.16.3.4 cget()	110
8.16.3.5 configure()	110
8.16.3.6 create()	111
8.16.3.7 getvalue()	111
8.16.3.8 setvalue()	111
8.17 LCARS Namespace Reference	112
8.17.1 Detailed Description	112
8.17.2 Package provided	112
8.18 lcc Namespace Reference	112
8.18.1 Detailed Description	114
8.18.2 Package provided	115
8.18.3 Package provided	115
8.18.4 Package provided	115
8.18.5 Package provided	115
8.18.6 Typedef Documentation	115
8.18.6.1 byte	115
8.18.6.2 bytelist	115
8.18.6.3 bytelist72	115

8.18.6.4 databuf	116
8.18.6.5 eightbytes	116
8.18.6.6 fifteenbits	116
8.18.6.7 fivebits	116
8.18.6.8 headerword	116
8.18.6.9 length	116
8.18.6.10 nid	117
8.18.6.11 sixbits	117
8.18.6.12 sixteenbits	117
8.18.6.13 threebits	117
8.18.6.14 twelvebits	117
8.18.6.15 twobits	117
8.18.6.16 uint32	118
8.18.7 Enumeration Type Documentation	118
8.18.7.1 datagramcontent	118
8.18.7.2 eventvalidity	118
8.18.8 Function Documentation	118
8.18.8.1 AbstractMessage()	119
8.18.8.2 AbstractMRMessage()	119
8.19 linuxgpio Namespace Reference	119
8.19.1 Detailed Description	120
8.19.2 Package provided	120
8.19.3 Typedef Documentation	120
8.19.3.1 pinnotype	120
8.19.4 Enumeration Type Documentation	120
8.19.4.1 pindirection	120
8.20 nce Namespace Reference	121
8.20.1 Detailed Description	122
8.20.2 Package provided	122
8.20.3 Typedef Documentation	122
8.20.3.1 AccessoryNumber	123
8.20.3.2 AspectBits	123
8.20.3.3 CabNumber	123
8.20.3.4 ConsistAddress	123
8.20.3.5 CSAddress	123
8.20.3.6 EchoMode	124
8.20.3.7 Hours	124
8.20.3.8 LCDMessage16	124
8.20.3.9 LCDMessage8	124

8.20.3.10 LocoAddress	124
8.20.3.11 MacroNumber	125
8.20.3.12 Minutes	125
8.20.3.13 MomentumLevel	125
8.20.3.14 RAMData	125
8.20.3.15 RAMData8	125
8.20.3.16 RawPacket	125
8.20.3.17 RawTrackPacket	126
8.20.3.18 ScaleClockRatio	126
8.20.3.19 Speed128	126
8.20.3.20 Speed28	126
8.20.3.21 UByte	126
8.20.4 Enumeration Type Documentation	126
8.20.4.1 Direction	126
8.20.4.2 SpeedMode	127
8.20.5 Function Documentation	127
8.20.5.1 ErrorMessage()	127
8.21 OvalWidgets Namespace Reference	128
8.21.1 Detailed Description	129
8.21.2 Package provided	129
8.21.3 Function Documentation	129
8.21.3.1 _ConfigureFont()	129
8.21.3.2 _ConfigureText()	129
8.21.3.3 _UnderSplit()	130
8.21.3.4 _VerifyFont()	130
8.21.3.5 _VerifyIntegerOrEmpty()	131
8.21.3.6 ColorFillOption()	131
8.21.3.7 ColorOptionMethods()	131
8.21.3.8 ColorOutlineOption()	131
8.21.3.9 CommonValidateMethods()	132
8.21.3.10 FontFamily()	132
8.21.3.11 OvalLabel()	132
8.21.3.12 SquareEndOptions()	133
8.21.3.13 XYWH()	133
8.21.3.14 ~OvalLabel()	133
8.21.4 Variable Documentation	133
8.21.4.1 canvas	133
8.21.4.2 HBar	134
8.21.4.3 VBar	134

8.22 PanedWindow Namespace Reference	134
8.22.1 Detailed Description	134
8.22.2 Package provided	134
8.23 Parsers Namespace Reference	134
8.23.1 Detailed Description	135
8.23.2 Tcl Package Provided	136
8.23.3 Library Provided	136
8.24 raildriver Namespace Reference	136
8.24.1 Detailed Description	137
8.24.2 Package provided	137
8.24.3 Typedef Documentation	137
8.24.3.1 eventlist	137
8.24.4 Enumeration Type Documentation	137
8.24.4.1 RaildriverEvents	137
8.25 ReadConfiguration Namespace Reference	138
8.25.1 Detailed Description	138
8.25.2 Package provided	138
8.25.3 Function Documentation	139
8.25.3.1 ConfigurationType()	139
8.25.3.2 IsEven()	139
8.25.3.3 ReadConfiguration()	140
8.25.3.4 WriteConfiguration()	140
8.26 TTSupport Namespace Reference	141
8.26.1 Detailed Description	142
8.26.2 Tcl Package Provided	142
8.26.3 Library Provided	143
8.26.4 Typedef Documentation	143
8.26.4.1 doubleVector	143
8.26.4.2 OptionHashMap	143
8.26.4.3 StringList	143
8.26.4.4 stringVector	144
8.26.4.5 TrainList	144
8.26.4.6 TrainStationTimes	144
8.26.4.7 TrainTimesAtStation	144
8.26.5 Function Documentation	145
8.26.5.1 StringListFromString()	145
8.26.5.2 StringListToString()	145
8.27 xpressnet Namespace Reference	146
8.27.1 Detailed Description	148

8.27.2 Package provided	148
8.27.3 Typedef Documentation	148
8.27.3.1 ConsistAddress	148
8.27.3.2 DecoderLongAddress	149
8.27.3.3 ElementAddress	149
8.27.3.4 nibble	149
8.27.3.5 S_128	149
8.27.3.6 S_14	149
8.27.3.7 S_27	149
8.27.3.8 S_28	150
8.27.3.9 u10	150
8.27.3.10 u3	150
8.27.3.11 u7	150
8.27.3.12 ubyte	150
8.27.4 Enumeration Type Documentation	150
8.27.4.1 DirectionCode	150
8.27.4.2 ErrorTypeCode	151
8.27.4.3 MessageTypeCode	151
8.27.4.4 NibbleCode	152
8.27.4.5 PowerUpMode	152
8.27.4.6 SpeedStepModeCode	152
8.27.4.7 TypeCode	153
9 Class Documentation	155
9.1 xpressnet::AccessoryDecoderInformation Class Reference	155
9.1.1 Detailed Description	156
9.1.2 Constructor & Destructor Documentation	156
9.1.2.1 AccessoryDecoderInformation()	156
9.1.3 Member Function Documentation	156
9.1.3.1 AccessoryType()	156
9.1.3.2 Address()	158
9.1.3.3 Completed()	158
9.1.3.4 Nibble()	158
9.1.3.5 NumberOfFeedbackElements()	159
9.1.3.6 TurnoutStatus()	159
9.1.4 Member Data Documentation	159
9.1.4.1 _accessory_type	159
9.1.4.2 _address	159
9.1.4.3 _completed	160

9.1.4.4 _nibble	160
9.1.4.5 _numberOfFeedbackElements	160
9.1.4.6 _t1	160
9.1.4.7 _t2	160
9.2 Instruments::AnalogClock Class Reference	160
9.2.1 Detailed Description	160
9.2.2 Constructor & Destructor Documentation	161
9.2.2.1 AnalogClock()	161
9.2.2.2 ~AnalogClock()	162
9.2.3 Member Function Documentation	162
9.2.3.1 settime()	162
9.3 azatrax::Azatrax Class Reference	162
9.3.1 Detailed Description	165
9.3.2 Member Enumeration Documentation	165
9.3.2.1 anonymous enum	165
9.3.2.2 commands	165
9.3.2.3 DeviceConnectionList	168
9.3.3 Constructor & Destructor Documentation	168
9.3.3.1 Azatrax()	168
9.3.3.2 ~Azatrax()	168
9.3.4 Member Function Documentation	168
9.3.4.1 AllConnectedDevices()	169
9.3.4.2 GetProductId()	169
9.3.4.3 GetStateData()	169
9.3.4.4 Identify_1()	169
9.3.4.5 IsThisTheAzatraxWeAreLookingFor()	170
9.3.4.6 MyProduct()	170
9.3.4.7 MyProductId()	170
9.3.4.8 NumberOfOpenDevices()	171
9.3.4.9 OpenDevice()	171
9.3.4.10 PacketCount()	171
9.3.4.11 ProductIdCode()	171
9.3.4.12 RestoreLEDFunction()	172
9.3.4.13 send2Bytes()	172
9.3.4.14 send3Bytes()	172
9.3.4.15 sendByte()	173
9.3.4.16 SerialNumber()	173
9.3.5 Friends And Related Function Documentation	174
9.3.5.1 MRD	174

9.3.5.2 SL2	174
9.3.5.3 SR4	174
9.3.6 Member Data Documentation	174
9.3.6.1 deviceOpenCount	174
9.3.6.2 handle	174
9.3.6.3 myProductId	175
9.3.6.4 mySerialNumber	175
9.3.6.5 stateDataPacket	175
9.4 Parsers::BezierBody Class Reference	175
9.4.1 Detailed Description	176
9.4.2 Constructor & Destructor Documentation	177
9.4.2.1 BezierBody()	177
9.4.3 Member Function Documentation	177
9.4.3.1 BezierEnds()	177
9.4.3.2 BezierSegmentCount()	177
9.4.3.3 CleanUpBezierBody()	178
9.4.3.4 CleanUpElement()	178
9.4.3.5 ConsBezierBody()	178
9.4.3.6 Element()	178
9.4.4 Friends And Related Function Documentation	178
9.4.4.1 BezierBodyElt	179
9.4.4.2 TrackGraph	179
9.4.5 Member Data Documentation	179
9.4.5.1 element	179
9.4.5.2 next	179
9.5 Parsers::BezierBodyElt Class Reference	179
9.5.1 Detailed Description	181
9.5.2 Member Enumeration Documentation	181
9.5.2.1 BezierBodyEltType	181
9.5.3 Constructor & Destructor Documentation	181
9.5.3.1 BezierBodyElt()	182
9.5.3.2 ~BezierBodyElt()	182
9.5.4 Member Function Documentation	182
9.5.4.1 GetCurveSegment()	182
9.5.4.2 GetStraightSegment()	182
9.5.4.3 InitTSegId()	183
9.5.4.4 MakeCurveSegment()	183
9.5.4.5 MakeStraightSegment()	183
9.5.4.6 MakeTrackEnd()	183

9.5.4.7 TheType()	184
9.5.5 Friends And Related Function Documentation	184
9.5.5.1 BezierBody	184
9.5.5.2 TrackGraph	184
9.5.6 Member Data Documentation	184
9.5.6.1 ang0	184
9.5.6.2 ang1	184
9.5.6.3 pos1	185
9.5.6.4 pos2	185
9.5.6.5 radius	185
9.5.6.6 segCount	185
9.5.6.7 segmentId	185
9.5.6.8 theEnd	186
9.5.6.9 theType	186
9.6 TTSupport::Cab Class Reference	186
9.6.1 Detailed Description	187
9.6.2 Constructor & Destructor Documentation	187
9.6.2.1 Cab() [1/2]	187
9.6.2.2 ~Cab()	187
9.6.2.3 Cab() [2/2]	188
9.6.3 Member Function Documentation	188
9.6.3.1 Color()	188
9.6.3.2 Name()	188
9.6.3.3 operator=()	188
9.6.3.4 Read()	189
9.6.3.5 Write()	189
9.6.4 Member Data Documentation	189
9.6.4.1 color	189
9.6.4.2 name	190
9.7 Instruments::CabSignalLamp Class Reference	190
9.7.1 Detailed Description	190
9.7.2 Constructor & Destructor Documentation	191
9.7.2.1 CabSignalLamp()	191
9.7.2.2 ~CabSignalLamp()	191
9.7.3 Member Function Documentation	192
9.7.3.1 _ConfigureFillColor()	192
9.7.3.2 _ConfigureOutlineColor()	192
9.7.3.3 _ConfigureSize()	192
9.7.3.4 _ConfigureXY()	193

9.7.4 Member Data Documentation	193
9.7.4.1 canvas	193
9.7.4.2 sx	193
9.7.4.3 sy	193
9.8 lcc::CanAlias Class Reference	194
9.8.1 Detailed Description	194
9.8.2 Constructor & Destructor Documentation	195
9.8.2.1 CanAlias()	195
9.8.3 Member Function Documentation	195
9.8.3.1 _peelid()	195
9.8.3.2 getMyAlias()	195
9.8.3.3 getMyNIDList()	196
9.8.3.4 getNextAlias()	196
9.8.3.5 validate()	196
9.8.4 Member Data Documentation	196
9.8.4.1 lfsr1	196
9.8.4.2 lfsr2	197
9.8.4.3 myalias	197
9.8.4.4 nidlist	197
9.9 lcc::CANGridConnect Class Reference	197
9.9.1 Detailed Description	199
9.9.2 Constructor & Destructor Documentation	199
9.9.2.1 CANGridConnect()	199
9.9.3 Member Function Documentation	200
9.9.3.1 _flags0()	200
9.9.3.2 _messageReader()	200
9.9.3.3 _reserveMyAlias()	201
9.9.3.4 _sendDatagram()	201
9.9.3.5 _sendmessage()	201
9.9.3.6 _timedout()	201
9.9.3.7 countNUL()	202
9.9.3.8 getAliasOfNID()	202
9.9.3.9 getAllAliases()	202
9.9.3.10 getAllNIDs()	203
9.9.3.11 getBits()	203
9.9.3.12 getNIDofAlias()	203
9.9.3.13 listeq() [1/2]	204
9.9.3.14 listeq() [2/2]	204
9.9.3.15 populateAliasMap()	205

9.9.3.16 reserveAlias()	205
9.9.3.17 sendMessage()	205
9.9.3.18 sendOpenLCBMessage()	205
9.9.3.19 setMessageHandler()	206
9.9.3.20 setSentMessageHandler()	206
9.9.3.21 updateAliasMap()	207
9.9.4 Member Data Documentation	207
9.9.4.1 _timeout	207
9.9.4.2 _timeoutFlag	207
9.9.4.3 aliasMap	207
9.9.4.4 canheader	208
9.9.4.5 datagrambuffers	208
9.9.4.6 gcmessage	208
9.9.4.7 gcreply	208
9.9.4.8 messagebuffers	208
9.9.4.9 messagehandler	208
9.9.4.10 mtidetail	209
9.9.4.11 mtiheader	209
9.9.4.12 mycanalias	209
9.9.4.13 nidMap	209
9.9.4.14 NIDPATTERN	209
9.9.4.15 parent	209
9.9.4.16 sentMessageHandler	210
9.9.4.17 simplenodeflags	210
9.10 Icc::CANGridConnectOverCANSocket Class Reference	210
9.10.1 Detailed Description	211
9.10.2 Constructor & Destructor Documentation	211
9.10.2.1 CANGridConnectOverCANSocket()	211
9.10.3 Member Function Documentation	212
9.10.3.1 _CancelOpenTransport()	212
9.10.3.2 _OpenTransport()	212
9.10.3.3 buildSocketnamenidDialog()	212
9.10.3.4 drawOptionsDialog()	212
9.10.3.5 requiredOpts()	213
9.10.4 Member Data Documentation	213
9.10.4.1 gccomponent	213
9.10.4.2 nidLEntry	214
9.10.4.3 socket	214
9.10.4.4 socketnameLEntry	214

9.10.4.5 socketnamenidDialog	214
9.11 Icc::CANGridConnectOverTcp Class Reference	214
9.11.1 Detailed Description	215
9.11.2 Constructor & Destructor Documentation	216
9.11.2.1 CANGridConnectOverTcp()	216
9.11.3 Member Function Documentation	216
9.11.3.1 _CancelOpenTransport()	216
9.11.3.2 _OpenTransport()	217
9.11.3.3 buildPortnidandhostDialog()	217
9.11.3.4 drawOptionsDialog()	217
9.11.3.5 requiredOpts()	218
9.11.4 Member Data Documentation	218
9.11.4.1 gccomponent	218
9.11.4.2 hostLEntry	218
9.11.4.3 nidLEntry	219
9.11.4.4 portLSpin	219
9.11.4.5 portnidandhostDialog	219
9.11.4.6 socket	219
9.12 Icc::CANGridConnectOverUSBSerial Class Reference	219
9.12.1 Detailed Description	220
9.12.2 Constructor & Destructor Documentation	221
9.12.2.1 CANGridConnectOverUSBSerial()	221
9.12.3 Member Function Documentation	221
9.12.3.1 _CancelOpenTransport()	221
9.12.3.2 _OpenTransport()	222
9.12.3.3 buildPortandnidDialog()	222
9.12.3.4 drawOptionsDialog()	222
9.12.3.5 findAvailableComPorts()	223
9.12.3.6 requiredOpts()	223
9.12.4 Member Data Documentation	223
9.12.4.1 gccomponent	223
9.12.4.2 nidLEntry	224
9.12.4.3 portandnidDialog	224
9.12.4.4 portLCombo	224
9.12.4.5 ttyfd	224
9.13 Icc::CANHeader Class Reference	224
9.13.1 Detailed Description	225
9.13.2 Constructor & Destructor Documentation	225
9.13.2.1 CANHeader()	225

9.13.3 Member Function Documentation	226
9.13.3.1 getHeader()	226
9.13.3.2 setHeader()	226
9.13.4 Member Data Documentation	226
9.13.4.1 OPENLCBFRAME_MASK	226
9.13.4.2 OPENLCBFRAME_SHIFT	227
9.13.4.3 RESERVED_SHIFT	227
9.13.4.4 SRCID_MASK	227
9.13.4.5 SRCID_SHIFT	227
9.13.4.6 VARIABLEFIELD_MASK	227
9.13.4.7 VARIABLEFIELD_SHIFT	227
9.14 lcc::CanMessage Class Reference	228
9.14.1 Detailed Description	229
9.14.2 Constructor & Destructor Documentation	230
9.14.2.1 CanMessage()	230
9.14.3 Member Function Documentation	231
9.14.3.1 copy()	231
9.14.3.2 equals()	231
9.14.3.3 getData()	231
9.14.3.4 getHeader()	232
9.14.3.5 hashCode()	232
9.14.3.6 replyExpected()	232
9.14.3.7 setData()	232
9.14.3.8 setHeader()	233
9.14.3.9 setNumDataElements()	233
9.14.3.10 toString()	233
9.14.3.11 validate()	234
9.14.4 Member Data Documentation	234
9.14.4.1 _header	234
9.15 lcc::CanTransport Class Reference	234
9.15.1 Detailed Description	235
9.15.2 Constructor & Destructor Documentation	235
9.15.2.1 CanTransport()	235
9.15.3 Member Function Documentation	235
9.15.3.1 _transportlayerconf()	236
9.15.4 Member Data Documentation	236
9.15.4.1 transport	236
9.16 FCFSupport::Car Class Reference	236
9.16.1 Detailed Description	240

9.16.2 Constructor & Destructor Documentation	240
9.16.2.1 Car() [1/3]	240
9.16.2.2 Car() [2/3]	240
9.16.2.3 Car() [3/3]	241
9.16.3 Member Function Documentation	242
9.16.3.1 Assignments()	242
9.16.3.2 CarOwner()	242
9.16.3.3 ClearAssignments()	242
9.16.3.4 ClearMovementsThisSession()	243
9.16.3.5 ClearTrips()	243
9.16.3.6 Destination()	243
9.16.3.7 Divisions()	243
9.16.3.8 EmptyP()	243
9.16.3.9 FixedRouteP()	244
9.16.3.10 IncrementAssignments()	244
9.16.3.11 IncrementTrips()	244
9.16.3.12 IncrmentMovementsThisSession()	244
9.16.3.13 IsDoneP()	244
9.16.3.14 LastTrain()	245
9.16.3.15 LdLmt()	245
9.16.3.16 Length()	245
9.16.3.17 Load()	245
9.16.3.18 LoadedP()	245
9.16.3.19 Location()	246
9.16.3.20 LtWt()	246
9.16.3.21 Marks()	246
9.16.3.22 MovementsThisSession()	246
9.16.3.23 Number()	246
9.16.3.24 OkToMirrorP()	247
9.16.3.25 operator=()	247
9.16.3.26 Peek()	247
9.16.3.27 Plate()	247
9.16.3.28 PrevTrain()	248
9.16.3.29 SetAssignments()	248
9.16.3.30 SetCarOwner()	248
9.16.3.31 SetDestination()	248
9.16.3.32 SetDivisions()	249
9.16.3.33 SetDone()	249
9.16.3.34 SetFixedRouteP()	249

9.16.3.35 SetLastTrain()	249
9.16.3.36 SetLdLmt()	250
9.16.3.37 SetLength()	250
9.16.3.38 SetLocation()	250
9.16.3.39 SetLtWt()	250
9.16.3.40 SetMarks()	251
9.16.3.41 SetNotDone()	251
9.16.3.42 SetNumber()	251
9.16.3.43 SetOkToMirrorP()	251
9.16.3.44 SetPeek()	252
9.16.3.45 SetPlate()	252
9.16.3.46 SetPrevTrain()	252
9.16.3.47 SetType()	252
9.16.3.48 SetWeightClass()	253
9.16.3.49 Trips()	253
9.16.3.50 Type()	253
9.16.3.51 UnLoad()	253
9.16.3.52 WeightClass()	253
9.16.4 Friends And Related Function Documentation	254
9.16.4.1 System	254
9.16.5 Member Data Documentation	254
9.16.5.1 assignments	254
9.16.5.2 destination	254
9.16.5.3 divisions	254
9.16.5.4 doneP	255
9.16.5.5 fixedP	255
9.16.5.6 lasttrain	255
9.16.5.7 ldLmt	255
9.16.5.8 length	255
9.16.5.9 loadedP	256
9.16.5.10 location	256
9.16.5.11 ltwt	256
9.16.5.12 marks	256
9.16.5.13 mirrorP	256
9.16.5.14 moves	257
9.16.5.15 number	257
9.16.5.16 owner	257
9.16.5.17 peek	257
9.16.5.18 plate	257

9.16.5.19 prevtrain	258
9.16.5.20 tmpStatus	258
9.16.5.21 trips	258
9.16.5.22 type	258
9.16.5.23 weightclass	258
9.17 FCFSupport::CarGroup Class Reference	259
9.17.1 Detailed Description	259
9.17.2 Member Enumeration Documentation	259
9.17.2.1 CarGroupConsts	259
9.17.3 Constructor & Destructor Documentation	260
9.17.3.1 CarGroup() [1/3]	260
9.17.3.2 CarGroup() [2/3]	260
9.17.3.3 CarGroup() [3/3]	260
9.17.4 Member Function Documentation	261
9.17.4.1 Description()	261
9.17.4.2 Group()	261
9.17.4.3 operator=()	261
9.17.5 Member Data Documentation	262
9.17.5.1 description	262
9.17.5.2 group	262
9.18 FCFSupport::CarType Class Reference	262
9.18.1 Detailed Description	263
9.18.2 Member Enumeration Documentation	264
9.18.2.1 CarTypeConsts	264
9.18.3 Constructor & Destructor Documentation	264
9.18.3.1 CarType() [1/3]	264
9.18.3.2 CarType() [2/3]	264
9.18.3.3 CarType() [3/3]	265
9.18.3.4 ~CarType()	265
9.18.4 Member Function Documentation	265
9.18.4.1 Comment()	265
9.18.4.2 Group()	266
9.18.4.3 operator=()	266
9.18.4.4 Type()	266
9.18.5 Friends And Related Function Documentation	266
9.18.5.1 System	266
9.18.6 Member Data Documentation	267
9.18.6.1 comment	267
9.18.6.2 group	267

9.18.6.3 type	267
9.19 FCFSupport::PDFFileStructures::CatalogDictionary Class Reference	267
9.19.1 Detailed Description	268
9.19.2 Constructor & Destructor Documentation	268
9.19.2.1 CatalogDictionary()	268
9.19.2.2 ~CatalogDictionary()	269
9.19.3 Member Function Documentation	269
9.19.3.1 AddPage()	269
9.19.3.2 AddPageLabelDictionary()	269
9.19.3.3 AddPageLabelTree()	270
9.19.3.4 AddPageTree()	270
9.19.3.5 WriteDictionaryElements()	270
9.19.4 Member Data Documentation	271
9.19.4.1 labels	271
9.19.4.2 pages	271
9.20 cmri::CMri Class Reference	271
9.20.1 Detailed Description	272
9.20.2 Constructor & Destructor Documentation	273
9.20.2.1 CMri()	273
9.20.2.2 ~CMri()	274
9.20.3 Member Function Documentation	274
9.20.3.1 _readbyte()	274
9.20.3.2 _readevent()	274
9.20.3.3 _transmit()	274
9.20.3.4 InitBoard()	275
9.20.3.5 Inputs()	275
9.20.3.6 Outputs()	276
9.20.4 Member Data Documentation	276
9.20.4.1 _timeout	276
9.20.4.2 AddressCode	277
9.20.4.3 CardType_Byte	277
9.20.4.4 DLE	277
9.20.4.5 ETX	277
9.20.4.6 Init	277
9.20.4.7 Poll	277
9.20.4.8 Read	278
9.20.4.9 STX	278
9.20.4.10 Transmit	278
9.20.4.11 ttyfd	278

9.21 CmriSupport::CmriNode Class Reference	278
9.21.1 Detailed Description	279
9.21.2 Constructor & Destructor Documentation	280
9.21.2.1 CmriNode()	280
9.21.3 Member Function Documentation	280
9.21.3.1 _ValidateAddress()	280
9.21.3.2 _ValidateByte()	281
9.21.3.3 _ValidateListOfBytes()	281
9.21.3.4 _ValidateSixElementListOfBytes()	281
9.21.3.5 _ValidateType()	282
9.21.3.6 _ValidateWord()	282
9.21.3.7 closeport()	282
9.21.3.8 inputs()	283
9.21.3.9 openport()	283
9.21.3.10 outputs()	283
9.21.3.11 portopenp()	283
9.21.3.12 setbitfield()	284
9.21.3.13 setport()	284
9.21.3.14 validate()	284
9.21.4 Member Data Documentation	284
9.21.4.1 _TypeCodes	285
9.21.4.2 outputbuffer	285
9.22 CTCPanel::CodeButton Class Reference	285
9.22.1 Detailed Description	285
9.22.2 Constructor & Destructor Documentation	286
9.22.2.1 CodeButton()	286
9.22.2.2 ~CodeButton()	286
9.22.3 Member Function Documentation	287
9.22.3.1 geti()	287
9.22.3.2 getv()	287
9.22.3.3 invoke()	287
9.22.3.4 seti()	287
9.22.3.5 setv()	288
9.22.4 Member Data Documentation	288
9.22.4.1 canvas	288
9.22.4.2 ctcpnl	288
9.23 xpressnet::CommandStationResponse Class Reference	288
9.23.1 Detailed Description	288
9.23.2 Constructor & Destructor Documentation	289

9.23.2.1 CommandStationResponse()	289
9.23.3 Member Function Documentation	289
9.23.3.1 ResponseType()	289
9.23.3.2 TimeStamp()	290
9.23.4 Member Data Documentation	290
9.23.4.1 _time_stamp	290
9.24 xpressnet::CommandStationStatus Class Reference	290
9.24.1 Detailed Description	291
9.24.2 Constructor & Destructor Documentation	291
9.24.2.1 CommandStationStatus()	291
9.24.3 Member Function Documentation	291
9.24.3.1 EmergencyOff()	292
9.24.3.2 EmergencyStop()	292
9.24.3.3 PoweringUp()	292
9.24.3.4 RAMCheckError()	292
9.24.3.5 ServiceMode()	292
9.24.3.6 StartMode()	292
9.24.4 Member Data Documentation	293
9.24.4.1 _emergency_off	293
9.24.4.2 _emergency_stop	293
9.24.4.3 _poweringup	293
9.24.4.4 _RAM_check_error	293
9.24.4.5 _service_mode	293
9.24.4.6 _start_mode	294
9.25 Parsers::TrackGraph::CompressedEdgeValues Struct Reference	294
9.25.1 Detailed Description	294
9.25.2 Constructor & Destructor Documentation	294
9.25.2.1 CompressedEdgeValues()	294
9.25.3 Member Data Documentation	294
9.25.3.1 length	295
9.26 Parsers::TrackGraph::CompressedNodeValues Struct Reference	295
9.26.1 Detailed Description	295
9.26.2 Constructor & Destructor Documentation	296
9.26.2.1 CompressedNodeValues()	296
9.26.3 Member Function Documentation	296
9.26.3.1 FindSegmentIndex()	296
9.26.4 Member Data Documentation	296
9.26.4.1 id	296
9.26.4.2 position	296

9.26.4.3 rawnode	297
9.26.4.4 segments	297
9.27 lcc::ConfigMemory Class Reference	297
9.27.1 Detailed Description	299
9.27.2 Constructor & Destructor Documentation	299
9.27.2.1 ConfigMemory()	299
9.27.3 Member Function Documentation	299
9.27.3.1 _Close()	300
9.27.3.2 _datagramhandler()	300
9.27.3.3 _Dump()	300
9.27.3.4 _dumpAsHex()	300
9.27.3.5 _dumpAsText()	301
9.27.3.6 _getAddressRange()	301
9.27.3.7 _messagehandler()	301
9.27.3.8 _Read()	302
9.27.3.9 _readmemory()	302
9.27.3.10 _Restore()	302
9.27.3.11 _Write()	303
9.27.3.12 _writememory()	303
9.27.3.13 putdebug()	303
9.27.4 Member Data Documentation	303
9.27.4.1 _datagramrejecterror	304
9.27.4.2 _ioComplete	304
9.27.4.3 _spaces	304
9.27.4.4 address	304
9.27.4.5 count	304
9.27.4.6 datagrambuffer	304
9.27.4.7 olddatagramhandler	305
9.27.4.8 oldgeneralmessagehandler	305
9.27.4.9 readlist	305
9.27.4.10 space	305
9.27.4.11 writelist	305
9.27.4.12 writeReplyCheck	305
9.28 lcc::ConfigOptions Class Reference	306
9.28.1 Detailed Description	306
9.28.2 Constructor & Destructor Documentation	307
9.28.2.1 ConfigOptions()	307
9.28.3 Member Function Documentation	307
9.28.3.1 _Close()	307

9.28.3.2 putdebug()	307
9.28.4 Member Data Documentation	308
9.28.4.1 available	308
9.28.4.2 highest	308
9.28.4.3 lowest	308
9.28.4.4 name	308
9.28.4.5 nodeid	309
9.28.4.6 writelengths	309
9.29 lcc::ConfigurationEditor Class Reference	309
9.29.1 Detailed Description	312
9.29.2 Constructor & Destructor Documentation	313
9.29.2.1 ConfigurationEditor()	313
9.29.3 Member Function Documentation	314
9.29.3.1 _actionWrite()	314
9.29.3.2 _close()	315
9.29.3.3 _datagramhandler()	315
9.29.3.4 _eventidComboRead()	315
9.29.3.5 _eventidComboWrite()	316
9.29.3.6 _eventidEntryRead()	316
9.29.3.7 _eventidEntryWrite()	317
9.29.3.8 _intCBRead()	317
9.29.3.9 _intCBWrite()	317
9.29.3.10 _intComboRead()	318
9.29.3.11 _intComboWrite()	318
9.29.3.12 _intRBRead()	319
9.29.3.13 _intRBWrite()	319
9.29.3.14 _intScaleRead()	320
9.29.3.15 _intScaleWrite()	320
9.29.3.16 _intSpinRead()	321
9.29.3.17 _intSpinWrite()	321
9.29.3.18 _printexport()	322
9.29.3.19 _printexport_csv()	322
9.29.3.20 _printexport_csv_frame()	323
9.29.3.21 _printexport_csv_frameAcross()	323
9.29.3.22 _printexport_csv_framesAcross()	323
9.29.3.23 _printexport_csv_vframe()	324
9.29.3.24 _printexport_csv_vframeAcross()	324
9.29.3.25 _printexport_pdf()	325
9.29.3.26 _printexport_pdf_frame()	325

9.29.3.27 _printexport_pdf_newpage()	325
9.29.3.28 _printexport_pdf_vframe()	326
9.29.3.29 _printexport_txt()	326
9.29.3.30 _printexport_txt_frame()	327
9.29.3.31 _printexport_txt_vframe()	327
9.29.3.32 _printexport_xml()	328
9.29.3.33 _printexport_xml_frame()	328
9.29.3.34 _printexport_xml_vframe()	329
9.29.3.35 _processXMLnode()	329
9.29.3.36 _readall()	329
9.29.3.37 _readmemory()	330
9.29.3.38 _stringComboRead()	330
9.29.3.39 _stringComboWrite()	331
9.29.3.40 _stringEntryRead()	331
9.29.3.41 _stringEntryWrite()	332
9.29.3.42 _writememory()	332
9.29.3.43 putdebug()	332
9.29.4 Member Data Documentation	333
9.29.4.1 _datagramrejecterror	333
9.29.4.2 _eventidnumber	333
9.29.4.3 _groupnumber	333
9.29.4.4 _intnumber	333
9.29.4.5 _ioComplete	334
9.29.4.6 _menu	334
9.29.4.7 _mkbuttons	334
9.29.4.8 _readall	334
9.29.4.9 _segmentnumber	334
9.29.4.10 _stringnumber	334
9.29.4.11 buttons	335
9.29.4.12 cdi	335
9.29.4.13 datagrambuffer	335
9.29.4.14 editframe	335
9.29.4.15 idheaders	335
9.29.4.16 main	335
9.29.4.17 olddatagramhandler	336
9.29.4.18 printexportfiletypes	336
9.29.4.19 scroll	336
9.29.4.20 statusline	336
9.29.4.21 writeReplyCheck	336

9.30 Parsers::CornuBody Class Reference	336
9.30.1 Detailed Description	337
9.30.2 Constructor & Destructor Documentation	338
9.30.2.1 CornuBody()	338
9.30.3 Member Function Documentation	338
9.30.3.1 CleanUpCornuBody()	338
9.30.3.2 CleanUpElement()	338
9.30.3.3 ConcatCornuBody()	339
9.30.3.4 ConsCornuBody()	339
9.30.3.5 CornuEnds()	339
9.30.3.6 CornuSegmentCount()	339
9.30.3.7 Element()	340
9.30.4 Friends And Related Function Documentation	340
9.30.4.1 CornuBodyElt	340
9.30.4.2 TrackGraph	340
9.30.5 Member Data Documentation	340
9.30.5.1 element	340
9.30.5.2 next	340
9.31 Parsers::CornuBodyElt Class Reference	341
9.31.1 Detailed Description	342
9.31.2 Member Enumeration Documentation	342
9.31.2.1 CornuBodyEltType	342
9.31.3 Constructor & Destructor Documentation	343
9.31.3.1 CornuBodyElt()	343
9.31.3.2 ~CornuBodyElt()	343
9.31.4 Member Function Documentation	343
9.31.4.1 GetCurveSegment()	343
9.31.4.2 GetStraightSegment()	344
9.31.4.3 InitTSegId()	344
9.31.4.4 MakeCurveSegment()	344
9.31.4.5 MakeStraightSegment()	344
9.31.4.6 MakeTrackEnd()	345
9.31.4.7 TheType()	345
9.31.5 Friends And Related Function Documentation	345
9.31.5.1 CornuBody	345
9.31.5.2 TrackGraph	345
9.31.6 Member Data Documentation	345
9.31.6.1 ang0	345
9.31.6.2 ang1	346

9.31.6.3 pos1	346
9.31.6.4 pos2	346
9.31.6.5 radius	346
9.31.6.6 segCount	346
9.31.6.7 segmentId	347
9.31.6.8 theEnd	347
9.31.6.9 theType	347
9.32 CTCPanel::Crossing Class Reference	347
9.32.1 Detailed Description	348
9.32.2 Constructor & Destructor Documentation	349
9.32.2.1 Crossing()	349
9.32.2.2 ~Crossing()	349
9.32.3 Member Function Documentation	349
9.32.3.1 _configureLabel()	349
9.32.3.2 _VerifyCrossingType()	350
9.32.3.3 geti()	350
9.32.3.4 getv()	350
9.32.3.5 invoke()	350
9.32.3.6 seti()	350
9.32.3.7 setv()	350
9.32.4 Member Data Documentation	351
9.32.4.1 canvas	351
9.32.4.2 ctcpnl	351
9.33 CTCPanel::Crossover Class Reference	351
9.33.1 Detailed Description	352
9.33.2 Constructor & Destructor Documentation	353
9.33.2.1 Crossover()	353
9.33.2.2 ~Crossover()	353
9.33.3 Member Function Documentation	354
9.33.3.1 _configureLabel()	354
9.33.3.2 geti()	354
9.33.3.3 getv()	354
9.33.3.4 invoke()	354
9.33.3.5 seti()	354
9.33.3.6 setv()	354
9.33.4 Member Data Documentation	355
9.33.4.1 canvas	355
9.33.4.2 ctcpnl	355
9.33.4.3 state	355

9.34 FCFSupport::PDFFileStructures::CrossReferenceTable Class Reference	355
9.34.1 Detailed Description	356
9.34.2 Member Typedef Documentation	357
9.34.2.1 objectMap	357
9.34.3 Constructor & Destructor Documentation	357
9.34.3.1 CrossReferenceTable()	357
9.34.3.2 ~CrossReferenceTable()	357
9.34.4 Member Function Documentation	357
9.34.4.1 AddIndirectObjectToTable()	357
9.34.4.2 FreeObject()	358
9.34.4.3 HighestObjectNumber()	358
9.34.4.4 WriteTable()	358
9.34.5 Friends And Related Function Documentation	359
9.34.5.1 IndirectObject	359
9.34.6 Member Data Documentation	359
9.34.6.1 lastObjectNumber	359
9.34.6.2 objectTable	359
9.35 CTCPanel::CTCLabel Class Reference	359
9.35.1 Detailed Description	360
9.35.2 Constructor & Destructor Documentation	361
9.35.2.1 CTCLabel()	361
9.35.2.2 ~CTCLabel()	361
9.35.3 Member Function Documentation	361
9.35.3.1 _configureColor()	361
9.35.3.2 _configureLabel()	362
9.35.3.3 geti()	362
9.35.3.4 getv()	362
9.35.3.5 invoke()	362
9.35.3.6 seti()	362
9.35.3.7 setv()	363
9.35.4 Member Data Documentation	363
9.35.4.1 canvas	363
9.35.4.2 ctcpnl	363
9.36 CTCPanel::CTCPanel Class Reference	363
9.36.1 Detailed Description	366
9.36.2 Constructor & Destructor Documentation	367
9.36.2.1 CTCPanel()	367
9.36.3 Member Function Documentation	367
9.36.3.1 _crosshairEnd()	367

9.36.3.2 _crosshairMove()	368
9.36.3.3 _crosshairStart()	368
9.36.3.4 _CtcMainHScroll2()	369
9.36.3.5 _CtcMainSyncX()	369
9.36.3.6 _PosInteger()	370
9.36.3.7 bind()	370
9.36.3.8 checkInitCP()	370
9.36.3.9 controls_crosshair()	371
9.36.3.10 coords()	371
9.36.3.11 cplist()	371
9.36.3.12 create_CodeButton()	372
9.36.3.13 create_Crossing()	372
9.36.3.14 create_Crossover()	372
9.36.3.15 create_CTCLabel()	373
9.36.3.16 create_CurvedBlock()	373
9.36.3.17 create_DoubleSlip()	373
9.36.3.18 create_EndBumper()	374
9.36.3.19 create_HiddenBlock()	374
9.36.3.20 create_Lamp()	374
9.36.3.21 create_PushButton()	375
9.36.3.22 create_SchLabel()	375
9.36.3.23 create_ScissorCrossover()	375
9.36.3.24 create_Signal()	376
9.36.3.25 create_SIGPlate()	376
9.36.3.26 create_SingleSlip()	376
9.36.3.27 create_StraightBlock()	377
9.36.3.28 create_StubYard()	377
9.36.3.29 create_Switch()	377
9.36.3.30 create_SWPlate()	378
9.36.3.31 create_ThreeWaySW()	378
9.36.3.32 create_ThroughYard()	378
9.36.3.33 create_Toggle()	379
9.36.3.34 delete()	379
9.36.3.35 exists()	379
9.36.3.36 geti()	380
9.36.3.37 getv()	380
9.36.3.38 getZoom()	380
9.36.3.39 invoke()	380
9.36.3.40 itemcget()	381

9.36.3.41 itemconfigure()	381
9.36.3.42 lappendCP()	381
9.36.3.43 lremoveCP()	382
9.36.3.44 move()	382
9.36.3.45 objectlist()	383
9.36.3.46 print()	383
9.36.3.47 schematic_crosshair()	383
9.36.3.48 seti()	384
9.36.3.49 setv()	384
9.36.3.50 setZoom()	384
9.36.3.51 updateAndSyncCP()	385
9.36.3.52 updateSR()	385
9.36.3.53 zoomBy()	385
9.36.4 Member Data Documentation	386
9.36.4.1 _ch_oldfocus	386
9.36.4.2 _ch_oldgrab	386
9.36.4.3 controls	386
9.36.4.4 controlsYscroll	386
9.36.4.5 CPData	387
9.36.4.6 CPList	387
9.36.4.7 Objects	387
9.36.4.8 scale	387
9.36.4.9 schematic	387
9.36.4.10 schematicYscroll	387
9.36.4.11 xscroll	388
9.37 ctiacela::CTIAcela Class Reference	388
9.37.1 Detailed Description	390
9.38 CTCPanel::CurvedBlock Class Reference	391
9.38.1 Detailed Description	392
9.38.2 Constructor & Destructor Documentation	393
9.38.2.1 CurvedBlock()	393
9.38.2.2 ~CurvedBlock()	393
9.38.3 Member Function Documentation	393
9.38.3.1 _configureLabel()	393
9.38.3.2 _RadiansToDegrees()	394
9.38.3.3 _square()	394
9.38.3.4 geti()	394
9.38.3.5 invoke()	394
9.38.3.6 seti()	394

9.38.3.7 setv()	394
9.38.4 Member Data Documentation	395
9.38.4.1 _PI	395
9.38.4.2 canvas	395
9.38.4.3 ctcpnl	395
9.39 Instruments::DialInstrument Class Reference	395
9.39.1 Detailed Description	396
9.39.2 Constructor & Destructor Documentation	397
9.39.2.1 DialInstrument()	398
9.39.2.2 ~DialInstrument()	398
9.39.3 Member Function Documentation	398
9.39.3.1 setvalue()	398
9.39.4 Member Data Documentation	398
9.39.4.1 dTextX	399
9.39.4.2 dTextY	399
9.39.4.3 ValueRange	399
9.40 FCFSupport::PDFFileStructures::Dictionary Class Reference	399
9.40.1 Detailed Description	400
9.40.2 Constructor & Destructor Documentation	400
9.40.2.1 Dictionary()	400
9.40.2.2 ~Dictionary()	400
9.40.3 Member Function Documentation	401
9.40.3.1 WriteDictionaryElements()	401
9.40.3.2 WriteDirect()	401
9.41 Instruments::DigitalClock Class Reference	401
9.41.1 Detailed Description	402
9.41.2 Constructor & Destructor Documentation	402
9.41.2.1 DigitalClock()	403
9.41.2.2 ~DigitalClock()	403
9.41.3 Member Function Documentation	403
9.41.3.1 settime()	403
9.42 Instruments::DigitalInstrument Class Reference	403
9.42.1 Detailed Description	404
9.42.2 Constructor & Destructor Documentation	405
9.42.2.1 DigitalInstrument()	405
9.42.2.2 ~DigitalInstrument()	405
9.42.3 Member Function Documentation	405
9.42.3.1 setvalue()	405
9.43 FCFSupport::Division Class Reference	406

9.43.1 Detailed Description	407
9.43.2 Constructor & Destructor Documentation	407
9.43.2.1 Division() [1/3]	407
9.43.2.2 Division() [2/3]	407
9.43.2.3 Division() [3/3]	408
9.43.2.4 ~Division()	408
9.43.3 Member Function Documentation	408
9.43.3.1 AppendStation()	408
9.43.3.2 Area()	409
9.43.3.3 Home()	409
9.43.3.4 Name()	409
9.43.3.5 NumberOfStations()	409
9.43.3.6 operator=()	409
9.43.3.7 Symbol()	410
9.43.3.8 TheStation()	410
9.43.4 Friends And Related Function Documentation	410
9.43.4.1 System	410
9.43.5 Member Data Documentation	410
9.43.5.1 area	411
9.43.5.2 home	411
9.43.5.3 name	411
9.43.5.4 stations	411
9.43.5.5 symbol	411
9.44 xpressnet::DoubleHeaderInformation Class Reference	412
9.44.1 Detailed Description	413
9.44.2 Constructor & Destructor Documentation	413
9.44.2.1 DoubleHeaderInformation()	413
9.44.3 Member Function Documentation	414
9.44.3.1 Address()	414
9.44.3.2 Address2()	415
9.44.3.3 Available()	415
9.44.3.4 Direction()	415
9.44.3.5 Function()	415
9.44.3.6 Speed()	415
9.44.3.7 SpeedStepMode()	416
9.44.4 Member Data Documentation	416
9.44.4.1 _address	416
9.44.4.2 _address2	416
9.44.4.3 _available	416

9.44.4.4	_direction	416
9.44.4.5	_function0	417
9.44.4.6	_function1	417
9.44.4.7	_function10	417
9.44.4.8	_function11	417
9.44.4.9	_function12	417
9.44.4.10	_function2	417
9.44.4.11	_function3	418
9.44.4.12	_function4	418
9.44.4.13	_function5	418
9.44.4.14	_function6	418
9.44.4.15	_function7	418
9.44.4.16	_function8	418
9.44.4.17	_function9	419
9.44.4.18	_speed	419
9.44.4.19	_speedstep	419
9.45	xpressnet::DoubleHeaderMuError Class Reference	419
9.45.1	Detailed Description	419
9.45.2	Constructor & Destructor Documentation	420
9.45.2.1	DoubleHeaderMuError()	420
9.45.3	Member Function Documentation	420
9.45.3.1	Error()	420
9.45.4	Member Data Documentation	420
9.45.4.1	_error	420
9.46	CTCPanel::DoubleSlip Class Reference	420
9.46.1	Detailed Description	421
9.46.2	Constructor & Destructor Documentation	422
9.46.2.1	DoubleSlip()	422
9.46.2.2	~DoubleSlip()	423
9.46.3	Member Function Documentation	423
9.46.3.1	_configureLabel()	423
9.46.3.2	geti()	423
9.46.3.3	getv()	423
9.46.3.4	invoke()	424
9.46.3.5	seti()	424
9.46.3.6	setv()	424
9.46.4	Member Data Documentation	424
9.46.4.1	canvas	424
9.46.4.2	ctcpanel	425

9.46.4.3 state	425
9.47 Parsers::TrackGraph::EdgeValues Struct Reference	425
9.47.1 Detailed Description	425
9.47.2 Constructor & Destructor Documentation	426
9.47.2.1 EdgeValues()	426
9.47.3 Member Data Documentation	426
9.47.3.1 a	426
9.47.3.2 index	426
9.47.3.3 length	427
9.47.3.4 x	427
9.47.3.5 y	427
9.48 CTCPanel::EndBumper Class Reference	427
9.48.1 Detailed Description	428
9.48.2 Constructor & Destructor Documentation	429
9.48.2.1 EndBumper()	429
9.48.2.2 ~EndBumper()	429
9.48.3 Member Function Documentation	429
9.48.3.1 _configureLabel()	429
9.48.3.2 geti()	430
9.48.3.3 invoke()	430
9.48.3.4 seti()	430
9.48.3.5 setv()	430
9.48.4 Member Data Documentation	430
9.48.4.1 canvas	431
9.48.4.2 ctcpnl	431
9.49 TTSupport::eqstr Struct Reference	431
9.49.1 Member Function Documentation	431
9.49.1.1 operator>()	431
9.50 Icc::EventID Class Reference	431
9.50.1 Detailed Description	432
9.50.2 Constructor & Destructor Documentation	432
9.50.2.1 EventID()	432
9.50.3 Member Function Documentation	433
9.50.3.1 _getEventID()	433
9.50.3.2 _setEventID()	433
9.50.3.3 validate()	434
9.50.4 Member Data Documentation	434
9.50.4.1 _eventID	434
9.50.4.2 EVENTIDFMT	434

9.51 Icc::EventID_or_null Class Reference	435
9.51.1 Detailed Description	435
9.51.2 Member Function Documentation	435
9.51.2.1 validate()	435
9.52 Icc::EventLog Class Reference	435
9.52.1 Detailed Description	436
9.52.2 Constructor & Destructor Documentation	436
9.52.2.1 EventLog()	436
9.52.3 Member Function Documentation	437
9.52.3.1 _clear()	437
9.52.3.2 _close()	437
9.52.3.3 _sendtheevent()	437
9.52.3.4 eventReceived()	437
9.52.3.5 open()	438
9.52.4 Member Data Documentation	438
9.52.4.1 logscroll	438
9.52.4.2 logtext	438
9.52.4.3 sendevent	438
9.53 Icc::EventReceived Class Reference	438
9.53.1 Detailed Description	439
9.53.2 Constructor & Destructor Documentation	439
9.53.2.1 EventReceived()	439
9.53.3 Member Function Documentation	440
9.53.3.1 _Close()	440
9.53.4 Member Data Documentation	440
9.53.4.1 eventid	440
9.54 FCFSupport::PDFFileStructures::FontDictionary Class Reference	440
9.54.1 Detailed Description	441
9.54.2 Constructor & Destructor Documentation	441
9.54.2.1 FontDictionary()	441
9.54.2.2 ~FontDictionary()	442
9.54.3 Member Function Documentation	442
9.54.3.1 WriteDictionaryElements()	442
9.54.3.2 WriteFontType()	443
9.54.4 Member Data Documentation	443
9.54.4.1 subType	443
9.55 FCFSupport::PDFFileStructures::FreedObject Class Reference	443
9.55.1 Detailed Description	444
9.55.2 Constructor & Destructor Documentation	444

9.55.2.1 FreedObject()	444
9.55.2.2 ~FreedObject()	444
9.55.3 Member Function Documentation	445
9.55.3.1 WriteDirect()	445
9.56 xpressnet::FunctionStatus Class Reference	445
9.56.1 Detailed Description	446
9.56.2 Constructor & Destructor Documentation	446
9.56.2.1 FunctionStatus()	446
9.56.3 Member Function Documentation	447
9.56.3.1 Status()	447
9.56.4 Member Data Documentation	447
9.56.4.1 _status0	447
9.56.4.2 _status1	448
9.56.4.3 _status10	448
9.56.4.4 _status11	448
9.56.4.5 _status12	448
9.56.4.6 _status2	448
9.56.4.7 _status3	448
9.56.4.8 _status4	449
9.56.4.9 _status5	449
9.56.4.10 _status6	449
9.56.4.11 _status7	449
9.56.4.12 _status8	449
9.56.4.13 _status9	449
9.57 linuxgpio::GpioInputActiveHigh Class Reference	450
9.57.1 Detailed Description	450
9.57.2 Constructor & Destructor Documentation	450
9.57.2.1 GpioInputActiveHigh()	451
9.57.2.2 ~GpioInputActiveHigh()	451
9.57.3 Member Data Documentation	451
9.57.3.1 basepin	451
9.58 linuxgpio::GpioInputActiveLow Class Reference	452
9.58.1 Detailed Description	452
9.58.2 Constructor & Destructor Documentation	452
9.58.2.1 GpioInputActiveLow()	453
9.58.2.2 ~GpioInputActiveLow()	453
9.58.3 Member Function Documentation	453
9.58.3.1 Get()	453
9.58.4 Member Data Documentation	454

9.58.4.1 basepin	454
9.59 linuxgpio::GpioOutputSafeHigh Class Reference	454
9.59.1 Detailed Description	454
9.59.2 Constructor & Destructor Documentation	455
9.59.2.1 GpioOutputSafeHigh()	455
9.59.2.2 ~GpioOutputSafeHigh()	455
9.59.3 Member Data Documentation	455
9.59.3.1 basepin	456
9.60 linuxgpio::GpioOutputSafeHighInvert Class Reference	456
9.60.1 Detailed Description	456
9.60.2 Constructor & Destructor Documentation	457
9.60.2.1 GpioOutputSafeHighInvert()	457
9.60.2.2 ~GpioOutputSafeHighInvert()	457
9.60.3 Member Function Documentation	457
9.60.3.1 Clr()	458
9.60.3.2 Get()	458
9.60.3.3 Set()	458
9.60.4 Member Data Documentation	458
9.60.4.1 basepin	458
9.61 linuxgpio::GpioOutputSafeLow Class Reference	458
9.61.1 Detailed Description	459
9.61.2 Constructor & Destructor Documentation	459
9.61.2.1 GpioOutputSafeLow()	459
9.61.2.2 ~GpioOutputSafeLow()	460
9.61.3 Member Data Documentation	460
9.61.3.1 basepin	460
9.62 linuxgpio::GpioOutputSafeLowInverted Class Reference	460
9.62.1 Detailed Description	461
9.62.2 Constructor & Destructor Documentation	461
9.62.2.1 GpioOutputSafeLowInverted()	462
9.62.2.2 ~GpioOutputSafeLowInverted()	462
9.62.3 Member Function Documentation	462
9.62.3.1 Clr()	462
9.62.3.2 Get()	463
9.62.3.3 Set()	463
9.62.4 Member Data Documentation	463
9.62.4.1 basepin	463
9.63 lcc::GridConnectMessage Class Reference	463
9.63.1 Detailed Description	464

9.63.2 Constructor & Destructor Documentation	465
9.63.2.1 GridConnectMessage()	465
9.63.3 Member Function Documentation	466
9.63.3.1 _copyCM()	466
9.63.3.2 _get_extended()	466
9.63.3.3 _get_rtr()	467
9.63.3.4 _set_extended()	467
9.63.3.5 _set_rtr()	467
9.63.3.6 setByte()	468
9.63.3.7 setHeader()	468
9.63.3.8 setHexDigit()	469
9.64 lcc::GridConnectReply Class Reference	469
9.64.1 Detailed Description	470
9.64.2 Constructor & Destructor Documentation	472
9.64.2.1 GridConnectReply()	472
9.64.3 Member Function Documentation	472
9.64.3.1 _copyGCM()	472
9.64.3.2 _get_extended()	473
9.64.3.3 _get_rtr()	473
9.64.3.4 basicFormatCheck()	473
9.64.3.5 createReply()	474
9.64.3.6 getByte()	474
9.64.3.7 getHeader()	474
9.64.3.8 getHexDigit()	475
9.64.3.9 getNumBytes()	475
9.64.3.10 maxSize()	475
9.64.3.11 setData()	475
9.64.3.12 setElement()	476
9.64.4 Member Data Documentation	476
9.64.4.1 _RTRoffset	476
9.64.4.2 MAXLEN	476
9.65 TTSupport::hash Struct Reference	476
9.65.1 Detailed Description	477
9.65.2 Member Function Documentation	477
9.65.2.1 operator>()	477
9.66 CTCPanel::HiddenBlock Class Reference	477
9.66.1 Detailed Description	478
9.66.2 Constructor & Destructor Documentation	479
9.66.2.1 HiddenBlock()	479

9.66.2.2 ~HiddenBlock()	479
9.66.3 Member Function Documentation	479
9.66.3.1 _configureLabel()	479
9.66.3.2 geti()	480
9.66.3.3 getv()	480
9.66.3.4 invoke()	480
9.66.3.5 seti()	480
9.66.3.6 setv()	480
9.66.4 Member Data Documentation	481
9.66.4.1 canvas	481
9.66.4.2 ctcpnl	481
9.67 HTMLHelp::HTMLHelp Class Reference	481
9.67.1 Detailed Description	486
9.67.2 Constructor & Destructor Documentation	486
9.67.2.1 HTMLHelp()	486
9.67.3 Member Function Documentation	487
9.67.3.1 _Close()	487
9.67.3.2 _SBackward()	487
9.67.3.3 _SForward()	487
9.67.3.4 a()	487
9.67.3.5 back()	488
9.67.3.6 backcurrenttopic()	488
9.67.3.7 color()	488
9.67.3.8 findtopicintoc()	488
9.67.3.9 font()	488
9.67.3.10 form()	489
9.67.3.11 forward()	489
9.67.3.12 forwardcurrenttopic()	489
9.67.3.13 get_html()	489
9.67.3.14 GetInstance()	489
9.67.3.15 help()	489
9.67.3.16 helpTopic()	490
9.67.3.17 HMapend_css()	490
9.67.3.18 HMcgiDecode()	490
9.67.3.19 HMcgiMap()	490
9.67.3.20 HMcheck_tocRelative()	491
9.67.3.21 HMcurrent_tags()	491
9.67.3.22 HMdo_map()	491
9.67.3.23 HMextract_param()	491

9.67.3.24 HGot_image()	491
9.67.3.25 Hgoto()	492
9.67.3.26 HInit_state()	492
9.67.3.27 HInit_win()	492
9.67.3.28 HInput_checkbox()	492
9.67.3.29 HInput_hidden()	492
9.67.3.30 HInput_image()	493
9.67.3.31 HInput_password()	493
9.67.3.32 HInput_radio()	493
9.67.3.33 HInput_reset()	493
9.67.3.34 HInput_submit()	493
9.67.3.35 HInput_text()	494
9.67.3.36 Hlink_callback()	494
9.67.3.37 Hlink_hit()	494
9.67.3.38 Hlink_setup()	494
9.67.3.39 Hload_css()	495
9.67.3.40 Hmap_esc()	495
9.67.3.41 Hmap_reply()	495
9.67.3.42 Hoptimize()	495
9.67.3.43 Hparse_html()	495
9.67.3.44 Hrender()	496
9.67.3.45 Hreset_win()	496
9.67.3.46 Hset_font()	496
9.67.3.47 Hset_image()	496
9.67.3.48 Hset_indent()	497
9.67.3.49 Hset_state()	497
9.67.3.50 Hstack()	497
9.67.3.51 hmstart()	497
9.67.3.52 Hsubmit_button()	498
9.67.3.53 Hsubmit_form()	498
9.67.3.54 Hsubmit_index()	498
9.67.3.55 Htag_a()	499
9.67.3.56 Htag_color()	499
9.67.3.57 Htag_dt()	499
9.67.3.58 Htag_font() [1/2]	499
9.67.3.59 Htag_font() [2/2]	500
9.67.3.60 Htag_form()	500
9.67.3.61 Htag_hmstart()	500
9.67.3.62 Htag_hr()	500

9.67.3.63 HMTag_img()	501
9.67.3.64 HMTag_input()	501
9.67.3.65 HMTag_isindex()	501
9.67.3.66 HMTag_li()	502
9.67.3.67 HMTag_link()	502
9.67.3.68 HMTag_menu()	502
9.67.3.69 HMTag_ol()	502
9.67.3.70 HMTag_option()	502
9.67.3.71 HMTag_select()	503
9.67.3.72 HMTag_textarea()	503
9.67.3.73 HMTag_title()	503
9.67.3.74 HMTag_ul()	503
9.67.3.75 HMtest_parse()	504
9.67.3.76 HMwent_to()	504
9.67.3.77 HMwin_install()	504
9.67.3.78 HMx_font()	504
9.67.3.79 HMzap_white()	505
9.67.3.80 menu()	505
9.67.3.81 nextlink()	505
9.67.3.82 prevlink()	505
9.67.3.83 pushcurrenttopic()	505
9.67.3.84 render()	506
9.67.3.85 searchbackward()	506
9.67.3.86 searchforward()	506
9.67.3.87 select()	506
9.67.3.88 setDefaults()	506
9.67.4 Member Data Documentation	507
9.67.4.1 _WidgetMap	507
9.67.4.2 command	507
9.67.4.3 curtopicindex	507
9.67.4.4 defaultHelpDirectory	507
9.67.4.5 defaultHelpWindow	508
9.67.4.6 defaultTableOfContents	508
9.67.4.7 Fonts	508
9.67.4.8 helptext	508
9.67.4.9 helptext_css	508
9.67.4.10 HMalphanumeric	508
9.67.4.11 HMesc_map	509
9.67.4.12 HMevents	509

9.67.4.13 HMform_map	509
9.67.4.14 HMinert_map	509
9.67.4.15 HMList_elements	509
9.67.4.16 HMparam_map	509
9.67.4.17 HMtag_map	509
9.67.4.18 lastsearch	510
9.67.4.19 panes	510
9.67.4.20 status	510
9.67.4.21 textscroll	510
9.67.4.22 toc	510
9.67.4.23 toc_css	511
9.67.4.24 tocscroll	511
9.67.4.25 topicstack	511
9.67.4.26 Url	511
9.68 FCFSupport::PDFFileStructures::IndirectFloatVector Class Reference	511
9.68.1 Detailed Description	512
9.68.2 Constructor & Destructor Documentation	512
9.68.2.1 IndirectFloatVector()	512
9.68.2.2 ~IndirectFloatVector()	512
9.68.3 Member Function Documentation	513
9.68.3.1 WriteDirect()	513
9.69 FCFSupport::PDFFileStructures::IndirectObject Class Reference	513
9.69.1 Detailed Description	514
9.69.2 Constructor & Destructor Documentation	514
9.69.2.1 IndirectObject()	515
9.69.2.2 ~IndirectObject()	515
9.69.3 Member Function Documentation	515
9.69.3.1 FileOffset()	515
9.69.3.2 GenerationNumber()	516
9.69.3.3 HasOffset()	516
9.69.3.4 IncrementGenerationNumber()	516
9.69.3.5 ObjectNumber()	516
9.69.3.6 SetObjectNumber()	516
9.69.3.7 WriteDirect()	517
9.69.3.8 WriteIndirectReference()	517
9.69.3.9 WriteObjectToFile()	518
9.69.4 Friends And Related Function Documentation	518
9.69.4.1 CrossReferenceTable	518
9.69.5 Member Data Documentation	518

9.69.5.1 fileOffset	518
9.69.5.2 generationNumber	519
9.69.5.3 objectNumber	519
9.69.5.4 table	519
9.70 FCFSupport::PDFFileStructures::IndirectObjectDictionary Class Reference	519
9.70.1 Detailed Description	520
9.70.2 Constructor & Destructor Documentation	520
9.70.2.1 IndirectObjectDictionary()	520
9.70.2.2 ~IndirectObjectDictionary()	521
9.70.3 Member Function Documentation	521
9.70.3.1 AddIndirectObject()	521
9.70.3.2 Size()	521
9.70.3.3 WriteDictionaryElements()	522
9.70.4 Member Data Documentation	522
9.70.4.1 elements	522
9.71 FCFSupport::Industry Class Reference	522
9.71.1 Detailed Description	525
9.71.2 Constructor & Destructor Documentation	525
9.71.2.1 Industry() [1/3]	525
9.71.2.2 Industry() [2/3]	525
9.71.2.3 Industry() [3/3]	526
9.71.3 Member Function Documentation	527
9.71.3.1 AssignLen()	527
9.71.3.2 CarsLen()	527
9.71.3.3 CarsNum()	527
9.71.3.4 DivisionControlList()	527
9.71.3.5 EmptiesAccepted()	528
9.71.3.6 Hazard()	528
9.71.3.7 IncrementStatsLen()	528
9.71.3.8 LoadsAccepted()	528
9.71.3.9 MaxCarLen()	528
9.71.3.10 MaxPlate()	529
9.71.3.11 MaxWeightClass()	529
9.71.3.12 MyMirror()	529
9.71.3.13 MyStation()	529
9.71.3.14 Name()	529
9.71.3.15 NumberOfCars()	530
9.71.3.16 operator=()	530
9.71.3.17 Priority()	530

9.71.3.18 Reload()	530
9.71.3.19 StatsLen()	531
9.71.3.20 TheCar()	531
9.71.3.21 TrackLen()	531
9.71.3.22 Type()	531
9.71.4 Friends And Related Function Documentation	531
9.71.4.1 System	532
9.71.5 Member Data Documentation	532
9.71.5.1 assignLen	532
9.71.5.2 cars	532
9.71.5.3 carsLen	532
9.71.5.4 carsNum	532
9.71.5.5 divisionControlList	533
9.71.5.6 emptyTypes	533
9.71.5.7 hazard	533
9.71.5.8 loadTypes	533
9.71.5.9 maxCarLen	533
9.71.5.10 mirror	534
9.71.5.11 name	534
9.71.5.12 plate	534
9.71.5.13 priority	534
9.71.5.14 reload	534
9.71.5.15 remLen	535
9.71.5.16 station	535
9.71.5.17 statsLen	535
9.71.5.18 trackLen	535
9.71.5.19 type	535
9.71.5.20 usedLen	536
9.71.5.21 weightclass	536
9.72 FCFSupport::PDFFileStructures::InformationDirectory Class Reference	536
9.72.1 Detailed Description	537
9.72.2 Constructor & Destructor Documentation	537
9.72.2.1 InformationDirectory()	537
9.72.2.2 ~InformationDirectory()	538
9.72.3 Member Function Documentation	538
9.72.3.1 WriteDictionaryElements()	538
9.72.4 Member Data Documentation	538
9.72.4.1 author	538
9.72.4.2 creator	539

9.72.4.3 creationDate	539
9.72.4.4 keywords	539
9.72.4.5 modificationDate	539
9.72.4.6 producer	539
9.72.4.7 subject	540
9.72.4.8 title	540
9.73 Parsers::IntegerList Class Reference	540
9.73.1 Detailed Description	541
9.73.2 Constructor & Destructor Documentation	541
9.73.2.1 IntegerList()	541
9.73.3 Member Function Documentation	541
9.73.3.1 CleanUpIntegerList()	542
9.73.3.2 CopyList()	542
9.73.3.3 Element()	542
9.73.3.4 ElementP()	542
9.73.3.5 IntAppend()	543
9.73.3.6 Next() [1/2]	543
9.73.3.7 Next() [2/2]	543
9.73.4 Friends And Related Function Documentation	543
9.73.4.1 operator<<	543
9.73.4.2 TurnoutBodyElt	544
9.73.5 Member Data Documentation	544
9.73.5.1 iElt	544
9.73.5.2 next	544
9.74 CTCPanel::Lamp Class Reference	544
9.74.1 Detailed Description	545
9.74.2 Constructor & Destructor Documentation	546
9.74.2.1 Lamp()	546
9.74.2.2 ~Lamp()	546
9.74.3 Member Function Documentation	546
9.74.3.1 _configureColor()	546
9.74.3.2 _configureLabel()	547
9.74.3.3 geti()	547
9.74.3.4 getv()	547
9.74.3.5 invoke()	547
9.74.3.6 seti()	547
9.74.3.7 setv()	547
9.74.4 Member Data Documentation	548
9.74.4.1 canvas	548

9.74.4.2 ctcpanel	548
9.74.4.3 state	548
9.75 Parsers::LayoutFile Class Reference	548
9.75.1 Detailed Description	551
9.75.2 Constructor & Destructor Documentation	551
9.75.2.1 LayoutFile()	551
9.75.2.2 ~LayoutFile()	551
9.75.3 Member Function Documentation	551
9.75.3.1 Angle()	551
9.75.3.2 CompressedEdgeCount()	552
9.75.3.3 CompressedEdgeLength()	552
9.75.3.4 CompressedEdgeNode()	552
9.75.3.5 CompressedGraphCircleLayout()	553
9.75.3.6 CompressedGraphKamadaKawaiSpring()	553
9.75.3.7 CompressedGraphKruskalMinimumSpanningTree()	553
9.75.3.8 CompressedGraphPrimMinimumSpanningTree()	553
9.75.3.9 CompressedNodePositionX()	554
9.75.3.10 CompressedNodePositionY()	554
9.75.3.11 CompressedNodeSegments()	554
9.75.3.12 CompressGraph()	554
9.75.3.13 EdgeA()	555
9.75.3.14 EdgeIndex()	555
9.75.3.15 EdgeLength()	555
9.75.3.16 EdgeX()	555
9.75.3.17 EdgeY()	556
9.75.3.18 Emit()	556
9.75.3.19 Heads()	556
9.75.3.20 HighestNode()	556
9.75.3.21 IsCompressed()	557
9.75.3.22 IsCompressedNode()	557
9.75.3.23 IsNodeP()	557
9.75.3.24 LengthOfNode()	557
9.75.3.25 LowestNode()	557
9.75.3.26 NameOfNode()	558
9.75.3.27 NodeTurnoutGraphic()	558
9.75.3.28 NodeTurnoutRoutelist()	558
9.75.3.29 NormalActionScript()	558
9.75.3.30 NumberOfHeads()	559
9.75.3.31 NumEdges()	559

9.75.3.32 OffScript()	559
9.75.3.33 OnScript()	559
9.75.3.34 OrigX()	560
9.75.3.35 OrigY()	560
9.75.3.36 Parse()	560
9.75.3.37 ParseError()	561
9.75.3.38 ReverseActionScript()	561
9.75.3.39 Roots()	561
9.75.3.40 SenseScript()	561
9.75.3.41 SignalAspects()	562
9.75.3.42 TrackList()	562
9.75.3.43 TurnoutNumber()	562
9.75.3.44 TypeOfNode()	562
9.75.4 Member Data Documentation	562
9.75.4.1 parser	563
9.75.4.2 trackGraph	563
9.76 xpressnet::LI100Message Class Reference	563
9.76.1 Detailed Description	563
9.76.2 Constructor & Destructor Documentation	564
9.76.2.1 LI100Message()	564
9.76.3 Member Function Documentation	564
9.76.3.1 MessageType()	564
9.76.4 Member Data Documentation	564
9.76.4.1 _message_type	564
9.77 xpressnet::LI100VersionNumbers Class Reference	564
9.77.1 Detailed Description	565
9.77.2 Constructor & Destructor Documentation	565
9.77.2.1 LI100VersionNumbers()	565
9.77.3 Member Function Documentation	566
9.77.3.1 HardwareVersion()	566
9.77.3.2 SoftwareVersion()	566
9.77.4 Member Data Documentation	566
9.77.4.1 _hardware_version	566
9.77.4.2 _software_version	566
9.78 xpressnet::LI101XPressNetAddress Class Reference	566
9.78.1 Detailed Description	567
9.78.2 Constructor & Destructor Documentation	567
9.78.2.1 LI101XPressNetAddress()	567
9.78.3 Member Function Documentation	567

9.78.3.1 Address()	568
9.78.4 Member Data Documentation	568
9.78.4.1 _address	568
9.79 linuxgpio::LinuxGpio Class Reference	568
9.79.1 Detailed Description	569
9.79.2 Constructor & Destructor Documentation	569
9.79.2.1 LinuxGpio()	569
9.79.2.2 ~LinuxGpio()	570
9.79.3 Member Function Documentation	570
9.79.3.1 Clr()	570
9.79.3.2 Get()	570
9.79.3.3 is_output()	570
9.79.3.4 read()	571
9.79.3.5 Set()	571
9.79.3.6 write()	571
9.79.4 Member Data Documentation	571
9.79.4.1 DIRECTIONFMT	571
9.79.4.2 EXPORT	572
9.79.4.3 UNEXPORT	572
9.79.4.4 VALUEFMT	572
9.80 xpressnet::LocomotiveAddress Class Reference	572
9.80.1 Detailed Description	573
9.80.2 Constructor & Destructor Documentation	573
9.80.2.1 LocomotiveAddress()	573
9.80.3 Member Function Documentation	573
9.80.3.1 Address()	573
9.80.3.2 AddressType()	573
9.80.4 Member Data Documentation	574
9.80.4.1 _address	574
9.80.4.2 _addressType	574
9.81 CabWidgets::LocomotiveDirection Class Reference	574
9.81.1 Detailed Description	575
9.81.2 Constructor & Destructor Documentation	575
9.81.2.1 LocomotiveDirection()	576
9.81.3 Member Function Documentation	576
9.81.3.1 _setdirection()	576
9.81.3.2 direction()	576
9.81.3.3 direction_sense()	576
9.81.3.4 invoke()	577

9.81.4 Member Data Documentation	577
9.81.4.1 _direction	577
9.81.4.2 _left	577
9.81.4.3 _right	577
9.81.4.4 currentDirection	578
9.81.4.5 forward	578
9.81.4.6 reverse	578
9.82 xpressnet::LocomotiveInformation Class Reference	578
9.82.1 Detailed Description	579
9.82.2 Constructor & Destructor Documentation	580
9.82.2.1 LocomotiveInformation()	580
9.82.3 Member Function Documentation	581
9.82.3.1 Address()	581
9.82.3.2 Address2()	581
9.82.3.3 Available()	581
9.82.3.4 Direction()	581
9.82.3.5 Function()	581
9.82.3.6 MTR()	582
9.82.3.7 Speed()	582
9.82.3.8 SpeedStepMode()	582
9.82.4 Member Data Documentation	582
9.82.4.1 _address	582
9.82.4.2 _address2	583
9.82.4.3 _available	583
9.82.4.4 _direction	583
9.82.4.5 _function0	583
9.82.4.6 _function1	583
9.82.4.7 _function10	583
9.82.4.8 _function11	584
9.82.4.9 _function12	584
9.82.4.10 _function2	584
9.82.4.11 _function3	584
9.82.4.12 _function4	584
9.82.4.13 _function5	584
9.82.4.14 _function6	585
9.82.4.15 _function7	585
9.82.4.16 _function8	585
9.82.4.17 _function9	585
9.82.4.18 _mtraddress	585

9.82.4.19 _speed	585
9.82.4.20 _speedstep	586
9.83 CabWidgets::LocomotiveSpeed Class Reference	586
9.83.1 Detailed Description	587
9.83.2 Constructor & Destructor Documentation	588
9.83.2.1 LocomotiveSpeed()	588
9.83.3 Member Function Documentation	588
9.83.3.1 _down1()	588
9.83.3.2 _down10()	588
9.83.3.3 _setspeed()	589
9.83.3.4 _stop()	589
9.83.3.5 _up1()	589
9.83.3.6 _up10()	589
9.83.3.7 invoke()	589
9.83.3.8 setspeed()	590
9.83.3.9 speed()	590
9.83.4 Member Data Documentation	590
9.83.4.1 _down	590
9.83.4.2 _down10	590
9.83.4.3 _speed	590
9.83.4.4 _stop	591
9.83.4.5 _up	591
9.83.4.6 _up10	591
9.83.4.7 bar	591
9.83.4.8 down1	591
9.83.4.9 down10	591
9.83.4.10 leftbuttons	592
9.83.4.11 rightbuttons	592
9.83.4.12 stop	592
9.83.4.13 up1	592
9.83.4.14 up10	592
9.84 FCFSupport::LogMessageCallback Class Reference	592
9.84.1 Detailed Description	593
9.84.2 Member Enumeration Documentation	593
9.84.2.1 MessageType	593
9.84.3 Constructor & Destructor Documentation	594
9.84.3.1 LogMessageCallback()	594
9.84.3.2 ~LogMessageCallback()	594
9.84.4 Member Function Documentation	594

9.84.4.1 LogMessage()	594
9.85 FCFSupport::LQ24PrinterDevice Class Reference	595
9.85.1 Detailed Description	596
9.85.2 Member Enumeration Documentation	596
9.85.2.1 ChCodes	596
9.85.3 Constructor & Destructor Documentation	597
9.85.3.1 LQ24PrinterDevice()	597
9.85.3.2 ~LQ24PrinterDevice()	597
9.85.4 Member Function Documentation	597
9.85.4.1 ClosePrinter()	597
9.85.4.2 NewPage()	598
9.85.4.3 OpenPrinter()	598
9.85.4.4 Put()	599
9.85.4.5 PutLine()	599
9.85.4.6 SetTypeSlant()	599
9.85.4.7 SetTypeSpacing()	600
9.85.4.8 SetTypeWeight()	600
9.85.4.9 Tab()	600
9.85.5 Member Data Documentation	601
9.85.5.1 currentColumn	601
9.85.5.2 currentColumnFraction	601
9.85.5.3 currentSlant	601
9.85.5.4 currentSpacing	601
9.85.5.5 currentWeight	601
9.85.5.6 oneColumnWidthFraction	602
9.85.5.7 printerStream	602
9.86 mainwindow Class Reference	602
9.86.1 Detailed Description	604
9.86.2 Package provided	605
9.86.3 Constructor & Destructor Documentation	605
9.86.3.1 mainwindow()	605
9.86.4 Member Function Documentation	605
9.86.4.1 buttons_add()	605
9.86.4.2 buttons_delete()	606
9.86.4.3 buttons_hide()	606
9.86.4.4 buttons_insert()	606
9.86.4.5 buttons_itemconfigure()	606
9.86.4.6 buttons_show()	608
9.86.4.7 menu_activate()	608

9.86.4.8 menu_add()	608
9.86.4.9 menu_delete()	609
9.86.4.10 menu_entrycget()	609
9.86.4.11 menu_entryconfigure()	609
9.86.4.12 menu_index()	610
9.86.4.13 menu_insert()	610
9.86.4.14 menu_invoke()	610
9.86.4.15 menu_sethelpvar()	611
9.86.4.16 menu_type()	611
9.86.4.17 setprogress()	611
9.86.4.18 setstatus()	613
9.86.4.19 showit()	613
9.86.4.20 slideout_add()	613
9.86.4.21 slideout_getframe()	614
9.86.4.22 slideout_hide()	614
9.86.4.23 slideout_issownp()	614
9.86.4.24 slideout_list()	614
9.86.4.25 slideout_reqwidth()	615
9.86.4.26 slideout_show()	615
9.86.4.27 toolbar_add()	615
9.86.4.28 toolbar_addbutton()	616
9.86.4.29 toolbar_buttoncget()	616
9.86.4.30 toolbar_buttonconfigure()	616
9.86.4.31 toolbar_hide()	617
9.86.4.32 toolbar_setbuttonstate()	617
9.86.4.33 toolbar_show()	617
9.86.5 Member Data Documentation	617
9.86.5.1 buttons	618
9.86.5.2 numtoolbars	618
9.86.5.3 panewindow	618
9.86.5.4 progress	618
9.86.5.5 scrollwindow	618
9.86.5.6 slideouts	618
9.86.5.7 status	619
9.86.5.8 toolbars	619
9.86.5.9 wipmessage	619
9.87 azatrax::MRD Class Reference	619
9.87.1 Detailed Description	621
9.87.2 Member Enumeration Documentation	621

9.87.2.1 OperatingMode_Type	621
9.87.3 Constructor & Destructor Documentation	622
9.87.3.1 MRD()	622
9.87.3.2 ~MRD()	622
9.87.4 Member Function Documentation	622
9.87.4.1 AllowingExternalChanges()	622
9.87.4.2 ClearExternallyChanged()	623
9.87.4.3 DisableExternal()	623
9.87.4.4 EnableExternal()	623
9.87.4.5 ExternallyChanged()	623
9.87.4.6 HasRelays()	624
9.87.4.7 Identify_1_2()	624
9.87.4.8 Identify_2()	624
9.87.4.9 Latch_1()	624
9.87.4.10 Latch_2()	625
9.87.4.11 OperatingMode()	625
9.87.4.12 ResetStatus()	625
9.87.4.13 ResetStopwatch()	625
9.87.4.14 Sense_1()	626
9.87.4.15 Sense_2()	626
9.87.4.16 SetChan1()	626
9.87.4.17 SetChan2()	626
9.87.4.18 Stopwatch()	626
9.87.4.19 StopwatchTicking()	627
9.87.5 Friends And Related Function Documentation	627
9.87.5.1 Azatrax	627
9.88 Parsers::MRRXtrkCad Class Reference	627
9.88.1 Detailed Description	629
9.88.2 Member Enumeration Documentation	629
9.88.2.1 YY_MRRXtrkCad_ENUM_TOKEN	629
9.88.3 Constructor & Destructor Documentation	630
9.88.3.1 MRRXtrkCad()	630
9.88.3.2 ~MRRXtrkCad()	630
9.88.4 Member Function Documentation	631
9.88.4.1 lookup_word()	631
9.88.4.2 yyerror()	631
9.88.4.3 yyerror1()	631
9.88.4.4 yylex()	631
9.88.4.5 yyparse()	631

9.88.5 Member Data Documentation	631
9.88.5.1 CurrentScale	632
9.88.5.2 fieldflag	632
9.88.5.3 scanEol	632
9.88.5.4 scanToEND	632
9.88.5.5 yychar	632
9.88.5.6 yydebug	632
9.88.5.7 yyloc	632
9.88.5.8 yyval	633
9.88.5.9 yynerrs	633
9.89 lcc::MTIDetail Class Reference	633
9.89.1 Detailed Description	634
9.89.2 Constructor & Destructor Documentation	635
9.89.2.1 MTIDetail()	635
9.89.3 Member Function Documentation	635
9.89.3.1 getHeader()	636
9.89.3.2 setHeader()	636
9.89.4 Member Data Documentation	636
9.89.4.1 ADDRESSP_MASK	637
9.89.4.2 ADDRESSP_SHIFT	637
9.89.4.3 DESTID_MASK	637
9.89.4.4 DESTID_SHIFT	637
9.89.4.5 EVENTP_MASK	637
9.89.4.6 EVENTP_SHIFT	637
9.89.4.7 MODIFIER_MASK	638
9.89.4.8 MODIFIER_SHIFT	638
9.89.4.9 mtiheader	638
9.89.4.10 PRIORITY_MASK	638
9.89.4.11 PRIORITY_SHIFT	638
9.89.4.12 SIMPLE_MASK	638
9.89.4.13 SIMPLE_SHIFT	639
9.89.4.14 SPECIAL_MASK	639
9.89.4.15 STREAMDG_MASK	639
9.89.4.16 TYPEWITHIN_MASK	639
9.89.4.17 TYPEWITHIN_SHIFT	639
9.90 lcc::MTIHeader Class Reference	639
9.90.1 Detailed Description	640
9.90.2 Constructor & Destructor Documentation	640
9.90.2.1 MTIHeader()	640

9.90.3 Member Function Documentation	641
9.90.3.1 getHeader()	641
9.90.3.2 setHeader()	641
9.90.4 Member Data Documentation	642
9.90.4.1 canheader	642
9.90.4.2 FRAMETYPE_MASK	642
9.90.4.3 FRAMETYPE_SHIFT	642
9.90.4.4 MTI_CAN_MASK	642
9.90.4.5 MTI_CAN_SHIFT	643
9.91 nce::NCE Class Reference	643
9.91.1 Detailed Description	646
9.91.2 Constructor & Destructor Documentation	646
9.91.2.1 NCE()	647
9.91.2.2 ~NCE()	647
9.91.3 Member Function Documentation	647
9.91.3.1 _explodechars()	647
9.91.3.2 _readbyte()	647
9.91.3.3 _readevent()	648
9.91.3.4 _readresponse()	648
9.91.3.5 _sendMessageAndReturnResponse()	648
9.91.3.6 _timeoutevent()	648
9.91.3.7 _transmit()	649
9.91.3.8 AccessoryDecoderOperation()	649
9.91.3.9 AddLeadLocomotiveToMultiUnit()	649
9.91.3.10 AddLocomotiveToMultiUnit()	650
9.91.3.11 AddRearLocomotiveToMultiUnit()	650
9.91.3.12 AssignLoco()	651
9.91.3.13 ChangeMomentumLevel()	651
9.91.3.14 DequeuePacket()	651
9.91.3.15 DisableMain()	652
9.91.3.16 Dummy()	652
9.91.3.17 EnableMain()	652
9.91.3.18 ExecuteMacro()	652
9.91.3.19 HardReset()	653
9.91.3.20 MacroCommand()	653
9.91.3.21 NOP()	653
9.91.3.22 NormalMode()	654
9.91.3.23 OperatingModeAccessoryProgrammingByteModeWrite()	654
9.91.3.24 OperatingModeProgrammingByteModeWrite()	654

9.91.3.25 ProgramMode()	655
9.91.3.26 ReadCVInDirectMode()	655
9.91.3.27 ReadCVInPagedMode()	655
9.91.3.28 ReadFromRAM()	656
9.91.3.29 ReadOneByteFromRAM()	656
9.91.3.30 ReadRegister()	657
9.91.3.31 RemoveLocomotiveFromMultiUnit()	657
9.91.3.32 ReturnAuxiliaryInputUnit()	657
9.91.3.33 ReturnAuxiliaryInputUnitShortForm()	658
9.91.3.34 ReturnClock()	658
9.91.3.35 SetBinaryCommandEchoMode()	658
9.91.3.36 SetCabBusAddressOfUSBBoard()	659
9.91.3.37 SetClock()	659
9.91.3.38 SetClockFormat()	660
9.91.3.39 SetClockRatio()	660
9.91.3.40 SetLocomotiveFunctionsGroup1()	660
9.91.3.41 SetLocomotiveFunctionsGroup2()	661
9.91.3.42 SetLocomotiveFunctionsGroup3()	661
9.91.3.43 SetLocomotiveSpeedAndDirection()	662
9.91.3.44 SetLocoSpeedMode()	662
9.91.3.45 SetSignalAspect()	663
9.91.3.46 SoftReset()	663
9.91.3.47 SoftwareVersion()	663
9.91.3.48 StartClock()	664
9.91.3.49 StopClock()	664
9.91.3.50 Write4BytesToRAM()	664
9.91.3.51 Write8BytesToRAM()	665
9.91.3.52 WriteCVInDirectMode()	665
9.91.3.53 WriteCVInPagedMode()	665
9.91.3.54 WriteLCDLine3()	666
9.91.3.55 WriteLCDLine4()	666
9.91.3.56 WriteLCDRightLine2()	667
9.91.3.57 WriteOneByteToRAM()	667
9.91.3.58 WriteRAWPacket()	668
9.91.3.59 WriteRAWTrackPacket()	668
9.91.3.60 WriteRegister()	668
9.91.3.61 WriteToRAM()	669
9.91.3.62 WriteTwoBytesToRAM()	669
9.91.4 Member Data Documentation	670

9.91.4.1 _timeout	670
9.91.4.2 NumberOfBytesReturned	670
9.91.4.3 ttyfd	670
9.92 lcc::nid_or_null Class Reference	670
9.92.1 Detailed Description	670
9.92.2 Member Function Documentation	671
9.92.2.1 validate()	671
9.93 Parsers::TrackGraph::NodeValues Struct Reference	671
9.93.1 Detailed Description	672
9.93.2 Constructor & Destructor Documentation	672
9.93.2.1 NodeValues()	673
9.93.3 Member Function Documentation	673
9.93.3.1 Cleanup()	673
9.93.4 Member Data Documentation	673
9.93.4.1 angle	674
9.93.4.2 aspectlist	674
9.93.4.3 id	674
9.93.4.4 length	674
9.93.4.5 name	674
9.93.4.6 normalactionsript	675
9.93.4.7 numheads	675
9.93.4.8 offscript	675
9.93.4.9 onscript	675
9.93.4.10 origx	675
9.93.4.11 origy	676
9.93.4.12 reverseactionsript	676
9.93.4.13 sensescript	676
9.93.4.14 tgr	676
9.93.4.15 tpo	676
9.93.4.16 tracklist	677
9.93.4.17 turnoutnumber	677
9.93.4.18 type	677
9.94 TTSupport::Occupied Class Reference	677
9.94.1 Detailed Description	678
9.94.2 Constructor & Destructor Documentation	678
9.94.2.1 Occupied() [1/2]	678
9.94.2.2 Occupied() [2/2]	679
9.94.3 Member Function Documentation	679
9.94.3.1 From()	679

9.94.3.2 operator=()	679
9.94.3.3 Read()	680
9.94.3.4 TrainNum()	680
9.94.3.5 TrainNum2()	680
9.94.3.6 Until()	680
9.94.3.7 Write()	680
9.94.4 Friends And Related Function Documentation	681
9.94.4.1 TimeTableSystem	681
9.94.5 Member Data Documentation	681
9.94.5.1 from	681
9.94.5.2 trainnum	681
9.94.5.3 trainnum2	682
9.94.5.4 until	682
9.95 Icc::OpenLCBMessage Class Reference	682
9.95.1 Detailed Description	683
9.95.2 Constructor & Destructor Documentation	683
9.95.2.1 OpenLCBMessage()	683
9.95.3 Member Function Documentation	684
9.95.3.1 _cgetdata()	684
9.95.3.2 _configuredata()	684
9.95.3.3 toString()	684
9.95.3.4 validate()	685
9.96 Icc::OpenLCBNode Class Reference	685
9.96.1 Detailed Description	687
9.96.2 Constructor & Destructor Documentation	688
9.96.2.1 OpenLCBNode()	688
9.96.3 Member Function Documentation	688
9.96.3.1 _buildSelectTransportConstructorDialog()	689
9.96.3.2 _CancelSelectTransport()	689
9.96.3.3 _messageHandler()	689
9.96.3.4 _SelectTransport()	689
9.96.3.5 ConsumerIdentified()	690
9.96.3.6 ConsumerRangIdentified()	690
9.96.3.7 DatagramReceivedOK()	690
9.96.3.8 DatagramRejected()	691
9.96.3.9 IdentifyConsumer()	691
9.96.3.10 IdentifyEvents()	691
9.96.3.11 IdentifyProducer()	692
9.96.3.12 LearnEvent()	692

9.96.3.13	nidlist()	692
9.96.3.14	ProduceEvent()	692
9.96.3.15	ProducerIdentified()	693
9.96.3.16	ProducerRangeIdentified()	693
9.96.3.17	ProtocolSupportRequest()	693
9.96.3.18	ReturnMySimpleNodeInfo()	694
9.96.3.19	ReturnMySupportedProtocols()	694
9.96.3.20	selectTransportConstructor()	694
9.96.3.21	SendDatagram()	695
9.96.3.22	SendInitComplete()	695
9.96.3.23	SendMyNodeVerification()	695
9.96.3.24	SendMySimpleNodeInfo()	695
9.96.3.25	SendMySupportedProtocols()	696
9.96.3.26	SendSimpleNodeInfoRequest()	696
9.96.3.27	SendSupportedProtocolsRequest()	696
9.96.3.28	SendVerifyNodeID()	697
9.96.3.29	transportConstructors()	697
9.96.4	Member Data Documentation	697
9.96.4.1	_transportConstructors	697
9.96.4.2	constructorCombo	697
9.96.4.3	protocolsupport	698
9.96.4.4	selectTransportConstructorDialog	698
9.96.4.5	simplenodeinfo	698
9.96.4.6	transport	698
9.97	Icc::OpenLCBOverTcp Class Reference	698
9.97.1	Detailed Description	700
9.97.2	Constructor & Destructor Documentation	700
9.97.2.1	OpenLCBOverTcp()	700
9.97.3	Member Function Documentation	701
9.97.3.1	_CancelOpenTransport()	701
9.97.3.2	_OpenTransport()	701
9.97.3.3	buildPortnidandhostDialog()	701
9.97.3.4	drawOptionsDialog()	701
9.97.3.5	requiredOpts()	702
9.97.3.6	sendMessage()	702
9.97.3.7	setMessageHandler()	703
9.97.3.8	setSentMessageHandler()	703
9.97.4	Member Data Documentation	703
9.97.4.1	_timeout	704

9.97.4.2 datagrambuffers	704
9.97.4.3 hostLEntry	704
9.97.4.4 messagebuffers	704
9.97.4.5 messagehandler	704
9.97.4.6 mtidetail	704
9.97.4.7 nidLEntry	705
9.97.4.8 NIDPATTERN	705
9.97.4.9 portLSpin	705
9.97.4.10 portnidandhostDialog	705
9.97.4.11 sentMessageHandler	705
9.97.4.12 sock	705
9.98 lcc::OpenLCBProtocols Class Reference	706
9.98.1 Detailed Description	706
9.98.2 Member Function Documentation	706
9.98.2.1 GetProtocolNames()	706
9.98.2.2 InsertProtocolBit()	707
9.98.2.3 ProtocolLabelString()	707
9.98.2.4 validate()	707
9.98.3 Member Data Documentation	709
9.98.3.1 bitstype	709
9.98.3.2 protocolstrings	709
9.99 OvalWidgets::OvalButton Class Reference	709
9.99.1 Detailed Description	709
9.99.2 Constructor & Destructor Documentation	710
9.99.2.1 OvalButton()	710
9.99.2.2 ~OvalButton()	711
9.99.3 Member Function Documentation	711
9.99.3.1 _ConfigureText()	711
9.99.3.2 invoke()	711
9.99.4 Member Data Documentation	711
9.99.4.1 canvas	711
9.100 OvalWidgets::OvalRoundCornerRectangle Class Reference	712
9.100.1 Detailed Description	712
9.100.2 Constructor & Destructor Documentation	712
9.100.2.1 OvalRoundCornerRectangle()	713
9.100.2.2 ~OvalRoundCornerRectangle()	713
9.100.3 Member Data Documentation	713
9.100.3.1 canvas	713
9.101 OvalWidgets::OvalScale Class Reference	713

9.101.1 Detailed Description	714
9.101.2 Constructor & Destructor Documentation	715
9.101.2.1 OvalScale()	715
9.101.2.2 ~OvalScale()	716
9.101.3 Member Function Documentation	716
9.101.3.1 _BaseRect()	716
9.101.3.2 _ConfigureText()	716
9.101.3.3 _ConfigureWL()	717
9.101.3.4 _ConfigureXY()	717
9.101.3.5 _MoveThumb()	717
9.101.3.6 get()	718
9.101.3.7 set()	718
9.101.4 Member Data Documentation	718
9.101.4.1 _value	718
9.101.4.2 canvas	718
9.102 OvalWidgets::OvalSlider Class Reference	718
9.102.1 Detailed Description	719
9.102.2 Constructor & Destructor Documentation	720
9.102.2.1 OvalSlider()	720
9.102.3 Member Function Documentation	721
9.102.3.1 _ConfigureL()	721
9.102.3.2 _ConfigureText()	721
9.102.3.3 _MoveThumb()	721
9.102.3.4 _VerifyBitmap()	722
9.102.3.5 get()	722
9.102.3.6 set()	722
9.102.4 Member Data Documentation	723
9.102.4.1 _value	723
9.102.4.2 canvas	723
9.103 OvalWidgets::OvalScrollBar Class Reference	723
9.103.1 Detailed Description	724
9.103.2 Constructor & Destructor Documentation	725
9.103.2.1 OvalScrollBar()	725
9.103.2.2 ~OvalScrollBar()	725
9.103.3 Member Function Documentation	725
9.103.3.1 _BaseRect()	725
9.103.3.2 _Command()	726
9.103.3.3 _ConfigureWL()	726
9.103.3.4 _ConfigureXY()	726

9.103.3.5 _MoveThumb()	727
9.103.3.6 delta()	727
9.103.3.7 fraction()	727
9.103.3.8 get()	728
9.103.3.9 identify()	728
9.103.3.10 resize()	728
9.103.3.11 set()	729
9.103.4 Member Data Documentation	729
9.103.4.1 _lastSet	729
9.103.4.2 canvas	730
9.104 FCFSupport::Owner Class Reference	730
9.104.1 Detailed Description	731
9.104.2 Constructor & Destructor Documentation	731
9.104.2.1 Owner() [1/3]	731
9.104.2.2 Owner() [2/3]	731
9.104.2.3 Owner() [3/3]	731
9.104.2.4 ~Owner()	732
9.104.3 Member Function Documentation	732
9.104.3.1 Comment()	732
9.104.3.2 Initials()	732
9.104.3.3 Name()	733
9.104.3.4 operator=()	733
9.104.4 Member Data Documentation	733
9.104.4.1 comment	733
9.104.4.2 initials	733
9.104.4.3 name	734
9.105 FCFSupport::PDFFileStructures::Page Class Reference	734
9.105.1 Detailed Description	735
9.105.2 Constructor & Destructor Documentation	735
9.105.2.1 Page()	735
9.105.2.2 ~Page()	736
9.105.3 Member Function Documentation	736
9.105.3.1 AppendStream()	736
9.105.3.2 WriteDictionaryElements()	736
9.105.4 Friends And Related Function Documentation	737
9.105.4.1 PageTree	737
9.105.5 Member Data Documentation	737
9.105.5.1 contents	737
9.105.5.2 cropBox	737

9.105.5.3 mediaBox	737
9.105.5.4 parent	738
9.105.5.5 resources	738
9.106 FCFSupport::PDFFileStructures::PageLabelDictionary Class Reference	738
9.106.1 Detailed Description	739
9.106.2 Member Enumeration Documentation	739
9.106.2.1 NumberStyle	739
9.106.3 Constructor & Destructor Documentation	740
9.106.3.1 PageLabelDictionary()	740
9.106.3.2 ~PageLabelDictionary()	740
9.106.4 Member Function Documentation	740
9.106.4.1 WriteDictionaryElements()	740
9.106.5 Member Data Documentation	741
9.106.5.1 prefix	741
9.106.5.2 start	741
9.106.5.3 style	741
9.107 FCFSupport::PDFFileStructures::PageLabelTree Class Reference	742
9.107.1 Detailed Description	743
9.107.2 Constructor & Destructor Documentation	743
9.107.2.1 PageLabelTree()	743
9.107.2.2 ~PageLabelTree()	743
9.107.3 Member Function Documentation	743
9.107.3.1 AddPageLabelDictionary()	744
9.107.3.2 AddPageLabelTree()	744
9.107.3.3 GetKidLimits()	744
9.107.3.4 Size()	745
9.107.3.5 WriteDictionaryElements()	745
9.107.4 Member Data Documentation	745
9.107.4.1 isRoot	745
9.107.4.2 kids	745
9.107.4.3 nums	746
9.108 FCFSupport::PDFFileStructures::PageTree Class Reference	746
9.108.1 Detailed Description	747
9.108.2 Constructor & Destructor Documentation	747
9.108.2.1 PageTree()	747
9.108.2.2 ~PageTree()	748
9.108.3 Member Function Documentation	748
9.108.3.1 AddPage()	748
9.108.3.2 AddPageTree()	748

9.108.3.3 WriteDictionaryElements()	749
9.108.4 Member Data Documentation	749
9.108.4.1 cropBox	749
9.108.4.2 mediaBox	749
9.108.4.3 pagenodes	750
9.108.4.4 parent	750
9.108.4.5 resources	750
9.109 Parsers::ParseFile Class Reference	750
9.109.1 Detailed Description	751
9.109.2 Constructor & Destructor Documentation	752
9.109.2.1 ParseFile()	752
9.109.2.2 ~ParseFile()	752
9.109.3 Member Function Documentation	752
9.109.3.1 Parse()	752
9.109.3.2 ParseError()	752
9.109.3.3 ProcessFile()	752
9.109.3.4 SourceFile()	753
9.109.4 Member Data Documentation	753
9.109.4.1 buffersize	753
9.109.4.2 errorstream	753
9.109.4.3 fp	753
9.109.4.4 line_buffer	754
9.109.4.5 lp	754
9.109.4.6 source_file	754
9.109.4.7 source_line	754
9.110 ParseXML Class Reference	754
9.110.1 Detailed Description	755
9.110.2 Constructor & Destructor Documentation	756
9.110.2.1 ParseXML()	756
9.110.3 Member Function Documentation	756
9.110.3.1 _characterdata()	756
9.110.3.2 _elementend()	756
9.110.3.3 _elementstart()	757
9.110.3.4 displayTree()	757
9.110.3.5 validate()	757
9.110.4 Member Data Documentation	759
9.110.4.1 nodeStack	759
9.110.4.2 rootnode	759
9.111 FCFSupport::PathName Class Reference	759

9.111.1 Detailed Description	761
9.111.2 Constructor & Destructor Documentation	761
9.111.2.1 PathName() [1/4]	761
9.111.2.2 PathName() [2/4]	761
9.111.2.3 PathName() [3/4]	762
9.111.2.4 PathName() [4/4]	762
9.111.2.5 ~PathName()	762
9.111.3 Member Function Documentation	762
9.111.3.1 Dirname()	762
9.111.3.2 Extension()	763
9.111.3.3 FullPath()	763
9.111.3.4 operator+() [1/2]	763
9.111.3.5 operator+() [2/2]	763
9.111.3.6 operator+=() [1/2]	764
9.111.3.7 operator+=() [2/2]	764
9.111.3.8 operator<()	764
9.111.3.9 operator<=()	765
9.111.3.10 operator=() [1/2]	765
9.111.3.11 operator=() [2/2]	765
9.111.3.12 operator==()	766
9.111.3.13 operator>()	766
9.111.3.14 operator>=()	766
9.111.3.15 PathSeparator()	767
9.111.3.16 SameDirectory()	767
9.111.3.17 Split()	767
9.111.3.18 Tail()	767
9.111.4 Member Data Documentation	767
9.111.4.1 pathname	768
9.112 TTSupport::PathName Class Reference	768
9.112.1 Detailed Description	769
9.112.2 Constructor & Destructor Documentation	769
9.112.2.1 PathName() [1/4]	769
9.112.2.2 PathName() [2/4]	770
9.112.2.3 PathName() [3/4]	771
9.112.2.4 PathName() [4/4]	771
9.112.2.5 ~PathName()	771
9.112.3 Member Function Documentation	772
9.112.3.1 Dirname()	772
9.112.3.2 Extension()	772

9.112.3.3 FullPath()	. 772
9.112.3.4 operator+() [1/2]	. 772
9.112.3.5 operator+() [2/2]	. 773
9.112.3.6 operator+=() [1/2]	. 773
9.112.3.7 operator+=() [2/2]	. 773
9.112.3.8 operator<()	. 773
9.112.3.9 operator<=()	. 774
9.112.3.10 operator=() [1/2]	. 774
9.112.3.11 operator=() [2/2]	. 774
9.112.3.12 operator==()	. 775
9.112.3.13 operator>()	. 775
9.112.3.14 operator>=()	. 775
9.112.3.15 PathSeparator()	. 776
9.112.3.16 SameDirectory()	. 776
9.112.3.17 Split()	. 776
9.112.3.18 Tail()	. 776
9.112.4 Member Data Documentation	. 777
9.112.4.1 pathname	. 777
9.113 FCFSupport::PauseCallback Class Reference	. 777
9.113.1 Detailed Description	. 777
9.113.2 Constructor & Destructor Documentation	. 777
9.113.2.1 PauseCallback()	. 778
9.113.2.2 ~PauseCallback()	. 778
9.113.3 Member Function Documentation	. 778
9.113.3.1 Pause()	. 778
9.114 FCFSupport::PDFFileStructures::PDFNameArray Class Reference	. 778
9.114.1 Detailed Description	. 779
9.114.2 Constructor & Destructor Documentation	. 779
9.114.2.1 PDFNameArray()	. 779
9.114.2.2 ~PDFNameArray()	. 779
9.115 FCFSupport::PDFPrinterDevice Class Reference	. 780
9.115.1 Detailed Description	. 781
9.115.2 Constructor & Destructor Documentation	. 782
9.115.2.1 PDFPrinterDevice()	. 782
9.115.2.2 ~PDFPrinterDevice()	. 782
9.115.3 Member Function Documentation	. 782
9.115.3.1 ClosePrinter()	. 782
9.115.3.2 CreateNewPage()	. 783
9.115.3.3 CreateNewStream()	. 783

9.115.3.4 NewPage()	783
9.115.3.5 OpenPrinter()	783
9.115.3.6 Put()	784
9.115.3.7 PutLine()	784
9.115.3.8 SetTypeSlant()	785
9.115.3.9 SetTypeSpacing()	785
9.115.3.10 SetTypeWeight()	785
9.115.3.11 Tab()	786
9.115.4 Member Data Documentation	786
9.115.4.1 crossReferenceTable	786
9.115.4.2 currentColumn	786
9.115.4.3 currentColumnFraction	786
9.115.4.4 currentFontName	787
9.115.4.5 currentPage	787
9.115.4.6 currentStream	787
9.115.4.7 horizontalScaling	787
9.115.4.8 info	787
9.115.4.9 lines	787
9.115.4.10 maxLines	788
9.115.4.11 needPage	788
9.115.4.12 pageTreeRoot	788
9.115.4.13 partline	788
9.115.4.14 printerStream	788
9.115.4.15 rootDictionary	788
9.115.4.16 title	789
9.116 FCFSupport::PDFFileStructures::PDFStream Class Reference	789
9.116.1 Detailed Description	789
9.116.2 Constructor & Destructor Documentation	789
9.116.2.1 PDFStream()	789
9.116.2.2 ~PDFStream()	790
9.116.3 Member Function Documentation	790
9.116.3.1 WriteDirect()	790
9.117 Parsers::TrackGraph::Point Struct Reference	790
9.117.1 Detailed Description	791
9.117.2 Member Data Documentation	791
9.117.2.1 x	791
9.117.2.2 y	791
9.118 Parsers::BezierBodyElt::Pos Struct Reference	791
9.118.1 Detailed Description	792

9.118.2 Member Data Documentation	792
9.118.2.1 x	792
9.118.2.2 y	792
9.119 Parsers::CornuBodyElt::Pos Struct Reference	792
9.119.1 Detailed Description	793
9.119.2 Member Data Documentation	793
9.119.2.1 x	793
9.119.2.2 y	793
9.120 Parsers::TurnoutBodyElt::Pos Struct Reference	793
9.120.1 Detailed Description	794
9.120.2 Member Data Documentation	794
9.120.2.1 x	794
9.120.2.2 y	794
9.121 FCFSupport::PostScriptPrinterDevice Class Reference	794
9.121.1 Detailed Description	796
9.121.2 Constructor & Destructor Documentation	796
9.121.2.1 PostScriptPrinterDevice()	796
9.121.2.2 ~PostScriptPrinterDevice()	796
9.121.3 Member Function Documentation	797
9.121.3.1 ClosePrinter()	797
9.121.3.2 NewPage()	797
9.121.3.3 OpenPrinter()	797
9.121.3.4 PSQuote()	798
9.121.3.5 Put()	798
9.121.3.6 PutLine()	798
9.121.3.7 PutPageHeader()	800
9.121.3.8 SetTypeSlant()	800
9.121.3.9 SetTypeSpacing()	800
9.121.3.10 SetTypeWeight()	801
9.121.3.11 Tab()	801
9.121.4 Member Data Documentation	801
9.121.4.1 lines	801
9.121.4.2 maxLines	801
9.121.4.3 needPageHeader	802
9.121.4.4 pages	802
9.121.4.5 partline	802
9.121.4.6 printerStream	802
9.121.4.7 title	802
9.122 FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary Class Reference	803

9.122.1 Detailed Description	803
9.122.2 Constructor & Destructor Documentation	803
9.122.2.1 PostScriptStandardType1FontDictionary()	804
9.122.2.2 ~PostScriptStandardType1FontDictionary()	804
9.123 FCFSupport::PrinterDevice Class Reference	804
9.123.1 Detailed Description	806
9.123.2 Member Enumeration Documentation	806
9.123.2.1 PageSize	806
9.123.2.2 TypeSlant	806
9.123.2.3 TypeSpacing	807
9.123.2.4 TypeWeight	807
9.123.3 Constructor & Destructor Documentation	807
9.123.3.1 PrinterDevice()	807
9.123.3.2 ~PrinterDevice()	808
9.123.4 Member Function Documentation	808
9.123.4.1 ClosePrinter()	808
9.123.4.2 IsOpenP()	809
9.123.4.3 NewPage()	809
9.123.4.4 OpenPrinter()	809
9.123.4.5 PrinterPageSize()	810
9.123.4.6 Put() [1/3]	810
9.123.4.7 Put() [2/3]	810
9.123.4.8 Put() [3/3]	811
9.123.4.9 PutLine()	811
9.123.4.10 SetTypeSlant()	811
9.123.4.11 SetTypeSpacing()	813
9.123.4.12 SetTypeWeight()	813
9.123.4.13 Tab()	813
9.123.5 Member Data Documentation	814
9.123.5.1 isOpenP	814
9.123.5.2 pageSize	814
9.124 CTCPanel::PushButton Class Reference	814
9.124.1 Detailed Description	815
9.124.2 Constructor & Destructor Documentation	816
9.124.2.1 PushButton()	816
9.124.2.2 ~PushButton()	816
9.124.3 Member Function Documentation	816
9.124.3.1 _configureLabel()	816
9.124.3.2 geti()	817

9.124.3.3	getv()	817
9.124.3.4	invoke()	817
9.124.3.5	seti()	817
9.124.3.6	setv()	817
9.124.4	Member Data Documentation	818
9.124.4.1	canvas	818
9.124.4.2	ctcpanel	818
9.125	raildriver::RaildriverClient Class Reference	818
9.125.1	Detailed Description	819
9.125.2	Constructor & Destructor Documentation	819
9.125.2.1	RaildriverClient()	819
9.125.2.2	~RaildriverClient()	819
9.125.3	Member Function Documentation	820
9.125.3.1	_poller()	820
9.125.3.2	_readevent()	820
9.125.3.3	clear()	820
9.125.3.4	leds()	820
9.125.3.5	mask()	820
9.125.3.6	speaker()	821
9.125.4	Member Data Documentation	821
9.125.4.1	pollid	821
9.125.4.2	socket	821
9.126	RaildriverIO Class Reference	821
9.126.1	Detailed Description	826
9.126.2	Tcl Package Provided	826
9.126.3	Library Provided	826
9.126.4	Member Enumeration Documentation	826
9.126.4.1	Eventcodes	826
9.126.4.2	Eventmask_bits	828
9.126.5	Constructor & Destructor Documentation	829
9.126.5.1	RaildriverIO() [1/2]	829
9.126.5.2	~RaildriverIO()	830
9.126.5.3	RaildriverIO() [2/2]	830
9.126.6	Member Function Documentation	830
9.126.6.1	GetAlert()	830
9.126.6.2	GetAutoBrake()	830
9.126.6.3	GetBailOff()	831
9.126.6.4	GetBell()	831
9.126.6.5	GetBlueButton1()	831

9.126.6.6 GetBlueButton10()	831
9.126.6.7 GetBlueButton11()	831
9.126.6.8 GetBlueButton12()	832
9.126.6.9 GetBlueButton13()	832
9.126.6.10 GetBlueButton14()	832
9.126.6.11 GetBlueButton15()	832
9.126.6.12 GetBlueButton16()	832
9.126.6.13 GetBlueButton17()	833
9.126.6.14 GetBlueButton18()	833
9.126.6.15 GetBlueButton19()	833
9.126.6.16 GetBlueButton2()	833
9.126.6.17 GetBlueButton20()	833
9.126.6.18 GetBlueButton21()	834
9.126.6.19 GetBlueButton22()	834
9.126.6.20 GetBlueButton23()	834
9.126.6.21 GetBlueButton24()	834
9.126.6.22 GetBlueButton25()	834
9.126.6.23 GetBlueButton26()	835
9.126.6.24 GetBlueButton27()	835
9.126.6.25 GetBlueButton28()	835
9.126.6.26 GetBlueButton3()	835
9.126.6.27 GetBlueButton4()	835
9.126.6.28 GetBlueButton5()	836
9.126.6.29 GetBlueButton6()	836
9.126.6.30 GetBlueButton7()	836
9.126.6.31 GetBlueButton8()	836
9.126.6.32 GetBlueButton9()	836
9.126.6.33 GetEBrakeDown()	837
9.126.6.34 GetEBrakeUp()	837
9.126.6.35 GetHeadlight()	837
9.126.6.36 GetIndependBrake()	837
9.126.6.37 GetPanDown()	837
9.126.6.38 GetPanLeft()	838
9.126.6.39 GetPanRight()	838
9.126.6.40 GetPantograph()	838
9.126.6.41 GetPanUp()	838
9.126.6.42 GetProductCodeId()	838
9.126.6.43 GetRangeDown()	839
9.126.6.44 GetRangeUp()	839

9.126.6.45 GetReverser()	839
9.126.6.46 GetSand()	839
9.126.6.47 GetThrottle()	839
9.126.6.48 GetWhistleDown()	840
9.126.6.49 GetWhistleUp()	840
9.126.6.50 GetWiper()	840
9.126.6.51 GetZoomUp()	840
9.126.6.52 GetZoopDown()	840
9.126.6.53 ReadInputs()	840
9.126.6.54 SetLEDS()	841
9.126.6.55 SpeakerOff()	841
9.126.6.56 SpeakerOn()	841
9.126.7 Member Data Documentation	841
9.126.7.1 AutoBrake	841
9.126.7.2 BailOff	842
9.126.7.3 Digital1	842
9.126.7.4 Digital2	842
9.126.7.5 Digital3	842
9.126.7.6 Digital4	842
9.126.7.7 Digital5	842
9.126.7.8 Digital6	843
9.126.7.9 Headlight	843
9.126.7.10 IndependBrake	843
9.126.7.11 LEDCommand	843
9.126.7.12 PIEngineering	843
9.126.7.13 ProductCodeId	843
9.126.7.14 RailDriverModernDesktop	844
9.126.7.15	844
9.126.7.16 rdriverdev	844
9.126.7.17 ReportBuffer	844
9.126.7.18 Reverser	845
9.126.7.19 SpeakerCommand	845
9.126.7.20	845
9.126.7.21 Throttle	845
9.126.7.22 Wiper	845
9.127 FCFSupport::PDFFileStructures::Rectangle Class Reference	845
9.127.1 Detailed Description	846
9.127.2 Constructor & Destructor Documentation	846
9.127.2.1 Rectangle()	847

9.127.2.2 ~Rectangle()	847
9.127.3 Member Function Documentation	847
9.127.3.1 WriteDirect()	847
9.127.3.2 X1()	848
9.127.3.3 X2()	848
9.127.3.4 Y1()	848
9.127.3.5 Y2()	848
9.127.4 Member Data Documentation	849
9.127.4.1 x1	849
9.127.4.2 x2	849
9.127.4.3 y1	849
9.127.4.4 y2	849
9.128 FCFSupport::PDFFileStructures::ResourceDictionary Class Reference	850
9.128.1 Detailed Description	851
9.128.2 Constructor & Destructor Documentation	851
9.128.2.1 ResourceDictionary()	851
9.128.2.2 ~ResourceDictionary()	852
9.128.3 Member Function Documentation	852
9.128.3.1 AddColorSpace()	852
9.128.3.2 AddExternalGraphicsState()	852
9.128.3.3 AddFont()	853
9.128.3.4 AddPattern()	853
9.128.3.5 AddProcSet()	853
9.128.3.6 AddProperties()	854
9.128.3.7 AddShading()	854
9.128.3.8 AddXObject()	855
9.128.3.9 WriteDictionaryElements()	855
9.128.4 Member Data Documentation	855
9.128.4.1 colorSpace	855
9.128.4.2 extGState	856
9.128.4.3 font	856
9.128.4.4 pattern	856
9.128.4.5 procSets	856
9.128.4.6 properties	856
9.128.4.7 shading	857
9.128.4.8 xObject	857
9.129 Parsers::RouteVec Struct Reference	857
9.129.1 Detailed Description	857
9.129.2 Member Data Documentation	857

9.129.2.1 positionName	858
9.129.2.2 posList	858
9.129.2.3 routeLength	858
9.130 Satellite Class Reference	858
9.130.1 Detailed Description	858
9.130.2 Constructor & Destructor Documentation	859
9.130.2.1 Satellite()	859
9.130.2.2 ~Satellite()	859
9.130.3 Member Function Documentation	860
9.130.3.1 remoteeval()	860
9.130.4 Member Data Documentation	860
9.130.4.1 socket	860
9.131 CTCPanel::SchLabel Class Reference	860
9.131.1 Detailed Description	861
9.131.2 Constructor & Destructor Documentation	862
9.131.2.1 SchLabel()	862
9.131.2.2 ~SchLabel()	862
9.131.3 Member Function Documentation	862
9.131.3.1 _configureColor()	863
9.131.3.2 _configureLabel()	863
9.131.3.3 geti()	863
9.131.3.4 getv()	863
9.131.3.5 invoke()	863
9.131.3.6 seti()	864
9.131.3.7 setv()	864
9.131.4 Member Data Documentation	864
9.131.4.1 canvas	864
9.131.4.2 ctcpnl	864
9.132 CTCPanel::ScissorCrossover Class Reference	864
9.132.1 Detailed Description	865
9.132.2 Constructor & Destructor Documentation	866
9.132.2.1 ScissorCrossover()	866
9.132.2.2 ~ScissorCrossover()	867
9.132.3 Member Function Documentation	867
9.132.3.1 _configureLabel()	867
9.132.3.2 geti()	867
9.132.3.3 getv()	867
9.132.3.4 invoke()	868
9.132.3.5 seti()	868

9.132.3.6 setv()	868
9.132.4 Member Data Documentation	868
9.132.4.1 canvas	868
9.132.4.2 ctcpnl	869
9.132.4.3 state	869
9.133 ScrollTabNotebook Class Reference	869
9.133.1 Detailed Description	872
9.133.2 Constructor & Destructor Documentation	872
9.133.2.1 ScrollTabNotebook()	872
9.133.3 Member Function Documentation	873
9.133.3.1 _compute_height()	873
9.133.3.2 _compute_width()	873
9.133.3.3 _Configure()	873
9.133.3.4 _draw_arrows()	873
9.133.3.5 _draw_page()	874
9.133.3.6 _get_x_page()	874
9.133.3.7 _highlight()	874
9.133.3.8 _redraw()	875
9.133.3.9 _resize()	875
9.133.3.10 _select()	875
9.133.3.11 _test_page()	875
9.133.3.12 _themeChanged()	876
9.133.3.13 _themeChanged_()	876
9.133.3.14 _xview()	876
9.133.3.15 add()	877
9.133.3.16 compute_size()	877
9.133.3.17 forget()	877
9.133.3.18 get3dcolor()	878
9.133.3.19 index()	878
9.133.3.20 insert()	879
9.133.3.21 see()	879
9.133.3.22 select()	880
9.133.3.23 tab()	880
9.133.3.24 tabs()	881
9.133.4 Member Data Documentation	881
9.133.4.1 _clientRow	881
9.133.4.2 _hpage	881
9.133.4.3 _left	881
9.133.4.4 _paddingtype	881

9.133.4.5 _radiustype	882
9.133.4.6 _right	882
9.133.4.7 _tabrow	882
9.133.4.8 _tabsides	882
9.133.4.9 _textid	882
9.133.4.10 _warrow	882
9.133.4.11 _wpage	883
9.133.4.12 base	883
9.133.4.13 dbg	883
9.133.4.14 lbg	883
9.133.4.15 left	883
9.133.4.16 pages	883
9.133.4.17 pages_opts	884
9.133.4.18 realized	884
9.133.4.19 right	884
9.133.4.20 select	884
9.133.4.21 tabrow	884
9.133.4.22 tabs	884
9.134 Parsers::SegPos Struct Reference	885
9.134.1 Detailed Description	885
9.134.2 Member Data Documentation	885
9.134.2.1 x	885
9.134.2.2 y	885
9.135 Parsers::SegVector Struct Reference	885
9.135.1 Detailed Description	886
9.135.2 Member Enumeration Documentation	887
9.135.2.1 GrType	887
9.135.3 Member Data Documentation	887
9.135.3.1 ang0	887
9.135.3.2 ang1	887
9.135.3.3 angle	887
9.135.3.4 ePos1	888
9.135.3.5 ePos2	888
9.135.3.6 gPos1	888
9.135.3.7 gPos2	888
9.135.3.8 L	888
9.135.3.9 len0	888
9.135.3.10 len1	889
9.135.3.11 length	889

9.135.3.12 R	889
9.135.3.13 radius	889
9.135.3.14 tgType	889
9.136 CabWidgets::SelectLocomotive Class Reference	889
9.136.1 Detailed Description	890
9.136.2 Constructor & Destructor Documentation	891
9.136.2.1 SelectLocomotive()	891
9.136.3 Member Function Documentation	891
9.136.3.1 _addnewloco()	891
9.136.3.2 _trimList()	891
9.136.3.3 currentLocomotive()	892
9.136.3.4 invoke()	892
9.136.4 Member Data Documentation	892
9.136.4.1 lf	892
9.136.4.2 locoList	892
9.137 lcc::SendEvent Class Reference	893
9.137.1 Detailed Description	893
9.137.2 Constructor & Destructor Documentation	893
9.137.2.1 SendEvent()	893
9.137.3 Member Function Documentation	894
9.137.3.1 _Close()	894
9.137.3.2 _Send()	894
9.137.4 Member Data Documentation	894
9.137.4.1 eventid	894
9.138 xpressnet::ServiceModeResponse Class Reference	895
9.138.1 Detailed Description	895
9.138.2 Constructor & Destructor Documentation	895
9.138.2.1 ServiceModeResponse()	895
9.138.3 Member Function Documentation	896
9.138.3.1 CV()	896
9.138.3.2 Data()	896
9.138.3.3 ServiceMode()	896
9.138.4 Member Data Documentation	896
9.138.4.1 _cv	896
9.138.4.2 _data	897
9.138.4.3 _service_mode	897
9.139 FCFSupport::ShowBannerCallback Class Reference	897
9.139.1 Detailed Description	897
9.139.2 Constructor & Destructor Documentation	897

9.139.2.1 ShowBannerCallback()	898
9.139.2.2 ~ShowBannerCallback()	898
9.139.3 Member Function Documentation	898
9.139.3.1 ShowBanner()	898
9.140 CTCPanel::Signal Class Reference	898
9.140.1 Detailed Description	899
9.140.2 Constructor & Destructor Documentation	900
9.140.2.1 Signal()	900
9.140.2.2 ~Signal()	900
9.140.3 Member Function Documentation	900
9.140.3.1 _configureLabel()	901
9.140.3.2 _SchematicDrawOval()	901
9.140.3.3 _SchematicDrawThinLine()	901
9.140.3.4 _VerifyHeads()	902
9.140.3.5 geti()	902
9.140.3.6 getv()	902
9.140.3.7 invoke()	902
9.140.3.8 seti()	903
9.140.3.9 setv()	903
9.140.4 Member Data Documentation	903
9.140.4.1 aspect	903
9.140.4.2 canvas	903
9.140.4.3 ctcpnl	903
9.141 CTCPanel::SIGPlate Class Reference	904
9.141.1 Detailed Description	904
9.141.2 Constructor & Destructor Documentation	905
9.141.2.1 SIGPlate()	906
9.141.2.2 ~SIGPlate()	907
9.141.3 Member Function Documentation	907
9.141.3.1 _configureLabel()	907
9.141.3.2 geti()	907
9.141.3.3 getv()	908
9.141.3.4 invoke()	908
9.141.3.5 seti()	908
9.141.3.6 setv()	908
9.141.4 Member Data Documentation	909
9.141.4.1 _PlatePolygon	909
9.141.4.2 canvas	909
9.141.4.3 ctcpnl	909

9.142 SimpleDOMEElement Class Reference	909
9.142.1 Detailed Description	911
9.142.2 Constructor & Destructor Documentation	911
9.142.2.1 SimpleDOMEElement()	911
9.142.3 Member Function Documentation	911
9.142.3.1 _formattrlist()	911
9.142.3.2 _quoteXML()	912
9.142.3.3 addchild()	912
9.142.3.4 attribute()	912
9.142.3.5 children()	913
9.142.3.6 data()	913
9.142.3.7 display()	913
9.142.3.8 getElementsById()	914
9.142.3.9 getElementsByTagName()	914
9.142.3.10 getParent()	915
9.142.3.11 isChild()	915
9.142.3.12 length()	915
9.142.3.13 removeChild()	916
9.142.3.14 setAttribute()	916
9.142.3.15 setdata()	916
9.142.3.16 validate()	916
9.142.4 Member Data Documentation	917
9.142.4.1 _children	917
9.142.4.2 _data	917
9.143 CTCPanel::SingleSlip Class Reference	917
9.143.1 Detailed Description	918
9.143.2 Constructor & Destructor Documentation	919
9.143.2.1 SingleSlip()	919
9.143.2.2 ~SingleSlip()	919
9.143.3 Member Function Documentation	920
9.143.3.1 _configureLabel()	920
9.143.3.2 geti()	920
9.143.3.3 getv()	920
9.143.3.4 invoke()	920
9.143.3.5 seti()	920
9.143.3.6 setv()	920
9.143.4 Member Data Documentation	921
9.143.4.1 canvas	921
9.143.4.2 ctcpnl	921

9.143.4.3 state	921
9.144 azatrax::SL2 Class Reference	921
9.144.1 Detailed Description	923
9.144.2 Constructor & Destructor Documentation	923
9.144.2.1 SL2()	923
9.144.2.2 ~SL2()	924
9.144.3 Member Function Documentation	924
9.144.3.1 Input_1_Enabled()	924
9.144.3.2 Input_2_Enabled()	924
9.144.3.3 Input_3_Enabled()	924
9.144.3.4 Input_4_Enabled()	925
9.144.3.5 Motor_1_Direction()	925
9.144.3.6 Motor_1_State()	925
9.144.3.7 Motor_2_Direction()	925
9.144.3.8 Motor_2_State()	926
9.144.3.9 OutputRelayInputControl()	926
9.144.3.10 Sense_1()	926
9.144.3.11 Sense_2()	927
9.144.3.12 Sense_3()	927
9.144.3.13 Sense_4()	927
9.144.3.14 SetQ1negQ2pos()	927
9.144.3.15 SetQ1posQ2neg()	928
9.144.3.16 SetQ1Q2open()	928
9.144.3.17 SetQ3negQ4pos()	928
9.144.3.18 SetQ3posQ4neg()	928
9.144.3.19 SetQ3Q4open()	928
9.144.4 Friends And Related Function Documentation	929
9.144.4.1 Azatrax	929
9.145 xpressnet::SoftwareVersion Class Reference	929
9.145.1 Detailed Description	929
9.145.2 Constructor & Destructor Documentation	930
9.145.2.1 SoftwareVersion()	930
9.145.3 Member Function Documentation	930
9.145.3.1 CommandStationTypeCode()	930
9.145.3.2 Major()	930
9.145.3.3 Minor()	930
9.145.4 Member Data Documentation	931
9.145.4.1 _command_station_type	931
9.145.4.2 _major	931

9.145.4.3 _minor	931
9.146 splash Class Reference	931
9.146.1 Detailed Description	932
9.146.2 Package provided	933
9.146.3 Constructor & Destructor Documentation	933
9.146.3.1 splash()	933
9.146.4 Member Function Documentation	933
9.146.4.1 CheckColor()	933
9.146.4.2 CheckImage()	934
9.146.4.3 enableClickDestroy()	934
9.146.4.4 hide()	934
9.146.4.5 show()	934
9.146.4.6 update()	934
9.146.5 Member Data Documentation	935
9.146.5.1 currentProgress	935
9.146.5.2 header	935
9.146.5.3 icon	935
9.146.5.4 image	935
9.146.5.5 progressBar	936
9.146.5.6 status	936
9.146.5.7 title	936
9.147 azatrax::SR4 Class Reference	936
9.147.1 Detailed Description	938
9.147.2 Constructor & Destructor Documentation	938
9.147.2.1 SR4()	938
9.147.2.2 ~SR4()	939
9.147.3 Member Function Documentation	939
9.147.3.1 BlinkRelays()	939
9.147.3.2 Input_1_Enabled()	939
9.147.3.3 Input_2_Enabled()	940
9.147.3.4 Input_3_Enabled()	940
9.147.3.5 Input_4_Enabled()	940
9.147.3.6 OutputRelayInputControl()	940
9.147.3.7 PulseRelays()	941
9.147.3.8 Q1_State()	941
9.147.3.9 Q2_State()	942
9.147.3.10 Q3_State()	942
9.147.3.11 Q4_State()	942
9.147.3.12 RelaysOff()	942

9.147.3.13 RelaysOn()	943
9.147.3.14 Sense_1_Latch()	943
9.147.3.15 Sense_1_Live()	943
9.147.3.16 Sense_2_Latch()	944
9.147.3.17 Sense_2_Live()	944
9.147.3.18 Sense_3_Latch()	944
9.147.3.19 Sense_3_Live()	944
9.147.3.20 Sense_4_Latch()	945
9.147.3.21 Sense_4_Live()	945
9.147.4 Friends And Related Function Documentation	945
9.147.4.1 Azatrax	945
9.148 azatrax::Azatrax::StateDataPacket Struct Reference	945
9.148.1 Detailed Description	946
9.148.2 Member Data Documentation	946
9.148.2.1 commandEcho	946
9.148.2.2 endOfData	947
9.148.2.3 operatingMode	947
9.148.2.4 packetCount	947
9.148.2.5 reserved	947
9.148.2.6 status1	947
9.148.2.7 status2	948
9.148.2.8 status3	948
9.148.2.9 status4	948
9.148.2.10 stopwatchHours	948
9.148.2.11 stopwatchMinutes	949
9.149 FCFSupport::Station Class Reference	949
9.149.1 Detailed Description	950
9.149.2 Constructor & Destructor Documentation	950
9.149.2.1 Station() [1/3]	950
9.149.2.2 Station() [2/3]	950
9.149.2.3 Station() [3/3]	951
9.149.2.4 ~Station()	951
9.149.3 Member Function Documentation	951
9.149.3.1 AppendIndustry()	951
9.149.3.2 Comment()	952
9.149.3.3 MyDivision()	952
9.149.3.4 Name()	952
9.149.3.5 NumberOfIndustries()	952
9.149.3.6 operator=()	952

9.149.3.7 TheIndustry()	953
9.149.4 Friends And Related Function Documentation	953
9.149.4.1 System	953
9.149.5 Member Data Documentation	953
9.149.5.1 comment	953
9.149.5.2 division	954
9.149.5.3 industries	954
9.149.5.4 name	954
9.150 TTSupport::Station Class Reference	954
9.150.1 Detailed Description	956
9.150.2 Constructor & Destructor Documentation	956
9.150.2.1 Station() [1/2]	956
9.150.2.2 Station() [2/2]	956
9.150.2.3 ~Station()	957
9.150.3 Member Function Documentation	957
9.150.3.1 AddStorageTrack()	957
9.150.3.2 DuplicateStationIndex()	957
9.150.3.3 FindStorageTrack()	957
9.150.3.4 FindTrackTrainsStoredOn()	958
9.150.3.5 FirstStorageTrack()	958
9.150.3.6 LastStorageTrack()	958
9.150.3.7 Name()	959
9.150.3.8 NumberOfStorageTracks()	959
9.150.3.9 operator=()	959
9.150.3.10 Read()	959
9.150.3.11 SetDuplicateStationIndex()	960
9.150.3.12 SMile()	960
9.150.3.13 Write()	960
9.150.4 Member Data Documentation	961
9.150.4.1 duplicateStationIndex	961
9.150.4.2 name	961
9.150.4.3 smile	961
9.150.4.4 storageTracks	961
9.151 FCFSupport::SwitchListElement::StationOrIndustry Union Reference	962
9.151.1 Detailed Description	962
9.151.2 Member Data Documentation	962
9.151.2.1 industry	962
9.151.2.2 station	962
9.152 FCFSupport::Train::StationOrIndustry Union Reference	963

9.152.1 Detailed Description	963
9.152.2 Member Data Documentation	963
9.152.2.1 industry	963
9.152.2.2 station	963
9.153 TTSupport::StationTimes Class Reference	963
9.153.1 Detailed Description	964
9.153.2 Constructor & Destructor Documentation	965
9.153.2.1 StationTimes() [1/2]	965
9.153.2.2 StationTimes() [2/2]	965
9.153.3 Member Function Documentation	965
9.153.3.1 Arrival()	965
9.153.3.2 Departure()	966
9.153.3.3 Flag()	966
9.153.3.4 operator=()	966
9.153.4 Member Data Documentation	966
9.153.4.1 arrival	967
9.153.4.2 departure	967
9.153.4.3 flag	967
9.154 azatrax::MRD::status1_union Union Reference	967
9.154.1 Detailed Description	968
9.154.2 Member Data Documentation	968
9.154.2.1 latch_1	968
9.154.2.2 latch_2	968
9.154.2.3 modtype	969
9.154.2.4 reserved	969
9.154.2.5 sense_1	969
9.154.2.6 sense_2	969
9.154.2.7	969
9.154.2.8 theByte	970
9.155 azatrax::SL2::status1_union Union Reference	970
9.155.1 Detailed Description	970
9.155.2 Member Data Documentation	970
9.155.2.1 motor_1_direction	971
9.155.2.2 motor_1_state	971
9.155.2.3 motor_2_direction	971
9.155.2.4 motor_2_state	971
9.155.2.5 reserved	971
9.155.2.6	972
9.155.2.7 theByte	972

9.156 azatrax::SR4::status1_union Union Reference	972
9.156.1 Detailed Description	972
9.156.2 Member Data Documentation	973
9.156.2.1 Q1_state	973
9.156.2.2 Q2_state	973
9.156.2.3 Q3_state	973
9.156.2.4 Q4_state	973
9.156.2.5 reserved	974
9.156.2.6	974
9.156.2.7 theByte	974
9.157 azatrax::MRD::status2_union Union Reference	974
9.157.1 Detailed Description	975
9.157.2 Member Data Documentation	975
9.157.2.1 allowExternalChanges	975
9.157.2.2 externallyChanged	975
9.157.2.3 reserved	975
9.157.2.4 resetStatus	975
9.157.2.5 stopwatchTicking	976
9.157.2.6	976
9.157.2.7 theByte	976
9.158 azatrax::SL2::status2_union Union Reference	976
9.158.1 Detailed Description	977
9.158.2 Member Data Documentation	977
9.158.2.1 reserved	977
9.158.2.2 sense_1	977
9.158.2.3 sense_2	977
9.158.2.4 sense_3	977
9.158.2.5 sense_4	978
9.158.2.6	978
9.158.2.7 theByte	978
9.159 azatrax::SR4::status2_union Union Reference	978
9.159.1 Detailed Description	979
9.159.2 Member Data Documentation	979
9.159.2.1 reserved	979
9.159.2.2 sense_1	979
9.159.2.3 sense_2	979
9.159.2.4 sense_3	979
9.159.2.5 sense_4	980
9.159.2.6	980

9.159.2.7 theByte	980
9.160 azatrax::SL2::status3_union Union Reference	980
9.160.1 Detailed Description	981
9.160.2 Member Data Documentation	981
9.160.2.1 input_1_enabled	981
9.160.2.2 input_2_enabled	981
9.160.2.3 input_3_enabled	981
9.160.2.4 input_4_enabled	981
9.160.2.5 reserved	982
9.160.2.6	982
9.160.2.7 theByte	982
9.161 azatrax::SR4::status3_union Union Reference	982
9.161.1 Detailed Description	983
9.161.2 Member Data Documentation	983
9.161.2.1 input_1_enabled	983
9.161.2.2 input_2_enabled	983
9.161.2.3 input_3_enabled	983
9.161.2.4 input_4_enabled	983
9.161.2.5 reserved	984
9.161.2.6	984
9.161.2.7 theByte	984
9.162 TTSupport::Stop Class Reference	984
9.162.1 Detailed Description	986
9.162.2 Member Enumeration Documentation	986
9.162.2.1 FlagType	986
9.162.3 Constructor & Destructor Documentation	987
9.162.3.1 Stop() [1/2]	987
9.162.3.2 Stop() [2/2]	987
9.162.3.3 ~Stop()	987
9.162.4 Member Function Documentation	988
9.162.4.1 AddNote()	988
9.162.4.2 Departure()	988
9.162.4.3 Flag()	988
9.162.4.4 Layover()	989
9.162.4.5 Note()	989
9.162.4.6 NumberOfNotes()	989
9.162.4.7 operator=()	989
9.162.4.8 Read()	990
9.162.4.9 RemoveNote()	990

9.162.4.10 SetCab()	990
9.162.4.11 SetLayover()	991
9.162.4.12 SetStorageTrackName()	991
9.162.4.13 StationIndex()	991
9.162.4.14 StorageTrackName()	992
9.162.4.15 TheCab()	992
9.162.4.16 Write()	992
9.162.5 Member Data Documentation	992
9.162.5.1 cab	992
9.162.5.2 flag	993
9.162.5.3 layover	993
9.162.5.4 notes	993
9.162.5.5 stationindex	993
9.162.5.6 storageTrackName	993
9.163 TTSupport::StorageTrack Class Reference	994
9.163.1 Detailed Description	995
9.163.2 Constructor & Destructor Documentation	995
9.163.2.1 StorageTrack() [1/2]	995
9.163.2.2 ~StorageTrack()	995
9.163.2.3 StorageTrack() [2/2]	996
9.163.3 Member Function Documentation	996
9.163.3.1 FindOccupied()	996
9.163.3.2 FirstOccupied()	996
9.163.3.3 IncludesTime()	997
9.163.3.4 LastOccupied()	997
9.163.3.5 Name()	997
9.163.3.6 operator=()	997
9.163.3.7 Read()	998
9.163.3.8 RemovedStoredTrain()	998
9.163.3.9 SetName()	998
9.163.3.10 StoreTrain()	999
9.163.3.11 UpdateStoredTrain()	999
9.163.3.12 UpdateStoredTrain2()	999
9.163.3.13 UpdateStoredTrainArrival()	1000
9.163.3.14 UpdateStoredTrainDeparture()	1000
9.163.3.15 UsedTimeRange()	1000
9.163.3.16 Write()	1001
9.163.4 Member Data Documentation	1001
9.163.4.1 name	1001

9.163.4.2 occupations	1001
9.164 CTCPanel::StraightBlock Class Reference	1002
9.164.1 Detailed Description	1002
9.164.2 Constructor & Destructor Documentation	1003
9.164.2.1 StraightBlock()	1003
9.164.2.2 ~StraightBlock()	1004
9.164.3 Member Function Documentation	1004
9.164.3.1 _configureLabel()	1004
9.164.3.2 geti()	1004
9.164.3.3 getv()	1004
9.164.3.4 invoke()	1005
9.164.3.5 seti()	1005
9.164.3.6 setv()	1005
9.164.4 Member Data Documentation	1005
9.164.4.1 canvas	1005
9.164.4.2 ctcpnl	1005
9.165 CTCPanel::StubYard Class Reference	1006
9.165.1 Detailed Description	1006
9.165.2 Constructor & Destructor Documentation	1007
9.165.2.1 StubYard()	1007
9.165.2.2 ~StubYard()	1008
9.165.3 Member Function Documentation	1008
9.165.3.1 _configureLabel()	1008
9.165.3.2 geti()	1008
9.165.3.3 getv()	1008
9.165.3.4 invoke()	1009
9.165.3.5 seti()	1009
9.165.3.6 setv()	1009
9.165.4 Member Data Documentation	1009
9.165.4.1 _StubYard_Poly	1009
9.165.4.2 canvas	1010
9.165.4.3 ctcpnl	1010
9.166 CTCPanel::Switch Class Reference	1010
9.166.1 Detailed Description	1011
9.166.2 Constructor & Destructor Documentation	1012
9.166.2.1 Switch()	1012
9.166.2.2 ~Switch()	1012
9.166.3 Member Function Documentation	1012
9.166.3.1 _configureLabel()	1012

9.166.3.2	geti()	1013
9.166.3.3	getv()	1013
9.166.3.4	invoke()	1013
9.166.3.5	seti()	1013
9.166.3.6	setv()	1013
9.166.4	Member Data Documentation	1014
9.166.4.1	canvas	1014
9.166.4.2	ctcpanel	1014
9.166.4.3	state	1014
9.167	FCFSupport::SwitchList Class Reference	1014
9.167.1	Detailed Description	1016
9.167.2	Constructor & Destructor Documentation	1016
9.167.2.1	SwitchList()	1016
9.167.2.2	~SwitchList()	1016
9.167.3	Member Function Documentation	1016
9.167.3.1	AddSwitchListElement() [1/2]	1016
9.167.3.2	AddSwitchListElement() [2/2]	1017
9.167.3.3	DiscardSwitchList()	1017
9.167.3.4	LimitCars()	1017
9.167.3.5	NextSwitchListForCarAndIndustry()	1018
9.167.3.6	operator[]() [1/2]	1018
9.167.3.7	operator[]() [2/2]	1018
9.167.3.8	PickCarEq()	1018
9.167.3.9	PickIndex()	1019
9.167.3.10	PickLocationEq()	1019
9.167.3.11	PickTrainEq()	1019
9.167.3.12	ResetLastIndex()	1020
9.167.3.13	ResetSwitchList()	1020
9.167.4	Friends And Related Function Documentation	1020
9.167.4.1	operator<<	1020
9.167.5	Member Data Documentation	1020
9.167.5.1	lastIndex	1020
9.167.5.2	limitCars	1021
9.167.5.3	pickIndex	1021
9.167.5.4	theList	1021
9.168	FCFSupport::SwitchListElement Class Reference	1021
9.168.1	Detailed Description	1023
9.168.2	Constructor & Destructor Documentation	1023
9.168.2.1	SwitchListElement() [1/4]	1023

9.168.2.2 SwitchListElement() [2/4]	1023
9.168.2.3 SwitchListElement() [3/4]	1023
9.168.2.4 SwitchListElement() [4/4]	1024
9.168.3 Member Function Documentation	1024
9.168.3.1 DropStopEQ()	1025
9.168.3.2 DropStopIndustry()	1025
9.168.3.3 DropStopStation()	1025
9.168.3.4 LastTrain()	1025
9.168.3.5 operator=()	1025
9.168.3.6 PickCar()	1026
9.168.3.7 PickLocation()	1026
9.168.3.8 PickTrain()	1026
9.168.4 Friends And Related Function Documentation	1026
9.168.4.1 System	1026
9.168.5 Member Data Documentation	1027
9.168.5.1 dropStop	1027
9.168.5.2 lastTrain	1027
9.168.5.3 pickCar	1027
9.168.5.4 pickLoc	1027
9.168.5.5 pickTrain	1028
9.169 CTCPanel::SWPlate Class Reference	1028
9.169.1 Detailed Description	1029
9.169.2 Constructor & Destructor Documentation	1030
9.169.2.1 SWPlate()	1030
9.169.2.2 ~SWPlate()	1031
9.169.3 Member Function Documentation	1031
9.169.3.1 _configureLabel()	1031
9.169.3.2 geti()	1031
9.169.3.3 getv()	1032
9.169.3.4 invoke()	1032
9.169.3.5 seti()	1032
9.169.3.6 setv()	1032
9.169.4 Member Data Documentation	1033
9.169.4.1 _PlatePolygon	1033
9.169.4.2 canvas	1033
9.169.4.3 ctcpnl	1033
9.170 FCFSupport::System Class Reference	1033
9.170.1 Detailed Description	1045
9.170.2 Member Enumeration Documentation	1046

9.170.2.1 CarLocationType	1046
9.170.2.2 CarTypeReport	1046
9.170.3 Constructor & Destructor Documentation	1046
9.170.3.1 System() [1/2]	1046
9.170.3.2 System() [2/2]	1047
9.170.3.3 ~System()	1047
9.170.4 Member Function Documentation	1047
9.170.4.1 AddCar()	1047
9.170.4.2 AddOwner()	1048
9.170.4.3 CarAssignment()	1048
9.170.4.4 CarMovements()	1049
9.170.4.5 CarsAtDest()	1049
9.170.4.6 CarsAtDest_CarsInTransit()	1049
9.170.4.7 CarsAtWorkBench()	1049
9.170.4.8 CarsFile()	1049
9.170.4.9 CarsInTransit()	1050
9.170.4.10 CarsMoved()	1050
9.170.4.11 CarsMovedMore()	1050
9.170.4.12 CarsMovedOnce()	1050
9.170.4.13 CarsMovedThree()	1050
9.170.4.14 CarsMovedTwice()	1051
9.170.4.15 CarsNotMoved()	1051
9.170.4.16 CarTypesFile()	1051
9.170.4.17 CarTypesOrder()	1051
9.170.4.18 CarTypesOrderIndex()	1052
9.170.4.19 DeleteAllExistingCars()	1052
9.170.4.20 FindCarInCarVector()	1052
9.170.4.21 FindDivisionByIndex()	1052
9.170.4.22 FindDivisionBySymbol()	1053
9.170.4.23 FindDivisionIndex()	1053
9.170.4.24 FindIndustry()	1053
9.170.4.25 FindIndustryByIndex()	1054
9.170.4.26 FindIndustryByName()	1054
9.170.4.27 FindIndustryIndex()	1054
9.170.4.28 FindStationByName()	1055
9.170.4.29 FindStationIndex()	1055
9.170.4.30 FindTrainByIndex()	1055
9.170.4.31 FindTrainByName()	1056
9.170.4.32 FirstCarType()	1056

9.170.4.33 FirstDivision()	1056
9.170.4.34 FirstIndustry()	1057
9.170.4.35 FirstOwner()	1057
9.170.4.36 FirstStation()	1057
9.170.4.37 FirstTrain()	1057
9.170.4.38 FixedRouteMirrorCheck()	1057
9.170.4.39 FormatDutyTime()	1058
9.170.4.40 GetCarStatus()	1058
9.170.4.41 GetIndustryCarCounts()	1058
9.170.4.42 GlobStringMatch()	1059
9.170.4.43 GlobStringMatchHelper()	1059
9.170.4.44 IndRipTrack()	1059
9.170.4.45 IndRipTrackConst()	1060
9.170.4.46 IndScrapYard()	1060
9.170.4.47 IndustriesFile()	1060
9.170.4.48 IndustryIndex()	1060
9.170.4.49 IndustryTakesCar()	1060
9.170.4.50 InternalRunOneTrain()	1061
9.170.4.51 LastCarType()	1061
9.170.4.52 LastDivision()	1062
9.170.4.53 LastIndustry()	1062
9.170.4.54 LastOwner()	1062
9.170.4.55 LastStation()	1062
9.170.4.56 LastTrain()	1062
9.170.4.57 LoadCarFile()	1062
9.170.4.58 LoadStatsFile()	1063
9.170.4.59 LogCarPickup()	1063
9.170.4.60 NextShift()	1063
9.170.4.61 NumberOfCars()	1064
9.170.4.62 NumberOfDivisions()	1064
9.170.4.63 NumberOfIndustries()	1064
9.170.4.64 NumberOfStations()	1064
9.170.4.65 NumberOfTrains()	1065
9.170.4.66 OrdersFile()	1065
9.170.4.67 OtherCarOkForTrain()	1065
9.170.4.68 OwnersFile()	1065
9.170.4.69 PrintAllCarTypes()	1066
9.170.4.70 PrintAllLists()	1066
9.170.4.71 PrintAlpha()	1066

9.170.4.72 PrintAnalysisHeader()	1066
9.170.4.73 PrintAtwice()	1067
9.170.4.74 PrintCarHeading()	1067
9.170.4.75 PrintCarTypesHeader()	1067
9.170.4.76 PrintCarTypesSummaryHeader()	1068
9.170.4.77 PrintDashedLine()	1068
9.170.4.78 PrintDispatch()	1068
9.170.4.79 PrintDispatcher()	1068
9.170.4.80 Printem()	1069
9.170.4.81 PrintFormFeed()	1069
9.170.4.82 PrintIndustryHeader()	1069
9.170.4.83 PrintList()	1070
9.170.4.84 PrintLocCommon()	1070
9.170.4.85 PrintLocOneIndustry()	1070
9.170.4.86 PrintLtwice()	1070
9.170.4.87 PrintOneAnalysis()	1071
9.170.4.88 PrintOneCarInfo()	1071
9.170.4.89 PrintOneCarLocation()	1071
9.170.4.90 PrintOneCarType()	1072
9.170.4.91 PrintOneIndustry()	1072
9.170.4.92 PrintSystemBanner()	1073
9.170.4.93 PrintTrainLoc()	1073
9.170.4.94 PrintTrainOrderHeader()	1074
9.170.4.95 PrintTrainOrders()	1074
9.170.4.96 PrintYards()	1074
9.170.4.97 RanAllTrains()	1075
9.170.4.98 Random()	1075
9.170.4.99 Randomize()	1075
9.170.4.100 ReadCarTypes()	1075
9.170.4.101 ReadDivisions()	1076
9.170.4.102 ReadGroupLimit()	1076
9.170.4.103 ReadIndustries()	1076
9.170.4.104 ReadOwners()	1077
9.170.4.105 ReadStations()	1077
9.170.4.106 ReadTrainOrders()	1077
9.170.4.107 ReadTrains()	1078
9.170.4.108 ReLoadCarFile()	1078
9.170.4.109 ReportAnalysis()	1078
9.170.4.110 ReportCarLocations()	1079

9.170.4.111 ReportCarOwners()	1079
9.170.4.112 ReportCars()	1080
9.170.4.113 ReportCarsNotMoved()	1080
9.170.4.114 ReportCarTypes()	1080
9.170.4.115 ReportIndustries()	1081
9.170.4.116 ReportLocAll()	1081
9.170.4.117 ReportLocDivision()	1082
9.170.4.118 ReportLocIndustry()	1082
9.170.4.119 ReportLocStation()	1082
9.170.4.120 ReportTrains()	1083
9.170.4.121 ResetIndustryStats()	1083
9.170.4.122 RestartLoop()	1083
9.170.4.123 RunAllTrains()	1084
9.170.4.124 RunBoxMoves()	1084
9.170.4.125 RunOneLocal()	1085
9.170.4.126 RunOneManifest()	1085
9.170.4.127 RunOnePassenger()	1086
9.170.4.128 RunOneTrain()	1086
9.170.4.129 SaveCars()	1086
9.170.4.130 SearchForCarIndexesByNumber()	1088
9.170.4.131 SearchForIndustryPattern()	1088
9.170.4.132 SearchForTrainPattern()	1088
9.170.4.133 SessionNumber()	1089
9.170.4.134 SetPrintAlpha()	1089
9.170.4.135 SetPrintAttwice()	1089
9.170.4.136 SetPrintDispatch()	1089
9.170.4.137 SetPrintem()	1090
9.170.4.138 SetPrintList()	1090
9.170.4.139 SetPrintLtwice()	1090
9.170.4.140 SetPrintYards()	1091
9.170.4.141 ShiftNumber()	1091
9.170.4.142 ShowCarMovements()	1091
9.170.4.143 ShowCarsInDivision()	1092
9.170.4.144 ShowCarsNotMoved()	1092
9.170.4.145 ShowTrainCars()	1092
9.170.4.146 ShowTrainTotals()	1093
9.170.4.147 ShowUnassignedCars()	1093
9.170.4.148 SkipCommentsGets()	1094
9.170.4.149 split()	1094

9.170.4.150 StatsFile()	1094
9.170.4.151 StatsPeriod()	1095
9.170.4.152 StringToInt()	1095
9.170.4.153 StringToIntRange()	1095
9.170.4.154 SystemFile()	1096
9.170.4.155 SystemName()	1096
9.170.4.156 TheCar()	1096
9.170.4.157 TheCarGroup()	1096
9.170.4.158 TheCarType()	1097
9.170.4.159 TheDivision()	1097
9.170.4.160 TheIndustry()	1097
9.170.4.161 TheOwner()	1099
9.170.4.162 TheStation()	1099
9.170.4.163 Today()	1099
9.170.4.164 TotalCars()	1100
9.170.4.165 TotalShifts()	1100
9.170.4.166 TrainByIndex()	1100
9.170.4.167 TrainByName()	1100
9.170.4.168 TrainCarPickupCheck()	1101
9.170.4.169 TrainDropAllCars()	1101
9.170.4.170 TrainDropOneCar()	1102
9.170.4.171 TrainIndex()	1102
9.170.4.172 TrainLocalDrops()	1103
9.170.4.173 TrainLocalOriginate()	1103
9.170.4.174 TrainLocalPickups()	1104
9.170.4.175 TrainManifestDrops()	1104
9.170.4.176 TrainManifestPickups()	1105
9.170.4.177 TrainPickupOneCar()	1105
9.170.4.178 TrainPrintConsistSummary()	1106
9.170.4.179 TrainPrintFinalSummary()	1106
9.170.4.180 TrainPrintTown()	1107
9.170.4.181 TrainsFile()	1107
9.170.4.182 trim()	1107
9.170.4.183 UpperCase()	1108
9.170.4.184 WriteOneCarToDisk()	1108
9.170.5 Member Data Documentation	1108
9.170.5.1 carDest	1108
9.170.5.2 carGroups	1109
9.170.5.3 carMovements	1109

9.170.5.4 cars	1109
9.170.5.5 carsAtDest	1109
9.170.5.6 carsAtDest_carsInTransit	1109
9.170.5.7 carsAtWorkBench	1110
9.170.5.8 carsFile	1110
9.170.5.9 carsInTransit	1110
9.170.5.10 carsMoved	1110
9.170.5.11 carsMovedMore	1110
9.170.5.12 carsMovedOnce	1111
9.170.5.13 carsMovedThree	1111
9.170.5.14 carsMovedTwice	1111
9.170.5.15 carsNotMoved	1111
9.170.5.16 carTypes	1111
9.170.5.17 carTypesFile	1112
9.170.5.18 carTypesOrder	1112
9.170.5.19 curDiv	1112
9.170.5.20 deliver	1112
9.170.5.21 divisions	1112
9.170.5.22 indScrapYard	1113
9.170.5.23 industries	1113
9.170.5.24 industriesFile	1113
9.170.5.25 messageBuffer	1113
9.170.5.26 numberCars	1113
9.170.5.27 ordersFile	1114
9.170.5.28 originYard	1114
9.170.5.29 owners	1114
9.170.5.30 ownersFile	1114
9.170.5.31 printAlpha	1114
9.170.5.32 printAtwice	1115
9.170.5.33 printDispatch	1115
9.170.5.34 printem	1115
9.170.5.35 printList	1115
9.170.5.36 printLtwice	1115
9.170.5.37 printYards	1116
9.170.5.38 ranAllTrains	1116
9.170.5.39 sessionNumber	1116
9.170.5.40 shiftNumber	1116
9.170.5.41 stations	1116
9.170.5.42 statsFile	1117

9.170.5.43 statsPeriod	1117
9.170.5.44 switchList	1117
9.170.5.45 systemFile	1117
9.170.5.46 systemName	1117
9.170.5.47 totalLoads	1118
9.170.5.48 totalPickups	1118
9.170.5.49 totalRevenueTons	1118
9.170.5.50 totalShifts	1118
9.170.5.51 totalTons	1118
9.170.5.52 trainEmpties	1119
9.170.5.53 trainIndex	1119
9.170.5.54 trainLastLocation	1119
9.170.5.55 trainLength	1119
9.170.5.56 trainLoads	1119
9.170.5.57 trainLongest	1120
9.170.5.58 trainPrintOK	1120
9.170.5.59 trains	1120
9.170.5.60 trainsFile	1120
9.170.5.61 trainTons	1120
9.170.5.62 wayFreight	1121
9.170.5.63 whitespace	1121
9.171 FCFSupport::TextPrinterDevice Class Reference	1121
9.171.1 Detailed Description	1122
9.171.2 Constructor & Destructor Documentation	1122
9.171.2.1 TextPrinterDevice()	1122
9.171.2.2 ~TextPrinterDevice()	1123
9.171.3 Member Function Documentation	1123
9.171.3.1 ClosePrinter()	1123
9.171.3.2 NewPage()	1123
9.171.3.3 OpenPrinter()	1124
9.171.3.4 Put()	1124
9.171.3.5 PutLine()	1124
9.171.3.6 Tab()	1125
9.171.4 Member Data Documentation	1125
9.171.4.1 currentColumn	1125
9.171.4.2 printerStream	1125
9.172 CTCPanel::ThreeWaySW Class Reference	1125
9.172.1 Detailed Description	1126
9.172.2 Constructor & Destructor Documentation	1127

9.172.2.1 ThreeWaySW()	1128
9.172.2.2 ~ThreeWaySW()	1129
9.172.3 Member Function Documentation	1129
9.172.3.1 _configureLabel()	1129
9.172.3.2 geti()	1129
9.172.3.3 getv()	1129
9.172.3.4 invoke()	1130
9.172.3.5 seti()	1130
9.172.3.6 setv()	1130
9.172.4 Member Data Documentation	1130
9.172.4.1 canvas	1130
9.172.4.2 ctcpnl	1131
9.172.4.3 state	1131
9.173 CTCPnl::ThroughYard Class Reference	1131
9.173.1 Detailed Description	1132
9.173.2 Constructor & Destructor Documentation	1132
9.173.2.1 ThroughYard()	1133
9.173.2.2 ~ThroughYard()	1133
9.173.3 Member Function Documentation	1133
9.173.3.1 _configureLabel()	1133
9.173.3.2 geti()	1133
9.173.3.3 invoke()	1134
9.173.3.4 seti()	1134
9.173.3.5 setv()	1134
9.173.4 Member Data Documentation	1134
9.173.4.1 _ThroughYard_Poly	1134
9.173.4.2 canvas	1135
9.173.4.3 ctcpnl	1135
9.174 TTSupport::TimeRange Class Reference	1135
9.174.1 Detailed Description	1136
9.174.2 Constructor & Destructor Documentation	1136
9.174.2.1 TimeRange() [1/2]	1136
9.174.2.2 TimeRange() [2/2]	1136
9.174.3 Member Function Documentation	1137
9.174.3.1 ContainsTime()	1137
9.174.3.2 From()	1137
9.174.3.3 operator<()	1137
9.174.3.4 operator<=()	1138
9.174.3.5 operator=()	1138

9.174.3.6 operator==()	1138
9.174.3.7 operator>()	1139
9.174.3.8 operator>=()	1139
9.174.3.9 Read()	1139
9.174.3.10 To()	1140
9.174.3.11 Write()	1140
9.174.4 Member Data Documentation	1140
9.174.4.1 from	1140
9.174.4.2 to	1141
9.175 TTSupport::TimeTableSystem Class Reference	1141
9.175.1 Detailed Description	1144
9.175.2 Constructor & Destructor Documentation	1144
9.175.2.1 TimeTableSystem() [1/3]	1145
9.175.2.2 TimeTableSystem() [2/3]	1145
9.175.2.3 TimeTableSystem() [3/3]	1145
9.175.2.4 ~TimeTableSystem()	1146
9.175.3 Member Function Documentation	1146
9.175.3.1 AddCab()	1146
9.175.3.2 AddNote()	1146
9.175.3.3 AddStation()	1147
9.175.3.4 AddStorageTrack()	1147
9.175.3.5 AddTrain()	1147
9.175.3.6 AddTrainLongVersion()	1148
9.175.3.7 ComputeTimes()	1149
9.175.3.8 CreateLaTeXTimetable()	1149
9.175.3.9 DeleteTrain()	1150
9.175.3.10 DuplicateStationIndex()	1150
9.175.3.11 Filename()	1151
9.175.3.12 FindCab()	1151
9.175.3.13 FindStationByName()	1151
9.175.3.14 FindStorageTrack()	1152
9.175.3.15 FindTrainByName()	1152
9.175.3.16 FindTrainByNumber()	1152
9.175.3.17 FirstCab()	1153
9.175.3.18 FirstPrintOption()	1153
9.175.3.19 FirstTrain()	1153
9.175.3.20 GetPrintOption()	1153
9.175.3.21 lthStation()	1154
9.175.3.22 LastCab()	1154

9.175.3.23 LastPrintOption()	1154
9.175.3.24 LastTrain()	1155
9.175.3.25 MakeTimeTableGroupByClass()	1155
9.175.3.26 MakeTimeTableGroupManually()	1155
9.175.3.27 MakeTimeTableOneTable()	1156
9.175.3.28 MakeTimeTableOneTableStationsCenter()	1156
9.175.3.29 MakeTimeTableOneTableStationsLeft()	1157
9.175.3.30 Name()	1157
9.175.3.31 Note()	1158
9.175.3.32 NumberOfCabs()	1158
9.175.3.33 NumberOfNotes()	1158
9.175.3.34 NumberOfStations()	1158
9.175.3.35 NumberOfTrains()	1159
9.175.3.36 ReadNote()	1159
9.175.3.37 SetDuplicateStationIndex()	1159
9.175.3.38 SetNote()	1160
9.175.3.39 SetPrintOption()	1160
9.175.3.40 SMile()	1160
9.175.3.41 StationName()	1161
9.175.3.42 TimeInterval()	1161
9.175.3.43 TimeScale()	1161
9.175.3.44 TotalLength()	1162
9.175.3.45 WriteNewTimeTableFile()	1162
9.175.3.46 WriteNote()	1162
9.175.3.47 WriteOldTimeTableFile()	1163
9.175.4 Member Data Documentation	1163
9.175.4.1 cabs	1163
9.175.4.2 DirectionName	1163
9.175.4.3 filepath	1164
9.175.4.4 name	1164
9.175.4.5 notes	1164
9.175.4.6 printOptions	1164
9.175.4.7 stations	1164
9.175.4.8 timeinterval	1165
9.175.4.9 timescale	1165
9.175.4.10 TOCP	1165
9.175.4.11 trains	1165
9.176 CTCPanel::Toggle Class Reference	1165
9.176.1 Detailed Description	1166

9.176.2 Constructor & Destructor Documentation	1167
9.176.2.1 Toggle()	1168
9.176.2.2 ~Toggle()	1169
9.176.3 Member Function Documentation	1169
9.176.3.1 _AddTLever()	1169
9.176.3.2 _configureCenterLabel()	1169
9.176.3.3 _configureLeftLabel()	1170
9.176.3.4 _configureRightLabel()	1170
9.176.3.5 _MoveTLever()	1170
9.176.3.6 _VerifyOrientationHV()	1170
9.176.3.7 geti()	1171
9.176.3.8 getv()	1171
9.176.3.9 invoke()	1171
9.176.3.10 seti()	1171
9.176.3.11 setv()	1171
9.176.4 Member Data Documentation	1172
9.176.4.1 canvas	1172
9.176.4.2 ctcpanel	1172
9.176.4.3 lever	1172
9.177 Parsers::TrackBody Class Reference	1172
9.177.1 Detailed Description	1173
9.177.2 Constructor & Destructor Documentation	1173
9.177.2.1 TrackBody()	1173
9.177.2.2 ~TrackBody()	1173
9.177.3 Member Function Documentation	1174
9.177.3.1 AppendTrackBodyElt()	1174
9.177.3.2 ConsTrackBody()	1174
9.177.3.3 TrackBodyLength()	1174
9.177.4 Friends And Related Function Documentation	1174
9.177.4.1 operator<<	1175
9.177.4.2 TrackGraph	1175
9.177.5 Member Data Documentation	1175
9.177.5.1 element	1175
9.177.5.2 next	1175
9.178 Parsers::TrackBodyElt Class Reference	1175
9.178.1 Detailed Description	1176
9.178.2 Constructor & Destructor Documentation	1176
9.178.2.1 TrackBodyElt()	1177
9.178.2.2 ~TrackBodyElt()	1177

9.178.3 Member Function Documentation	1177
9.178.3.1 ConnectedTrackEnd()	1177
9.178.3.2 UnConnectedTrackEnd()	1177
9.178.4 Friends And Related Function Documentation	1178
9.178.4.1 operator<<	1178
9.178.4.2 TrackGraph	1178
9.178.5 Member Data Documentation	1178
9.178.5.1 a	1178
9.178.5.2 index	1178
9.178.5.3 x	1179
9.178.5.4 y	1179
9.179 Parsers::TrackGraph Class Reference	1179
9.179.1 Detailed Description	1184
9.179.2 Member Typedef Documentation	1185
9.179.2.1 CompressedEdgePair	1185
9.179.2.2 CompressedEdgePairVector	1185
9.179.2.3 CompressedGraph	1185
9.179.2.4 CompressedIdNodeMap	1186
9.179.2.5 CompressedNode	1186
9.179.2.6 CompressedNodeVector	1186
9.179.2.7 Graph	1186
9.179.2.8 IdNodeMap	1186
9.179.2.9 Node	1186
9.179.3 Member Enumeration Documentation	1186
9.179.3.1 NodeType	1186
9.179.3.2 RotationUnit	1187
9.179.4 Constructor & Destructor Documentation	1187
9.179.4.1 TrackGraph()	1187
9.179.4.2 ~TrackGraph()	1187
9.179.5 Member Function Documentation	1188
9.179.5.1 AddNewNode()	1188
9.179.5.2 Angle()	1188
9.179.5.3 compressed_edge_exists()	1188
9.179.5.4 CompressedEdgeCount()	1188
9.179.5.5 CompressedEdgeLength()	1189
9.179.5.6 CompressedEdgeNode()	1189
9.179.5.7 CompressedGraphCircleLayout()	1189
9.179.5.8 CompressedGraphKamadaKawaiSpring()	1189
9.179.5.9 CompressedGraphKruskalMinimumSpanningTree()	1190

9.179.5.10 CompressedGraphPrimMinimumSpanningTree()	1190
9.179.5.11 CompressedNodePositionX()	1190
9.179.5.12 CompressedNodePositionY()	1190
9.179.5.13 CompressedNodeSegments()	1191
9.179.5.14 CompressGraph()	1191
9.179.5.15 computeHeads()	1191
9.179.5.16 ComputeRouteLength()	1191
9.179.5.17 DeleteTurnoutGraphic()	1191
9.179.5.18 DeleteTurnoutRouteList()	1192
9.179.5.19 EdgeA()	1192
9.179.5.20 EdgeIndex()	1192
9.179.5.21 EdgeLength()	1192
9.179.5.22 EdgeX()	1193
9.179.5.23 EdgeY()	1193
9.179.5.24 FindBlock()	1193
9.179.5.25 FindNode()	1193
9.179.5.26 Heads()	1194
9.179.5.27 HighestNode()	1194
9.179.5.28 InsertBezierTrack()	1194
9.179.5.29 InsertBlock()	1194
9.179.5.30 insertCompressedNode()	1195
9.179.5.31 InsertControl()	1195
9.179.5.32 InsertCornuTrack()	1195
9.179.5.33 InsertCurveTrack()	1196
9.179.5.34 InsertJointTrack()	1196
9.179.5.35 InsertSensor()	1196
9.179.5.36 InsertSignal()	1196
9.179.5.37 InsertStraightTrack()	1197
9.179.5.38 InsertSwitchMotor()	1197
9.179.5.39 InsertTurnOut()	1197
9.179.5.40 InsertTurnTable()	1197
9.179.5.41 IsCompressed()	1198
9.179.5.42 IsCompressedNode()	1198
9.179.5.43 IsNodeP()	1198
9.179.5.44 IsNone()	1198
9.179.5.45 LengthOfCurve()	1199
9.179.5.46 LengthOfJoint()	1199
9.179.5.47 LengthOfNode()	1199
9.179.5.48 LengthOfStraight()	1199

9.179.5.49	LowestNode()	1200
9.179.5.50	MakeTurnoutGraphic()	1200
9.179.5.51	MakeTurnoutRouteList()	1200
9.179.5.52	NameOfNode()	1200
9.179.5.53	NodeTurnoutGraphic()	1201
9.179.5.54	NodeTurnoutRoutelist()	1201
9.179.5.55	NormalActionScript()	1201
9.179.5.56	NumberOfHeads()	1201
9.179.5.57	NumEdges()	1201
9.179.5.58	OffScript()	1201
9.179.5.59	OnScript()	1202
9.179.5.60	OrigX()	1202
9.179.5.61	OrigY()	1202
9.179.5.62	ReverseActionScript()	1203
9.179.5.63	Roots()	1203
9.179.5.64	SenseScript()	1203
9.179.5.65	SignalAspects()	1204
9.179.5.66	tr_rotate()	1204
9.179.5.67	tr_scale() [1/2]	1204
9.179.5.68	tr_scale() [2/2]	1204
9.179.5.69	tr_translate()	1204
9.179.5.70	TrackList()	1205
9.179.5.71	traversePrimMST()	1205
9.179.5.72	TurnoutNumber()	1205
9.179.5.73	TypeOfNode()	1205
9.179.6	Friends And Related Function Documentation	1205
9.179.6.1	operator<<	1206
9.179.7	Member Data Documentation	1206
9.179.7.1	backpointers	1206
9.179.7.2	c_idMap	1206
9.179.7.3	c_nodes	1206
9.179.7.4	c_roots	1206
9.179.7.5	circleLayoutP	1207
9.179.7.6	compressedP	1207
9.179.7.7	heads	1207
9.179.7.8	idMap	1207
9.179.7.9	KamadaKawaiSpringLayoutP	1207
9.179.7.10	nodes	1208
9.179.7.11	none	1208

9.179.7.12 valid_heads	1208
9.180 FCFSupport::Train Class Reference	1208
9.180.1 Detailed Description	1211
9.180.2 Member Enumeration Documentation	1211
9.180.2.1 TrainType	1211
9.180.3 Constructor & Destructor Documentation	1211
9.180.3.1 Train() [1/3]	1211
9.180.3.2 Train() [2/3]	1212
9.180.3.3 Train() [3/3]	1212
9.180.3.4 ~Train()	1213
9.180.4 Member Function Documentation	1213
9.180.4.1 CarTypes()	1213
9.180.4.2 Description()	1214
9.180.4.3 DivisionList()	1214
9.180.4.4 Done()	1214
9.180.4.5 IndustryStop()	1214
9.180.4.6 MaxCars()	1215
9.180.4.7 MaxClear()	1215
9.180.4.8 MaxLength()	1215
9.180.4.9 MaxWeight()	1215
9.180.4.10 Name()	1215
9.180.4.11 NumberOfOrders()	1216
9.180.4.12 NumberOfStops()	1216
9.180.4.13 OnDuty()	1216
9.180.4.14 operator=()	1216
9.180.4.15 Order()	1217
9.180.4.16 Print()	1217
9.180.4.17 SetMaxLength()	1217
9.180.4.18 SetMaxWeight()	1217
9.180.4.19 SetPrint()	1218
9.180.4.20 SetShift()	1218
9.180.4.21 Shift()	1218
9.180.4.22 StationStop()	1219
9.180.4.23 Type()	1219
9.180.5 Friends And Related Function Documentation	1219
9.180.5.1 System	1219
9.180.6 Member Data Documentation	1219
9.180.6.1 carTypes	1220
9.180.6.2 description	1220

9.180.6.3 divList	1220
9.180.6.4 done	1220
9.180.6.5 maxcars	1220
9.180.6.6 maxclear	1221
9.180.6.7 maxlength	1221
9.180.6.8 maxweight	1221
9.180.6.9 name	1221
9.180.6.10 on duty	1221
9.180.6.11 orders	1222
9.180.6.12 print	1222
9.180.6.13 shift	1222
9.180.6.14 stops	1222
9.180.6.15 type	1222
9.181 TTSupport::Train Class Reference	1223
9.181.1 Detailed Description	1224
9.181.2 Constructor & Destructor Documentation	1224
9.181.2.1 Train()	1225
9.181.3 Member Function Documentation	1225
9.181.3.1 AddNoteToStop()	1225
9.181.3.2 AddNoteToTrain()	1226
9.181.3.3 ClassNumber()	1226
9.181.3.4 Departure()	1226
9.181.3.5 Name()	1226
9.181.3.6 Note()	1226
9.181.3.7 Number()	1227
9.181.3.8 NumberOfNotes()	1227
9.181.3.9 NumberOfStops()	1227
9.181.3.10 Read()	1227
9.181.3.11 RemoveNoteFromStop()	1228
9.181.3.12 RemoveNoteFromTrain()	1228
9.181.3.13 SetDeparture()	1228
9.181.3.14 SetDestinationStorageTrack()	1229
9.181.3.15 SetOriginStorageTrack()	1229
9.181.3.16 SetTransitStorageTrack()	1229
9.181.3.17 Speed()	1230
9.181.3.18 StartSMile()	1230
9.181.3.19 StopI()	1230
9.181.3.20 UpdateStopCab()	1231
9.181.3.21 UpdateStopLayover()	1231

9.181.3.22 Write()	1231
9.181.4 Member Data Documentation	1231
9.181.4.1 classnumber	1232
9.181.4.2 departure	1232
9.181.4.3 name	1232
9.181.4.4 notes	1232
9.181.4.5 number	1232
9.181.4.6 speed	1233
9.181.4.7 startSMile	1233
9.181.4.8 stops	1233
9.182 FCFSupport::TrainDisplayCallback Class Reference	1233
9.182.1 Detailed Description	1234
9.182.2 Constructor & Destructor Documentation	1234
9.182.2.1 TrainDisplayCallback()	1234
9.182.2.2 ~TrainDisplayCallback()	1234
9.182.3 Member Function Documentation	1234
9.182.3.1 CloseTrainDisplay()	1234
9.182.3.2 GrabTrainDisplay()	1235
9.182.3.3 InitializeTrainDisplay()	1235
9.182.3.4 ReleaseTrainDisplay()	1235
9.182.3.5 UpdateTrainDisplay()	1235
9.183 Parsers::TrackGraph::Transform2D Class Reference	1236
9.183.1 Detailed Description	1237
9.183.2 Constructor & Destructor Documentation	1237
9.183.2.1 Transform2D() [1/3]	1237
9.183.2.2 Transform2D() [2/3]	1238
9.183.2.3 Transform2D() [3/3]	1238
9.183.3 Member Function Documentation	1238
9.183.3.1 Apply() [1/2]	1238
9.183.3.2 Apply() [2/2]	1238
9.183.3.3 Determinant()	1239
9.183.3.4 Inverse()	1239
9.183.3.5 Minor()	1239
9.183.3.6 operator"!="()	1239
9.183.3.7 operator==(())	1239
9.183.4 Friends And Related Function Documentation	1239
9.183.4.1 operator*	1240
9.183.5 Member Data Documentation	1240
9.183.5.1 FUZZ	1240

9.183.5.2 matrix	1240
9.184 Parsers::TurnoutBody Class Reference	1240
9.184.1 Detailed Description	1241
9.184.2 Constructor & Destructor Documentation	1241
9.184.2.1 TurnoutBody()	1241
9.184.3 Member Function Documentation	1242
9.184.3.1 CleanUpElement()	1242
9.184.3.2 CleanUpTurnoutBody()	1242
9.184.3.3 ConsTurnoutBody()	1242
9.184.3.4 Element()	1242
9.184.3.5 TurnoutEnds()	1243
9.184.3.6 TurnoutRouteCount()	1243
9.184.3.7 TurnoutSegmentCount()	1243
9.184.4 Friends And Related Function Documentation	1243
9.184.4.1 TrackGraph	1243
9.184.4.2 TurnoutBodyElt	1243
9.184.5 Member Data Documentation	1244
9.184.5.1 element	1244
9.184.5.2 next	1244
9.185 Parsers::TurnoutBodyElt Class Reference	1244
9.185.1 Detailed Description	1246
9.185.2 Member Enumeration Documentation	1246
9.185.2.1 TurnoutBodyEltType	1246
9.185.3 Constructor & Destructor Documentation	1247
9.185.3.1 TurnoutBodyElt()	1247
9.185.3.2 ~TurnoutBodyElt()	1247
9.185.4 Member Function Documentation	1247
9.185.4.1 GetTurnoutCurveSegment()	1247
9.185.4.2 GetTurnoutJointSegment()	1248
9.185.4.3 GetTurnoutRoute()	1248
9.185.4.4 GetTurnoutStraightSegment()	1248
9.185.4.5 InitTSegId()	1248
9.185.4.6 MakeTurnoutCurveSegment()	1249
9.185.4.7 MakeTurnoutEnd()	1249
9.185.4.8 MakeTurnoutJointSegment()	1249
9.185.4.9 MakeTurnoutRoute()	1250
9.185.4.10 MakeTurnoutStraightSegment()	1250
9.185.4.11 TheType()	1250
9.185.5 Friends And Related Function Documentation	1250

9.185.5.1 TrackGraph	1250
9.185.5.2 TurnoutBody	1251
9.185.6 Member Data Documentation	1251
9.185.6.1 ang0	1251
9.185.6.2 ang1	1251
9.185.6.3 L	1251
9.185.6.4 pos1	1251
9.185.6.5 pos2	1252
9.185.6.6 R	1252
9.185.6.7 radius	1252
9.185.6.8 routeList	1252
9.185.6.9 RouteName	1252
9.185.6.10 segCount	1253
9.185.6.11 segmentId	1253
9.185.6.12 theEnd	1253
9.185.6.13 theType	1253
9.186 Parsers::TurnoutGraphic Struct Reference	1253
9.186.1 Detailed Description	1254
9.186.2 Member Data Documentation	1254
9.186.2.1 maxX	1254
9.186.2.2 maxY	1254
9.186.2.3 minX	1255
9.186.2.4 minY	1255
9.186.2.5 numSegments	1255
9.186.2.6 segments	1255
9.187 Parsers::TurnoutRoutelist Struct Reference	1255
9.187.1 Detailed Description	1256
9.187.2 Member Data Documentation	1256
9.187.2.1 numRoutelists	1256
9.187.2.2 routes	1256
9.188 FCFSupport::PDFFileStructures::Type1FontDictionary Class Reference	1256
9.188.1 Detailed Description	1257
9.188.2 Constructor & Destructor Documentation	1257
9.188.2.1 Type1FontDictionary() [1/2]	1258
9.188.2.2 Type1FontDictionary() [2/2]	1258
9.188.2.3 ~Type1FontDictionary()	1259
9.188.3 Member Function Documentation	1259
9.188.3.1 WriteDictionaryElements()	1259
9.188.4 Member Data Documentation	1259

9.188.4.1 baseFont	1260
9.188.4.2 encodingDictionary	1260
9.188.4.3 encodingName	1260
9.188.4.4 firstChar	1260
9.188.4.5 fontDescriptor	1260
9.188.4.6 lastChar	1261
9.188.4.7 widths	1261
9.189 FCFSupport::PDFFileStructures::TypedDictionary Class Reference	1261
9.189.1 Detailed Description	1262
9.189.2 Constructor & Destructor Documentation	1262
9.189.2.1 TypedDictionary()	1262
9.189.2.2 ~TypedDictionary()	1262
9.189.3 Member Function Documentation	1263
9.189.3.1 WriteDictionaryElements()	1263
9.189.3.2 WriteDictionaryType()	1263
9.189.4 Member Data Documentation	1263
9.189.4.1 type	1264
9.190 FCFSupport::WorkInProgressCallback Class Reference	1264
9.190.1 Detailed Description	1264
9.190.2 Constructor & Destructor Documentation	1264
9.190.2.1 WorkInProgressCallback()	1265
9.190.2.2 ~WorkInProgressCallback()	1265
9.190.3 Member Function Documentation	1265
9.190.3.1 ProgressDone()	1265
9.190.3.2 ProgressStart()	1265
9.190.3.3 ProgressUpdate()	1266
9.191 xpressnet::XPressNet Class Reference	1266
9.191.1 Detailed Description	1269
9.191.2 Constructor & Destructor Documentation	1269
9.191.2.1 XPressNet()	1269
9.191.2.2 ~XPressNet()	1270
9.191.3 Member Function Documentation	1270
9.191.3.1 _ADDRESS()	1270
9.191.3.2 _appendXORByte()	1270
9.191.3.3 _CheckForResponse_0x00()	1271
9.191.3.4 _CheckForResponse_0x40()	1271
9.191.3.5 _CheckForResponse_0x60()	1271
9.191.3.6 _CheckForResponse_0x80()	1271
9.191.3.7 _CheckForResponse_0xa0()	1271

9.191.3.8 _CheckForResponse_0xc0()	1272
9.191.3.9 _CheckForResponse_0xe0()	1272
9.191.3.10 _readbyte()	1272
9.191.3.11 _readevent()	1272
9.191.3.12 _timeoutevent()	1273
9.191.3.13 _transmit()	1273
9.191.3.14 AccessoryDecoderInformationRequest()	1273
9.191.3.15 AccessoryDecoderOperation()	1273
9.191.3.16 AddLocomotiveToMultiUnit()	1274
9.191.3.17 AddressInquiryNextMU()	1274
9.191.3.18 AddressInquiryNextMUMember()	1274
9.191.3.19 AddressInquiryNextStack()	1275
9.191.3.20 AddressInquiryPreviousMU()	1275
9.191.3.21 AddressInquiryPreviousMUMember()	1275
9.191.3.22 AddressInquiryPreviousStack()	1276
9.191.3.23 CheckForResponse()	1276
9.191.3.24 CommandStationSoftwareVersion()	1276
9.191.3.25 CommandStationStatusRequest()	1276
9.191.3.26 DeleteLocomotiveFromStack()	1276
9.191.3.27 DirectModeCVRead()	1277
9.191.3.28 DirectModeCVWrite()	1277
9.191.3.29 DissolveDoubleHeader()	1277
9.191.3.30 EmergencyStopAllLocomotives()	1278
9.191.3.31 EmergencyStopALocomotive()	1278
9.191.3.32 EstablishDoubleHeader()	1278
9.191.3.33 FunctionStatusRequest()	1278
9.191.3.34 GetLI100VersionNumbers()	1279
9.191.3.35 GetNextCommandStationResponse()	1279
9.191.3.36 LocomotiveInformationRequest()	1279
9.191.3.37 OperatingModeProgrammingBitModeWrite()	1279
9.191.3.38 OperatingModeProgrammingByteModeWrite()	1280
9.191.3.39 PagedModeCVRead()	1280
9.191.3.40 PagedModeCVWrite()	1281
9.191.3.41 readevent()	1281
9.191.3.42 RegisterModeRead()	1281
9.191.3.43 RegisterModeWrite()	1281
9.191.3.44 RemoveLocomotiveFromMultiUnit()	1282
9.191.3.45 RequestForServiceModeResults()	1282
9.191.3.46 ResumeOperations()	1282

9.191.3.47 SetCommandStationPowerUpMode()	1282
9.191.3.48 SetFunctionStateGroup1()	1283
9.191.3.49 SetFunctionStateGroup2()	1283
9.191.3.50 SetFunctionStateGroup3()	1284
9.191.3.51 SetLI101Address()	1284
9.191.3.52 SetLocomotiveFunctionsGroup1()	1284
9.191.3.53 SetLocomotiveFunctionsGroup2()	1285
9.191.3.54 SetLocomotiveFunctionsGroup3()	1285
9.191.3.55 SetLocomotiveSpeedAndDirection()	1285
9.191.3.56 StopOperations()	1286
9.191.4 Member Data Documentation	1286
9.191.4.1 _timeout	1286
9.191.4.2 responseList	1286
9.191.4.3 ttyfd	1287
9.192 xpressnet::XpressNetEvent Class Reference	1287
9.192.1 Detailed Description	1287
9.192.2 Constructor & Destructor Documentation	1287
9.192.2.1 XpressNetEvent()	1288
9.192.2.2 ~XpressNetEvent()	1288
9.192.3 Member Function Documentation	1288
9.192.3.1 _eventhandler()	1288
9.192.4 Member Data Documentation	1288
9.192.4.1 _script	1289
9.192.4.2 xpressnet	1289
9.193 YY_MRRXtrkCad_INHERIT Class Reference	1289
9.193.1 Member Enumeration Documentation	1290
9.193.1.1 YY_MRRXtrkCad_ENUM_TOKEN	1290
9.193.2 Constructor & Destructor Documentation	1292
9.193.2.1 ~MRRXtrkCad()	1292
9.193.3 Member Function Documentation	1292
9.193.3.1 lookup_word()	1292
9.193.3.2 YY_MRRXtrkCad_CLASS()	1292
9.193.3.3 YY_MRRXtrkCad_ERROR()	1292
9.193.3.4 YY_MRRXtrkCad_LEX()	1293
9.193.3.5 YY_MRRXtrkCad_PARSE()	1293
9.193.3.6 yyerror1()	1293
9.193.4 Member Data Documentation	1293
9.193.4.1 CurrentScale	1293
9.193.4.2 fieldflag	1293

9.193.4.3 scanEol	1293
9.193.4.4 scanToEND	1294
9.193.4.5 YY_MRRXtrkCad_CHAR	1294
9.193.4.6 YY_MRRXtrkCad_DEBUG_FLAG	1294
9.193.4.7 YY_MRRXtrkCad_LLOC	1294
9.193.4.8 YY_MRRXtrkCad_LVAL	1294
9.193.4.9 YY_MRRXtrkCad_NERRS	1294
9.194 yy_MRRXtrkCad_stype Union Reference	1294
9.194.1 Member Data Documentation	1295
9.194.1.1 fval	1295
9.194.1.2 il	1295
9.194.1.3 ival	1295
9.194.1.4 spl	1295
9.194.1.5 sval	1296
9.194.1.6 tb	1296
9.194.1.7 tbb	1296
9.194.1.8 tbbe	1296
9.194.1.9 tbe	1296
9.194.1.10 tcb	1296
9.194.1.11 tcbe	1296
9.194.1.12 trb	1297
9.194.1.13 trbe	1297
9.195 yyltype Struct Reference	1297
9.195.1 Member Data Documentation	1297
9.195.1.1 first_column	1297
9.195.1.2 first_line	1297
9.195.1.3 last_column	1298
9.195.1.4 last_line	1298
9.195.1.5 text	1298
9.195.1.6 timestamp	1298
10 File Documentation	1299
10.1 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/Azatrax/Azatrax.h File Reference	1299
10.1.1 Macro Definition Documentation	1299
10.1.1.1 ErrorCode	1300
10.1.1.2 stopwatchFract	1300
10.1.1.3 stopwatchSeconds	1300
10.2 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/FCFSupport/System.h File Reference	1300
10.3 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/ParserClasses/MRRXtrkCad.tab.h File Reference	1301

10.3.1 Macro Definition Documentation	1302
10.3.1.1 BISON_YYLTYPE_ISDECLARED	1302
10.3.1.2 FALSE	1302
10.3.1.3 RADIANS	1302
10.3.1.4 TRUE	1302
10.3.1.5 YY_MRRXtrkCad_CHAR	1303
10.3.1.6 YY_MRRXtrkCad_CLASS	1303
10.3.1.7 YY_MRRXtrkCad_COMPATIBILITY	1303
10.3.1.8 YY_MRRXtrkCad_CONSTRUCTOR_CODE	1303
10.3.1.9 YY_MRRXtrkCad_CONSTRUCTOR_INIT	1303
10.3.1.10 YY_MRRXtrkCad_CONSTRUCTOR_PARAM	1303
10.3.1.11 YY_MRRXtrkCad_DEBUG	1304
10.3.1.12 YY_MRRXtrkCad_DEBUG_FLAG	1304
10.3.1.13 YY_MRRXtrkCad_ERROR	1304
10.3.1.14 YY_MRRXtrkCad_ERROR_BODY	1304
10.3.1.15 YY_MRRXtrkCad_ERROR_VERBOSE	1304
10.3.1.16 YY_MRRXtrkCad_INHERIT	1304
10.3.1.17 YY_MRRXtrkCad_LEX	1304
10.3.1.18 YY_MRRXtrkCad_LEX_BODY	1305
10.3.1.19 YY_MRRXtrkCad_LLOC	1305
10.3.1.20 YY_MRRXtrkCad_LSP_NEEDED	1305
10.3.1.21 YY_MRRXtrkCad_LTYPE	1305
10.3.1.22 YY_MRRXtrkCad_LVAL	1305
10.3.1.23 YY_MRRXtrkCad_MEMBERS	1305
10.3.1.24 YY_MRRXtrkCad_NERRS	1306
10.3.1.25 YY_MRRXtrkCad_PARSE	1306
10.3.1.26 YY_MRRXtrkCad_PARSE_PARAM	1306
10.3.1.27 YY_MRRXtrkCad_STYPE	1306
10.3.1.28 YY_MRRXtrkCad_USE_CONST_TOKEN	1306
10.3.1.29 YY_MRRXtrkCad_USE_GOTO	1306
10.3.1.30 YY_USE_CLASS	1306
10.3.2 Typedef Documentation	1307
10.3.2.1 yytype	1307
10.3.3 Variable Documentation	1307
10.3.3.1 CENTIMETERSperMM	1307
10.3.3.2 FEETperMM	1307
10.3.3.3 GScale	1307
10.3.3.4 HOScale	1307
10.3.3.5 INCHESperMM	1307

10.3.3.6 IScale	1308
10.3.3.7 METERSperMM	1308
10.3.3.8 NScale	1308
10.3.3.9 OScale	1308
10.3.3.10 YARDSperMM	1308
10.4 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/ParserClasses/ParserClassesGroup.h File Reference	1308
10.5 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/RailDriver/RaildriverIO.h File Reference	1309
10.6 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/TTSupport/TTSupportGroup.h File Reference	1309
10.7 C++/Azatrax/mrd.h File Reference	1309
10.8 C++/Azatrax/sl2.h File Reference	1310
10.9 C++/Azatrax/sr4.h File Reference	1310
10.10 C++/FCFSupport/CallBack.h File Reference	1311
10.11 C++/FCFSupport/Car.h File Reference	1311
10.12 C++/FCFSupport/CarType.h File Reference	1311
10.13 C++/FCFSupport/Division.h File Reference	1312
10.14 C++/FCFSupport/FCFSupportGroup.h File Reference	1313
10.15 C++/FCFSupport/Industry.h File Reference	1313
10.16 C++/FCFSupport/LQ24Printer.h File Reference	1313
10.17 C++/FCFSupport/Owner.h File Reference	1314
10.18 C++/FCFSupport/PathName.h File Reference	1314
10.19 C++/TTSupport/PathName.h File Reference	1315
10.20 C++/FCFSupport/PDFPrinter.h File Reference	1315
10.20.1 Macro Definition Documentation	1316
10.20.1.1 oneColumnWidthFraction	1316
10.21 C++/FCFSupport/PDFPrinterSupport.h File Reference	1316
10.21.1 Function Documentation	1318
10.21.1.1 asctime_r()	1318
10.21.1.2 localtime_r()	1318
10.22 C++/FCFSupport/PostScriptPrinter.h File Reference	1318
10.23 C++/FCFSupport/Printer.h File Reference	1319
10.24 C++/FCFSupport/Station.h File Reference	1319
10.25 C++/TTSupport/Station.h File Reference	1320
10.26 C++/FCFSupport/SwitchList.h File Reference	1320
10.27 C++/FCFSupport/TextPrinter.h File Reference	1321
10.28 C++/FCFSupport/Train.h File Reference	1322
10.29 C++/TTSupport/Train.h File Reference	1322
10.30 C++/ParserClasses/BezierBody.h File Reference	1323
10.30.1 Macro Definition Documentation	1323

10.30.1.1 angle	1324
10.30.1.2 len0	1324
10.30.1.3 len1	1324
10.31 C++/ParserClasses/CornuBody.h File Reference	1324
10.31.1 Macro Definition Documentation	1325
10.31.1.1 angle	1325
10.31.1.2 len0	1325
10.31.1.3 len1	1325
10.32 C++/ParserClasses/IntegerList.h File Reference	1325
10.33 C++/ParserClasses/ParseFile.h File Reference	1325
10.34 C++/ParserClasses/SocketPair.h File Reference	1326
10.35 C++/ParserClasses/TrackBody.h File Reference	1326
10.36 C++/ParserClasses/TrackGraph.h File Reference	1327
10.37 C++/ParserClasses/TurnoutBody.h File Reference	1328
10.37.1 Macro Definition Documentation	1328
10.37.1.1 angle	1328
10.37.1.2 len0	1328
10.37.1.3 len1	1329
10.38 C++/TclSocketCAN/TclSocketCAN.i File Reference	1329
10.38.1 Macro Definition Documentation	1329
10.38.1.1 SWIG_name	1329
10.38.1.2 SWIG_version	1329
10.39 C++/TTSupport/Cab.h File Reference	1329
10.40 C++/TTSupport/TimeTableSystem.h File Reference	1330
10.40.1 Macro Definition Documentation	1331
10.40.1.1 USE_UNORDERED_MAP	1331
10.41 C++/TTSupport/TimeTableSystemTcl.h File Reference	1332
10.42 C++/wiringPi/tclwiringpi.i File Reference	1332
10.42.1 Macro Definition Documentation	1333
10.42.1.1 SWIG_name	1333
10.42.1.2 SWIG_version	1333
10.42.2 Variable Documentation	1333
10.42.2.1 TcLwiringpi	1333
10.43 Doc/doxygen/titlepage.h File Reference	1333
10.44 Scripts/CMri/cmri.tcl File Reference	1333
10.45 Scripts/Common/CabWidgets.tcl File Reference	1334
10.46 Scripts/Common/CommonTclGroup.h File Reference	1334
10.47 Scripts/Common/CTCPanel2.tcl File Reference	1334
10.48 Scripts/Common/fileentry.tcl File Reference	1336

10.49 Scripts/Common/gettext.tcl File Reference	1337
10.50 Scripts/Common/HTMLHelp.tcl File Reference	1337
10.51 Scripts/Common/labelcombobox.tcl File Reference	1337
10.52 Scripts/Common/labelselectcolor.tcl File Reference	1338
10.53 Scripts/Common/labelspinbox.tcl File Reference	1339
10.54 Scripts/Common/mainwindow.tcl File Reference	1339
10.55 Scripts/Common/panedw.tcl File Reference	1339
10.56 Scripts/Common/ParseXML.tcl File Reference	1340
10.56.1 Detailed Description	1340
10.57 Scripts/Common/ReadConfiguration.tcl File Reference	1340
10.58 Scripts/Common/snitScrollNotebook.tcl File Reference	1340
10.59 Scripts/Common/splash.tcl File Reference	1341
10.60 Scripts/ControlSupport/CmriSupport.tcl File Reference	1341
10.61 Scripts/CTIAcela/CTIAcela.tcl File Reference	1341
10.62 Scripts/GRSupport/grsupport2.tcl File Reference	1342
10.63 Scripts/GRSupport/GRSupportTclGroup.h File Reference	1343
10.64 Scripts/GRSupport/Instruments2.tcl File Reference	1343
10.65 Scripts/GRSupport/LCARSWidgets2.tcl File Reference	1343
10.66 Scripts/GRSupport/OvalWidgets2.tcl File Reference	1343
10.67 Scripts/LCC/ConfigDialogs.tcl File Reference	1345
10.68 Scripts/LCC/ConfigurationEditor.tcl File Reference	1345
10.69 Scripts/LCC/eventDialogs.tcl File Reference	1345
10.70 Scripts/LCC/lcc.tcl File Reference	1346
10.71 Scripts/LinuxGpio/LinuxGpio.tcl File Reference	1348
10.72 Scripts/NCE/nce.tcl File Reference	1349
10.73 Scripts/RailDriverSupport/raildriver_client.tcl File Reference	1350
10.74 Scripts/Satellite/Satellite.tcl File Reference	1351
10.75 Scripts/XPressNet/xpressnet.tcl File Reference	1351

Index	1355
--------------	-------------

Chapter 1

Internals (developer) documentation.

Author

Robert Heller
Deepwoods Software
Wendell, MA, USA
<http://www.deepsoft.com/>
heller@deepsoft.com

1.1 Introduction

This is the documentation for all of the library functions, classes, and widgets. This includes both the C++ implemented libraries and the Tcl implemented libraries. For most of the C++ implemented code there is a Tcl interface included as part of the library. The code is broken up into modules and almost everything is in either a C++ or Tcl namespace. This allows for multiple code libraries to be included or linked to without global name conflicts.

Note: The Tcl code is documented using a C/C++ style. This might seem a little weird from a Tcl point of view.

Chapter 2

Module Index

2.1 Modules

Here is a list of all modules:

Azatrax	23
FCFSupportModule	24
ParserClasses	24
TimeTableSystem	25
TimeTableSystemTcl	26
Station 	31
Train and support classes.	33
Cab	34
TclSocketCANModule	35
TclwiringpiModule	37
Cmri	37
CTIAcela	38
LCCModule	60
XPressNetModule	61
NCEModule	61
TclCommon	62
LinuxGpio	63
Cmri Support code	63
RaildriverClientModule	63
Graphics Support Code	64
GRSupportModule	64
SatelliteModule	65
FCFSupport	65

Chapter 3

Namespace Index

3.1 Namespace List

Here is a list of all namespaces with brief descriptions:

azatrax		
Azatrax	C++ LibUSB 1.0 Interface	67
CabWidgets		
	Cab Widget code	68
cmri		
	CMR/I Tcl Serial Port Interface	68
CmriSupport		
	Cmri Support code	71
CTCPanel		
	CTC Panel code, Version 2	71
ctiacela		
	CTI Acela Tcl Serial Port Interface	75
FCFSupport		
	Namespace to hold all of the FCF Support code	76
FCFSupport::PDFFileStructures		
	PDF File support structures	82
FileEntry		
	This is a specialized form of the LabelEntry widget intended for selecting file names	85
gettext		
	Localization functions	89
GRSupport		
	Code to support the various graphics packages	91
HTMLHelp		
	HTMLHelp namespace, which contains the HTMLHelp snit widget adapter object and associated code	94
Instruments		
	Namespace used for instruments code	95
LabelComboBox		
	This is a specialized form of the LabelFrame widget containing a ComboBox Widget	96
LabelSelectColor		
	This package provides a BWidget style megawidget for selecting colors, in the same style as a LabelEntry widget	103

LabelSpinBox	This is a specialized form of the LabelFrame widget containing a SpinBox Widget	107
LCARS	Namespace where the LCARS code lives	112
lcc	Namespace that holds the LCC interface code	112
linuxgpio	Linux GPIO Interface	119
nce	Namespace that holds the NCE interface code	121
OvalWidgets	These oval shaped widgets are much like the Star Trek NG computer screens	128
PanedWindow	A modified version of the BWidget PanedWindow	134
Parsers	File-based parser classes	134
raildriver	Namespace that holds the Raildriver Client class code	136
ReadConfiguration	The Read Configuration File code is contained in this namespace	138
TTSupport	Time Table Support Namespace	141
xpressnet	Namespace that holds the XPressNet interface code	146

Chapter 4

Hierarchical Index

4.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

xpressnet::AccessoryDecoderInformation	155
Instruments::AnalogClock	160
azatrax::Azatrax	162
azatrax::MRD	619
azatrax::SL2	921
azatrax::SR4	936
Parsers::BezierBody	175
Parsers::BezierBodyElt	179
TTSupport::Cab	186
Instruments::CabSignalLamp	190
lcc::CanAlias	194
lcc::CANGridConnect	197
lcc::CANGridConnectOverCANSocket	210
lcc::CANGridConnectOverTcp	214
lcc::CANGridConnectOverUSBSerial	219
lcc::CANHeader	224
lcc::CanMessage	228
lcc::CanTransport	234
FCFSupport::Car	236
FCFSupport::CarGroup	259
FCFSupport::CarType	262
cmri::CMri	271
CmriSupport::CmriNode	278
CTCPanel::CodeButton	285
xpressnet::CommandStationResponse	288
xpressnet::CommandStationStatus	290
Parsers::TrackGraph::CompressedEdgeValues	294
Parsers::TrackGraph::CompressedNodeValues	295
lcc::ConfigMemory	297
lcc::ConfigOptions	306
lcc::ConfigurationEditor	309

Parsers::CornuBody	336
Parsers::CornuBodyElt	341
CTCPanel::Crossing	347
CTCPanel::Crossover	351
FCFSupport::PDFFileStructures::CrossReferenceTable	355
CTCPanel::CTCLabel	359
CTCPanel::CTCPanel	363
ctiacela::CTIAcela	388
CTCPanel::CurvedBlock	391
Instruments::DialInstrument	395
Instruments::DigitalClock	401
Instruments::DigitalInstrument	403
FCFSupport::Division	406
xpressnet::DoubleHeaderInformation	412
xpressnet::DoubleHeaderMuError	419
CTCPanel::DoubleSlip	420
Parsers::TrackGraph::EdgeValues	425
CTCPanel::EndBumper	427
TTSupport::eqstr	431
lcc::EventID	431
lcc::EventID_or_null	435
lcc::EventLog	435
lcc::EventReceived	438
xpressnet::FunctionStatus	445
linuxgpio::GpioInputActiveHigh	450
linuxgpio::GpioInputActiveLow	452
linuxgpio::GpioOutputSafeHigh	454
linuxgpio::GpioOutputSafeHighInvert	456
linuxgpio::GpioOutputSafeLow	458
linuxgpio::GpioOutputSafeLowInverted	460
lcc::GridConnectMessage	463
lcc::GridConnectReply	469
TTSupport::hash	476
CTCPanel::HiddenBlock	477
HTMLHelp::HTMLHelp	481
FCFSupport::PDFFileStructures::IndirectObject	513
FCFSupport::PDFFileStructures::Dictionary	399
FCFSupport::PDFFileStructures::IndirectObjectDictionary	519
FCFSupport::PDFFileStructures::InformationDirectory	536
FCFSupport::PDFFileStructures::PageLabelTree	742
FCFSupport::PDFFileStructures::ResourceDictionary	850
FCFSupport::PDFFileStructures::TypedDictionary	1261
FCFSupport::PDFFileStructures::CatalogDictionary	267
FCFSupport::PDFFileStructures::FontDictionary	440
FCFSupport::PDFFileStructures::Type1FontDictionary	1256
FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary	803
FCFSupport::PDFFileStructures::Page	734
FCFSupport::PDFFileStructures::PageLabelDictionary	738
FCFSupport::PDFFileStructures::PageTree	746
FCFSupport::PDFFileStructures::FreedObject	443
FCFSupport::PDFFileStructures::IndirectFloatVector	511
FCFSupport::PDFFileStructures::PDFStream	789
FCFSupport::PDFFileStructures::Rectangle	845
FCFSupport::Industry	522

Parsers::IntegerList	540
CTCPanel::Lamp	544
xpressnet::LI100Message	563
xpressnet::LI100VersionNumbers	564
xpressnet::LI101XPressNetAddress	566
linuxgpio::LinuxGpio	568
xpressnet::LocomotiveAddress	572
CabWidgets::LocomotiveDirection	574
xpressnet::LocomotiveInformation	578
CabWidgets::LocomotiveSpeed	586
FCFSupport::LogMessageCallback	592
mainwindow	602
lcc::MTIDetail	633
lcc::MTIHeader	639
nce::NCE	643
lcc::nid_or_null	670
Parsers::TrackGraph::NodeValues	671
TTSupport::Occupied	677
lcc::OpenLCBMessage	682
lcc::OpenLCBNode	685
lcc::OpenLCBOverTcp	698
lcc::OpenLCBProtocols	706
std::ostream	
FCFSupport::PDFFileStructures::PDFStream	789
OvalWidgets::OvalButton	709
OvalWidgets::OvalRoundCornerRectangle	712
OvalWidgets::OvalScale	713
OvalWidgets::OvalSlider	718
OvalWidgets::OvalScrollBar	723
FCFSupport::Owner	730
Parsers::ParseFile	750
Parsers::LayoutFile	548
Parsers::MRRXtrkCad	627
ParseXML	754
FCFSupport::PathName	759
TTSupport::PathName	768
FCFSupport::PauseCallback	777
Parsers::TrackGraph::Point	790
Parsers::BezierBodyElt::Pos	791
Parsers::CornuBodyElt::Pos	792
Parsers::TurnoutBodyElt::Pos	793
FCFSupport::PrinterDevice	804
FCFSupport::LQ24PrinterDevice	595
FCFSupport::PDFPrinterDevice	780
FCFSupport::PostScriptPrinterDevice	794
FCFSupport::TextPrinterDevice	1121
CTCPanel::PushButton	814
raildriver::RaildriverClient	818
RaildriverIO	821
Parsers::RouteVec	857
Satellite	858
CTCPanel::SchLabel	860
CTCPanel::ScissorCrossover	864
ScrollTabNotebook	869

Parsers::SegPos	885
Parsers::SegVector	885
CabWidgets::SelectLocomotive	889
lcc::SendEvent	893
xpressnet::ServiceModeResponse	895
FCFSupport::ShowBannerCallback	897
CTCPanel::Signal	898
CTCPanel::SIGPlate	904
SimpleDOMEElement	909
CTCPanel::SingleSlip	917
xpressnet::SoftwareVersion	929
splash	931
azatrax::Azatrax::StateDataPacket	945
FCFSupport::Station	949
TTSupport::Station	954
FCFSupport::SwitchListElement::StationOrIndustry	962
FCFSupport::Train::StationOrIndustry	963
TTSupport::StationTimes	963
azatrax::MRD::status1_union	967
azatrax::SL2::status1_union	970
azatrax::SR4::status1_union	972
azatrax::MRD::status2_union	974
azatrax::SL2::status2_union	976
azatrax::SR4::status2_union	978
azatrax::SL2::status3_union	980
azatrax::SR4::status3_union	982
TTSupport::Stop	984
TTSupport::StorageTrack	994
CTCPanel::StraightBlock	1002
CTCPanel::StubYard	1006
CTCPanel::Switch	1010
FCFSupport::SwitchList	1014
FCFSupport::SwitchListElement	1021
CTCPanel::SWPlate	1028
FCFSupport::System	1033
CTCPanel::ThreeWaySW	1125
CTCPanel::ThroughYard	1131
TTSupport::TimeRange	1135
TTSupport::TimeTableSystem	1141
CTCPanel::Toggle	1165
Parsers::TrackBody	1172
Parsers::TrackBodyElt	1175
Parsers::TrackGraph	1179
FCFSupport::Train	1208
TTSupport::Train	1223
FCFSupport::TrainDisplayCallback	1233
Parsers::TrackGraph::Transform2D	1236
Parsers::TurnoutBody	1240
Parsers::TurnoutBodyElt	1244
Parsers::TurnoutGraphic	1253
Parsers::TurnoutRoutelist	1255
vector	
FCFSupport::PDFFileStructures::IndirectFloatVector	511
FCFSupport::PDFFileStructures::PDFNameArray	778

FCFSupport::WorkInProgressCallback	1264
xpressnet::XPressNet	1266
xpressnet::XpressNetEvent	1287
YY_MRRXtrkCad_INHERIT	1289
yy_MRRXtrkCad_stype	1294
yytype	1297

Chapter 5

Class Index

5.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

xpressnet::AccessoryDecoderInformation	
Accessory decoder information	155
Instruments::AnalogClock	
Analog clock instrument	160
azatrax::Azatrax	
Azatrax I/O Class	162
Parsers::BezierBody	
List of Bezier body lines (T, E, S, and C lines)	175
Parsers::BezierBodyElt	
Bezier Body elements: T, E, S, and C lines are collected	179
TTSupport::Cab	
This class maintains information about cabs	186
Instruments::CabSignalLamp	
Cab signal lamp type	190
lcc::CanAlias	
Implements a CAN Alias	194
lcc::CANGridConnect	
Base class to connect to a CAN bus using GridConnect formatted message over	197
lcc::CANGridConnectOverCANSocket	
Connect to a CAN bus using GridConnect formatted message over a CAN Socket connection	210
lcc::CANGridConnectOverTcp	
Connect to a CAN bus using GridConnect formatted message over a Tcp/Ip connection	214
lcc::CANGridConnectOverUSBSerial	
Connect to a CAN bus using GridConnect formatted message over a USB Serial port	219
lcc::CANHeader	
CAN Header type	224
lcc::CanMessage	
A CAN Message, containing a 29-bit header and upto 8 bytes of data	228
lcc::CanTransport	
Logical transport of CAN Messages	234
FCFSupport::Car	
This class holds all of the information for a single car	236

FCFSupport::CarGroup	
Car group class	259
FCFSupport::CarType	
Type of railroad car (rolling stock)	262
FCFSupport::PDFFileStructures::CatalogDictionary	
Master catalog of the PDF file	267
cmri::CMri	
Main C/MRI interface class	271
CmriSupport::CmriNode	
CMR/I node type	278
CTCPanel::CodeButton	
Code button object type	285
xpressnet::CommandStationResponse	
General response class	288
xpressnet::CommandStationStatus	
Command station status	290
Parsers::TrackGraph::CompressedEdgeValues	
Compressed graph edge values	294
Parsers::TrackGraph::CompressedNodeValues	
Compressed graph node values	295
lcc::ConfigMemory	
Configure memory	297
lcc::ConfigOptions	
Display memory config options	306
lcc::ConfigurationEditor	
Generate OpenLCB Memory Configuration Window	309
Parsers::CornuBody	
List of Cornu body lines (T, E, S, and C lines)	336
Parsers::CornuBodyElt	
Cornu Body elements: T, E, S, and C lines are collected	341
CTCPanel::Crossing	
Crossing object type	347
CTCPanel::Crossover	
Crossover (turnout) object type	351
FCFSupport::PDFFileStructures::CrossReferenceTable	
The cross reference table object	355
CTCPanel::CTCLabel	
CTC Label object type	359
CTCPanel::CTCPanel	
Main CTC Panel megawidget	363
ctiacela::CTIAcela	
Main CTIAcela interface class	388
CTCPanel::CurvedBlock	
Curved Block object type	391
Instruments::DialInstrument	
Generic dial instrument	395
FCFSupport::PDFFileStructures::Dictionary	
PDF Dictionary class	399
Instruments::DigitalClock	
Digital clock instrument	401
Instruments::DigitalInstrument	
Digital instrument	403
FCFSupport::Division	
Implements a single division, which contains a number of contiguous stations	406

xpressnet::DoubleHeaderInformation	
Double header information	412
xpressnet::DoubleHeaderMuError	
Double header or MU error	419
CTCPanel::DoubleSlip	
Double Slip (turnout) object type	420
Parsers::TrackGraph::EdgeValues	
Uncompressed graph edge values	425
CTCPanel::EndBumper	
End Bumper object type	427
TTSupport::eqstr	431
lcc::EventID	
An event id structure	431
lcc::EventID_or_null	
An EventID or empty string	435
lcc::EventLog	
Event received log, with event sender	435
lcc::EventReceived	
Display a received event	438
FCFSupport::PDFFileStructures::FontDictionary	
A Font dictionary object	440
FCFSupport::PDFFileStructures::FreedObject	
A deleted indirect object	443
xpressnet::FunctionStatus	
Function status	445
linuxgpio::GpioInputActiveHigh	
Input pin, active high (high is true)	450
linuxgpio::GpioInputActiveLow	
Input pin, active low (low is true)	452
linuxgpio::GpioOutputSafeHigh	
Output pin, initialized to high	454
linuxgpio::GpioOutputSafeHighInvert	
Output pin, initialized to high, inverted	456
linuxgpio::GpioOutputSafeLow	
Output pin, initialized to low	458
linuxgpio::GpioOutputSafeLowInverted	
Output pin, initialized to low, with inverted logic	460
lcc::GridConnectMessage	
A Grid Connect formatted CAN message	463
lcc::GridConnectReply	
A Grid Connect formatted CAN message (reply)	469
TTSupport::hash	
Option hash map, used for Print options	476
CTCPanel::HiddenBlock	
Hidden Block object type	477
HTMLHelp::HTMLHelp	
A widget that implements a help dialog that renders HTML coded help pages (generally generated from LaTeX using tex4ht's htlatex script)	481
FCFSupport::PDFFileStructures::IndirectFloatVector	
Indirect array of floats	511
FCFSupport::PDFFileStructures::IndirectObject	
Indirect object base class	513
FCFSupport::PDFFileStructures::IndirectObjectDictionary	
PDF Indirect Object Dictionary , used for named resources in a Resource Dictionary	519

FCFSupport::Industry	
Industry	522
FCFSupport::PDFFileStructures::InformationDirectory	
Information directory	536
Parsers::IntegerList	
The IntegerList class implements a linked list of integers, used for turnout route lists	540
CTCPanel::Lamp	
Lamp object type	544
Parsers::LayoutFile	
File to parse an XTrkCad layout file and create a track graph	548
xpressnet::LI100Message	
LI100 messages	563
xpressnet::LI100VersionNumbers	
LI100 Version Numbers	564
xpressnet::LI101XPressNetAddress	
LI101 XPress Net Address	566
linuxgpio::LinuxGpio	
Base generic GPIO interface class	568
xpressnet::LocomotiveAddress	
Locomotive address	572
CabWidgets::LocomotiveDirection	
Locomotive Direction widget	574
xpressnet::LocomotiveInformation	
Locomotive information	578
CabWidgets::LocomotiveSpeed	
Locomotive Speed widget	586
FCFSupport::LogMessageCallback	
A callback to log a message	592
FCFSupport::LQ24PrinterDevice	
Class for an LQ24 compatible printer	595
mainwindow	
A widget that is heavily extended from the BWidget MainFrame windget	602
azatrax::MRD	
MRD I/O Class	619
Parsers::MRRXtrkCad	
MRRXtrkCad parser class	627
lcc::MTIDetail	
MTI Header type, detailed version	633
lcc::MTIHeader	
MTI Header type	639
nce::NCE	
Main NCE Cab Bus interface class	643
lcc::nid_or_null	
Node ID regexp pattern or the empty string	670
Parsers::TrackGraph::NodeValues	
Uncompressed graph node values	671
TTSupport::Occupied	
This class records a train sitting on a storage track during a specified time frame	677
lcc::OpenLCBMessage	
OpenLCB Message type	682
lcc::OpenLCBNode	
Connect to a OpenLCB interface	685
lcc::OpenLCBOverTcp	
Connect to a OpenLCB over Tcp/Ip	698

Icc::OpenLCBProtocols	
Supported LCC Protocol name type	706
OvalWidgets::OvalButton	
Oval button	709
OvalWidgets::OvalRoundCornerRectangle	
Oval Round Corner Rectangle	712
OvalWidgets::OvalScale	
An oval scale widget, much like a standard Tk scale widget	713
OvalWidgets::OvalSlider	
Oval Slider	718
OvalWidgets::OvalScrollBar	
Oval ScrollBar	723
FCFSupport::Owner	
Describes a car owner	730
FCFSupport::PDFFileStructures::Page	
Describes a single page	734
FCFSupport::PDFFileStructures::PageLabelDictionary	
Page label dictionary	738
FCFSupport::PDFFileStructures::PageLabelTree	
A tree of page label dictionaries	742
FCFSupport::PDFFileStructures::PageTree	
A tree of pages	746
Parsers::ParseFile	
Virtual base class for file-based parsers	750
ParseXML	
Class to hold an XML tree	754
FCFSupport::PathName	
A Class that portably represents a pathname	759
TTSupport::PathName	
A Class that portably represents a pathname	768
FCFSupport::PauseCallback	
The Pause callback	777
FCFSupport::PDFFileStructures::PDFNameArray	
PDF Name array	778
FCFSupport::PDFPrinterDevice	
PDF Printer device	780
FCFSupport::PDFFileStructures::PDFStream	
Stream object	789
Parsers::TrackGraph::Point	
Position structure	790
Parsers::BezierBodyElt::Pos	
Position structure	791
Parsers::CornuBodyElt::Pos	
Position structure	792
Parsers::TurnoutBodyElt::Pos	
Position structure	793
FCFSupport::PostScriptPrinterDevice	
Derived class for printing on Postscript printers	794
FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary	
A standard Type1 PostScript font dictionary	803
FCFSupport::PrinterDevice	
Base class for printer devices (hard copy output)	804
CTCPanel::PushButton	
Push Button object type	814

raildriver::RaildriverClient	
Raildriver Client class – connects to the Raildriver daemon	818
RaildriverIO	
Low-level Raildriver I/O functions	821
FCFSupport::PDFFileStructures::Rectangle	
A rectangle object	845
FCFSupport::PDFFileStructures::ResourceDictionary	
Resource dictionary	850
Parsers::RouteVec	
Route structure	857
Satellite	
Satellite class	858
CTCPanel::SchLabel	
Schematic Label object type	860
CTCPanel::ScissorCrossover	
Scissor Crossover (turnout) object type	864
ScrollTabNotebook	
Tabbed Notebook with scrollable tabs	869
Parsers::SegPos	
Segment position, endpoint or other coordinate	885
Parsers::SegVector	
Segemnt structure	885
CabWidgets::SelectLocomotive	
Select or enter a Locomotive address	889
lcc::SendEvent	
Send Event Dialog – send PCRE message	893
xpressnet::ServiceModeResponse	
Service mode response	895
FCFSupport::ShowBannerCallback	
Display a page heading type message on the screen	897
CTCPanel::Signal	
Signal object type	898
CTCPanel::SIGPlate	
Signal plate object type	904
SimpleDOMElement	
A simple DOM element coded in Tcl using SNIT	909
CTCPanel::SingleSlip	
Single Slip (turnout) object type	917
azatrax::SL2	
SL2 I/O Class	921
xpressnet::SoftwareVersion	
Software version	929
splash	
Widget that implements a splash window	931
azatrax::SR4	
SR4 I/O Class	936
azatrax::Azatrax::StateDataPacket	
Raw USB Data Packet	945
FCFSupport::Station	
Implements a single station	949
TTSupport::Station	
Implements a station	954

FCFSupport::SwitchListElement::StationOrIndustry	
A const pointer to a train's stop, which can be either a station or an industry, depending on what kind of train it is	962
FCFSupport::Train::StationOrIndustry	
Union of stations or industries, used for stops	963
TTSupport::StationTimes	
Station times class, used by the LaTeX generator methods	963
azatrax::MRD::status1_union	
Status byte 1 union type	967
azatrax::SL2::status1_union	
Status byte 1 union type (Output states)	970
azatrax::SR4::status1_union	
Status byte 1 union type (Outputs)	972
azatrax::MRD::status2_union	
Status byte 2 union type	974
azatrax::SL2::status2_union	
Status byte 2 union type (Input sense)	976
azatrax::SR4::status2_union	
Status byte 2 union type (Input sense)	978
azatrax::SL2::status3_union	
Status byte 3 union type (Input control state)	980
azatrax::SR4::status3_union	
Status byte 3 union type (Input Control Status)	982
TTSupport::Stop	
This class implements a stop	984
TTSupport::StorageTrack	
Implements a storage track	994
CTCPanel::StraightBlock	
Straight Block object type	1002
CTCPanel::StubYard	
Stub Yard object type	1006
CTCPanel::Switch	
Switch (turnout) object type	1010
FCFSupport::SwitchList	
The global switch list structure	1014
FCFSupport::SwitchListElement	
This class implements each switch list element	1021
CTCPanel::SWPlate	
Switch plate object type	1028
FCFSupport::System	
This is the main Freight Car Forwarder class	1033
FCFSupport::TextPrinterDevice	
Derived class for printing on generic plain text printers	1121
CTCPanel::ThreeWaySW	
Three Way Switch (turnout) object type	1125
CTCPanel::ThroughYard	
Through Yard object type	1131
TTSupport::TimeRange	
Implements a range of times	1135
TTSupport::TimeTableSystem	
This is the main Time Table Class	1141
CTCPanel::Toggle	
Toggle switch object type	1165

Parsers::TrackBody	
List of track endpoints (T and E lines)	1172
Parsers::TrackBodyElt	
Track endpoint elements (T and E lines)	1175
Parsers::TrackGraph	
Track Graph class, which encapsulates the track graphs	1179
FCFSupport::Train	
Train	1208
TTSupport::Train	
This class implements a train	1223
FCFSupport::TrainDisplayCallback	
Callback to manage a train status display	1233
Parsers::TrackGraph::Transform2D	
Two dimensional transform class	1236
Parsers::TurnoutBody	
List of turnout body lines (T, E, P, S, C, and J lines)	1240
Parsers::TurnoutBodyElt	
Turnout body elements: T, E, P, S, C, and J lines are collected	1244
Parsers::TurnoutGraphic	
Structure holding a turnout's graphical information	1253
Parsers::TurnoutRoutelist	
Turnout route list structure	1255
FCFSupport::PDFFileStructures::Type1FontDictionary	
Type 1 Font dictionary	1256
FCFSupport::PDFFileStructures::TypedDictionary	
Typed dictionary	1261
FCFSupport::WorkInProgressCallback	
Work In Progress Callback	1264
xpressnet::XPressNet	
Main XPressNet interface class	1266
xpressnet::XpressNetEvent	
XPressNet Event class	1287
YY_MRRXtrkCad_INHERIT	1289
yy_MRRXtrkCad_stype	1294
yyltype	1297

Chapter 6

File Index

6.1 File List

Here is a list of all files with brief descriptions:

/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/Azatrax/ Azatrax.h	1299
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/FCFSupport/ System.h	1300
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/ParserClasses/ MRRXtrkCad.tab.h	1301
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/ParserClasses/ ParserClassesGroup.h	1308
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/RailDriver/ RaildriverIO.h	1309
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/TTSupport/ TTSupportGroup.h	1309
C++/Azatrax/ mrd.h	1309
C++/Azatrax/ sl2.h	1310
C++/Azatrax/ sr4.h	1310
C++/FCFSupport/ CallBack.h	1311
C++/FCFSupport/ Car.h	1311
C++/FCFSupport/ CarType.h	1311
C++/FCFSupport/ Division.h	1312
C++/FCFSupport/ FCFSupportGroup.h	1313
C++/FCFSupport/ Industry.h	1313
C++/FCFSupport/ LQ24Printer.h	1313
C++/FCFSupport/ Owner.h	1314
C++/FCFSupport/ PathName.h	1314
C++/FCFSupport/ PDFPrinter.h	1315
C++/FCFSupport/ PDFPrinterSupport.h	1316
C++/FCFSupport/ PostScriptPrinter.h	1318
C++/FCFSupport/ Printer.h	1319
C++/FCFSupport/ Station.h	1319
C++/FCFSupport/ SwitchList.h	1320
C++/FCFSupport/ TextPrinter.h	1321
C++/FCFSupport/ Train.h	1322
C++/ParserClasses/ BezierBody.h	1323
C++/ParserClasses/ CornuBody.h	1324
C++/ParserClasses/ IntegerList.h	1325
C++/ParserClasses/ ParseFile.h	1325
C++/ParserClasses/ SocketPair.h	1326

C++/ParserClasses/TrackBody.h	1326
C++/ParserClasses/TrackGraph.h	1327
C++/ParserClasses/TurnoutBody.h	1328
C++/TclSocketCAN/TclSocketCAN.i	1329
C++/TTSupport/Cab.h	1329
C++/TTSupport/PathName.h	1315
C++/TTSupport/Station.h	1320
C++/TTSupport/TimeTableSystem.h	1330
C++/TTSupport/TimeTableSystemTcl.h	1332
C++/TTSupport/Train.h	1322
C++/wiringPi/tclwiringpi.i	1332
Doc/doxygen/titlepage.h	1333
Scripts/CMri/cmri.tcl	1333
Scripts/Common/CabWidgets.tcl	1334
Scripts/Common/CommonTclGroup.h	1334
Scripts/Common/CTCPanel2.tcl	1334
Scripts/Common/fileentry.tcl	1336
Scripts/Common/gettext.tcl	1337
Scripts/Common/HTMLHelp.tcl	1337
Scripts/Common/labelcombobox.tcl	1337
Scripts/Common/labelselectcolor.tcl	1338
Scripts/Common/labelspinbox.tcl	1339
Scripts/Common/mainwindow.tcl	1339
Scripts/Common/panedw.tcl	1339
Scripts/Common/ParseXML.tcl	
Parse XML and create a simple DOM tree	1340
Scripts/Common/ReadConfiguration.tcl	1340
Scripts/Common/snitScrollNotebook.tcl	1340
Scripts/Common/splash.tcl	1341
Scripts/ControlSupport/CmriSupport.tcl	1341
Scripts/CTIAcela/CTIAcela.tcl	1341
Scripts/GRSupport/grsupport2.tcl	1342
Scripts/GRSupport/GRSupportTclGroup.h	1343
Scripts/GRSupport/Instruments2.tcl	1343
Scripts/GRSupport/LCARSWidgets2.tcl	1343
Scripts/GRSupport/OvalWidgets2.tcl	1343
Scripts/LCC/ConfigDialogs.tcl	1345
Scripts/LCC/ConfigurationEditor.tcl	1345
Scripts/LCC/eventDialogs.tcl	1345
Scripts/LCC/lcc.tcl	1346
Scripts/LinuxGpio/LinuxGpio.tcl	1348
Scripts/NCE/nce.tcl	1349
Scripts/RailDriverSupport/raildriver_client.tcl	1350
Scripts/Satellite/Satellite.tcl	1351
Scripts/XPressNet/xpressnet.tcl	1351

Chapter 7

Module Documentation

7.1 Azatrax

Azatrax C++ LibUSB 1.0 Interface.

Namespaces

- namespace [azatrax](#)
[Azatrax C++ LibUSB 1.0 Interface.](#)

7.1.1 Detailed Description

Azatrax C++ LibUSB 1.0 Interface.

This library implements a class that interfaces to Azatrax's MRD2-S, MRD2-U, SL2, and SR4 modules. Both the MRD2-S and the MRD2-U contain a pair a IR sensors, a stopwatch, and the MRD2-S contains relays. These units can sense trains, either reflectively (typically 'buried' in the track roadbed) or across the track. The sensors trigger the stopwatch and can also trigger the relays. The SL2 and SR4 modules are intended to operate switch machines, either directly (SL2) or via something like a NCE Switch-It (SR4). Both the SL2 and SR4 also have inputs meant for local push-button control (but they can be used for other purposes).

I was contacted by John Parsons of Azatrax (<http://www.azatrax.com>) and he kindly sent some samples of the MRD2-U and MRD2-S modules. This code is the result. The samples allowed me to test the code.

Author

Robert Heller <heller@deepsoft.com>

7.2 FCFSupportModule

Freight Car Forwarder C++ support classes.

Freight Car Forwarder C++ support classes.

These classes implement the low-level support code for my second port of Tim O'Connor's Freight Car Forwarder system.

The main class, `System`, implements a complete railroad system, which consists of one or more divisions with one or more stations and industries. Running over the trackage are one or more trains, pulling an assortment of cars (some loaded and some empty). The cars are of various types, suitable for various types of loads. The system class collects the data for all of these items into one big data structure and implements the various algorithms to create a freight car forwarding system using switchlists.

The original system was written in QBASIC and was a mess of spaghetti code. I first recoded it as a pure Tcl/Tk application and because Tcl completely lacks a 'goto' statement, I needed to unravel every strand of 'spaghetti'. The Tcl code worked, but was somewhat slow. This C++ version puts the more computationally intensive (mostly heavy data indexing logic) into C++, using the STL to implement the various aggregate collections of objects. These objects are indexed and crossed indexed heavily and the forwarding algorithms traverses these collections frequently.

@author Robert Heller \<heller\@deepsoft.com\>

7.3 ParserClasses

File-based parser classes.

Namespaces

- namespace [Parsers](#)
File-based parser classes.

Functions

- list [tcl_socketpair](#) ()
Tcl interface to socketpair.

7.3.1 Detailed Description

File-based parser classes.

These are file-based parser classes. Right now only one parser for XTrkCAD layout files. Other classes might be added later.

Included are classes used by the XTrkCAD parser. These classes are used to store the track plan information in an XTrkCAD layout file, specifically as it relates to operating issues, such as dispatching and signaling.

The track plan is loaded into a directed graph representation, where each node is one logical piece of trackwork. From this graph representation a schematic display could be created in a semi-automated way.

This package features the use of the Boost Graph Library as the underlying structure for the track graph built from reading in XTrkCAD layout files.

Author

Robert Heller <heller@deepsoft.com>

7.3.2 Function Documentation

7.3.2.1 tcl_socketpair()

```
list tcl_socketpair ( )
```

Tcl interface to socketpair.

Returns a list of two file channels, which are opposite ends of a connected pair of sockets.

7.4 TimeTableSystem

Time Table C++ support class library.

Modules

- [TimeTableSystemTcl](#)
Tcl Helper functions.

Namespaces

- namespace [TTSupport](#)
Time Table Support Namespace.

7.4.1 Detailed Description

Time Table C++ support class library.

This class library handles all of the low-level data structures and processing for the TimeTable (V2) program. This includes the representation of scheduled trains, the stations they stop at (or go by), and the data needed to generated formatted and printed timetables.

A time table system consists of a vector of stations, which are in the order that the stations exist along the track. There is a map of cabs, a map of trains, a vector of notes, and a hash table of print options also stored in a train system. In addition, there are some system wide scalar parameter settings.

The Time Table class includes code to read and write itself to a specially formatted text file for storage between editing or processing sessions. The class includes a method to generate a LaTeX file, which can be processed by LaTeX to create a formatted timetable which can be printed. It is assumed that the `TimeTable.sty` is available for inclusion by the LaTeX system.

The ideas and structure of this code was heavily influenced by Bruce Chubb's Kalmbach book, How to Operate Your Model Railroad.

Author

Robert Heller <heller@deepsoft.com>

7.5 TimeTableSystemTcl

Tcl Helper functions.

Functions

- TimeTableSystem * [NewCreateTimeTable](#) (const char *name, int timescale, int timeinterval)
Tcl constructor to create a new TimeTable.
- TimeTableSystem * [OldCreateTimeTable](#) (const char *filename, char **outmessage)
Tcl constructor to create a time table system from an existing file.
- int [ForEveryStation](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for Stations.
- int [ForEveryCab](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for Cabs.
- int [ForEveryTrain](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for Trains.
- int [ForEveryNote](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for notes.
- int [ForEveryPrintOption](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for print options.
- int [TT_StringListToList](#) (Tcl_Interp *interp, const char *stringList)
Tcl function to convert a serialized string list to a Tcl list.
- int [TT_ListToStringListString](#) (Tcl_Interp *interp, Tcl_Obj *list)
Tcl function to convert a Tcl list to a serialized string list.

Variables

- apply int `Tcl_Result` { int `TTSupport::ForEveryStation` }

7.5.1 Detailed Description

Tcl Helper functions.

These are top level Tcl support functions for the TimeTableSystem class. They are only available from Tcl, C++ programs have other API functions, including overloaded constructors and iterator methods.

Author

Robert Heller <heller@deepsoft.com>

7.5.2 Function Documentation

7.5.2.1 ForEveryCab()

```
int ForEveryCab (
    Tcl_Interp * interp,
    TimeTableSystem * timetable,
    Tcl_Obj * variable,
    Tcl_Obj * body )
```

Tcl looping construct for Cabs.

Tcl looping construct that loops over the cabs in timetable, setting variable to the Cab pointer and evaluates body.

Parameters

<i>timetable</i>	The time table object.
<i>variable</i>	The loop variable.
<i>body</i>	The body script.

Returns

An empty string.

7.5.2.2 ForEveryNote()

```
int ForEveryNote (
    Tcl_Interp * interp,
    TimeTableSystem * timetable,
    Tcl_Obj * variable,
    Tcl_Obj * body )
```

Tcl looping construct for notes.

Tcl looping construct that loops over the notes in timetable, setting variable to the note string and evaluates body.

Parameters

<i>timetable</i>	The time table object.
<i>variable</i>	The loop variable.
<i>body</i>	The body script.

Returns

An empty string.

7.5.2.3 ForEveryPrintOption()

```
int ForEveryPrintOption (
    Tcl_Interp * interp,
    TimeTableSystem * timetable,
    Tcl_Obj * variable,
    Tcl_Obj * body )
```

Tcl looping construct for print options.

Tcl looping construct that loops over the stations in timetable, setting variable to the print option key and evaluates body.

Parameters

<i>timetable</i>	The time table object.
<i>variable</i>	The loop variable.
<i>body</i>	The body script.

Returns

An empty string.

7.5.2.4 ForEveryStation()

```
int ForEveryStation (
    Tcl_Interp * interp,
    TimeTableSystem * timetable,
    Tcl_Obj * variable,
    Tcl_Obj * body )
```

Tcl looping construct for Stations.

Tcl looping construct that loops over the stations in timetable, setting variable to the Station pointer and evaluates body.

Parameters

<i>timetable</i>	The time table object.
<i>variable</i>	The loop variable.
<i>body</i>	The body script.

Returns

An empty string.

7.5.2.5 ForEveryTrain()

```
int ForEveryTrain (
    Tcl_Interp * interp,
    TimeTableSystem * timetable,
    Tcl_Obj * variable,
    Tcl_Obj * body )
```

Tcl looping construct for Trains.

Tcl looping construct that loops over the stations in timetable, setting variable to the Train pointer and evaluates body.

Parameters

<i>timetable</i>	The time table object.
<i>variable</i>	The loop variable.
<i>body</i>	The body script.

Returns

An empty string.

7.5.2.6 NewCreateTimeTable()

```
TimeTableSystem * NewCreateTimeTable (
    const char * name,
    int timescale,
    int timeinterval )
```

Tcl constructor to create a new TimeTable.

Tcl constructor to create a new TimeTable. Calls the new time table constructor.

Parameters

<i>name</i>	The name of the time table system.
<i>timescale</i>	Number of time units per 24 hours. There are 1440 minutes in 24 hours.
<i>timeinterval</i>	The tick frequency in time units.

Returns

A TimeTableSystem object.

7.5.2.7 OldCreateTimeTable()

```
TimeTableSystem * OldCreateTimeTable (
    const char * filename,
    char ** outmessage )
```

Tcl constructor to create a time table system from an existing file.

Tcl constructor to create a time table system from an existing file. The file is read in and the class is properly initialized from the data in the file.

Parameters

<i>filename</i>	The name of the file to load.
-----------------	-------------------------------

Returns

A TimeTableSystem object.

7.5.2.8 TT_ListToStringListString()

```
int TT_ListToStringListString (
    Tcl_Interp * interp,
    Tcl_Obj * list )
```


Tcl function to convert a Tcl list to a serialized string list.

Used to convert Tcl lists to a form that the C++ code can deal with portably.

Parameters

<i>list</i>	A Tcl list.
-------------	-------------

Returns

A serialized string list.

7.5.2.9 TT_StringListToList()

```
int TT_StringListToList (
    Tcl_Interp * interp,
    const char * stringList )
```

Tcl function to convert a serialized string list to a Tcl list.

Used to convert serialized C++ string lists to a Tcl list.

Parameters

<i>stringList</i>	A serialized string list.
-------------------	---------------------------

Returns

A Tcl list.

7.5.3 Variable Documentation

7.5.3.1 Tcl_Result

```
apply int Tcl_Result { int TTSupport::ForEveryStation }
```

7.6 Station

[Station](#) and support classes.

Classes

- class [TTSupport::Occupied](#)
This class records a train sitting on a storage track during a specified time frame.
- class [TTSupport::TimeRange](#)
The [TimeRange](#) class implements a range of times.
- class [TTSupport::StorageTrack](#)
The [StorageTrack](#) class implements a storage track.
- class [TTSupport::Station](#)
The [Station](#) class implements a station.

Typedefs

- typedef map< [TimeRange](#), [Occupied](#), less< [TimeRange](#) > > [TTSupport::OccupiedMap](#)
The [Occupied](#) Map type, ordered by time ranges.
- typedef map< string, [StorageTrack](#), less< string > > [TTSupport::StorageTrackMap](#)
Storage track map.
- typedef vector< [Station](#) > [TTSupport::StationVector](#)
Station Vector.

7.6.1 Detailed Description

[Station](#) and support classes.

This class and its support classes implement information about stations and station stops. This includes where a station is along the line (its scale mile), what storage tracks it has, and what trains are being stored on the storage tracks during what times. Stations are places where trains stop or just important junctions or mile post locations that trains pass by – they might only be used for time keeping checks. Note: the classification tracks at a yard are not storage tracks. Nor are RIP or service or other special purpose tracks. Storage tracks are only for storing whole, complete trains (they might be without engines).

Author

Robert Heller <heller@deepsoft.com>

7.6.2 Typedef Documentation

7.6.2.1 OccupiedMap

```
typedef map<TimeRange, Occupied, less<TimeRange> > TTSupport::OccupiedMap
```

The [Occupied](#) Map type, ordered by time ranges.

Author

Robert Heller <heller@deepsoft.com>

7.6.2.2 StationVector

```
typedef vector<Station> TTSupport::StationVector
```

Station Vector.

7.6.2.3 StorageTrackMap

```
typedef map<string, StorageTrack, less<string> > TTSupport::StorageTrackMap
```

Storage track map.

Indexed by name.

Author

Robert Heller <heller@deepsoft.com>

7.7 Train and support classes.

The train class implements a running train and lists the stations it passes (and possibly stops at).

Classes

- class `TTSupport::Stop`
This class implements a stop.
- class `TTSupport::Train`
This class implements a train.

Typedefs

- typedef vector< `Stop` > `TTSupport::StopVector`
A vector of stops.
- typedef map< string, `Train` *, less< string > > `TTSupport::TrainNumberMap`
Train number map, indexed by train number (symbol).

7.7.1 Detailed Description

The train class implements a running train and lists the stations it passes (and possibly stops at).

Author

Robert Heller <heller@deepsoft.com>

7.7.2 Typedef Documentation

7.7.2.1 StopVector

```
typedef vector<Stop> TTSupport::StopVector
```

A vector of stops.

7.7.2.2 TrainNumberMap

```
typedef map<string, Train *, less<string> > TTSupport::TrainNumberMap
```

[Train](#) number map, indexed by train number (symbol).

7.8 Cab

[Cab](#) class and support types.

Classes

- class [TTSupport::Cab](#)
This class maintains information about cabs.

Typedefs

- typedef map< string, [Cab](#) *, less< string > > [TTSupport::CabNameMap](#)
[Cab](#) name map, cabs indexed by name.

7.8.1 Detailed Description

[Cab](#) class and support types.

This only really important for pure DC systems, but it useful for DCC systems as a way define crew(s).

Author

Robert Heller <heller@deepsoft.com>

7.8.2 Typedef Documentation

7.8.2.1 CabNameMap

```
typedef map<string, Cab *, less<string> > TTSupport::CabNameMap
```

`Cab` name map, cabs indexed by name.

7.9 TclSocketCANModule

Tcl Channel for CAN Sockets.

Functions

- SWIGEXPORT int `Tclsocketcan_SafeInit` (Tcl_Interp *)
- int `SocketCAN` (Tcl_Interp *interp, const char *candev)

Open a CAN Socket.

Variables

- module `TclSocketCAN`
- include typemaps `i`

7.9.1 Detailed Description

Tcl Channel for CAN Sockets.

This module defines a Tcl Channel type for CAN Sockets. These are much like TCP Sockets, except the read/write code translates CAN frames to/from GridConnect messages. This module is only available under Linux, since only Linux has kernel support for the CAN socket family (AF_CAN).

Author

Robert Heller <heller@deepsoft.com>

7.9.2 Function Documentation

7.9.2.1 SocketCAN()

```
int SocketCAN (  
    Tcl_Interp * interp,  
    const char * candev )
```

Open a CAN Socket.

This function opens a read/write connection to a CAN socket to the named interface. The result of this function is the name of a Tcl Channel and can be used as an argument to any Tcl Channel function (such as gets, puts, or fileevent).

Parameters

<i>candev</i>	The name of the CAN interface to connect to.
---------------	--

Returns

The name of a Tcl Channel.

7.9.2.2 Tcsocketcan_SafeInit()

```
SWIGEXPORT int Tcsocketcan_SafeInit (
    Tcl_Interp * )
```

7.9.3 Variable Documentation**7.9.3.1 i**

```
include typemaps i
```

Initial value:

```
{
#define SWIG_name
#define SWIG_version
%}
%apply int Tcl_Result { int SocketCAN }
```

Referenced by [lcc::CANGridConnect::_flags0\(\)](#), [cmri::CMri::_readbyte\(\)](#), [TTSupport::Stop::AddNote\(\)](#), [TTSupport::Train::AddNoteToTrain\(\)](#), [TTSupport::TimeTableSystem::AddStorageTrack\(\)](#), [lcc::GridConnectReply::basicFormatCheck\(\)](#), [lcc::CanAlias::CanAlias\(\)](#), [lcc::CANGridConnectOverUSBSerial::CANGridConnectOverUSBSerial\(\)](#), [FCFSupport::System::CarTypesOrder\(\)](#), [TTSupport::TimeTableSystem::DuplicateStationIndex\(\)](#), [FCFSupport::System::FindDivisionByIndex\(\)](#), [FCFSupport::System::FindIndustryByIndex\(\)](#), [TTSupport::TimeTableSystem::FindStorageTrack\(\)](#), [FCFSupport::System::FindTrainByIndex\(\)](#), [FCFSupport::Industry::IncrementStatsLength\(\)](#), [TTSupport::TimeTableSystem::lthStation\(\)](#), [TTSupport::TimeTableSystem::Note\(\)](#), [TTSupport::Stop::Note\(\)](#), [TTSupport::Train::Note\(\)](#), [FCFSupport::Owner::Owner\(\)](#), [TTSupport::TimeTableSystem::SetDuplicateStationIndex\(\)](#), [TTSupport::TimeTableSystem::SetNote\(\)](#), [TTSupport::TimeTableSystem::SMile\(\)](#), [TTSupport::TimeTableSystem::StationName\(\)](#), [TTSupport::Train::Stop\(\)](#), [FCFSupport::System::TheCar\(\)](#), [FCFSupport::Industry::TheCar\(\)](#), [FCFSupport::System::TheCarGroup\(\)](#), [FCFSupport::System::TheDivisionByIndex\(\)](#), [FCFSupport::System::TheIndustry\(\)](#), [FCFSupport::Station::TheIndustry\(\)](#), [FCFSupport::System::TheStation\(\)](#), [FCFSupport::Division::TheStation\(\)](#), [FCFSupport::System::TrainByIndex\(\)](#), and [FCFSupport::PDFFileStructures::IndirectFloatVector::Write\(\)](#).

7.9.3.2 TclSocketCAN

```
module TclSocketCAN
```

Initial value:

```
{
    static const char rcsid[] = "@(#) : $Id$"
```

7.10 TcLwiringpiModule

WiringPi TcL bindings module.

WiringPi TcL bindings module.

This module provides TcL bindings to the Wiring Pi library. All of the functions defined in the Wiring Pi C library are made available as TcL commands. Please see the documentation for the Wiring Pi C library.

Author

Robert Heller <heller@deepsoft.com>

7.11 Cmri

CMR/I TcL Serial Port Interface.

Namespaces

- namespace [cmri](#)

CMR/I TcL Serial Port Interface.

7.11.1 Detailed Description

CMR/I TcL Serial Port Interface.

This is a cross-platform implementation of Bruce Chubb's C/MRI QBASIC serial port code ported to TcL. This code has been tested with TcL 8.4.

Basically, the way this code works is to use a SNIT class (described on in CMri) to interface to the serial port, which may have one or more serial port cards (a mix of USICs, SUSICs, and SMINIs). A given class instance interfaces to all of the cards on attached to a given serial port. There are three public member functions, one to initialize a given board (described in CMri::InitBoard), one to set the output ports (described in CMri::Outputs), and one to poll the state of the input ports (described in CMri::Inputs).

I was inspired to write this code after reading the four part series in Model Railroader and reading the download package for the SMINI card. I already have a copy of Bruce Chubb's Build Your Own Universal Computer Interface, but the SMINI looks like a great option for small "remote" locations of a layout where there are a few turnouts and a some signals, such as a small junction, interchange yard, or isolated industrial spur.

Author

Robert Heller <heller@deepsoft.com>

7.12 CTIAcela

CTI Acela Serial Port Interface.

Namespaces

- namespace [ctiacela](#)
CTI Acela Tcl Serial Port Interface.

Classes

- class [ctiacela::CTIAcela](#)
Main [CTIAcela](#) interface class.

Typedefs

- typedef int [ctiacela::addresstype](#)
Module address type.
- typedef int [ctiacela::ubyte](#)
Unsigned byte type.
- typedef int [ctiacela::speedtype](#)
Speed type.
- typedef int [ctiacela::momtype](#)
Momentum control type.
- typedef int [ctiacela::filterthreshtype](#)
Filter threshold type.

Functions

- static [ctiacela::CTIAcela::validate](#) (object)
Type validation method.
- [ctiacela::CTIAcela::CTIAcela](#) (name, port,...)
Constructor: open a connection to the CTI Acela.
- [ctiacela::CTIAcela::~~CTIAcela](#) ()
The destructor restores the serial port's state and closes it.
- [ctiacela::CTIAcela::HaveData](#) ()
- [ctiacela::CTIAcela::OnlineP](#) ()
- [ctiacela::CTIAcela::_handleSRQ](#) ()
Handle a service request.
- static [ctiacela::CTIAcela::highbyte](#) (addr)
Return the high byte of address.
- static [ctiacela::CTIAcela::lowbyte](#) (addr)
Return the low byte of address.
- [ctiacela::CTIAcela::Activate](#) (address)

- Activate a control.*

 - `ctiacela::CTIAcela::Deactive` (address)
- Deactive a control.*

 - `ctiacela::CTIAcela::PulseOn` (address, pulsewidth)
- Pulse On a control.*

 - `ctiacela::CTIAcela::PulseOff` (address, pulsewidth)
- Pulse Off a control.*

 - `ctiacela::CTIAcela::Blink` (address, pulsewidth)
- Blink a control.*

 - `ctiacela::CTIAcela::ReverseBlink` (address, pulsewidth)
- Reverse Blink a control.*

 - `ctiacela::CTIAcela::Control4` (address, c1, c2, c3, c4)
- Configure 4 controls simultaneously.*

 - `ctiacela::CTIAcela::Control8` (address, c1, c2, c3, c4, c5, c6, c7, c8)
- Configure 8 controls simultaneously.*

 - `ctiacela::CTIAcela::Control16` (address, c1, c2, c3, c4, c5, c6, c7, c8, c9, c10, c11, c12, c13, c14, c15, c16)
- Configure 16 controls simultaneously.*

 - static `ctiacela::CTIAcela::pack4` (b1, b2, b3, b4)
- pack 4 bits*

 - static `ctiacela::CTIAcela::pack8` (b1, b2, b3, b4, b5, b6, b7, b8)
- pack 4 bits*

 - `ctiacela::CTIAcela::Throttle` (address, speed, momentum, brake, direction, idle)
- Throttle command.*

 - `ctiacela::CTIAcela::EmergencyStop` ()
- Emergency Stop.*

 - `ctiacela::CTIAcela::Signal2` (address, lamp1, lamp2, yellow="off")
- Control 2-lamp signals.*

 - `ctiacela::CTIAcela::Signal3` (address, lamp1, lamp2, lamp3)
- Control 3-lamp signals.*

 - `ctiacela::CTIAcela::Signal4` (address, lamp1, lamp2, lamp3, lamp4)
- Control 4-lamp signals.*

 - `ctiacela::CTIAcela::SignalSettings` (blinkrate, yellowhue)
- Set Signal Settings.*

 - `ctiacela::CTIAcela::SignalBrightness` (brightness)
- Set signal brightness.*

 - `ctiacela::CTIAcela::ConfigureSensor` (address, threshold, select, polarity)
- Configure a sensor.*

 - `ctiacela::CTIAcela::Read` (address)
- Read the state of a sensor.*

 - `ctiacela::CTIAcela::Read4` (address)
- Read the state of four sensors.*

 - `ctiacela::CTIAcela::Read8` (address)
- Read the state of eight sensors.*

 - `ctiacela::CTIAcela::Read16` (address)
- Read the state of sixteen sensors.*

 - `ctiacela::CTIAcela::ReadAll` ()
- Read all sensors.*

- `ctiacela::CTIAcela::SRQControl` (enable="yes")
Enable or disable SRQ messages.
- `ctiacela::CTIAcela::Query` ()
Query sensor change state.
- `ctiacela::CTIAcela::ResetNetwork` ()
Reset the network.
- `ctiacela::CTIAcela::NetworkOnline` ()
Bring the network online.
- `ctiacela::CTIAcela::NetworkOffline` ()
Bring the network offline.
- `ctiacela::CTIAcela::Poll` ()
Poll the network configuration.
- `ctiacela::CTIAcela::ReadRevision` ()
Read CTI Acela firmware revision.
- `ctiacela::CTIAcela::_transmit` (buffer, responsebytes=0)
Transmit buffer and wait for response.
- `ctiacela::CTIAcela::_readevent` ()
Read event method.
- `ctiacela::CTIAcela::_readbyte` (thebytevar)
Read a single byte from the serial interface.

Variables

- `ctiacela::ctiacela`
- static `ctiacela::CTIAcela::Responses`
Responses.
- static `ctiacela::CTIAcela::Opcodes`
Opcodes.
- static `ctiacela::CTIAcela::LampBits`
Lamp Bits.
- static `ctiacela::CTIAcela::FilterSelectBits`
Filter Select Bits.
- static `ctiacela::CTIAcela::CTI_DeviceMap`
CTI Module Map.
- `ctiacela::CTIAcela::ttyfd`
Terminal file descriptor.
- `ctiacela::CTIAcela::dataavailable`
Flag set to true (yes) when sensor data is available.
- `ctiacela::CTIAcela::networkonline`
Flag set to false (no) when the network goes offline.
- `ctiacela::CTIAcela::_timeout`
Timeout flag.
- static `ctiacela::CTIAcela::maxtries`
Loop control for read attempts.

7.12.1 Detailed Description

CTI Acela Serial Port Interface.

This is a cross-platform implementation of the host (computer) side of the CTI Acela Serial Port Interface.

Basically, the way this code works is to use a SNIT class (described in the CTIAcela type) to interface to the serial port, which may have one or more CTI modules (Train Brain, Dash-8, Watchman, Signalman, Smart Cab, etc.). A given class instance interfaces to all of the modules attached to a given serial port.

Author

Robert Heller <heller@deepsoft.com>

7.12.2 Typedef Documentation

7.12.2.1 addresstype

```
unsigned short int ctiacela::addresstype
```

Module address type.

An integer in the range from 0 to 65535, inclusive.

7.12.2.2 filterthreshtype

```
int ctiacela::filterthreshtype
```

Filter threshold type.

An integer from 0 to 31, inclusive.

7.12.2.3 momtype

```
int ctiacela::momtype
```

Momentum control type.

Integer in the range of 0 to 7, inclusive.

7.12.2.4 speedtype

```
int ctiacela::speedtype
```

Speed type.

Integer in the range of 0 to 100, inclusive.

7.12.2.5 ubyte

```
unsigned char ctiacela::ubyte
```

Unsigned byte type.

An integer in the range from 0 to 255, inclusive.

7.12.3 Function Documentation

7.12.3.1 _handleSRQ()

```
ctiacela::CTIAcela::_handleSRQ ( ) [private]
```

Handle a service request.

7.12.3.2 _readbyte()

```
ctiacela::CTIAcela::_readbyte (
    thebytevar ) [private]
```

Read a single byte from the serial interface.

Used by methods that read responses.

Parameters

<i>thebytevar</i>	A name of a variable to put the byte read. Undefined if there was an error.
-------------------	---

Returns

false on error and true on success.

7.12.3.3 _readevent()

```
ctiacela::CTIAcela::_readevent ( ) [private]
```

Read event method.

7.12.3.4 _transmit()

```
ctiacela::CTIAcela::_transmit (
    buffer ,
    responsebytes = 0 ) [private]
```

Transmit buffer and wait for response.

Parameters

<i>buffer</i>	List of bytes to transmit.
<i>responsebytes</i>	Number of expected databytes (not counting the command ack byte) or N for a variable number of result bytes.

Returns

the response, either a single byte or a list of bytes.

7.12.3.5 Activate()

```
ctiacela::CTIAcela::Activate (
    address )
```

Activate a control.

Parameters

<i>address</i>	Address of the control.
----------------	-------------------------

7.12.3.6 Blink()

```
ctiacela::CTIAcela::Blink (
    address ,
    pulsewidth )
```

Blink a control.

Parameters

<i>address</i>	Address of the control.
<i>pulsewidth</i>	Pulsewidth in 10ths of a second

7.12.3.7 ConfigureSensor()

```
ctiacela::CTIAcela::ConfigureSensor (
    address ,
    threshold ,
    select ,
    polarity )
```

Configure a sensor.

Parameters

<i>address</i>	Address of the sensor.
<i>threshold</i>	Filter threshold, 0-31.
<i>select</i>	Filter select, one of noise, bounce, gap, pr dirty.
<i>polarity</i>	Polarity, one of normal or invert.

7.12.3.8 Control16()

```
ctiacela::CTIAcela::Control16 (
    address ,
    c1 ,
    c2 ,
    c3 ,
    c4 ,
    c5 ,
```

```

c6 ,
c7 ,
c8 ,
c9 ,
c10 ,
c11 ,
c12 ,
c13 ,
c14 ,
c15 ,
c16 )

```

Configure 16 controls simultaneously.

Parameters

<i>address</i>	Address of the first control.
<i>c1</i>	First control status, boolean true activates, boolean false deactivates.
<i>c2</i>	Second control status, boolean true activates, boolean false deactivates.
<i>c3</i>	Third control status, boolean true activates, boolean false deactivates.
<i>c4</i>	Fourth control status, boolean true activates, boolean false deactivates.
<i>c5</i>	Fifth control status, boolean true activates, boolean false deactivates.
<i>c6</i>	Sixth control status, boolean true activates, boolean false deactivates.
<i>c7</i>	Seventh control status, boolean true activates, boolean false deactivates.
<i>c8</i>	Eighth control status, boolean true activates, boolean false deactivates.
<i>c9</i>	Ninth control status, boolean true activates, boolean false deactivates.
<i>c10</i>	Tenth control status, boolean true activates, boolean false deactivates.
<i>c11</i>	Eleventh control status, boolean true activates, boolean false deactivates.
<i>c12</i>	Twelfth control status, boolean true activates, boolean false deactivates.
<i>c13</i>	Thirteenth control status, boolean true activates, boolean false deactivates.
<i>c14</i>	Fourteenth control status, boolean true activates, boolean false deactivates.
<i>c15</i>	Fifteenth control status, boolean true activates, boolean false deactivates.
<i>c16</i>	Sixteenth control status, boolean true activates, boolean false deactivates.

7.12.3.9 Control4()

```

ctiacela::CTIAcela::Control4 (
    address ,
    c1 ,
    c2 ,
    c3 ,
    c4 )

```

Configure 4 controls simultaneously.

Parameters

<i>address</i>	Address of the first control.
<i>c1</i>	First control status, boolean true activates, boolean false deactivates.
<i>c2</i>	Second control status, boolean true activates, boolean false deactivates.
<i>c3</i>	Third control status, boolean true activates, boolean false deactivates.
<i>c4</i>	Fourth control status, boolean true activates, boolean false deactivates.

7.12.3.10 Control8()

```
ctiacela::CTIAcela::Control8 (
    address ,
    c1 ,
    c2 ,
    c3 ,
    c4 ,
    c5 ,
    c6 ,
    c7 ,
    c8 )
```

Configure 8 controls simultaneously.

Parameters

<i>address</i>	Address of the first control.
<i>c1</i>	First control status, boolean true activates, boolean false deactivates.
<i>c2</i>	Second control status, boolean true activates, boolean false deactivates.
<i>c3</i>	Third control status, boolean true activates, boolean false deactivates.
<i>c4</i>	Fourth control status, boolean true activates, boolean false deactivates.
<i>c5</i>	Fifth control status, boolean true activates, boolean false deactivates.
<i>c6</i>	Sixth control status, boolean true activates, boolean false deactivates.
<i>c7</i>	Seventh control status, boolean true activates, boolean false deactivates.
<i>c8</i>	Eighth control status, boolean true activates, boolean false deactivates.

7.12.3.11 CTIAcela()

```
ctiacela::CTIAcela::CTIAcela (
    name ,
    port ,
    ... )
```

Constructor: open a connection to the CTI Acela.

Parameters

<i>name</i>	The name of this instance.
<i>port</i>	Name of the serial port connected to theCTI Acela.
...	Options: <ul style="list-style-type: none">• -srqhandler Script to run when there is a sense state change.

7.12.3.12 Deactive()

```
ctiacela::CTIAcela::Deactive (
    address )
```

Deactive a control.

Parameters

<i>address</i>	Address of the control.
----------------	-------------------------

7.12.3.13 EmergencyStop()

```
ctiacela::CTIAcela::EmergencyStop ( )
```

Emergency Stop.

Stop all trains.

7.12.3.14 HaveData()

```
ctiacela::CTIAcela::HaveData ( )
```

Returns

Yes, if there is data available.

7.12.3.15 highbyte()

```
static ctiacela::CTIAcela::highbyte (  
    addr ) [static], [private]
```

Return the high byte of address.

Parameters

<i>addr</i>	Address word (16-bits)
-------------	------------------------

Returns

upper 8 bits

7.12.3.16 lowbyte()

```
static ctiacela::CTIAcela::lowbyte (  
    addr ) [static], [private]
```

Return the low byte of address.

Parameters

<i>addr</i>	Address word (16-bits)
-------------	------------------------

Returns

lower 8 bits

7.12.3.17 NetworkOffline()

```
ctiacela::CTIAcela::NetworkOffline ( )
```

Bring the network offline.

7.12.3.18 NetworkOnline()

```
ctiacela::CTIAcela::NetworkOnline ( )
```

Bring the network online.

7.12.3.19 OnlineP()

```
ctiacela::CTIAcela::OnlineP ( )
```

Returns

Yes, if the network is online.

7.12.3.20 pack4()

```
static ctiacela::CTIAcela::pack4 (
    b1 ,
    b2 ,
    b3 ,
    b4 ) [static], [private]
```

pack 4 bits

Parameters

<i>b1</i>	First bit
<i>b2</i>	Second bit
<i>b3</i>	Third bit
<i>b4</i>	Fourth bit

Returns

a byte with the bits packed.

7.12.3.21 pack8()

```
static ctiacela::CTIAcela::pack8 (
    b1 ,
    b2 ,
    b3 ,
    b4 ,
    b5 ,
    b6 ,
    b7 ,
    b8 ) [static], [private]
```

pack 4 bits

Parameters

<i>b1</i>	First bit
<i>b2</i>	Second bit
<i>b3</i>	Third bit
<i>b4</i>	Fourth bit
<i>b5</i>	Fifth bit
<i>b6</i>	Sixth bit
<i>b7</i>	Seventh bit
<i>b8</i>	Eighth bit

Returns

a byte with the bits packed.

7.12.3.22 Poll()

```
ctiacela::CTIAcela::Poll ( )
```

Poll the network configuration.

Returns

a list of modules on the network.

7.12.3.23 PulseOff()

```
ctiacela::CTIAcela::PulseOff (
    address ,
    pulsewidth )
```

Pulse Off a control.

Parameters

<i>address</i>	Address of the control.
<i>pulsewidth</i>	Pulsewidth in 10ths of a second

7.12.3.24 PulseOn()

```
ctiacela::CTIAcela::PulseOn (
    address ,
    pulsewidth )
```

Pulse On a control.

Parameters

<i>address</i>	Address of the control.
<i>pulsewidth</i>	Pulsewidth in 10ths of a second

7.12.3.25 Query()

```
ctiacela::CTIAcela::Query ( )
```

Query sensor change state.

Returns

true if sensors changed state since the last Query call.

7.12.3.26 Read()

```
ctiacela::CTIAcela::Read (
    address )
```

Read the state of a sensor.

Parameters

<i>address</i>	Address of the sensor.
----------------	------------------------

Returns

the sensor state as a boolean value.

7.12.3.27 Read16()

```
ctiacela::CTIAcela::Read16 (  
    address )
```

Read the state of sixteen sensors.

Parameters

<i>address</i>	Address of the first sensor.
----------------	------------------------------

Returns

the state of sixteen sensors as a sixteen element list of boolean values.

7.12.3.28 Read4()

```
ctiacela::CTIAcela::Read4 (  
    address )
```

Read the state of four sensors.

Parameters

<i>address</i>	Address of the first sensor.
----------------	------------------------------

Returns

the state of four sensors as a four element list of boolean values.

7.12.3.29 Read8()

```
ctiacela::CTIAcela::Read8 (  
    address )
```

Read the state of eight sensors.

Parameters

<i>address</i>	Address of the first sensor.
----------------	------------------------------

Returns

the state of eight sensors as an eight element list of boolean values.

7.12.3.30 ReadAll()

```
ctiacela::CTIAcela::ReadAll ( )
```

Read all sensors.

Returns

the state of all sensors as a list of boolean values.

7.12.3.31 ReadRevision()

```
ctiacela::CTIAcela::ReadRevision ( )
```

Read CTI Acela firmware revision.

Returns

a two element list containing the major and minor revision numbers of the Acela

7.12.3.32 ResetNetwork()

```
ctiacela::CTIAcela::ResetNetwork ( )
```

Reset the network.

7.12.3.33 ReverseBlink()

```
ctiacela::CTIAcela::ReverseBlink (
    address ,
    pulsewidth )
```

Reverse Blink a control.

Parameters

<i>address</i>	Address of the control.
<i>pulsewidth</i>	Pulsewidth in 10ths of a second

7.12.3.34 Signal2()

```
ctiacela::CTIAcela::Signal2 (
    address ,
    lamp1 ,
    lamp2 ,
    yellow = "off" )
```

Control 2-lamp signals.

Parameters

<i>address</i>	Address of first lamp.
<i>lamp1</i>	Lamp 1 control, one of off, on, blink, or reverseblink.
<i>lamp2</i>	Lamp 2 control, one of off, on, blink, or reverseblink.
<i>yellow</i>	Yellow control, one of off, on, blink, or reverseblink.

7.12.3.35 Signal3()

```
ctiacela::CTIAcela::Signal3 (
    address ,
    lamp1 ,
    lamp2 ,
    lamp3 )
```

Control 3-lamp signals.

Parameters

<i>address</i>	Address of first lamp.
<i>lamp1</i>	Lamp 1 control, one of off, on, blink, or reverseblink.
<i>lamp2</i>	Lamp 2 control, one of off, on, blink, or reverseblink.
<i>lamp3</i>	Lamp 3 control, one of off, on, blink, or reverseblink.

7.12.3.36 Signal4()

```
ctiacela::CTIAcela::Signal4 (
    address ,
    lamp1 ,
    lamp2 ,
    lamp3 ,
    lamp4 )
```

Control 4-lamp signals.

Parameters

<i>address</i>	Address of first lamp.
<i>lamp1</i>	Lamp 1 control, one of off, on, blink, or reverseblink.
<i>lamp2</i>	Lamp 2 control, one of off, on, blink, or reverseblink.
<i>lamp3</i>	Lamp 3 control, one of off, on, blink, or reverseblink.
<i>lamp4</i>	Lamp 4 control, one of off, on, blink, or reverseblink.

7.12.3.37 SignalBrightness()

```
ctiacela::CTIAcela::SignalBrightness (
    brightness )
```

Set signal brightness.

Parameters

<i>brightness</i>	Signal brightness.
-------------------	--------------------

7.12.3.38 SignalSettings()

```
ctiacela::CTIAcela::SignalSettings (
    blinkrate ,
    yellowhue )
```

Set Signal Settings.

Parameters

<i>blinkrate</i>	Blink rate in 10ths of a second
<i>yellowhue</i>	Mix of red and green to get yellow as a percentage of green vs red: 128 is 50/50.

7.12.3.39 SRQControl()

```
ctiacela::CTIAcela::SRQControl (
    enable = "yes" )
```

Enable or disable SRQ messages.

Parameters

<i>enable</i>	Boolean, if true enable SRQ messages.
---------------	---------------------------------------

7.12.3.40 Throttle()

```
ctiacela::CTIAcela::Throttle (
    address ,
    speed ,
    momentum ,
    brake ,
    direction ,
    idle )
```

Throttle command.

Parameters

<i>address</i>	Address of the throttle.
<i>speed</i>	Speed (0-100).
<i>momentum</i>	Momentum Control (0 minimum, 7 maximum).
<i>brake</i>	Brake control (boolean: true is on).
<i>direction</i>	Direction control (forward or reverse).
<i>idle</i>	Idle Voltage Control (boolean: true is on).

7.12.3.41 validate()

```
static ctiacela::CTIAcela::validate (
    object ) [static]
```

Type validation method.

Validate object as a [CTIAcela](#) instance.

Parameters

<i>object</i>	The object to validate.
---------------	-------------------------

7.12.3.42 ~CTIAcela()

```
ctiacela::CTIAcela::~~CTIAcela ( )
```

The destructor restores the serial port's state and closes it.

7.12.4 Variable Documentation

7.12.4.1 _timeout

```
ctiacela::CTIAcela::_timeout [private]
```

Timeout flag.

7.12.4.2 CTI_DeviceMap

```
ctiacela::CTIAcela::CTI_DeviceMap [static], [private]
```

CTI Module Map.

7.12.4.3 ctiacela

```
ctiacela::ctiacela
```

7.12.4.4 dataavailable

```
ctiacela::CTIAcela::dataavailable [private]
```

Flag set to true (yes) when sensor data is available.

7.12.4.5 FilterSelectBits

```
ctiacela::CTIAcela::FilterSelectBits [static], [private]
```

Filter Select Bits.

7.12.4.6 LampBits

```
ctiacela::CTIAcela::LampBits [static], [private]
```

Lamp Bits.

7.12.4.7 maxtries

```
ctiacela::CTIAcela::maxtries [static], [private]
```

Loop control for read attempts.

7.12.4.8 networkonline

```
ctiacela::CTIAcela::networkonline [private]
```

Flag set to false (no) when the network goes offline.

7.12.4.9 Opcodes

```
ctiacela::CTIAcela::Opcodes [static], [private]
```

Opcodes.

7.12.4.10 Responses

```
ctiacela::CTIAcela::Responses [static], [private]
```

Responses.

7.12.4.11 ttyfd

```
ctiacela::CTIAcela::ttyfd [private]
```

Terminal file descriptor.

7.13 LCCModule

LCC (OpenLCB) interface code.

Namespaces

- namespace [lcc](#)

Namespace that holds the LCC interface code.

7.13.1 Detailed Description

LCC (OpenLCB) interface code.

These are Tcl SNIT classes that interface to the LCC / OpenLCB bus.

Author

Robert Heller <heller@deepsoft.com>

7.14 XPressNetModule

XPressNet interface code.

Namespaces

- namespace [xpressnet](#)
Namespace that holds the [XPressNet](#) interface code.

7.14.1 Detailed Description

XPressNet interface code.

These are Tcl SNIT classes that interface to the Lenz XPressNet interface used on Lenz DCC Command Units. There is a low-level collection of Tcl SNIT classes that handles the low-level Serial I/O interface and there is a higher level interface that defines a Tcl Event to handle the asynchronous aspects of the low-level XPressNet serial I/O, by entering the Lenz XPressnet interface into Tcl's Event processing system.

Author

Robert Heller <heller@deepsoft.com>

7.15 NCEModule

NCE Cab Bus interface code.

Namespaces

- namespace [nce](#)
Namespace that holds the [NCE](#) interface code.

7.15.1 Detailed Description

NCE Cab Bus interface code.

This is the Tcl SNIT class that interfaces with the NCE Cab Bus. It works with either the NCE USB Interface board (typically with the Power Cab) OR the NCE RS232 interface (typically used with the CS02 command station).

Author

Robert Heller <heller@deepsoft.com>

7.16 TclCommon

Common Tcl Script Library.

Namespaces

- namespace [FileEntry](#)
This is a specialized form of the [LabelEntry](#) widget intended for selecting file names.
- namespace [ReadConfiguration](#)
The Read Configuration File code is contained in this namespace.
- namespace [CTCPanel](#)
CTC Panel code, Version 2.
- namespace [LabelSelectColor](#)
This package provides a [BWidget](#) style megawidget for selecting colors, in the same style as a [LabelEntry](#) widget.
- namespace [LabelComboBox](#)
This is a specialized form of the [LabelFrame](#) widget containing a [ComboBox](#) Widget.
- namespace [LabelSpinBox](#)
This is a specialized form of the [LabelFrame](#) widget containing a [SpinBox](#) Widget.
- namespace [PanedWindow](#)
A modified version of the [BWidget](#) [PanedWindow](#).
- namespace [CabWidgets](#)
Cab Widget code.
- namespace [HTMLHelp](#)
[HTMLHelp](#) namespace, which contains the [HTMLHelp](#) snit widget adapter object and associated code.
- namespace [gettext](#)
Localization functions.

Classes

- class [splash](#)
Widget that implements a splash window.
- class [mainwindow](#)
A widget that is heavily extended from the [BWidget](#) [MainFrame](#) widget.
- class [SimpleDOMElement](#)
A simple DOM element coded in Tcl using SNIT.
- class [ParseXML](#)
Class to hold an XML tree.
- class [ScrollTabNotebook](#)
Tabbed Notebook with scrollable tabs.

7.16.1 Detailed Description

Common Tcl Script Library.

This script library contains a collection of Tcl Scripts that are commonly used throughout the Model Railroad System. Most of them relate to various extended GUI elements.

Author

Robert Heller <heller@deepsoft.com>

7.17 LinuxGpio

Linux GPIO interface, using sysfs.

Namespaces

- namespace [linuxgpio](#)
Linux GPIO Interface.

7.17.1 Detailed Description

Linux GPIO interface, using sysfs.

This is the portable implementation of GPIO under Linux, using the sysfs file system (/sys/class/gpio/...). This code should work on all SBC / development boards that run Linux (Raspberry Pis, Beagle Bones, Banana Pis, etc.).

Author

Robert Heller <heller@deepsoft.com>

7.18 Cmri Support code

Namespaces

- namespace [CmriSupport](#)
Cmri Support code.

7.18.1 Detailed Description

7.19 RaildriverClientModule

Raildriver Client class code.

Namespaces

- namespace [raildriver](#)
Namespace that holds the Raildriver Client class code.

7.19.1 Detailed Description

Raildriver Client class code.

This is the Tcl SNIT class that implements a client that connects to the RailDriver daemon.

Author

Robert Heller <heller@deepsoft.com>

7.20 Graphics Support Code

These scripts provide support for additional graphical objects, including (dashboard) instruments and touch screen widgets (similar to what is used on Star Trek).

These scripts provide support for additional graphical objects, including (dashboard) instruments and touch screen widgets (similar to what is used on Star Trek).

At present little of this code is actually used by any of the Model Railroad System programs, but it is provided for future use and for use by people developing and exploring additional graphical user interface options.

7.21 GRSupportModule

Graphics Support code.

Namespaces

- namespace [GRSupport](#)
Code to support the various graphics packages.
- namespace [Instruments](#)
Namespace used for instruments code.
- namespace [LCARS](#)
Namespace where the [LCARS](#) code lives.
- namespace [OvalWidgets](#)
These oval shaped widgets are much like the Star Trek NG computer screens.

7.21.1 Detailed Description

Graphics Support code.

A collection of packages to help with various graphics needs.

Author

Robert Heller <heller@deepsoft.com>

7.22 SatelliteModule

[Satellite](#) master client.

Classes

- class [Satellite](#)
Satellite class.

7.22.1 Detailed Description

[Satellite](#) master client.

This Tcl SNIT class interfaces with SatelliteDaemon processes (daemons) running on slave computers (usually Raspberry Pis).

Author

Robert Heller <heller@deepsoft.com>

7.23 FCFSupport

Various callback classes.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

7.23.1 Detailed Description

Various callback classes.

Switch List Support code.

These classes are used to provide a means for various class members to access code in the outer application to handle message passing and related activities. For the most part, the base classes don't do anything at all, but provide a set of virtual methods that implement the various sorts of callback functionality.

Author

Robert Heller <heller@deepsoft.com>

These classes provide support to create switch lists for trains and yards.

Chapter 8

Namespace Documentation

8.1 azatrax Namespace Reference

[Azatrax](#) C++ LibUSB 1.0 Interface.

Classes

- class [Azatrax](#)
[Azatrax](#) I/O Class.
- class [MRD](#)
[MRD](#) I/O Class.
- class [SL2](#)
[SL2](#) I/O Class.
- class [SR4](#)
[SR4](#) I/O Class.

8.1.1 Detailed Description

[Azatrax](#) C++ LibUSB 1.0 Interface.

This is the basic cross-platform class library that uses the libusb-1.0 API to communicate with MRD2-U, MRD2-S, [SL2](#), and [SR4](#) modules from [Azatrax](#) over the USB bus. This library contains classes that encapsulate logic to communicate with these devices. Each class instance connects to a specific device instance.

Author

Robert Heller <heller@deepsoft.com>

8.1.2 Tcl Package Provided

[Azatrax](#) 1.0.0

8.1.3 Library Provided

libAzatrax 1.0.0

8.2 CabWidgets Namespace Reference

Cab Widget code.

Classes

- class [LocomotiveDirection](#)
Locomotive Direction widget.
- class [LocomotiveSpeed](#)
Locomotive Speed widget.
- class [SelectLocomotive](#)
Select or enter a Locomotive address.

8.2.1 Detailed Description

Cab Widget code.

Contains various widgets related to DCC (or CD) Cab panels, including locomotive speed, direction, locomotive address, and DCC Programming features.

Author

Robert Heller <heller@deepsoft.com>

8.2.2 Package provided

[CabWidgets](#) 1.0

8.3 cmri Namespace Reference

CMR/I Tcl Serial Port Interface.

Classes

- class [CMri](#)
Main C/MRI interface class.

Typedefs

- typedef int [uatype](#)
Board address type.
- typedef int [ubyte](#)
Unsigned byte.
- typedef listtype [ByteList](#)
List of bytes.

Enumerations

- enum [CardType](#) { [USIC](#) , [SUSIC](#) , [SMINI](#) }
Card type codes.

8.3.1 Detailed Description

CMR/I Tcl Serial Port Interface.

This is a cross-platform implementation of Bruce Chubb's C/MRI QBASIC serial port code ported to Tcl. This code has been tested with Tcl 8.4.

Basically, the way this code works is to use a SNIT class (described on in [CMri](#)) to interface to the serial port, which may have one or more serial port cards (a mix of USICs, SUSICs, and SMINIs). A given class instance interfaces to all of the cards on attached to a given serial port. There are three public member functions, one to initialize a given board (described in [CMri::InitBoard](#)), one to set the output ports (described in [CMri::Outputs](#)), and one to poll the state of the input ports (described in [CMri::Inputs](#)).

I was inspired to write this code after reading the four part series in Model Railroader and reading the download package for the SMINI card. I already have a copy of Bruce Chubb's Build Your Own Universal Computer Interface, but the SMINI looks like a great option for small "remote" locations of a layout where there are a few turnouts and a some signals, such as a small junction, interchange yard, or isolated industrial spur.

Author

Robert Heller <heller@deepsoft.com>

8.3.2 Package provided

Cmri 2.0.0

8.3.3 Typedef Documentation

8.3.3.1 ByteList

```
list< cmri::ubyte > cmri::ByteList
```

List of bytes.

Contains a list of unsigned bytes.

8.3.3.2 uatype

```
int cmri::uatype
```

Board address type.

An integer in the range from 0 to 127, inclusive.

8.3.3.3 ubyte

```
unsigned char cmri::ubyte
```

Unsigned byte.

8-bit unsigned byte.

8.3.4 Enumeration Type Documentation

8.3.4.1 CardType

```
enum cmri::CardType
```

Card type codes.

Enumerator

USIC	Classic Universal Serial Interface Card.
SUSIC	Super Classic Universal Serial Interface Card.
SMINI	SMINI Super Mini node.

8.4 CmriSupport Namespace Reference

Cmri Support code.

Classes

- class [CmriNode](#)
CMR/I node type.

8.4.1 Detailed Description

Cmri Support code.

This is high-level code to support the CMR/I code, in the form of a SNIT type object that wraps the low-level class and creates a network of boards on the bus that the low-level class accesses.

Author

Robert Heller <heller@deepsoft.com>

8.4.2 Package provided

[CmriSupport](#) 1.2

8.5 CTCPanel Namespace Reference

CTC Panel code, Version 2.

Classes

- class [CodeButton](#)
Code button object type.
- class [Crossing](#)
Crossing object type.
- class [Crossover](#)
Crossover (turnout) object type.
- class [CTCLabel](#)
CTC Label object type.
- class [CTCPanel](#)
Main CTC Panel megawidget.
- class [CurvedBlock](#)
Curved Block object type.

- class [DoubleSlip](#)
Double Slip (turnout) object type.
- class [EndBumper](#)
End Bumper object type.
- class [HiddenBlock](#)
Hidden Block object type.
- class [Lamp](#)
Lamp object type.
- class [PushButton](#)
Push Button object type.
- class [SchLabel](#)
Schematic Label object type.
- class [ScissorCrossover](#)
Scissor [Crossover](#) (turnout) object type.
- class [Signal](#)
Signal object type.
- class [SIGPlate](#)
Signal plate object type.
- class [SingleSlip](#)
Single Slip (turnout) object type.
- class [StraightBlock](#)
Straight Block object type.
- class [StubYard](#)
Stub Yard object type.
- class [Switch](#)
Switch (turnout) object type.
- class [SWPlate](#)
Switch plate object type.
- class [ThreeWaySW](#)
Three Way Switch (turnout) object type.
- class [ThroughYard](#)
Through Yard object type.
- class [Toggle](#)
Toggle switch object type.

Functions

- [leverMethods](#) (hasCenter)
Macro to add lever methods to object types.
- [verifyDoubleMethod](#) ()
Macro to add a verify double method to a snit type.
- [verifyBoolMethod](#) ()
Macro to add a verify boolean method to a snit type.
- [verifyColorMethod](#) ()
Macro to add a verify color method to a snit type.
- [verifyOrientation8Method](#) ()

Macro to add a verify 8-way orientation method to a snit type.

- [verifyPositionMethod](#) ()

Macro to add a verify position method to a snit type.

- [standardMethods](#) ()

Macro to add a standard set of methods to an object type.

- [trackworkmethods](#) ()

Macro to include trackwork drawing methods.

8.5.1 Detailed Description

CTC Panel code, Version 2.

This version of the CTC Panel code uses tile and snit to implement CTC panels and the gadgets that populate CTC panels. The CTC Panel code is contained in this namespace.

Author

Robert Heller <heller@deepsoft.com>

8.5.2 Package provided

[CTCPanel](#) 2.0

8.5.3 Function Documentation

8.5.3.1 leverMethods()

```
CTCPanel::leverMethods (
    hasCenter )
```

Macro to add lever methods to object types.

Parameters

<i>hasCenter</i>	Flag to indicate if there is a center position for this object's lever.
------------------	---

8.5.3.2 standardMethods()

```
CTCPanel::standardMethods ( )
```

Macro to add a standard set of methods to an object type.

Referenced by [CTCPanel::StubYard::invoke\(\)](#).

8.5.3.3 trackworkmethods()

```
CTCPanel::trackworkmethods ( )
```

Macro to include trackwork drawing methods.

8.5.3.4 verifyBoolMethod()

```
CTCPanel::verifyBoolMethod ( )
```

Macro to add a verify boolean method to a snit type.

8.5.3.5 verifyColorMethod()

```
CTCPanel::verifyColorMethod ( )
```

Macro to add a verify color method to a snit type.

8.5.3.6 verifyDoubleMethod()

```
CTCPanel::verifyDoubleMethod ( )
```

Macro to add a verify double method to a snit type.

8.5.3.7 verifyOrientation8Method()

```
CTCPanel::verifyOrientation8Method ( )
```

Macro to add a verify 8-way orientation method to a snit type.

8.5.3.8 verifyPositionMethod()

```
CTCPanel::verifyPositionMethod ( )
```

Macro to add a verify position method to a snit type.

8.6 ctiacela Namespace Reference

CTI Acela Tcl Serial Port Interface.

Classes

- class [CTIAcela](#)
Main [CTIAcela](#) interface class.

Typedefs

- typedef int [addresstype](#)
Module address type.
- typedef int [ubyte](#)
Unsigned byte type.
- typedef int [speedtype](#)
Speed type.
- typedef int [momtype](#)
Momentum control type.
- typedef int [filterthreshtype](#)
Filter threshold type.

Variables

- [ctiacela](#)

8.6.1 Detailed Description

CTI Acela Tcl Serial Port Interface.

Author

Robert Heller <heller@deepsoft.com>

8.6.2 Package provided

CTIAcela 1.0.0

8.7 FCFSupport Namespace Reference

Namespace to hold all of the FCF Support code.

Namespaces

- namespace [PDFFileStructures](#)
PDF File support structures.

Classes

- class [Car](#)
This class holds all of the information for a single car.
- class [CarGroup](#)
Car group class.
- class [CarType](#)
The CarType class represents a type of railroad car (rolling stock).
- class [Division](#)
The Division class implements a single division, which contains a number of contiguous stations.
- class [Industry](#)
The Industry class represents an industry.
- class [LogMessageCallback](#)
A callback to log a message.
- class [LQ24PrinterDevice](#)
Class for an LQ24 compatible printer.
- class [Owner](#)
The Owner class describes a car owner.
- class [PathName](#)
A Class that portably represents a pathname.
- class [PauseCallback](#)
The Pause callback.
- class [PDFPrinterDevice](#)
PDF Printer device.
- class [PostScriptPrinterDevice](#)
Derived class for printing on Postscript printers.
- class [PrinterDevice](#)
Base class for printer devices (hard copy output).
- class [ShowBannerCallback](#)
Display a page heading type message on the screen.
- class [Station](#)

- The [Station](#) class implements a single station.

 - class [SwitchList](#)

The global switch list structure.
 - class [SwitchListElement](#)

This class implements each switch list element.
 - class [System](#)

This is the main Freight [Car](#) Forwarder class.
 - class [TextPrinterDevice](#)

Derived class for printing on generic plain text printers.
 - class [Train](#)

The [Train](#) class represents a train.
 - class [TrainDisplayCallback](#)

Callback to manage a train status display.
 - class [WorkInProgressCallback](#)

Work In Progress Callback.

Typedefs

- typedef vector< [Division](#) * > [DivisionVector](#)

A vector of divisions.
- typedef map< int, [Division](#) *, less< int > > [DivisionMap](#)

A map of divisions, by integer index (division index).
- typedef map< char, [Division](#) *, less< char > > [DivisionSymbolMap](#)

A map of divisions, by division symbol (a character).
- typedef vector< [Station](#) * > [StationVector](#)

A station vector.
- typedef map< int, [Station](#) *, less< int > > [StationMap](#)

A station map by integer index.
- typedef map< int, [Train](#) *, less< int > > [TrainMap](#)

A map of trains, indexed by integer (train index).
- typedef map< string, [Train](#) *, less< string > > [TrainNameMap](#)

A map of trains, indexed by string (Train name).
- typedef vector< [Car](#) * > [CarVector](#)

A vector of cars.
- typedef map< int, [Industry](#) *, less< int > > [IndustryMap](#)

A map of industry pointers indexed by an integer.
- typedef vector< [Industry](#) * > [IndustryVector](#)

A vector of industry pointers.
- typedef vector< char > [CarTypeOrderVector](#)

A vector of ordered car types.
- typedef map< char, [CarType](#) *, less< char > > [CarTypeMap](#)

A map of car types indexed by type character.
- typedef map< string, [Owner](#) *, less< string > > [OwnerMap](#)

Map of owners, indexed by their initials.
- typedef vector< [SwitchListElement](#) > [SwitchListElementVector](#)

A vector of switch list elements.
- typedef vector< string > [stringVector](#)

A Vector of strings.

Functions

- ostream & [operator<<](#) (ostream &stream, const [SwitchListElement](#) &element)
Output stream operator for SwitchListElements.
- ostream & [operator<<](#) (ostream &stream, const [PDFFileStructures::PDFNameArray](#) &parray)
Output stream operator for PDFNameArrays.

8.7.1 Detailed Description

Namespace to hold all of the FCF Support code.

Author

Robert Heller <heller@deepsoft.com>

8.7.2 Tcl Package Provided

Fcfclasses 1.0.4

8.7.3 Library Provided

libfcfclasses 1.0.4

8.7.4 Typedef Documentation

8.7.4.1 CarTypeMap

```
typedef map<char, CarType *, less<char> > FCFSupport::CarTypeMap
```

A map of car types indexed by type character.

8.7.4.2 CarTypeOrderVector

```
typedef vector<char> FCFSupport::CarTypeOrderVector
```

A vector of ordered car types.

8.7.4.3 CarVector

```
typedef vector< Car * > FCFSupport::CarVector
```

A vector of cars.

8.7.4.4 DivisionMap

```
typedef map<int, Division *, less<int> > FCFSupport::DivisionMap
```

A map of divisions, by integer index (division index).

8.7.4.5 DivisionSymbolMap

```
typedef map<char, Division *, less<char> > FCFSupport::DivisionSymbolMap
```

A map of divisions, by division symbol (a character).

8.7.4.6 DivisionVector

```
typedef vector<Division *> FCFSupport::DivisionVector
```

A vector of divisions.

8.7.4.7 IndustryMap

```
typedef map<int, Industry *, less<int> > FCFSupport::IndustryMap
```

A map of industry pointers indexed by an integer.

8.7.4.8 IndustryVector

```
typedef vector<Industry *> FCFSupport::IndustryVector
```

A vector of industry pointers.

8.7.4.9 OwnerMap

```
typedef map<string, Owner *, less<string> > FCFSupport::OwnerMap
```

Map of owners, indexed by their initials.

8.7.4.10 StationMap

```
typedef map<int, Station *, less<int> > FCFSupport::StationMap
```

A station map by integer index.

8.7.4.11 StationVector

```
typedef vector<Station *> FCFSupport::StationVector
```

A station vector.

8.7.4.12 stringVector

```
typedef vector<string> FCFSupport::stringVector
```

A Vector of strings.

Used as the list of path list in a [PathName](#) instance.

Author

Robert Heller <heller@deepsoft.com>

8.7.4.13 SwitchListElementVector

```
typedef vector<SwitchListElement> FCFSupport::SwitchListElementVector
```

A vector of switch list elements.

8.7.4.14 TrainMap

```
typedef map<int, Train *, less<int> > FCFSupport::TrainMap
```

A map of trains, indexed by integer (train index).

8.7.4.15 TrainNameMap

```
typedef map<string, Train *, less<string> > FCFSupport::TrainNameMap
```

A map of trains, indexed by string (Train name).

8.7.5 Function Documentation

8.7.5.1 operator<<() [1/2]

```
ostream & FCFSupport::operator<< (
    ostream & stream,
    const PDFFileStructures::PDFNameArray & parray )
```

Output stream operator for PDFNameArrays.

Parameters

<i>stream</i>	The stream to write to.
<i>parray</i>	The array to write.

8.7.5.2 operator<<() [2/2]

```
ostream & FCFSupport::operator<< (
    ostream & stream,
    const SwitchListElement & element )
```

Output stream operator for SwitchListElements.

Parameters

<i>stream</i>	The output stream.
<i>element</i>	The switch list element to output.

8.8 FCFSupport::PDFFileStructures Namespace Reference

PDF File support structures.

Classes

- class [CatalogDictionary](#)
Master catalog of the PDF file.
- class [CrossReferenceTable](#)
The cross reference table object.
- class [Dictionary](#)
PDF [Dictionary](#) class.
- class [FontDictionary](#)
A Font dictionary object.
- class [FreedObject](#)
A deleted indirect object.
- class [IndirectFloatVector](#)
Indirect array of floats.
- class [IndirectObject](#)
Indirect object base class.
- class [IndirectObjectDictionary](#)
PDF Indirect Object [Dictionary](#), used for named resources in a Resource [Dictionary](#).
- class [InformationDirectory](#)
Information directory.
- class [Page](#)
Describes a single page.
- class [PageLabelDictionary](#)
[Page](#) label dictionary.
- class [PageLabelTree](#)
A tree of page label dictionaries.
- class [PageTree](#)
A tree of pages.
- class [PDFNameArray](#)
PDF Name array.
- class [PDFStream](#)
Stream object.
- class [PostScriptStandardType1FontDictionary](#)
A standard Type1 PostScript font dictionary.
- class [Rectangle](#)
A rectangle object.
- class [ResourceDictionary](#)
Resource dictionary.
- class [Type1FontDictionary](#)
Type 1 Font dictionary.
- class [TypedDictionary](#)
Typed dictionary.

Typedefs

- typedef map< string, [IndirectObject](#) *, less< string > > [NamedIndirectObjectMap](#)
A ``vector'' of named indirect objects, implemented as a map.
- typedef vector< [PDFStream](#) * > [PDFStreamVector](#)
A vector of PDF Streams.
- typedef vector< [PageLabelTree](#) * > [PageLabelTreeKidVector](#)
Map of [PageLabelTree](#) kids.
- typedef map< int, [PageLabelDictionary](#) *, less< int > > [PageLabelDictionaryNumMap](#)
Map of [PageLabelDictionary](#) numbers.

Functions

- string [QuotePDFString](#) (const string &str)
Quote a string (protect special character with a backslash).

8.8.1 Detailed Description

PDF File support structures.

These classes and structures are designed to implement some of the functionality described in Adobe's PDF Reference Fifth Edition version 1.6.

Author

Robert Heller <heller@deepsoft.com>

8.8.2 Typedef Documentation

8.8.2.1 NamedIndirectObjectMap

```
typedef map<string, IndirectObject *, less<string> > FCFSupport::PDFFileStructures::NamedIndirectObjectMap
```

A ``vector'' of named indirect objects, implemented as a map.

The elements are ndexed by name.

Author

Robert Heller <heller@deepsoft.com>

8.8.2.2 PageLabelDictionaryNumMap

```
typedef map<int, PageLabelDictionary*, less<int> > FCFSupport::PDFFileStructures::PageLabelDictionaryNumMap
```

Map of [PageLabelDictionary](#) numbers.

8.8.2.3 PageLabelTreeKidVector

```
typedef vector<PageLabelTree*> FCFSupport::PDFFileStructures::PageLabelTreeKidVector
```

Map of [PageLabelTree](#) kids.

8.8.2.4 PDFStreamVector

```
typedef vector<PDFStream *> FCFSupport::PDFFileStructures::PDFStreamVector
```

A vector of PDF Streams.

Author

Robert Heller <heller@deepsoft.com>

8.8.3 Function Documentation

8.8.3.1 QuotePDFString()

```
string FCFSupport::PDFFileStructures::QuotePDFString (
    const string & str )
```

Quote a string (protect special character with a backslash).

Parameters

<i>str</i>	The string to quote.
------------	----------------------

8.9 FileEntry Namespace Reference

This is a specialized form of the LabelEntry widget intended for selecting file names.

Functions

- [create](#) (path,...)
Creation procedure.
- [configure](#) (path,...)
Configuration procedure: configure one or more options for this widget.
- [cget](#) (path, option)
Configuration option accessor procedure: access one option directly.
- [bind](#) (path,...)
Bind function.
- [_path_command](#) (path, cmd, larg)
Path command for this megawidget.
- [_destroy](#) (path)
Destructor function.
- [_openFile](#) (path)
Prodedure bound to the file open button.

8.9.1 Detailed Description

This is a specialized form of the LabelEntry widget intended for selecting file names.

A button is included to the right of the entry that pops up a file selection dialog. Many of the resources from LabelFrame, Entry, and Button are included in this widget.

Parameters

<i>path</i>	The widget path.
-------------	------------------

Parameters

...	<p>Options:</p> <ul style="list-style-type: none"> • <code>-filebitmap</code> The name of a bitmap to use for the button. By default an option folder image is used. • <code>-fileimage</code> The name of an image to use for the button. By default an option folder image is used. • <code>-filedialog</code> The type of file dialog to use. Should be one of open, save, or directory. If open, <code>tk_getOpenFile</code> is used; if save, <code>tk_getSaveFile</code> is used; and if directory, <code>tk_chooseDirectory</code> is used. • <code>-defaulttextextension</code> This option is passed to <code>tk_getOpenFile</code> or <code>tk_getSaveFile</code>. • <code>-filetypes</code> This option is passed to <code>tk_getOpenFile</code> or <code>tk_getSaveFile</code>. • <code>-title</code> This option is passed to <code>tk_getOpenFile</code> or <code>tk_getSaveFile</code>. • <code>-labeljustify</code> From <code>LabelFrame</code> (<code>-justify</code>). • <code>-labelwidth</code> From <code>LabelFrame</code> (<code>-width</code>). • <code>-labelanchor</code> From <code>LabelFrame</code> (<code>-anchor</code>). • <code>-labelheight</code> From <code>LabelFrame</code> (<code>-height</code>). • <code>-labelfont</code> From <code>LabelFrame</code> (<code>-font</code>). • <code>-labeltextvariable</code> From <code>LabelFrame</code> (<code>-textvariable</code>). • <code>-label</code> From <code>LabelFrame</code> (<code>-text</code>). • <code>-entryfg</code> From <code>Entry</code> (<code>-foreground</code>). • <code>-entrybg</code> From <code>Entry</code> (<code>-background</code>). • <code>-text</code> From <code>Entry</code>. • <code>-buttonfg</code> From <code>Button</code> (<code>-foreground</code>). • <code>-buttonbg</code> From <code>Button</code> (<code>-background</code>). • <code>-buttonactivebg</code> From <code>Button</code> (<code>-activebackground</code>). • <code>-buttonactivefg</code> From <code>Button</code> (<code>-activeforeground</code>). • <code>-buttondisabledfg</code> From <code>Button</code> (<code>-disabledforeground</code>). • <code>-buttonhighlightbg</code> From <code>Button</code> (<code>-highlightbackground</code>). • <code>-buttonhighlightcolor</code> From <code>Button</code> (<code>-highlightcolor</code>).
-----	--

Author

Robert Heller <heller@deepsoft.com>

8.9.2 Package provided

BWFileEntry 1.0.0

8.9.3 Function Documentation

8.9.3.1 `_destroy()`

```
FileEntry::_destroy (
    path ) [private]
```

Destructor function.

Parameters

<i>path</i>	The path of the megawidget.
-------------	-----------------------------

8.9.3.2 `_openFile()`

```
FileEntry::_openFile (
    path ) [private]
```

Prodedure bound to the file open button.

Pops up a file selector dialog.

Parameters

<i>path</i>	The path of the megawidget.
-------------	-----------------------------

8.9.3.3 `_path_command()`

```
FileEntry::_path_command (
    path ,
    cmd ,
    larg ) [private]
```

Path command for this megawidget.

Implements all of the megawidget commands.

Parameters

<i>path</i>	The path of the megawidget.
<i>cmd</i>	The command name.
<i>larg</i>	The command argument.

8.9.3.4 bind()

```
FileEntry::bind (
    path ,
    ... )
```

Bind function.

Passthrough to the entry widget.

Parameters

<i>path</i>	The path of the megawidget.
...	Bind arguments

Referenced by [lcc::ConfigurationEditor::_readall\(\)](#).

8.9.3.5 cget()

```
FileEntry::cget (
    path ,
    option )
```

Configuration option accessor procedure: access one option directly.

Parameters

<i>path</i>	The path of the megawidget.
<i>option</i>	The option to access

Referenced by [ReadConfiguration::ConfigurationType\(\)](#), [lcc::GridConnectMessage::setByte\(\)](#), and [lcc::OpenLCBMessage::toString\(\)](#).

8.9.3.6 configure()

```
FileEntry::configure (
    path ,
    ... )
```

Configuration procedure: configure one or more options for this widget.

Parameters

<i>path</i>	The path of the megawidget.
...	Option value pairs.

Referenced by [lcc::ConfigurationEditor::_readall\(\)](#), and [lcc::GridConnectMessage::_set_rtr\(\)](#).

8.9.3.7 create()

```
FileEntry::create (
    path ,
    ... )
```

Creation procedure.

Parameters

<i>path</i>	The megawidget's path.
...	Options for this widget.

Referenced by [CTCPanel::Crossing::_VerifyCrossingType\(\)](#), and [CTCPanel::Crossover::invoke\(\)](#).

8.10 gettext Namespace Reference

Localization functions.

Functions

- [_m](#) (msgid,...)
Handle messages with a context hint prefix (eg Label|lab).
- [_mx](#) (...)
Get maxlength of a set of messages with a context hint prefix.
- [_](#) (...)
Get a localized from the message catalog and deal with forming possible arguments, by calling ::msgcat::mc.

8.10.1 Detailed Description

Localization functions.

Functions to fetch localized messages from the message catalog.

Author

Robert Heller <heller@deepsoft.com>

8.10.2 Package provided

gettext 1.0

8.10.3 Function Documentation

8.10.3.1 `_()`

```
gettext::_ (
    ... )
```

Get a localized from the message catalog and deal with formatting possible arguments, by calling `::msgcat::mc`.

Referenced by [cmri::CMri::_readbyte\(\)](#).

8.10.3.2 `_m()`

```
gettext::_m (
    msgid ,
    ... )
```

Handle messages with a context hint prefix (eg Label|lab).

Referenced by [lcc::ConfigurationEditor::_readall\(\)](#).

8.10.3.3 `_mx()`

```
gettext::_mx (
    ... )
```

Get maxlen of a set of messages with a context hint prefix.

Used to compute label widths.

8.11 GRSupport Namespace Reference

Code to support the various graphics packages.

Functions

- [_ROI2](#) (name1, name2, op)
A variable trace to enforce the read-only-ness of PI2.
- [_ROI](#) (name1, name2, op)
A variable trace to enforce the read-only-ness of PI.
- [DegreesToRadians](#) (degrees)
Function to convert from degrees to radians.
- [RadiansToDegrees](#) (rads)
Function to convert from radians to degrees.
- [VerifyDoubleMethod](#) ()
Snit macro defining a validate method for doubles.
- [VerifyBooleanMethod](#) ()
Snit macro defining a validate method for booleans.
- [VerifyIntegerMethod](#) ()
Snit macro defining a validate method integers.
- [VerifyOrientationHVMMethod](#) ()
Snit macro defining a validate method for orientation (horizontal or vertical).
- [VerifyColorMethod](#) ()
Snit macro defining a validate method for colors.

Variables

- [PI2](#)
Variable containing $\pi/2$.
- [PI](#)
Variable containing π .

8.11.1 Detailed Description

Code to support the various graphics packages.

Namespace where all of the graphics support code lives.

Author

Robert Heller <heller@deepsoft.com>

8.11.2 Package provided

grsupport 2.0

8.11.3 Function Documentation

8.11.3.1 `_ROPI()`

```
GRSupport::_ROPI (
    name1 ,
    name2 ,
    op ) [private]
```

A variable trace to enforce the read-only-ness of PI.

8.11.3.2 `_ROPI2()`

```
GRSupport::_ROPI2 (
    name1 ,
    name2 ,
    op ) [private]
```

A variable trace to enforce the read-only-ness of PI2.

8.11.3.3 `DegreesToRadians()`

```
GRSupport::DegreesToRadians (
    degrees )
```

Function to convert from degrees to radians.

Parameters

<i>degrees</i>	Value to convert to radians.
----------------	------------------------------

8.11.3.4 RadiansToDegrees()

```
GRSupport::RadiansToDegrees (
    rads )
```

Function to convert from radians to degrees.

Parameters

<i>rads</i>	Value to convert to degrees.
-------------	------------------------------

8.11.3.5 VerifyBooleanMethod()

```
GRSupport::VerifyBooleanMethod ( )
```

Snit macro defining a validate method for booleans.

8.11.3.6 VerifyColorMethod()

```
GRSupport::VerifyColorMethod ( )
```

Snit macro defining a validate method for colors.

8.11.3.7 VerifyDoubleMethod()

```
GRSupport::VerifyDoubleMethod ( )
```

Snit macro defining a validate method for doubles.

8.11.3.8 VerifyIntegerMethod()

```
GRSupport::VerifyIntegerMethod ( )
```

Snit macro defining a validate method integers.

8.11.3.9 VerifyOrientationHVMethod()

```
GRSupport::VerifyOrientationHVMethod ( )
```

Snit macro defining a validate method for orientation (horizontal or vertical).

8.11.4 Variable Documentation

8.11.4.1 PI

```
GRSupport::PI
```

Variable containing π .

This variable is read-only.

8.11.4.2 PI2

```
GRSupport::PI2
```

Variable containing $\pi/2$.

This variable is read-only.

8.12 HTMLHelp Namespace Reference

[HTMLHelp](#) namespace, which contains the [HTMLHelp](#) snit widget adapter object and associated code.

Classes

- class [HTMLHelp](#)

A widget that implements a help dialog that renders HTML coded help pages (generally generated from LaTeX using tex4ht's htlatex script).

8.12.1 Detailed Description

[HTMLHelp](#) namespace, which contains the [HTMLHelp](#) snit widget adapter object and associated code.

It uses code originally written by Stephen Uhler and modified by Clif Flynt (htmllib 0.3 through 0.3.4). I have modified it further and embedded into a snit widget adapter object to create a full featured help dialog object. I also added limited support for cascading style sheets.

Author

Stephen Uhler <stephen.uhler@sun.com>, Clif Flynt <clif@cflynt.com>, and Robert Heller <heller@deepsoft.com>.

8.12.2 Package provided

[HTMLHelp](#) 1.0

8.13 Instruments Namespace Reference

Namespace used for instruments code.

Classes

- class [AnalogClock](#)
Analog clock instrument.
- class [CabSignalLamp](#)
Cab signal lamp type.
- class [DialInstrument](#)
Generic dial instrument.
- class [DigitalClock](#)
Digital clock instrument.
- class [DigitalInstrument](#)
Digital instrument.

Functions

- [CommonOptions](#) (defaultLabel)
Snit macro to define common options used by all instruments.

8.13.1 Detailed Description

Namespace used for instruments code.

Author

Robert Heller <heller@deepsoft.com>

8.13.2 Package provided

[Instruments](#) 2.0

8.13.3 Function Documentation

8.13.3.1 CommonOptions()

```
Instruments::CommonOptions (
    defaultLabel )
```

Snit macro to define common options used by all instruments.

Parameters

<i>defaultLabel</i>	Default value for the label.
...	<p>Options:</p> <ul style="list-style-type: none"> • -x The X coordinate of the instrument (default 0). • -y The Y coordinate of the instrument (default 0). • -size The size of the instrument (default 100). • -label The label of the instrument. • -labelcolor The color of the label (default black). • -labelfont The font of the label (default {Times 14 bold}). • -background The background color of the instrument (default blue). • -outline The outline color of the instrument (default black). • -scaleback The background color of the scale (default white). • -scaleticks The color of the scale ticks (default black). • -fontfamily The font family used on the instrument (default Courier).

8.14 LabelComboBox Namespace Reference

This is a specialized form of the LabelFrame widget containing a ComboBox Widget.

Functions

- [create](#) (path,...)

Procedure to create a [LabelComboBox](#).

- [configure](#) (path,...)

Procedure to configure a [LabelComboBox](#).

- [cget](#) (path, option)

Procedure to get a configuration option.

- [bind](#) (path,...)

Procedure to set a binding on the ComboBox entry.

- [get](#) (path,...)

Procedure to get the ComboBox value.

- [getlistbox](#) (path,...)

Procedure to get the listbox of the ComboBox widget.

- [getvalue](#) (path,...)

Procedure to get the value of the ComboBox.

- [icursor](#) (path,...)

Pass through procedure for the ComboBox icursor function.

- [post](#) (path,...)

Pass through procedure for the ComboBox post function.

- [setvalue](#) (path,...)

Pass through procedure for the ComboBox setvalue function.

- [unpost](#) (path,...)

Pass through procedure for the ComboBox unpost function.

- [_path_command](#) (path, cmd, larg)

Path command for this megawidget.

- [_destroy](#) (path)

Destructor function.

8.14.1 Detailed Description

This is a specialized form of the LabelFrame widget containing a ComboBox Widget.

Most of the resources from the LabelFrame and ComboBox widgets are included in this widget.

Parameters

<i>path</i>	The widget path.
-------------	------------------

Parameters

...	Options: <ul style="list-style-type: none"> • -labeljustify From LabelFrame (-justify). • -labelwidth From LabelFrame (-width). • -labelanchor From LabelFrame (-anchor). • -labelheight From LabelFrame (-height). • -labelfont From LabelFrame (-font). • -labeltextvariable From LabelFrame (-textvariable). • -label From LabelFrame (-text). • -comboboxfg From ComboBox (-foreground). • -comboboxbg From ComboBox (-background). • -comboboxheight From ComboBox (-height). • -comboboxlistboxwidth From ComboBox (-listboxwidth). • -values From ComboBox.
-----	--

Author

Robert Heller <heller@deepsoft.com>

8.14.2 Package provided

BWLabelComboBox 1.0

8.14.3 Function Documentation

8.14.3.1 `_destroy()`

```
LabelComboBox::_destroy (
    path ) [private]
```

Destructor function.

Parameters

<i>path</i>	The path of the megawidget.
-------------	-----------------------------

8.14.3.2 `_path_command()`

```
LabelComboBox::_path_command (
    path ,
    cmd ,
    larg ) [private]
```

Path command for this megawidget.

Implements all of the megawidget commands.

Parameters

<i>path</i>	The path of the megawidget.
<i>cmd</i>	The command name.
<i>larg</i>	The command argument.

8.14.3.3 `bind()`

```
LabelComboBox::bind (
    path ,
    ... )
```

Procedure to set a binding on the ComboBox entry.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the ComboBox bind procedure.

8.14.3.4 `cget()`

```
LabelComboBox::cget (
    path ,
    option )
```

Procedure to get a configuration option.

Parameters

<i>path</i>	Path to the new widget.
<i>option</i>	Configuration option to get.

8.14.3.5 configure()

```
LabelComboBox::configure (
    path ,
    ... )
```

Procedure to configure a [LabelComboBox](#).

Parameters

<i>path</i>	Path to the new widget.
...	Configuration options.

8.14.3.6 create()

```
LabelComboBox::create (
    path ,
    ... )
```

Procedure to create a [LabelComboBox](#).

Parameters

<i>path</i>	Path to the new widget.
...	Configuration options.

8.14.3.7 get()

```
LabelComboBox::get (
    path ,
    ... )
```

Procedure to get the ComboBox value.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the ComboBox get procedure

8.14.3.8 getlistbox()

```
LabelComboBox::getlistbox (
    path ,
    ... )
```

Procedure to get the listbox of the ComboBox widget.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the ComboBox getlistbox procedure.

8.14.3.9 getvalue()

```
LabelComboBox::getvalue (
    path ,
    ... )
```

Procedure to get the value of the ComboBox.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the ComboBox getvalue procedure.

8.14.3.10 icursor()

```
LabelComboBox::icursor (
    path ,
    ... )
```

Pass through procedure for the ComboBox icursor function.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the ComboBox icursor function.

8.14.3.11 post()

```
LabelComboBox::post (
    path ,
    ... )
```

Pass through procedure for the ComboBox post function.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the ComboBox post function.

8.14.3.12 setvalue()

```
LabelComboBox::setvalue (
    path ,
    ... )
```

Pass through procedure for the ComboBox setvalue function.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the ComboBox setvalue function.

8.14.3.13 unpost()

```
LabelComboBox::unpost (
    path ,
    ... )
```

Pass through procedure for the ComboBox unpost function.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the ComboBox unpost function.

8.15 LabelSelectColor Namespace Reference

This package provides a BWidget style megawidget for selecting colors, in the same style as a LabelEntry widget.

Functions

- [create](#) (path,...)
Creation procedure.
- [ColorPopup](#) (path)
Procedure bound to the palette button to select a color.
- [configure](#) (path,...)
Configuration procedure: configure one or more options for this widget.
- [cget](#) (path, option)
Configuration option accessor procedure: access one option directly.
- [_path_command](#) (path, cmd, larg)
Path command for this megawidget.
- [_destroy](#) (path)
Destructor function.

8.15.1 Detailed Description

This package provides a BWidget style megawidget for selecting colors, in the same style as a LabelEntry widget.

This megawidget includes resources from the LabelFrame, Entry, and Button widgets.

Parameters

<i>pathname</i>	Widget pathname.
-----------------	------------------

Parameters

...	<p>Options:</p> <ul style="list-style-type: none"> • -labeljustify From LabelFrame (-justify). • -labelwidth From LabelFrame (-width). • -labelanchor From LabelFrame (-anchor). • -labelheight From LabelFrame (-height). • -labelfont From LabelFrame (-font). • -labeltextvariable From LabelFrame (-textvariable). • -label From LabelFrame (-text). • -selectcolorfg From Entry (-foreground). • -selectcolorbg From Entry (-background). • -text From Entry. • -buttonfg From Button (-foreground). • -buttonbg From Button (-background). • -buttonactivebg From Button (-activebackground). • -buttonactivefg From Button (-activeforeground). • -buttondisabledfg From Button (-disabledforeground). • -buttonhighlightbg From Button (-highlightbackground). • -buttonhighlightcolor From Button (-highlightcolor).
-----	--

Author

Robert Heller <heller@deepsoft.com>

8.15.2 Package provided

[LabelSelectColor](#) 1.0

8.15.3 Function Documentation

8.15.3.1 `_destroy()`

```
LabelSelectColor::_destroy (
    path ) [private]
```

Destructor function.

Parameters

<i>path</i>	– The path of the megawidget.
-------------	-------------------------------

8.15.3.2 `_path_command()`

```
LabelSelectColor::_path_command (  
    path ,  
    cmd ,  
    larg ) [private]
```

Path command for this megawidget.

Implements all of the megawidget commands.

Parameters

<i>path</i>	– The path of the megawidget.
<i>cmd</i>	– The command name.
<i>larg</i>	– The command argument.

8.15.3.3 `cget()`

```
LabelSelectColor::cget (  
    path ,  
    option )
```

Configuration option accessor procedure: access one option directly.

Parameters

<i>path</i>	– The path of the megawidget.
<i>option</i>	– The option to access

8.15.3.4 `ColorPopup()`

```
LabelSelectColor::ColorPopup (  
    path )
```

Procedure bound to the palette button to select a color.

Parameters

<i>path</i>	– The path of the megawidget.
-------------	-------------------------------

8.15.3.5 configure()

```
LabelSelectColor::configure (  
    path ,  
    ... )
```

Configuration procedure: configure one or more options for this widget.

Parameters

<i>path</i>	– The path of the megawidget.
...	– Option value pairs.

8.15.3.6 create()

```
LabelSelectColor::create (  
    path ,  
    ... )
```

Creation procedure.

Parameters

<i>path</i>	– The megawidget's path.
...	– Options for this widget.

8.16 LabelSpinBox Namespace Reference

This is a specialized form of the LabelFrame widget containing a SpinBox Widget.

Functions

- [create](#) (path,...)

Procedure to create a [LabelSpinBox](#).

- [configure](#) (path,...)

Procedure to configure a [LabelSpinBox](#).

- [cget](#) (path, option)

Procedure to get a configuration option.

- [setvalue](#) (path,...)

Procedure to set the value of the [SpinBox](#).

- [getvalue](#) (path,...)

Procedure to get the value of the [SpinBox](#).

- [bind](#) (path,...)

Procedure to set a binding on the [SpinBox](#) entry.

- [_path_command](#) (path, cmd, larg)

Path command for this megawidget.

- [_destroy](#) (path)

Destructor function.

8.16.1 Detailed Description

This is a specialized form of the [LabelFrame](#) widget containing a [SpinBox](#) Widget.

Most of the resources from the [LabelFrame](#) and [SpinBox](#) widgets are included in this widget.

Parameters

<i>path</i>	The widget path
...	Options: <ul style="list-style-type: none"> • -labeljustify From LabelFrame (-justify). • -labelwidth From LabelFrame (-width). • -labelanchor From LabelFrame (-anchor). • -labelheight From LabelFrame (-height). • -labelfont From LabelFrame (-font). • -labeltextvariable From LabelFrame (-textvariable). • -label From LabelFrame (-text). • -spinboxfg From SpinBox (-foreground). • -spinboxbg From SpinBox (-background). • -range From SpinBox. • -values From SpinBox.

Author

Robert Heller <heller@deepsoft.com>

8.16.2 Package provided

BWLabelSpinBox 1.0

8.16.3 Function Documentation

8.16.3.1 `_destroy()`

```
LabelSpinBox::_destroy (  
    path ) [private]
```

Destructor function.

Parameters

<i>path</i>	The path of the megawidget.
-------------	-----------------------------

8.16.3.2 `_path_command()`

```
LabelSpinBox::_path_command (  
    path ,  
    cmd ,  
    larg ) [private]
```

Path command for this megawidget.

Implements all of the megawidget commands.

Parameters

<i>path</i>	The path of the megawidget.
<i>cmd</i>	The command name.
<i>larg</i>	The command argument.

8.16.3.3 bind()

```
LabelSpinBox::bind (
    path ,
    ... )
```

Procedure to set a binding on the SpinBox entry.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the SpinBox bind procedure.

8.16.3.4 cget()

```
LabelSpinBox::cget (
    path ,
    option )
```

Procedure to get a configuration option.

Parameters

<i>path</i>	Path to the new widget.
<i>option</i>	Configuration option to get.

8.16.3.5 configure()

```
LabelSpinBox::configure (
    path ,
    ... )
```

Procedure to configure a [LabelSpinBox](#).

Parameters

<i>path</i>	Path to the new widget.
...	Configuration options.

8.16.3.6 create()

```
LabelSpinBox::create (
    path ,
    ... )
```

Procedure to create a [LabelSpinBox](#).

Parameters

<i>path</i>	Path to the new widget.
...	Configuration options.

8.16.3.7 getvalue()

```
LabelSpinBox::getvalue (
    path ,
    ... )
```

Procedure to get the value of the SpinBox.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the SpinBox getvalue procedure.

8.16.3.8 setvalue()

```
LabelSpinBox::setvalue (
    path ,
    ... )
```

Procedure to set the value of the SpinBox.

Parameters

<i>path</i>	Path to the new widget.
...	Arguments to pass to the SpinBox setvalue procedure.

8.17 LCARS Namespace Reference

Namespace where the [LCARS](#) code lives.

8.17.1 Detailed Description

Namespace where the [LCARS](#) code lives.

Author

Robert Heller <heller@deepsoft.com>

8.17.2 Package provided

LCARSWidgets 2.0

8.18 Icc Namespace Reference

Namespace that holds the LCC interface code.

Classes

- class [CanAlias](#)
Implements a CAN Alias.
- class [CANGridConnect](#)
Base class to connect to a CAN bus using GridConnect formatted message over.
- class [CANGridConnectOverCANSocket](#)
Connect to a CAN bus using GridConnect formatted message over a CAN Socket connection.
- class [CANGridConnectOverTcp](#)
Connect to a CAN bus using GridConnect formatted message over a Tcp/Ip connection.
- class [CANGridConnectOverUSBSerial](#)
Connect to a CAN bus using GridConnect formatted message over a USB Serial port.
- class [CANHeader](#)
CAN Header type.
- class [CanMessage](#)
A CAN Message, containing a 29-bit header and upto 8 bytes of data.
- class [CanTransport](#)
Logical transport of CAN Messages.
- class [ConfigMemory](#)
Configure memory.
- class [ConfigOptions](#)
Display memory config options.

- class [ConfigurationEditor](#)
Generate OpenLCB Memory Configuration Window.
- class [EventID](#)
An event id structure.
- class [EventID_or_null](#)
An [EventID](#) or empty string.
- class [EventLog](#)
Event received log, with event sender.
- class [EventReceived](#)
Display a received event.
- class [GridConnectMessage](#)
A Grid Connect formatted CAN message.
- class [GridConnectReply](#)
A Grid Connect formatted CAN message (reply).
- class [MTIDetail](#)
MTI Header type, detailed version.
- class [MTIHeader](#)
MTI Header type.
- class [nid_or_null](#)
Node ID regexp pattern or the empty string.
- class [OpenLCBMessage](#)
OpenLCB Message type.
- class [OpenLCBNode](#)
Connect to a OpenLCB interface.
- class [OpenLCBOverTcp](#)
Connect to a OpenLCB over Tcp/Ip.
- class [OpenLCBProtocols](#)
Supported LCC Protocol name type.
- class [SendEvent](#)
Send Event Dialog – send PCRE message.

Typedefs

- typedef int [twobits](#)
A 2 bit integer.
- typedef int [threebits](#)
A 3 bit integer.
- typedef int [fivebits](#)
A 5 bit integer.
- typedef int [sixbits](#)
A 6 bit integer.
- typedef int [length](#)
An integer from 1 to 64.
- typedef int [byte](#)
An 8-bit unsigned byte.
- typedef int [twelvebits](#)

- A 12 bit integer.*
 - typedef int [fifteenbits](#)
- A 15 bit integer.*
 - typedef int [sixteenbits](#)
- A 16 bit integer.*
 - typedef int [headerword](#)
- A 29 bit integer.*
 - typedef int [uint32](#)
- A 32 bit unsigned integer.*
 - typedef listtype [eightbytes](#)
- A list of bytes, from 0 to 8 elements.*
 - typedef listtype [bytelist72](#)
- A list of bytes, from 0 to 72 elements.*
 - typedef listtype [bytelist](#)
- A list of bytes, unbounded.*
 - typedef listtype [databuf](#)
- A list of bytes, from 1 to 64 elements.*
 - typedef char * [nid](#)
- Node ID regexp pattern.*

Enumerations

- enum [datagramcontent](#) {
[complete](#) , [first](#) , [middle](#) , [last](#) ,
[stream](#) }*Datagram and stream types.*
- enum [eventvalidity](#) { [valid](#) , [invalid](#) , [unknown](#) }*Event validity.*

Functions

- [AbstractMessage](#) ()*Define common variables and accessor methods.*
- [AbstractMRMessage](#) ()*@Brief Macro to create common methods and variables for an AbstractMRMessage*

8.18.1 Detailed Description

Namespace that holds the LCC interface code.

This is a cross-platform implementation ...

Author

Robert Heller <heller@deepsoft.com>

8.18.2 Package provided

LCC 1.0

8.18.3 Package provided

ConfigDialogs 1.0

8.18.4 Package provided

EventDialogs 1.0

8.18.5 Package provided

[ConfigurationEditor](#) 1.0

8.18.6 Typedef Documentation

8.18.6.1 byte

```
unsigned char lcc::byte
```

An 8-bit unsigned byte.

8.18.6.2 bytelist

```
list lcc::bytelist
```

A list of bytes, unbounded.

8.18.6.3 bytelist72

```
list lcc::bytelist72
```

A list of bytes, from 0 to 72 elements.

8.18.6.4 databuf

```
list lcc::databuf
```

A list of bytes, from 1 to 64 elements.

8.18.6.5 eightbytes

```
list lcc::eightbytes
```

A list of bytes, from 0 to 8 elements.

8.18.6.6 fifteenbits

```
int lcc::fifteenbits
```

A 15 bit integer.

8.18.6.7 fivebits

```
int lcc::fivebits
```

A 5 bit integer.

8.18.6.8 headerword

```
int lcc::headerword
```

A 29 bit integer.

8.18.6.9 length

```
int lcc::length
```

An integer from 1 to 64.

8.18.6.10 nid

```
string lcc::nid
```

Node ID regexp pattern.

A Node Id is six bytes as pairs of hex digits separated by colons (:).

8.18.6.11 sixbits

```
int lcc::sixbits
```

A 6 bit integer.

8.18.6.12 sixteenbits

```
int lcc::sixteenbits
```

A 16 bit integer.

8.18.6.13 threebits

```
int lcc::threebits
```

A 3 bit integer.

8.18.6.14 twelvebits

```
int lcc::twelvebits
```

A 12 bit integer.

8.18.6.15 twobits

```
int lcc::twobits
```

A 2 bit integer.

8.18.6.16 uint32

```
int lcc::uint32
```

A 32 bit unsigned integer.

8.18.7 Enumeration Type Documentation

8.18.7.1 datagramcontent

```
enum lcc::datagramcontent
```

Datagram and stream types.

Enumerator

complete	One frame datagram.
first	First frame datagram.
middle	Middle frame datagram.
last	Last frame datagram.
stream	Stream frame.

8.18.7.2 eventvalidity

```
enum lcc::eventvalidity
```

Event validity.

Enumerator

valid	Currently valid.
invalid	Currently invalid.
unknown	Currently unknown.

8.18.8 Function Documentation

8.18.8.1 AbstractMessage()

```
lcc::AbstractMessage ( )
```

Define common variables and accessor methods.

8.18.8.2 AbstractMRMessage()

```
lcc::AbstractMRMessage ( )
```

@Brief Macro to create common methods and variables for an AbstractMRMessage

8.19 linuxgpio Namespace Reference

Linux GPIO Interface.

Classes

- class [GpioInputActiveHigh](#)
Input pin, active high (high is true).
- class [GpioInputActiveLow](#)
Input pin, active low (low is true).
- class [GpioOutputSafeHigh](#)
Output pin, initialized to high.
- class [GpioOutputSafeHighInvert](#)
Output pin, initialized to high, inverted.
- class [GpioOutputSafeLow](#)
Output pin, initialized to low.
- class [GpioOutputSafeLowInverted](#)
Output pin, initialized to low, with inverted logic.
- class [LinuxGpio](#)
Base generic GPIO interface class.

Typedefs

- typedef int [pinnotype](#)
Pin number type, a positive integer.

Enumerations

- enum [pindirection](#) { [in](#) , [out](#) , [high](#) , [low](#) }
Pin direction and initial type code.

8.19.1 Detailed Description

Linux GPIO Interface.

This is the portable implementation of GPIO under Linux, using the sysfs file system (/sys/class/gpio/...). This code should work on all SBC / development boards that run Linux (Raspberry Pis, Beagle Bones, Banana Pis, etc.).

Author

Robert Heller <heller@deepsoft.com>

8.19.2 Package provided

[LinuxGpio](#) 1.0.0

8.19.3 Typedef Documentation

8.19.3.1 pinnotype

```
typedef int linuxgpio::pinnotype
```

Pin number type, a positive integer.

8.19.4 Enumeration Type Documentation

8.19.4.1 pindirection

```
enum linuxgpio::pindirection
```

Pin direction and initial type code.

Enumerator

in	Input Pin.
out	Output Pin.
high	Output Pin, initialized to high.
low	Output Pin, initialized to low.

8.20 nce Namespace Reference

Namespace that holds the [NCE](#) interface code.

Classes

- class [NCE](#)
Main [NCE](#) Cab Bus interface class.

Typedefs

- typedef int [LocoAddress](#)
Locomotive address type.
- typedef int [ConsistAddress](#)
Consist address type.
- typedef int [AccessoryNumber](#)
Accessory address type.
- typedef int [MacroNumber](#)
[NCE](#) Macro number.
- typedef int [CabNumber](#)
Cab number type.
- typedef int [Hours](#)
Hours type.
- typedef int [Minutes](#)
Minutes type.
- typedef int [ScaleClockRatio](#)
Scale clock ratio range.
- typedef int [EchoMode](#)
This is really should be an enumeration, but works as a limited range integer.
- typedef int [Speed28](#)
28 speed step speeds.
- typedef int [Speed128](#)
128 speed step speeds.
- typedef int [CSAddress](#)
CSAddress type.
- typedef int [UByte](#)
Unsigned byte type (data byte).
- typedef listtype [RAMData](#)
Datalist for RAM data, 1 to 16 unsigned bytes.
- typedef char * [LCDMessage16](#)
Data for 16 character LCD lines.
- typedef char * [LCDMessage8](#)
Data for 8 character LCD lines.
- typedef listtype [RawPacket](#)
Raw packets for writing raw packets to the temp queue.

- typedef listtype [RawTrackPacket](#)
Raw packets for writing raw packets to the track queue.
- typedef listtype [RAMData8](#)
Datalist for RAM data 8 unsigned bytes.
- typedef int [MomentumLevel](#)
Momentum level.
- typedef int [AspectBits](#)
Aspect bit mask.

Enumerations

- enum [SpeedMode](#) { [S14](#) , [S28](#) , [S128](#) }
- enum [Direction](#) { [Forward](#) , [Reverse](#) }

Functions

- [ErrorMessage](#) (code)
Return the error message, given the error code.

8.20.1 Detailed Description

Namespace that holds the [NCE](#) interface code.

This is a cross-platform implementation the [NCE](#) Cab Bus serial port interface. Based on documentation provided by [NCE](#) (usb_1.pdf and Bincmds.pdf).

Basically, the way this code works is to use a class to interface to the real RS232 port attached to a CS02 command station OR the 'virtual' serial port implemented by the [NCE](#) USB Interface Board connected to the [NCE](#) Cab Bus.

Author

Robert Heller <heller@deepsoft.com>

8.20.2 Package provided

[NCE](#) 1.0.0

8.20.3 Typedef Documentation

8.20.3.1 AccessoryNumber

```
int nce::AccessoryNumber
```

Accessory address type.

8.20.3.2 AspectBits

```
int nce::AspectBits
```

Aspect bit mask.

8.20.3.3 CabNumber

```
int nce::CabNumber
```

Cab number type.

8.20.3.4 ConsistAddress

```
int nce::ConsistAddress
```

Consist address type.

8.20.3.5 CSAddress

```
unsigned short int nce::CSAddress
```

CSAddress type.

8.20.3.6 EchoMode

```
int nce::EchoMode
```

This is really should be an enumeration, but works as a limited range integer.

Allowed values are:

- 0 No echo.
- 1 Echo 1st byte of command.
- 2 Echo entire command.

8.20.3.7 Hours

```
int nce::Hours
```

Hours type.

8.20.3.8 LCDMessage16

```
char nce::LCDMessage16[16]
```

Data for 16 character LCD lines.

8.20.3.9 LCDMessage8

```
char nce::LCDMessage8[8]
```

Data for 8 character LCD lines.

8.20.3.10 LocoAddress

```
int nce::LocoAddress
```

Locomotive address type.

8.20.3.11 MacroNumber

```
int nce::MacroNumber
```

NCE Macro number.

8.20.3.12 Minutes

```
int nce::Minutes
```

Minutes type.

8.20.3.13 MomentumLevel

```
int nce::MomentumLevel
```

Momentum level.

8.20.3.14 RAMData

```
list nce::RAMData
```

Datalist for RAM data, 1 to 16 unsigned bytes.

8.20.3.15 RAMData8

```
list nce::RAMData8
```

Datalist for RAM data 8 unsigned bytes.

8.20.3.16 RawPacket

```
list nce::RawPacket
```

Raw packets for writing raw packets to the temp queue.

8.20.3.17 RawTrackPacket

list `nce::RawTrackPacket`

Raw packets for writing raw packets to the track queue.

8.20.3.18 ScaleClockRatio

int `nce::ScaleClockRatio`

Scale clock ratio range.

8.20.3.19 Speed128

int `nce::Speed128`

128 speed step speeds.

8.20.3.20 Speed28

int `nce::Speed28`

28 speed step speeds.

8.20.3.21 UByte

unsigned char `nce::UByte`

Unsigned byte type (data byte).

8.20.4 Enumeration Type Documentation

8.20.4.1 Direction

enum `nce::Direction`

Enumerator

Forward	Forward direction.
Reverse	Reverse direction.

8.20.4.2 SpeedMode

```
enum nce::SpeedMode
```

Enumerator

S14	Fourteen speed step mode.
S28	Twenty eight speed step mode.
S128	128 speed step mode.

8.20.5 Function Documentation**8.20.5.1 ErrorMessage()**

```
nce::ErrorMessage (
    code )
```

Return the error message, given the error code.

This function returns the error message associated with a given error code.

Parameters

<i>code</i>	Error code returned.
-------------	----------------------

Returns

A localized error message string.

Author

Robert Heller <heller@deepsoft.com>

8.21 OvalWidgets Namespace Reference

These oval shaped widgets are much like the Star Trek NG computer screens.

Classes

- class [OvalButton](#)
Oval button.
- class [OvalRoundCornerRectangle](#)
Oval Round Corner Rectangle.
- class [OvalScale](#)
An oval scale widget, much like a standard Tk scale widget.
- class [OvalSlider](#)
Oval Slider.
- class [OvalScrollBar](#)
Oval ScrollBar.

Functions

- [XYWH](#) (width, height)
Defines the options for position (-x,-y) and size (-width,-height).
- [ColorOptionMethods](#) ()
Snit macro to default color option methods.
- [CommonValidateMethods](#) ()
Macro to include the common validation methods.
- [ColorFillOption](#) (optspec, default)
Method to define a fill color option.
- [ColorOutlineOption](#) (optspec, default)
Method to define an outline color option.
- [FontFamily](#) (default)
Macro to define the -fontfamily option.
- [SquareEndOptions](#) ()
Macro to define the square end options (-rightsquare, -leftsquare).
- [_VerifyFont](#) (option, value)
Method to validate a font value.
- [_ConfigureFont](#) (option, value)
Method to configure a font value.
- [_ConfigureText](#) (option, value)
Method to configure the text of the button.
- [_VerifyIntegerOrEmpty](#) (option, value)
Method to validate an integer or empty string option.
- [OvalLabel](#) (name, _canvas,...)
Construct some text.
- [~OvalLabel](#) ()
Destructor free up all resources.
- [_UnderSplit](#) (beforevar, undervar, aftervar)
Method to split label text into before, under, and after segments.

Variables

- [HBar](#)
Holds the horizontal bar bitmap.
- [VBar](#)
Holds the vertical bar bitmap.
- var [canvas](#)
Canvas the widget is on.

8.21.1 Detailed Description

These oval shaped widgets are much like the Star Trek NG computer screens.

Author

Robert Heller <heller@deepsoft.com>

8.21.2 Package provided

[OvalWidgets](#) 2.0

8.21.3 Function Documentation

8.21.3.1 `_ConfigureFont()`

```
OvalWidgets::_ConfigureFont (
    option ,
    value ) [private]
```

Method to configure a font value.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value of the option.

8.21.3.2 `_ConfigureText()`

```
OvalWidgets::_ConfigureText (
```

```
option ,  
value ) [private]
```

Method to configure the text of the button.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value to configure it to.

8.21.3.3 _UnderSplit()

```
OvalWidgets::_UnderSplit (  
    beforevar ,  
    undervar ,  
    aftervar ) [private]
```

Method to split label text into before, under, and after segments.

Parameters

<i>beforevar</i>	The name of the before variable.
<i>undervar</i>	The name of the under variable.
<i>aftervar</i>	The name of the after variable.

8.21.3.4 _VerifyFont()

```
OvalWidgets::_VerifyFont (  
    option ,  
    value ) [private]
```

Method to validate a font value.

Parameters

<i>option</i>	The name of the option to validate.
<i>value</i>	The value of the option.

8.21.3.5 `_VerifyIntegerOrEmpty()`

```
OvalWidgets::_VerifyIntegerOrEmpty (
    option ,
    value ) [private]
```

Method to validate an integer or empty string option.

Parameters

<i>option</i>	The name of the option to validate.
<i>value</i>	The value of the option.

8.21.3.6 `ColorFillOption()`

```
OvalWidgets::ColorFillOption (
    optspec ,
    default )
```

Method to define a fill color option.

Parameters

<i>optspec</i>	The option specification
<i>default</i>	The default value.

8.21.3.7 `ColorOptionMethods()`

```
OvalWidgets::ColorOptionMethods ( )
```

Snit macro to default color option methods.

8.21.3.8 `ColorOutlineOption()`

```
OvalWidgets::ColorOutlineOption (
    optspec ,
    default )
```

Method to define an outline color option.

Parameters

<i>optspec</i>	The option specification
<i>default</i>	The default value.

8.21.3.9 CommonValidateMethods()

```
OvalWidgets::CommonValidateMethods ( )
```

Macro to include the common validation methods.

8.21.3.10 FontFamily()

```
OvalWidgets::FontFamily (
    default )
```

Macro to define the -fontfamily option.

Parameters

<i>default</i>	The default font family.
----------------	--------------------------

8.21.3.11 OvalLabel()

```
OvalWidgets::OvalLabel (
    name ,
    _canvas ,
    ... )
```

Construct some text.

Parameters

<i>_canvas</i>	The canvas to draw the text on.
...	The option value list.

8.21.3.12 SquareEndOptions()

```
OvalWidgets::SquareEndOptions ( )
```

Macro to define the square end options (-rightsquare, -leftsquare).

8.21.3.13 XYWH()

```
OvalWidgets::XYWH (
    width ,
    height )
```

Defines the options for position (-x,-y) and size (-width,-height).

Parameters

<i>width</i>	Default width.
<i>height</i>	Default height.

8.21.3.14 ~OvalLabel()

```
OvalWidgets::~~OvalLabel ( )
```

Destructor free up all resources.

8.21.4 Variable Documentation

8.21.4.1 canvas

```
var OvalWidgets::canvas [private]
```

Initial value:

```
{
public:
_ConfigureXY ( option, value)
```

Canvas the widget is on.

8.21.4.2 HBar

`OvalWidgets::HBar`

Holds the horizontal bar bitmap.

8.21.4.3 VBar

`OvalWidgets::VBar`

Holds the vertical bar bitmap.

8.22 PanedWindow Namespace Reference

A modified version of the BWidget [PanedWindow](#).

8.22.1 Detailed Description

A modified version of the BWidget [PanedWindow](#).

Added methods: `index`, `paneconfigure`, `panecget`, `Pane::configure`, and `Pane::cget`. Added a `-name` option to the `add` function. The modification allow for accessing and configuring the panes added to the [PanedWindow](#), mostly to get size information. This makes the BWidget [PanedWindow](#) more like the Tix Paned Window widget. (See the BWidget documentation for [PanedWindow](#).)

Author

Robert Heller <heller@deepsoft.com>

8.22.2 Package provided

DWpanedw 1.0

8.23 Parsers Namespace Reference

File-based parser classes.

Classes

- class [BezierBody](#)
List of Bezier body lines (T, E, S, and C lines).
- class [BezierBodyElt](#)
Bezier Body elements: T, E, S, and C lines are collected.
- class [CornuBody](#)
List of Cornu body lines (T, E, S, and C lines).
- class [CornuBodyElt](#)
Cornu Body elements: T, E, S, and C lines are collected.
- class [IntegerList](#)
The [IntegerList](#) class implements a linked list of integers, used for turnout route lists.
- class [LayoutFile](#)
File to parse an XTrkCad layout file and create a track graph.
- class [MRRXtrkCad](#)
[MRRXtrkCad](#) parser class.
- class [ParseFile](#)
Virtual base class for file-based parsers.
- struct [RouteVec](#)
Route structure.
- struct [SegPos](#)
Segment position, endpoint or other coordinate.
- struct [SegVector](#)
Segemnt structure.
- class [TrackBody](#)
List of track endpoints (T and E lines).
- class [TrackBodyElt](#)
Track endpoint elements (T and E lines).
- class [TrackGraph](#)
Track Graph class, which encapsulates the track graphs.
- class [TurnoutBody](#)
List of turnout body lines (T, E, P, S, C, and J lines).
- class [TurnoutBodyElt](#)
Turnout body elements: T, E, P, S, C, and J lines are collected.
- struct [TurnoutGraphic](#)
Structure holding a turnout's graphical information.
- struct [TurnoutRoutelist](#)
Turnout route list structure.

8.23.1 Detailed Description

File-based parser classes.

These are file-based parser classes. Right now only one parser for XTrkCAD layout files. Other classes might be added later.

Included are classes used by the XTrkCAD parser. These classes are used to store the track plan information in an XTrkCAD layout file, specifically as it relates to operating issues, such as dispatching and signaling.

The track plan is loaded into a directed graph representation, where each node is one logical piece of trackwork. From this graph representation a schematic display could be created in a semi-automated way.

This package features the use of the Boost Graph Library as the underlying structure for the track graph built from reading in XTrkCAD layout files.

Author

Robert Heller <heller@deepsoft.com>

8.23.2 Tcl Package Provided

Mrr 2.2.2

8.23.3 Library Provided

libMRRParserClasses 2.2.2

8.24 raildriver Namespace Reference

Namespace that holds the Raildriver Client class code.

Classes

- class [RaildriverClient](#)
Raildriver Client class – connects to the Raildriver daemon.

Typedefs

- typedef listtype [eventlist](#)
List of event codes.

Enumerations

- enum [RaildriverEvents](#) {
 [REVERSER](#) , [THROTTLE](#) , [AUTOBRAKE](#) , [INDEPENDBRK](#) ,
 [BAILOFF](#) , [WIPER](#) , [HEADLIGHT](#) , [DIGITAL1](#) ,
 [DIGITAL2](#) , [DIGITAL3](#) , [DIGITAL4](#) , [DIGITAL5](#) ,
 [DIGITAL6](#) }
These are the event codes for the Rail Driver's report message.

8.24.1 Detailed Description

Namespace that holds the Raildriver Client class code.

Author

Robert Heller <heller@deepsoft.com>

8.24.2 Package provided

[RaildriverClient](#) 1.0.0

8.24.3 Typedef Documentation

8.24.3.1 eventlist

```
list< raildriver::RaildriverEvents > raildriver::eventlist
```

List of event codes.

8.24.4 Enumeration Type Documentation

8.24.4.1 RaildriverEvents

```
enum raildriver::RaildriverEvents
```

These are the event codes for the Rail Driver's report message.

There is a code for each of the thirteen bytes in the report buffer.

Enumerator

REVERSER	Reverser lever. This is a value between 0 and 255 representing the position of the reverser lever.
THROTTLE	Throttle lever. This is a value between 0 and 255 representing the position of the throttle / dynamic brake lever.
AUTOBRAKE	Automatic Brake lever. This is a value between 0 and 255 representing the position of the automatic brake lever.
INDEPENDBRK	Independent Brake lever. This is a value between 0 and 255 representing the position of the independent brake lever.

Enumerator

BAILOFF	Independent Brake bail off. This is a value between 0 and 255 representing the position of the independent brake lever bail off.
WIPER	Wiper switch. This is a value between 0 and 255 representing the position of the wiper switch.
HEADLIGHT	Headlight switch. This is a value between 0 and 255 representing the position of the headlight switch.
DIGITAL1	Blue Buttons 1-8. This is a bitfield representing 8 of the generic "blue" buttons.
DIGITAL2	Blue Buttons 9-16. This is a bitfield representing 8 of the generic "blue" buttons.
DIGITAL3	Blue Buttons 17-24. This is a bitfield representing 8 of the generic "blue" buttons.
DIGITAL4	Blue Buttons 25-28, Zoom, Pan. This is a bitfield representing the last 4 of the generic "blue" buttons, the zoom rocker, and one-half of the pan (2d) rocker.
DIGITAL5	Pan, Cab Buttons. This is a bitfield representing the second half of the pan (2d) rocker, and several of the two of the cab rocker switches.
DIGITAL6	Cab Buttons, Whistle. This is a bitfield representing the cab buttons and the whistle lever.

8.25 ReadConfiguration Namespace Reference

The Read Configuration File code is contained in this namespace.

Functions

- [ReadConfiguration](#) (filename, configurationArrayName)
This procedure reads in the configuration file named by the filename into the array named by configurationArrayName.
- [IsEven](#) (i)
Checks if its argument is an even number.
- [WriteConfiguration](#) (filename, configurationArrayName)
This procedure writes the configuration contained in configurationArrayName to the file named by the filename.
- [ConfigurationType](#) (...)
This macro defines the body of a snit::type that implements a program's global configuration (or preferences).

8.25.1 Detailed Description

The Read Configuration File code is contained in this namespace.

Author

Robert Heller <heller@deepsoft.com>

8.25.2 Package provided

[ReadConfiguration](#) 1.0

8.25.3 Function Documentation

8.25.3.1 ConfigurationType()

```
ReadConfiguration::ConfigurationType (
    ... )
```

This macro defines the body of a `snit::type` that implements a program's global configuration (or preferences).

The argument list is a set of configuration variable definition lists. Each list contains four elements: the label, the key list name (a one or two element list), the type (one of `directory`, `infile`, `outfile`, `string`, `enumerated`, `integer`, `double`, or `color`), and the default value. Enumerated types have an additional (fifth) element, the set of possible values. Numerical types (`double` and `integer`) have a range of values as a fifth element. This macro should only be called inside a `snit::type` definition.

The configuration (aka preferences) are stored in the user's home directory. The file name under UNIX (including Mac↔OSX) starts with a dot and contains the application rootname (from `argv0`). Under MS-Windows, the file name does not start with a dot. Instead `.rc` is appended.

Parameters

...	The configuration variable definitions.
-----	---

Type methods defined:

- `load` Load the configuration.
- `save` Save the configuration.
- `edit` Edit the configuration with a popup dialog.
- `getkeyoption` Get a keyed option. Takes two arguments.
- `getoption` Get a non-keyed option. Takes one argument.
- `getanonymous` Gets the anonymous option. Takes no arguments.

Author

Robert Heller <heller@deepsoft.com>

References [FileEntry::cget\(\)](#), [ReadConfiguration\(\)](#), and [WriteConfiguration\(\)](#).

8.25.3.2 IsEven()

```
ReadConfiguration::IsEven (
    i )
```

Checks if its argument is an even number.

Parameters

<i>i</i>	Value to check.
----------	-----------------

Author

Robert Heller <heller@deepsoft.com>

8.25.3.3 ReadConfiguration()

```
ReadConfiguration::ReadConfiguration (
    filename ,
    configurationArrayName )
```

This procedure reads in the configuration file named by the filename into the array named by configurationArrayName.

Parameters

<i>filename</i>	The name of the configuration file.
<i>configurationArrayName</i>	The name of the array to hold the configuration.

Author

Robert Heller <heller@deepsoft.com>

Referenced by [ConfigurationType\(\)](#).

8.25.3.4 WriteConfiguration()

```
ReadConfiguration::WriteConfiguration (
    filename ,
    configurationArrayName )
```

This procedure writes the configuration contained in configurationArrayName to the file named by the filename.

Parameters

<i>filename</i>	The name of the configuration file.
<i>configurationArrayName</i>	The name of the array holding the configuration.

Author

Robert Heller <heller@deepsoft.com>

Referenced by [ConfigurationType\(\)](#).

8.26 TTSupport Namespace Reference

Time Table Support Namespace.

Classes

- class [Cab](#)
This class maintains information about cabs.
- struct [eqstr](#)
- struct [hash](#)
Option hash map, used for Print options.
- class [Occupied](#)
This class records a train sitting on a storage track during a specified time frame.
- class [PathName](#)
A Class that portably represents a pathname.
- class [Station](#)
The [Station](#) class implements a station.
- class [StationTimes](#)
[Station](#) times class, used by the LaTeX generator methods.
- class [Stop](#)
This class implements a stop.
- class [StorageTrack](#)
The [StorageTrack](#) class implements a storage track.
- class [TimeRange](#)
The [TimeRange](#) class implements a range of times.
- class [TimeTableSystem](#)
This is the main Time Table Class.
- class [Train](#)
This class implements a train.

Typedefs

- typedef vector< double > [doubleVector](#)
A Vector of doubles.
- typedef std::unordered_map< const char *, std::string, [hash](#), [eqstr](#) > [OptionHashMap](#)
- typedef list< [Train](#) * > [TrainList](#)
List of trains.
- typedef map< string, [StationTimes](#), less< string > > [TrainStationTimes](#)
Map of station times, indexed by train number.
- typedef map< int, [TrainStationTimes](#), less< int > > [TrainTimesAtStation](#)
Map of maps of station times, indexed by station index.
- typedef list< string > [StringList](#)
List of strings.
- typedef map< [TimeRange](#), [Occupied](#), less< [TimeRange](#) > > [OccupiedMap](#)
The [Occupied](#) Map type, ordered by time ranges.
- typedef map< string, [StorageTrack](#), less< string > > [StorageTrackMap](#)
Storage track map.
- typedef vector< [Station](#) > [StationVector](#)
[Station](#) Vector.
- typedef vector< [Stop](#) > [StopVector](#)
A vector of stops.
- typedef map< string, [Train](#) *, less< string > > [TrainNumberMap](#)
[Train](#) number map, indexed by train number (symbol).
- typedef map< string, [Cab](#) *, less< string > > [CabNameMap](#)
[Cab](#) name map, cabs indexed by name.
- typedef vector< string > [stringVector](#)
A Vector of strings.

Functions

- const char * [StringListToString](#) (const [StringList](#) &list)
Convert a list of strings to a flat string.
- bool [StringListFromString](#) (string strlinList, [StringList](#) &result)
Convert a flat string to a list of strings.

8.26.1 Detailed Description

Time Table Support Namespace.

Author

Robert Heller <heller@deepsoft.com>

8.26.2 Tcl Package Provided

Ttclasses 1.0.2

8.26.3 Library Provided

libttclasses 1.0.2

8.26.4 Typedef Documentation

8.26.4.1 doubleVector

```
typedef vector<double> TTSupport::doubleVector
```

A Vector of doubles.

Used as a vector of layover times.

Author

Robert Heller <heller@deepsoft.com>

8.26.4.2 OptionHashMap

```
typedef std::unordered_map<const char*, std::string, hash, eqstr> TTSupport::OptionHashMap
```

8.26.4.3 StringList

```
typedef list<string> TTSupport::StringList
```

List of strings.

This is a simple linked list of strings, used in various places.

Author

Robert Heller <heller@deepsoft.com>

8.26.4.4 stringVector

```
typedef vector<string> TTSupport::stringVector
```

A Vector of strings.

Used as the list of path list in a [PathName](#) instance.

8.26.4.5 TrainList

```
typedef list<Train*> TTSupport::TrainList
```

List of trains.

Simple linked list of trains, used for passing train lists around.

Author

Robert Heller <heller@deepsoft.com>

8.26.4.6 TrainStationTimes

```
typedef map<string, StationTimes, less<string> > TTSupport::TrainStationTimes
```

Map of station times, indexed by train number.

These are the individual rows of the time table. The train number (symbol) is the column index. Each of these rows is for a single station. This is a sparse vector, since not all trains stop at (or go past) all stations. The omitted elements result in blank cells in the output table.

Author

Robert Heller <heller@deepsoft.com>

8.26.4.7 TrainTimesAtStation

```
typedef map<int, TrainStationTimes, less<int> > TTSupport::TrainTimesAtStation
```

Map of maps of station times, indexed by station index.

This is the whole time table. The station index is the row index. This is a sparse vector, since not all trains stop at (or go past) all stations. The omitted elements result in blank cells in the output table.

Author

Robert Heller <heller@deepsoft.com>

8.26.5 Function Documentation

8.26.5.1 StringListFromString()

```
bool TTSupport::StringListFromString (
    string strlinList,
    StringList & result )
```

Convert a flat string to a list of strings.

Returns false if there was a syntax error.

Parameters

<i>strlinList</i>	The input string.
<i>result</i>	The output list.

Author

Robert Heller <heller@deepsoft.com>

8.26.5.2 StringListToString()

```
const char * TTSupport::StringListToString (
    const StringList & list )
```

Convert a list of strings to a flat string.

The result is comma separated and each string is enclosed in quote characters ("). If a string contains a quote character or a backslash, the character is quoted with a backslash.

Parameters

<i>list</i>	The list of strings.
-------------	----------------------

Author

Robert Heller <heller@deepsoft.com>

8.27 xpressnet Namespace Reference

Namespace that holds the [XPressNet](#) interface code.

Classes

- class [AccessoryDecoderInformation](#)
Accessory decoder information.
- class [CommandStationResponse](#)
General response class.
- class [CommandStationStatus](#)
Command station status.
- class [DoubleHeaderInformation](#)
Double header information.
- class [DoubleHeaderMuError](#)
Double header or MU error.
- class [FunctionStatus](#)
Function status.
- class [LI100Message](#)
LI100 messages.
- class [LI100VersionNumbers](#)
LI100 Version Numbers.
- class [LI101XPressNetAddress](#)
LI101 XPress Net Address.
- class [LocomotiveAddress](#)
Locomotive address.
- class [LocomotiveInformation](#)
Locomotive information.
- class [ServiceModeResponse](#)
Service mode response.
- class [SoftwareVersion](#)
Software version.
- class [XPressNet](#)
Main [XPressNet](#) interface class.
- class [XpressNetEvent](#)
[XPressNet](#) Event class.

Typedefs

- typedef int [nibble](#)
A 4 bit unsigned integer.
- typedef int [ubyte](#)
An 8 bit unsigned integer.
- typedef int [DecoderLongAddress](#)
Decoder address, an unsigned 14 bit integer.
- typedef int [ElementAddress](#)
A 2 bit unsigned integer.
- typedef int [S_14](#)
14 Speed steps.
- typedef int [S_27](#)
27 Speed steps.
- typedef int [S_28](#)
28 Speed steps.
- typedef int [S_128](#)
128 Speed steps.
- typedef int [u10](#)
An unsigned 10 bit integer.
- typedef int [u3](#)
An unsigned 3 bit integer.
- typedef int [u7](#)
An unsigned 7 bit integer.
- typedef int [ConsistAddress](#)
Multi-unit Address.

Enumerations

- enum [TypeCode](#) {
[NO_RESPONSE_AVAILABLE](#), [NORMAL_OPERATION_RESUMED](#), [TRACK_POWER_OFF](#), [EMERGENCY_STOP](#)
, [SERVICE_MODE_ENTRY](#), [PROGRAMMING_INFO_SHORT_CIRCUIT](#), [PROGRAMMING_INFO_DATA_BYTE_NOT_FOUND](#)
, [PROGRAMMING_INFO_COMMAND_STATION_BUSY](#),
[PROGRAMMING_INFO_COMMAND_STATION_READY](#), [SERVICE_MODE_RESPONSE](#), [SOFTWARE_VERSION](#)
, [COMMAND_STATION_STATUS](#),
[TRANSFER_ERRORS](#), [COMMAND_STATION_BUSY](#), [INSTRUCTION_NOT_SUPPORTED](#), [ACCESSORY_DECODER_INFORMATION](#)
, [LOCOMOTIVE_INFORMATION](#), [FUNCTION_STATUS](#), [LOCOMOTIVE_ADDRESS](#), [DOUBLE_HEADER_INFORMATION](#)
, [DOUBLE_HEADER_MU_ERROR](#), [LI100_MESSAGE](#), [LI100_VERSION](#), [LI101_XPRESSNET_ADDRESS](#) }
Response types.
- enum [PowerUpMode](#) { [Manual](#) , [Automatic](#) }
Power up modes.
- enum [NibbleCode](#) { [Lower](#) , [Upper](#) }
Accessory nibble code.
- enum [SpeedStepModeCode](#) { [S14](#) , [S27](#) , [S28](#) , [S128](#) }
Speed step mode code.

- enum `DirectionCode` { `Forward` , `Reverse` }
Direction flag.
- enum `ErrorTypeCode` {
 `NotOperatedOr0` , `UsedByAnotherDevice` , `UsedInANotherDHMU` , `SpeedNotZero` ,
 `NotMU` , `NotMUBaseAddress` , `CantDelete` , `StackFull` }
Error type code.
- enum `MessageTypeCode` {
 `ErrorBetweenLI100AndPC` , `ErrorBetweenLI100AndCommandStation` , `UnknownCommunicationsError` , `Success`
 , `NoTimeslot` , `BufferOverflow` , `Other` }
Message type code.

8.27.1 Detailed Description

Namespace that holds the `XPressNet` interface code.

This is a cross-platform implementation the `XPressNet` serial port interface. Based on documentation provided by Lenz Elektronik GMBH (6/2003 third edition). This code works with Tcl 8.4 and later and uses SNIT to implement the classes as `snit::types`.

Basically, the way this code works is to use a class to interface to the serial port attached to one of Lenz's serial port adapters (LI100, LI100F, or LI101). This code should also work with the LiUSB interface as well.

Author

Robert Heller <heller@deepsoft.com>

8.27.2 Package provided

Xpressnet 2.0.0

8.27.3 Typedef Documentation

8.27.3.1 ConsistAddress

```
int xpressnet::ConsistAddress
```

Multi-unit Address.

8.27.3.2 DecoderLongAddress

```
short int xpressnet::DecoderLongAddress
```

Decoder address, an unsigned 14 bit integer.

8.27.3.3 ElementAddress

```
int xpressnet::ElementAddress
```

A 2 bit unsigned integer.

8.27.3.4 nibble

```
int xpressnet::nibble
```

A 4 bit unsigned integer.

8.27.3.5 S_128

```
int xpressnet::S_128
```

128 Speed steps.

8.27.3.6 S_14

```
int xpressnet::S_14
```

14 Speed steps.

8.27.3.7 S_27

```
int xpressnet::S_27
```

27 Speed steps.

8.27.3.8 S_28

int `xpressnet::S_28`

28 Speed steps.

8.27.3.9 u10

int `xpressnet::u10`

An unsigned 10 bit integer.

8.27.3.10 u3

int `xpressnet::u3`

An unsigned 3 bit integer.

8.27.3.11 u7

int `xpressnet::u7`

An unsigned 7 bit integer.

8.27.3.12 ubyte

unsigned char `xpressnet::ubyte`

An 8 bit unsigned integer.

8.27.4 Enumeration Type Documentation

8.27.4.1 DirectionCode

enum `xpressnet::DirectionCode`

Direction flag.

Enumerator

Forward	Forward.
Reverse	Reverse.

8.27.4.2 ErrorTypeCode

```
enum xpressnet::ErrorTypeCode
```

Error type code.

Enumerator

NotOperatedOr0	One of the locomotives has not been operated by the XpressNet device assembling the Double Header/Multi Unit or locomotive 0 was selected.
UsedByAnotherDevice	One of the locomotives of the Double Header/Multi Unit is being used by another XpressNet device.
UsedInANotherDHMU	One of the locomotives is already in another Double Header/Multi Unit.
SpeedNotZero	The speed of one of the locomotives is not zero.
NotMU	The locomotive is not a multi-unit.
NotMUBaseAddress	The locomotive is not a multi-unit base address.
CantDelete	It is not possible to delete the locomotive.
StackFull	The command station stack is full.

8.27.4.3 MessageTypeCode

```
enum xpressnet::MessageTypeCode
```

Message type code.

Enumerator

ErrorBetweenLI100AndPC	Error occurred between the interface and the PC. (Timeout during data communication with the PC.)
ErrorBetweenLI100AndCommandStation	Error occurred between the interface and the command station. (Timeout during data communication with the command station.)
UnknownCommunicationsError	Unknown communication error. (Command station addressed the LI100 with request for acknowledgement.)
Success	Instruction was successfully sent to the command station or normal operations have resumed after a timeout.
NoTimeslot	The command station is no longer providing the LI100 a timeslot for communication.
BufferOverflow	Buffer overflow in the LI100.
Generated by Doxygen	Other
	Other messages (undefined).

8.27.4.4 NibbleCode

enum `xpressnet::NibbleCode`

Accessory nibble code.

Enumerator

Lower	Lower nibble.
Upper	Upper nibble.

8.27.4.5 PowerUpMode

enum `xpressnet::PowerUpMode`

Power up modes.

Enumerator

Manual	Manual mode.
Automatic	Automatic mode.

8.27.4.6 SpeedStepModeCode

enum `xpressnet::SpeedStepModeCode`

Speed step mode code.

Enumerator

S14	14 speed step mode.
S27	27 speed step mode.
S28	28 speed step mode.
S128	128 speed step mode.

8.27.4.7 TypeCode

```
enum xpressnet::TypeCode
```

Response types.

Enumerator

NO_RESPONSE_AVAILABLE	No response available.
NORMAL_OPERATION_RESUMED	Normal operation resumed.
TRACK_POWER_OFF	Track power off.
EMERGENCY_STOP	Emergency stop.
SERVICE_MODE_ENTRY	Service mode entry.
PROGRAMMING_INFO_SHORT_CIRCUIT	Programming info. ``short-circuit``.
PROGRAMMING_INFO_DATA_BYTE_NOT_FOUND	Programming info. ``data byte not found``.
PROGRAMMING_INFO_COMMAND_STATION_BUSY	Programming info. ``command station busy``.
PROGRAMMING_INFO_COMMAND_STATION_READY	Programming info. ``command station ready``.
SERVICE_MODE_RESPONSE	Service mode response.
SOFTWARE_VERSION	Software version.
COMMAND_STATION_STATUS	Command station status.
TRANSFER_ERRORS	Transfer errors.
COMMAND_STATION_BUSY	Command station busy.
INSTRUCTION_NOT_SUPPORTED	Instruction not supported by command station.
ACCESSORY_DECODER_INFORMATION	Accessory decoder information.
LOCOMOTIVE_INFORMATION	Locomotive information.
FUNCTION_STATUS	Function status.
LOCOMOTIVE_ADDRESS	Locomotive address.
DOUBLE_HEADER_INFORMATION	Double header information.
DOUBLE_HEADER_MU_ERROR	Double header or MU error.
LI100_MESSAGE	LI100 Messages.
LI100_VERSION	LI100 Version Numbers.
LI101_XPRESSNET_ADDRESS	LI101 XPressNet Address.

Chapter 9

Class Documentation

9.1 xpressnet::AccessoryDecoderInformation Class Reference

Accessory decoder information.

Public Member Functions

- [AccessoryDecoderInformation](#) (name, count,...)
Constructor.
- [NumberOfFeedbackElements](#) ()
Return the number of feedback elements.
- [Address](#) (index)
Return address.
- [Completed](#) (index)
Return completed flag.
- [AccessoryType](#) (index)
Return accessory type.
- [Nibble](#) (index)
Return nibble code.
- [TurnoutStatus](#) (index, [nibble](#))
Return turnout status.

Private Attributes

- [_numberOfFeedbackElements](#)
Number of Accessory Decoder feedback elements.
- [_address](#)
Address value.
- [_completed](#)
Completion flag.

- [_accessory_type](#)
Accessory type.
- [_nibble](#)
Nibble value.
- [_t1](#)
Lower nibble turnout status.
- [_t2](#)
Upper nibble turnout status.

9.1.1 Detailed Description

Accessory decoder information.

Author

Robert Heller <heller@deepsoft.com>

9.1.2 Constructor & Destructor Documentation

9.1.2.1 AccessoryDecoderInformation()

```
xpressnet::AccessoryDecoderInformation::AccessoryDecoderInformation (
    name ,
    count ,
    ... )
```

Constructor.

Parameters

<i>count</i>	Number of Accessory Decoder feedback elements (1 through 7).
<i>args</i>	Address and data bytes.

9.1.3 Member Function Documentation

9.1.3.1 AccessoryType()

```
xpressnet::AccessoryDecoderInformation::AccessoryType (
    index )
```

Return accessory type.

Parameters

<i>index</i>	Element index.
--------------	----------------

9.1.3.2 Address()

```
xpressnet::AccessoryDecoderInformation::Address (
    index )
```

Return address.

Parameters

<i>index</i>	Element index.
--------------	----------------

9.1.3.3 Completed()

```
xpressnet::AccessoryDecoderInformation::Completed (
    index )
```

Return completed flag.

Parameters

<i>index</i>	Element index.
--------------	----------------

9.1.3.4 Nibble()

```
xpressnet::AccessoryDecoderInformation::Nibble (
    index )
```

Return nibble code.

Parameters

<i>index</i>	Element index.
--------------	----------------

9.1.3.5 NumberOfFeedbackElements()

```
xpressnet::AccessoryDecoderInformation::NumberOfFeedbackElements ( )
```

Return the number of feedback elements.

9.1.3.6 TurnoutStatus()

```
xpressnet::AccessoryDecoderInformation::TurnoutStatus (
    index ,
    nibble )
```

Return turnout status.

Parameters

<i>index</i>	Element index.
<i>nibble</i>	Which turnout?

9.1.4 Member Data Documentation

9.1.4.1 _accessory_type

```
xpressnet::AccessoryDecoderInformation::_accessory_type [private]
```

Accessory type.

9.1.4.2 _address

```
xpressnet::AccessoryDecoderInformation::_address [private]
```

Address value.

9.1.4.3 `_completed`

`xpressnet::AccessoryDecoderInformation::_completed` [private]

Completion flag.

9.1.4.4 `_nibble`

`xpressnet::AccessoryDecoderInformation::_nibble` [private]

Nibble value.

9.1.4.5 `_numberOfFeedbackElements`

`xpressnet::AccessoryDecoderInformation::_numberOfFeedbackElements` [private]

Number of Accessory Decoder feedback elements.

9.1.4.6 `_t1`

`xpressnet::AccessoryDecoderInformation::_t1` [private]

Lower nibble turnout status.

9.1.4.7 `_t2`

`xpressnet::AccessoryDecoderInformation::_t2` [private]

Upper nibble turnout status.

9.2 `Instruments::AnalogClock` Class Reference

Analog clock instrument.

Public Member Functions

- [`AnalogClock`](#) (name, _canvas,...)
Constructor – initialize an analog clock.
- [`~AnalogClock`](#) ()
Destructor – free up all resources.
- [`settime`](#) (hour, minute)
Method to set the time.

9.2.1 Detailed Description

Analog clock instrument.

Parameters

<code>_canvas</code>	The canvas to draw the analog clock on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The X coordinate of the instrument (default 0). • <code>-y</code> The Y coordinate of the instrument (default 0). • <code>-size</code> The size of the instrument (default 100). • <code>-label</code> The label of the instrument (default Clock). • <code>-labelcolor</code> The color of the label (default black). • <code>-labelfont</code> The font of the label (default {Times 14 bold}). • <code>-background</code> The background color of the instrument (default blue). • <code>-outline</code> The outline color of the instrument (default black). • <code>-scaleback</code> The background color of the scale (default white). • <code>-scaleticks</code> The color of the scale ticks (default black). • <code>-fontfamily</code> The font family used on the instrument (default Courier). • <code>-hubcolor</code> The color of the hub (default black). • <code>-minutehandcolor</code> The color of the minute hand (default black). • <code>-hourhandcolor</code> The color of the hour hand (default black).

Author

Robert Heller <heller@deepsoft.com>

9.2.2 Constructor & Destructor Documentation

9.2.2.1 AnalogClock()

```
Instruments::AnalogClock::AnalogClock (
    name ,
    _canvas ,
    ... )
```

Constructor – initialize an analog clock.

Parameters

<code>_canvas</code>	The canvas to draw the DialInstrument on.
<code>...</code>	Option list.

9.2.2.2 ~AnalogClock()

```
Instruments::AnalogClock::~~AnalogClock ( )
```

Destructor – free up all resources.

9.2.3 Member Function Documentation**9.2.3.1 settime()**

```
Instruments::AnalogClock::settime (
    hour ,
    minute )
```

Method to set the time.

Parameters

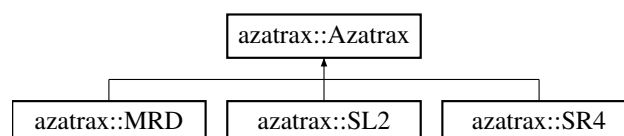
<i>hour</i>	The hour, an integer between 1 and 12.
<i>minute</i>	The minute, an integer between 0 and 59.

9.3 azatrax::Azatrax Class Reference

[Azatrax](#) I/O Class.

```
#include <Azatrax.h>
```

Inheritance diagram for azatrax::Azatrax:



Classes

- struct **StateDataPacket**
Raw USB Data Packet.

Public Types

- enum commands {
 cmd_SetChan1 =0x31 , cmd_SetChan2 =0x32 , cmd_ClearExternallyChanged =0x34 , cmd_DisableExternal =0x37 ,
 cmd_EnableExternal =0x38 , cmd_Q1posQ2neg =0x39 , cmd_Q1negQ2pos =0x3A , cmd_Q1Q2open =0x3F ,
 cmd_Q3posQ4neg =0x49 , cmd_Q3negQ4pos =0x4A , cmd_Q3Q4open =0x4F , cmd_RestoreLEDFunction =0x50 ,
 cmd_Identify_1 =0x51 , cmd_Identify_2 =0x52 , cmd_Identify_1_2 =0x53 , cmd_ResetStopwatch =0x54 ,
 cmd_GetStateData =0x57 , cmd_OutputRelayBlink =0x61 , cmd_OutputRelayOff =0x67 , cmd_OutputRelayOn =0x6B ,
 cmd_OutputRelayPulse =0x6D , cmd_OutputRelayInputControl =0x6E }
Command codes.
- enum DeviceConnectionList { _InitSize = 10 , _GrowSize = 10 }
Device connection list constants.
- enum { idAzatraxVendor = 0x265F , idMRDProduct = 0xfcb2 , idSL2Product = 0xfca1 , idSR4Product = 0xfca2 }
Azatrax vendor and product codes.

Public Member Functions

- `~Azatrax ()`
Base destructor.
- `ErrorCode RestoreLEDFunction ()` const
Restore LED function.
- `ErrorCode Identify_1 ()` const
Identify 1.
- `ErrorCode GetStateData ()`
Get State Data.
- `uint8_t PacketCount ()` const
Packet count.
- `const char * SerialNumber ()` const
Serial Number.
- `const char * MyProduct ()` const
My product name.
- `unsigned short int MyProductId ()` const
My product code.

Static Public Member Functions

- static int [NumberOfOpenDevices](#) ()
Open device count.
- static char ** [AllConnectedDevices](#) ()
List serial numbers of all connected devices.
- static [Azatrax](#) * [OpenDevice](#) (const char *serialnumber, unsigned short int idProduct=0, char **outmessage=NULL)
Open an [Azatrax](#) device by serial number.
- static unsigned short int [ProductIdCode](#) (const char *productName)
Product id code.

Protected Member Functions

- [Azatrax](#) (const char *serialnumber, unsigned short int idProduct, char **outmessage=NULL)
Base constructor.
- [ErrorCode](#) [sendByte](#) (uint8_t commandByte) const
Send a command byte.
- [ErrorCode](#) [send2Bytes](#) (uint8_t commandByte, uint8_t byte2) const
Send a command byte with 1 data byte.
- [ErrorCode](#) [send3Bytes](#) (uint8_t commandByte, uint8_t byte2, uint8_t byte3) const
Send a command byte with 2 data bytes.

Static Protected Member Functions

- static bool [IsThisTheAzatraxWeAreLookingFor](#) (libusb_device *dev, const char *serialnumber, unsigned short int idProduct)
Is this the device we want?
- static unsigned short int [GetProductId](#) (libusb_device *dev, const char *serialnumber, unsigned short int idProductMatch=0)
Return the matching product id for this device and serial number.

Protected Attributes

- struct libusb_device_handle * [handle](#)
USB Device Handle.
- char [mySerialNumber](#) [10]
Serial number buffer.
- unsigned short int [myProductId](#)
Product id.
- struct [azatrax::Azatrax::StateDataPacket](#) [stateDataPacket](#)

Static Protected Attributes

- static int [deviceOpenCount](#)
Device open count.

Friends

- class [MRD](#)
- class [SL2](#)
- class [SR4](#)

9.3.1 Detailed Description

[Azatrax](#) I/O Class.

Base [Azatrax](#) interface class. From this base class, a class is derived that implements the device-specific functions. The base class only implements the shared core functions. It also includes a static method that implements a factor that creates device instances from device serial numbers.

There are two static methods, one that return the number of open devices (active instances) and another that returns a list of discovered serial numbers.

Author

Robert Heller <heller@deepsoft.com>

9.3.2 Member Enumeration Documentation

9.3.2.1 anonymous enum

anonymous enum

[Azatrax](#) vendor and product codes.

This is the vendor and product codes ([Azatrax](#)) was granted for their USB products.

Enumerator

idAzatraxVendor	Azatrax vendor id.
idMRDProduct	MRD2 Product id.
idSL2Product	SL2 Product id.
idSR4Product	SR4 Product id.

9.3.2.2 commands

enum [azatrax::Azatrax::commands](#)

Command codes.

Enumerator

cmd_SetChan1	Set channel 1 (MRD2 only)
cmd_SetChan2	Set channel 2 (MRD2 only)
cmd_ClearExternallyChanged	Clear Externally Changed (MRD2 only)
cmd_DisableExternal	Disable External Changes (MRD2 only)
cmd_EnableExternal	Enable External Changes (MRD2 only)
cmd_Q1posQ2neg	(SL2 only) Sets output terminal Q1 to positive, Q2 to negative.
cmd_Q1negQ2pos	(SL2 only) Sets output terminal Q1 to negative, Q2 to positive.
cmd_Q1Q2open	(SL2 only) Outputs Q1 & Q2 both set to open circuit (disconnects switch machine #1)
cmd_Q3posQ4neg	(SL2 only) Sets output terminal Q3 to positive, Q4 to negative.
cmd_Q3negQ4pos	(SL2 only) Sets output terminal Q3 to negative, Q4 to positive.
cmd_Q3Q4open	(SL2 only) Outputs Q3 & Q4 both set to open circuit (disconnects switch machine #1)
cmd_RestoreLEDFunction	Restore LED Function (All devices)
cmd_Identify_1	Identify LED 1 (All devices)
cmd_Identify_2	Identify LED 2 (MRD2 only)
cmd_Identify_1_2	Identify both LEDs (MRD2 only)
cmd_ResetStopwatch	Reset Stopwatch (MRD2 only)
cmd_GetStateData	Get State Data (All devices)
cmd_OutputRelayBlink	3 bytes - Sets output relay contacts to blinking state. 2nd Byte is a bit map of the outputs to be affected: bits 7-4: ignored bit 3: 1 if Q4 affected bit 2: 1 if Q3 affected bit 1: 1 if Q2 affected bit 0: 1 if Q1 affected 3rd Byte is the output on/off rate (50% duty cycle): bits<7:2>: ignored bits<1:0>: 1,1 - one cycle / 2 seconds 1,0 - one cycle / second 0,1 - two cycles / second 0,0 - four cycles / second
cmd_OutputRelayOff	2 bytes - Sets output relay contacts to 'off' state. 2nd Byte is a bit map of the outputs to be affected: bits 7-4: ignored bit 3: 1 if Q4 affected bit 2: 1 if Q3 affected bit 1: 1 if Q2 affected bit 0: 1 if Q1 affected
cmd_OutputRelayOn	(SR4 only) 2 bytes - Sets output relay contacts to 'on' state. 2nd Byte is a bit map of the outputs to be affected: bits 7-4: ignored bit 3: 1 if Q4 affected bit 2: 1 if Q3 affected bit 1: 1 if Q2 affected bit 0: 1 if Q1 affected
cmd_OutputRelayPulse	(SR4 only) 3 bytes - Pulses output relay contacts to momentary 'on' state. 2nd Byte is a bit map of the outputs to be affected: bits 7-4: ignored bit 3: 1 if Q4 affected bit 2: 1 if Q3 affected bit 1: 1 if Q2 affected bit 0: 1 if Q1 affected 3rd Byte is pulse duration in 0.5 second increments: 0x00: no pulse generated 0x01: 0.5 sec 0x02: 1.0 sec ... 0xFE 63.0 sec 0xFF 63.5 sec
cmd_OutputRelayInputControl	(SR4 and SL2 only) 2 bytes - Enables/disables discrete input lines from controlling outputs For SL2: When enabled, I1 & I2 affect Q1 & Q2 (switch 1), I3 & I4 affect Q3 & Q4 (switch 2). 2nd Byte is a bit map of the outputs to be affected: bits 7-4: ignored bit 3: 1 enables I4, 0 disables bit 2: 1 enables I3, 0 disables bit 1: 1 enables I2, 0 disables bit 0: 1 enables I1, 0 disables For SR4: 2nd Byte is a bit map of the inputs: bits 7-4: ignored bit 3: 1 if I4 active causes Q4 on, else 0 (I4 does not affect Q4) bit 2: 1 if I3 active causes Q3 on, else 0 (I3 does not affect Q3) bit 1: 1 if I2 active causes Q2 on, else 0 (I2 does not affect Q2) bit 0: 1 if I1 active causes Q1 on, else 0 (I1 does not affect Q1)

9.3.2.3 DeviceConnectionList

```
enum azatrax::Azatrax::DeviceConnectionList
```

Device connection list constants.

Enumerator

_InitSize	
_GrowSize	

9.3.3 Constructor & Destructor Documentation

9.3.3.1 Azatrax()

```
azatrax::Azatrax::Azatrax (
    const char * serialnumber,
    unsigned short int idProduct,
    char ** outmessage = NULL ) [protected]
```

Base constructor.

Parameters

<i>serialnumber</i>	The serial number of the device to open.
<i>idProduct</i>	The product Id to look for.
<i>outmessage</i>	To hold an error message, if any.

9.3.3.2 ~Azatrax()

```
azatrax::Azatrax::~~Azatrax ( )
```

Base destructor.

9.3.4 Member Function Documentation

9.3.4.1 AllConnectedDevices()

```
static char ** azatrax::Azatrax::AllConnectedDevices ( ) [static]
```

List serial numbers of all connected devices.

Return a vector of serial number strings.

9.3.4.2 GetProductId()

```
static unsigned short int azatrax::Azatrax::GetProductId (
    libusb_device * dev,
    const char * serialnumber,
    unsigned short int idProductMatch = 0 ) [static], [protected]
```

Return the matching product id for this device and serial number.

Checks if the dev is a [Azatrax](#) device, with the specified serial number, matching for product id.

Parameters

<i>dev</i>	libusb_device struct pointer (from libusb_get_device_list).
<i>serialnumber</i>	the serial number we are looking for.
<i>idProductMatch</i>	either an exact product id or 0 (means any product id)

Returns

The actual product id (device matched) or 0 (no match).

9.3.4.3 GetStateData()

```
ErrorCode azatrax::Azatrax::GetStateData ( )
```

Get State Data.

Get State Data - retrieve 16 byte data packet from sensor to in memory copy.

9.3.4.4 Identify_1()

```
ErrorCode azatrax::Azatrax::Identify_1 ( ) const [inline]
```

Identify 1.

Identify 1 - Flashes sensor 1's LED.

References [cmd_Identify_1](#), and [sendByte\(\)](#).

9.3.4.5 IsThisTheAzatraxWeAreLookingFor()

```
static bool azatrax::Azatrax::IsThisTheAzatraxWeAreLookingFor (
    libusb_device * dev,
    const char * serialnumber,
    unsigned short int idProduct ) [static], [protected]
```

Is this the device we want?

Check to see if this device is a [Azatrax](#) device and if it has the serial number we want.

Parameters

<i>dev</i>	libusb_device struct pointer (from libusb_get_device_list).
<i>serialnumber</i>	the serial number we are looking for.
<i>idProduct</i>	the product id code.

9.3.4.6 MyProduct()

```
const char * azatrax::Azatrax::MyProduct ( ) const [inline]
```

My product name.

Return our Product name.

References [idMRDProduct](#), [idSL2Product](#), [idSR4Product](#), and [myProductId](#).

9.3.4.7 MyProductId()

```
unsigned short int azatrax::Azatrax::MyProductId ( ) const [inline]
```

My product code.

Return our Product Id.

References [myProductId](#).

9.3.4.8 NumberOfOpenDevices()

```
static int azatrax::Azatrax::NumberOfOpenDevices ( ) [inline], [static]
```

Open device count.

Return the number of open devices.

References [deviceOpenCount](#).

9.3.4.9 OpenDevice()

```
static Azatrax * azatrax::Azatrax::OpenDevice (
    const char * serialnumber,
    unsigned short int idProduct = 0,
    char ** outmessage = NULL ) [static]
```

Open an [Azatrax](#) device by serial number.

Parameters

<i>serialnumber</i>	the serial number to open.
<i>idProduct</i>	The product id code identifying the type of device to open. Passing 0 means open any Azatrax device.
<i>outmessage</i>	To hold an error message, if any.

9.3.4.10 PacketCount()

```
uint8_t azatrax::Azatrax::PacketCount ( ) const [inline]
```

Packet count.

References [azatrax::Azatrax::StateDataPacket::packetCount](#), and [stateDataPacket](#).

9.3.4.11 ProductIdCode()

```
static unsigned short int azatrax::Azatrax::ProductIdCode (
    const char * productName ) [inline], [static]
```

Product id code.

Return a product ID code.

Parameters

<i>productName</i>	The name of the product.
--------------------	--------------------------

References [idMRDProduct](#), [idSL2Product](#), and [idSR4Product](#).

9.3.4.12 RestoreLEDFunction()

```
ErrorCode azatrax::Azatrax::RestoreLEDFunction ( ) const [inline]
```

Restore LED function.

Restore LED function - On-board LEDs return to their normal function of indicating status of sensors 1 and 2.

References [cmd_RestoreLEDFunction](#), and [sendByte\(\)](#).

9.3.4.13 send2Bytes()

```
ErrorCode azatrax::Azatrax::send2Bytes (
    uint8_t commandByte,
    uint8_t byte2 ) const [protected]
```

Send a command byte with 1 data byte.

Sends one command byte on endpoint 01, with one data byte.

Parameters

<i>commandByte</i>	The command byte to send.
<i>byte2</i>	The data byte to send.

Referenced by [azatrax::SL2::OutputRelayInputControl\(\)](#), [azatrax::SR4::OutputRelayInputControl\(\)](#), [azatrax::SR4::RelaysOff\(\)](#), and [azatrax::SR4::RelaysOn\(\)](#).

9.3.4.14 send3Bytes()

```
ErrorCode azatrax::Azatrax::send3Bytes (
    uint8_t commandByte,
```

```
uint8_t byte2,
uint8_t byte3 ) const [protected]
```

Send a command bytewith 2 data bytes.

Sends one command byte on endpoint 01, with two data bytes.

Parameters

<i>commandByte</i>	The command byte to send.
<i>byte2</i>	The first data byte to send.
<i>byte3</i>	The second data byte to send.

Referenced by [azatrax::SR4::BlinkRelays\(\)](#), and [azatrax::SR4::PulseRelays\(\)](#).

9.3.4.15 sendByte()

```
ErrorCode azatrax::Azatrax::sendByte (
    uint8_t commandByte ) const [protected]
```

Send a command byte.

Sends one command byte on endpoint 01.

Parameters

<i>commandByte</i>	the command byte to send.
--------------------	---------------------------

Referenced by [azatrax::MRD::ClearExternallyChanged\(\)](#), [azatrax::MRD::DisableExternal\(\)](#), [azatrax::MRD::EnableExternal\(\)](#), [Identify_1\(\)](#), [azatrax::MRD::Identify_1_2\(\)](#), [azatrax::MRD::Identify_2\(\)](#), [azatrax::MRD::ResetStopwatch\(\)](#), [RestoreLEDFunction\(\)](#), [azatrax::MRD::SetChan1\(\)](#), [azatrax::MRD::SetChan2\(\)](#), [azatrax::SL2::SetQ1negQ2pos\(\)](#), [azatrax::SL2::SetQ1posQ2neg\(\)](#), [azatrax::SL2::SetQ1Q2open\(\)](#), [azatrax::SL2::SetQ3negQ4pos\(\)](#), [azatrax::SL2::SetQ3posQ4neg\(\)](#), and [azatrax::SL2::SetQ3Q4open\(\)](#).

9.3.4.16 SerialNumber()

```
const char * azatrax::Azatrax::SerialNumber ( ) const [inline]
```

Serial Number.

Return our serial number.

References [mySerialNumber](#).

9.3.5 Friends And Related Function Documentation

9.3.5.1 MRD

```
friend class MRD [friend]
```

9.3.5.2 SL2

```
friend class SL2 [friend]
```

9.3.5.3 SR4

```
friend class SR4 [friend]
```

9.3.6 Member Data Documentation

9.3.6.1 deviceOpenCount

```
int azatrax::Azatrax::deviceOpenCount [static], [protected]
```

Device open count.

This is used to decide if and when to call `libusb_init` and `libusb_exit`.

Referenced by [NumberOfOpenDevices\(\)](#).

9.3.6.2 handle

```
struct libusb_device_handle* azatrax::Azatrax::handle [protected]
```

USB Device Handle.

This is the USB device handle for the device.

9.3.6.3 myProductId

```
unsigned short int azatrax::Azatrax::myProductId [protected]
```

Product id.

Referenced by [MyProduct\(\)](#), and [MyProductId\(\)](#).

9.3.6.4 mySerialNumber

```
char azatrax::Azatrax::mySerialNumber[10] [protected]
```

Serial number buffer.

This holds the serial number of the device.

Referenced by [SerialNumber\(\)](#).

9.3.6.5 stateDataPacket

```
struct azatrax::Azatrax::StateDataPacket azatrax::Azatrax::stateDataPacket [protected]
```

Referenced by [azatrax::MRD::AllowingExternalChanges\(\)](#), [azatrax::MRD::ExternallyChanged\(\)](#), [azatrax::MRD::HasRelays\(\)](#), [azatrax::SL2::Input_1_Enabled\(\)](#), [azatrax::SR4::Input_1_Enabled\(\)](#), [azatrax::SL2::Input_2_Enabled\(\)](#), [azatrax::SR4::Input_2_Enabled\(\)](#), [azatrax::SL2::Input_3_Enabled\(\)](#), [azatrax::SR4::Input_3_Enabled\(\)](#), [azatrax::SL2::Input_4_Enabled\(\)](#), [azatrax::SR4::Input_4_Enabled\(\)](#), [azatrax::MRD::Latch_1\(\)](#), [azatrax::MRD::Latch_2\(\)](#), [azatrax::SL2::Motor_1_Direction\(\)](#), [azatrax::SL2::Motor_1_State\(\)](#), [azatrax::SL2::Motor_2_Direction\(\)](#), [azatrax::SL2::Motor_2_State\(\)](#), [azatrax::MRD::OperatingMode\(\)](#), [PacketCount\(\)](#), [azatrax::SR4::Q1_State\(\)](#), [azatrax::SR4::Q2_State\(\)](#), [azatrax::SR4::Q3_State\(\)](#), [azatrax::SR4::Q4_State\(\)](#), [azatrax::MRD::ResetStatus\(\)](#), [azatrax::MRD::Sense_1\(\)](#), [azatrax::SL2::Sense_1\(\)](#), [azatrax::SR4::Sense_1_Latch\(\)](#), [azatrax::SR4::Sense_1_Live\(\)](#), [azatrax::MRD::Sense_2\(\)](#), [azatrax::SL2::Sense_2\(\)](#), [azatrax::SR4::Sense_2_Latch\(\)](#), [azatrax::SR4::Sense_2_Live\(\)](#), [azatrax::SL2::Sense_3\(\)](#), [azatrax::SR4::Sense_3_Latch\(\)](#), [azatrax::SR4::Sense_3_Live\(\)](#), [azatrax::SL2::Sense_4\(\)](#), [azatrax::SR4::Sense_4_Latch\(\)](#), [azatrax::SR4::Sense_4_Live\(\)](#), [azatrax::MRD::Stopwatch\(\)](#), and [azatrax::MRD::StopwatchTicking\(\)](#).

9.4 Parsers::BezierBody Class Reference

List of Bezier body lines (T, E, S, and C lines).

```
#include <BezierBody.h>
```

Public Member Functions

- [BezierBody](#) ([BezierBodyElt](#) *e, [BezierBody](#) *n)
Basic constructor.
- [TrackBody](#) * [BezierEnds](#) ()
Create a track endpoint list.
- int [BezierSegmentCount](#) ()
Count segments (S, C, and J lines).
- const [BezierBodyElt](#) * [Element](#) () const
Return current element.

Static Public Member Functions

- static [BezierBody](#) * [ConsBezierBody](#) ([BezierBodyElt](#) *trbe, [BezierBody](#) *trb)
Alternative constructor function.
- static void [CleanUpBezierBody](#) ([BezierBody](#) *trb)
Free up memory.

Private Member Functions

- void [CleanUpElement](#) ()
Free up memory.

Private Attributes

- [BezierBodyElt](#) * [element](#)
Current element.
- [BezierBody](#) * [next](#)
Next element.

Friends

- class [BezierBodyElt](#)
- class [TrackGraph](#)

9.4.1 Detailed Description

List of Bezier body lines (T, E, S, and C lines).

Author

Robert Heller <heller@deepsoft.com>

9.4.2 Constructor & Destructor Documentation

9.4.2.1 BezierBody()

```
Parsers::BezierBody::BezierBody (
    BezierBodyElt * e,
    BezierBody * n ) [inline]
```

Basic constructor.

References [element](#), and [next](#).

Referenced by [ConsBezierBody\(\)](#).

9.4.3 Member Function Documentation

9.4.3.1 BezierEnds()

```
TrackBody * Parsers::BezierBody::BezierEnds ( ) [inline]
```

Create a track endpoint list.

References [Parsers::TrackBody::AppendTrackBodyElt\(\)](#), [Parsers::BezierBodyElt::BezierEnd](#), [element](#), [next](#), [Parsers::BezierBodyElt::theEnd](#), and [Parsers::BezierBodyElt::theType](#).

9.4.3.2 BezierSegmentCount()

```
int Parsers::BezierBody::BezierSegmentCount ( ) [inline]
```

Count segments (S, C, and J lines).

References [Parsers::BezierBodyElt::BezierCurvedSegment](#), [Parsers::BezierBodyElt::BezierStraightSegment](#), [element](#), [next](#), and [Parsers::BezierBodyElt::theType](#).

9.4.3.3 CleanupBezierBody()

```
static void Parsers::BezierBody::CleanupBezierBody (  
    BezierBody * trb ) [inline], [static]
```

Free up memory.

References [CleanupElement\(\)](#), [element](#), and [next](#).

9.4.3.4 CleanupElement()

```
void Parsers::BezierBody::CleanupElement ( ) [inline], [private]
```

Free up memory.

References [Parsers::BezierBodyElt::BezierCurvedSegment](#), [Parsers::BezierBodyElt::BezierEnd](#), [Parsers::BezierBodyElt::BezierStraightS](#), [element](#), [Parsers::BezierBodyElt::None](#), [Parsers::BezierBodyElt::theEnd](#), and [Parsers::BezierBodyElt::theType](#).

Referenced by [CleanupBezierBody\(\)](#).

9.4.3.5 ConsBezierBody()

```
static BezierBody * Parsers::BezierBody::ConsBezierBody (  
    BezierBodyElt * trbe,  
    BezierBody * trb ) [inline], [static]
```

Alternative constructor function.

References [BezierBody\(\)](#).

9.4.3.6 Element()

```
const BezierBodyElt * Parsers::BezierBody::Element ( ) const [inline]
```

Return current element.

References [element](#).

9.4.4 Friends And Related Function Documentation

9.4.4.1 BezierBodyElt

```
friend class BezierBodyElt [friend]
```

9.4.4.2 TrackGraph

```
friend class TrackGraph [friend]
```

9.4.5 Member Data Documentation

9.4.5.1 element

```
BezierBodyElt* Parsers::BezierBody::element [private]
```

Current element.

Referenced by [BezierBody\(\)](#), [BezierEnds\(\)](#), [BezierSegmentCount\(\)](#), [CleanupBezierBody\(\)](#), [CleanupElement\(\)](#), and [Element\(\)](#).

9.4.5.2 next

```
BezierBody* Parsers::BezierBody::next [private]
```

Next element.

Referenced by [BezierBody\(\)](#), [BezierEnds\(\)](#), [BezierSegmentCount\(\)](#), and [CleanupBezierBody\(\)](#).

9.5 Parsers::BezierBodyElt Class Reference

Bezier Body elements: T, E, S, and C lines are collected.

```
#include <BezierBody.h>
```

Classes

- struct [Pos](#)
Position structure.

Public Types

- enum [BezierBodyEltType](#) { [None](#) , [BezierEnd](#) , [BezierStraightSegment](#) , [BezierCurvedSegment](#) }
Element types.

Public Member Functions

- [BezierBodyElt](#) ()
Constructor.
- [~BezierBodyElt](#) ()
Destructor.
- [BezierBodyEltType TheType](#) () const
Type accessor.
- int [GetStraightSegment](#) (float &x1, float &y1, float &x2, float &y2) const
Fetch straight segment data.
- int [GetCurveSegment](#) (float &r, float &x, float &y, float &a0, float &a1) const
Fetch curve segment data.

Static Public Member Functions

- static void [InitTSegId](#) ()
Segment count initializer.
- static [BezierBodyElt](#) * [MakeTrackEnd](#) ([TrackBodyElt](#) *tbe)
Create an endpoint (T or E lines).
- static [BezierBodyElt](#) * [MakeStraightSegment](#) (float x1, float y1, float x2, float y2)
Create a straight segment (S lines).
- static [BezierBodyElt](#) * [MakeCurveSegment](#) (float r, float x, float y, float a0, float a1)
Create a curve segment (C lines).

Private Attributes

- [BezierBodyEltType theType](#)
Element type.
- [TrackBodyElt](#) * [theEnd](#)
Pointer to T or E line data.
- int [segmentId](#)
Segment index (S or C lines).
- [Pos](#) [pos1](#)
First position.
- [Pos](#) [pos2](#)
Second position.
- float [radius](#)
A radius value.
- float [ang0](#)
An angle value.
- float [ang1](#)
Another angle value.

Static Private Attributes

- static int [segCount](#)
Counter for S and C segments.

Friends

- class [TrackGraph](#)
- class [BezierBody](#)

9.5.1 Detailed Description

Bezier Body elements: T, E, S, and C lines are collected.

others are discarded.

Author

Robert Heller <heller@deepsoft.com>

9.5.2 Member Enumeration Documentation

9.5.2.1 BezierBodyEltType

enum [Parsers::BezierBodyElt::BezierBodyEltType](#)

Element types.

Enumerator

None	Placeholder.
BezierEnd	T or E line.
BezierStraightSegment	S line.
BezierCurvedSegment	C line.

9.5.3 Constructor & Destructor Documentation

9.5.3.1 BezierBodyElt()

```
Parsers::BezierBodyElt::BezierBodyElt ( ) [inline]
```

Constructor.

References [None](#), [theEnd](#), and [theType](#).

Referenced by [MakeCurveSegment\(\)](#), [MakeStraightSegment\(\)](#), and [MakeTrackEnd\(\)](#).

9.5.3.2 ~BezierBodyElt()

```
Parsers::BezierBodyElt::~~BezierBodyElt ( ) [inline]
```

Destructor.

9.5.4 Member Function Documentation

9.5.4.1 GetCurveSegment()

```
int Parsers::BezierBodyElt::GetCurveSegment (
    float & r,
    float & x,
    float & y,
    float & a0,
    float & a1 ) const [inline]
```

Fetch curve segment data.

References [ang0](#), [ang1](#), [pos1](#), [radius](#), [segmentId](#), [Parsers::BezierBodyElt::Pos::x](#), and [Parsers::BezierBodyElt::Pos::y](#).

9.5.4.2 GetStraightSegment()

```
int Parsers::BezierBodyElt::GetStraightSegment (
    float & x1,
    float & y1,
    float & x2,
    float & y2 ) const [inline]
```

Fetch straight segment data.

References [pos1](#), [pos2](#), [segmentId](#), [Parsers::BezierBodyElt::Pos::x](#), and [Parsers::BezierBodyElt::Pos::y](#).

9.5.4.3 InitTSegId()

```
static void Parsers::BezierBodyElt::InitTSegId ( ) [inline], [static]
```

Segment count initializer.

References [segCount](#).

9.5.4.4 MakeCurveSegment()

```
static BezierBodyElt * Parsers::BezierBodyElt::MakeCurveSegment (
    float r,
    float x,
    float y,
    float a0,
    float a1 ) [inline], [static]
```

Create a curve segment (C lines).

References [ang0](#), [ang1](#), [BezierBodyElt\(\)](#), [BezierCurvedSegment](#), [pos1](#), [radius](#), [segCount](#), [segmentId](#), [theType](#), [Parsers::BezierBodyElt::Pos::x](#), and [Parsers::BezierBodyElt::Pos::y](#).

9.5.4.5 MakeStraightSegment()

```
static BezierBodyElt * Parsers::BezierBodyElt::MakeStraightSegment (
    float x1,
    float y1,
    float x2,
    float y2 ) [inline], [static]
```

Create a straight segment (S lines).

References [BezierBodyElt\(\)](#), [BezierStraightSegment](#), [pos1](#), [pos2](#), [segCount](#), [segmentId](#), [theType](#), [Parsers::BezierBodyElt::Pos::x](#), and [Parsers::BezierBodyElt::Pos::y](#).

9.5.4.6 MakeTrackEnd()

```
static BezierBodyElt * Parsers::BezierBodyElt::MakeTrackEnd (
    TrackBodyElt * tbe ) [inline], [static]
```

Create an endpoint (T or E lines).

References [BezierBodyElt\(\)](#), [BezierEnd](#), [theEnd](#), and [theType](#).

9.5.4.7 TheType()

```
BezierBodyElementType Parsers::BezierBodyElt::TheType ( ) const [inline]
```

Type accessor.

References [theType](#).

9.5.5 Friends And Related Function Documentation

9.5.5.1 BezierBody

```
friend class BezierBody [friend]
```

9.5.5.2 TrackGraph

```
friend class TrackGraph [friend]
```

9.5.6 Member Data Documentation

9.5.6.1 ang0

```
float Parsers::BezierBodyElt::ang0 [private]
```

An angle value.

Referenced by [GetCurveSegment\(\)](#), and [MakeCurveSegment\(\)](#).

9.5.6.2 ang1

```
float Parsers::BezierBodyElt::ang1 [private]
```

Another angle value.

Referenced by [GetCurveSegment\(\)](#), and [MakeCurveSegment\(\)](#).

9.5.6.3 pos1

```
Pos Parsers::BezierBodyElt::pos1 [private]
```

First position.

Referenced by [GetCurveSegment\(\)](#), [GetStraightSegment\(\)](#), [MakeCurveSegment\(\)](#), and [MakeStraightSegment\(\)](#).

9.5.6.4 pos2

```
Pos Parsers::BezierBodyElt::pos2 [private]
```

Second position.

Referenced by [GetStraightSegment\(\)](#), and [MakeStraightSegment\(\)](#).

9.5.6.5 radius

```
float Parsers::BezierBodyElt::radius [private]
```

A radius value.

Referenced by [GetCurveSegment\(\)](#), and [MakeCurveSegment\(\)](#).

9.5.6.6 segCount

```
int Parsers::BezierBodyElt::segCount [static], [private]
```

Counter for S and C segments.

Referenced by [InitTSegId\(\)](#), [MakeCurveSegment\(\)](#), and [MakeStraightSegment\(\)](#).

9.5.6.7 segmentId

```
int Parsers::BezierBodyElt::segmentId [private]
```

Segment index (S or C lines).

Referenced by [GetCurveSegment\(\)](#), [GetStraightSegment\(\)](#), [MakeCurveSegment\(\)](#), and [MakeStraightSegment\(\)](#).

9.5.6.8 theEnd

`TrackBodyElt* Parsers::BezierBodyElt::theEnd [private]`

Pointer to T or E line data.

Referenced by [BezierBodyElt\(\)](#), [Parsers::BezierBody::BezierEnds\(\)](#), [Parsers::BezierBody::CleanUpElement\(\)](#), and [MakeTrackEnd\(\)](#).

9.5.6.9 theType

`BezierBodyEltType Parsers::BezierBodyElt::theType [private]`

Element type.

Referenced by [BezierBodyElt\(\)](#), [Parsers::BezierBody::BezierEnds\(\)](#), [Parsers::BezierBody::BezierSegmentCount\(\)](#), [Parsers::BezierBody::CleanUpElement\(\)](#), [MakeCurveSegment\(\)](#), [MakeStraightSegment\(\)](#), [MakeTrackEnd\(\)](#), and [TheType\(\)](#).

9.6 TTSupport::Cab Class Reference

This class maintains information about cabs.

```
#include <Cab.h>
```

Public Member Functions

- [Cab](#) (string name_="", string color_="")
Construct a new cab.
- [~Cab](#) ()
Clean things up.
- const char * [Name](#) () const
Return the name of the cab.
- const char * [Color](#) () const
Return the color of the cab.
- [Cab](#) (const [Cab](#) &other)
Copy constructor.
- [Cab](#) & [operator=](#) (const [Cab](#) &other)
Assignment operator.
- ostream & [Write](#) (ostream &stream) const
Write object to a stream.
- istream & [Read](#) (istream &stream)
Read an object from a stream.

Private Attributes

- string [name](#)
The name of the cab.
- string [color](#)
The color of the cab.

9.6.1 Detailed Description

This class maintains information about cabs.

A cab has a color and a name.

Author

Robert Heller <heller@deepsoft.com>

9.6.2 Constructor & Destructor Documentation

9.6.2.1 Cab() [1/2]

```
TTSupport::Cab::Cab (  
    string name_ = "",  
    string color_ = "" ) [inline]
```

Construct a new cab.

Parameters

<i>name</i> ↔ —	The name of the new cab.
<i>color</i> ↔ —	The color of the cab.

References [color](#), and [name](#).

9.6.2.2 ~Cab()

```
TTSupport::Cab::~~Cab ( ) [inline]
```

Clean things up.

9.6.2.3 Cab() [2/2]

```
TTSupport::Cab::Cab (
    const Cab & other ) [inline]
```

Copy constructor.

Create a new cab as a copy of an existing cab.

Parameters

<i>other</i>	The other cab.
--------------	----------------

References [color](#), and [name](#).

9.6.3 Member Function Documentation

9.6.3.1 Color()

```
const char * TTSupport::Cab::Color ( ) const [inline]
```

Return the color of the cab.

References [color](#).

9.6.3.2 Name()

```
const char * TTSupport::Cab::Name ( ) const [inline]
```

Return the name of the cab.

References [name](#).

9.6.3.3 operator=()

```
Cab & TTSupport::Cab::operator= (
    const Cab & other ) [inline]
```

Assignment operator.

Assign one cab to another cab.

Parameters

<i>other</i>	The other cab.
--------------	----------------

References [color](#), and [name](#).

9.6.3.4 Read()

```
istream & TTSupport::Cab::Read (  
    istream & stream )
```

Read an object from a stream.

Parameters

<i>stream</i>	Stream to read from.
---------------	----------------------

9.6.3.5 Write()

```
ostream & TTSupport::Cab::Write (  
    ostream & stream ) const
```

Write object to a stream.

Parameters

<i>stream</i>	Stream to write to.
---------------	---------------------

9.6.4 Member Data Documentation

9.6.4.1 color

```
string TTSupport::Cab::color [private]
```

The color of the cab.

Referenced by [Cab\(\)](#), [Color\(\)](#), and [operator=\(\)](#).

9.6.4.2 name

```
string TTSupport::Cab::name [private]
```

The name of the cab.

Referenced by [Cab\(\)](#), [Name\(\)](#), and [operator=\(\)](#).

9.7 Instruments::CabSignalLamp Class Reference

Cab signal lamp type.

Public Member Functions

- [CabSignalLamp](#) (name, _canvas,...)
Constructor – initialize a Cab Signal Lamp.
- [~CabSignalLamp](#) ()
Destructor – free up all resources.

Private Member Functions

- [_ConfigureXY](#) (option, value)
Method to configure X or Y.
- [_ConfigureSize](#) (option, value)
Method to configure size.
- [_ConfigureFillColor](#) (option, value)
Method to configure a fill color.
- [_ConfigureOutlineColor](#) (option, value)
Method to configure an outline color.

Private Attributes

- [canvas](#)
Canvas the lamp is on.
- [sx](#)
X size offset.
- [sy](#)
Y size offset.

9.7.1 Detailed Description

Cab signal lamp type.

Parameters

<code>_canvas</code>	The canvas to draw the cab signal lamp on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The X coordinate of the instrument (default 0). • <code>-y</code> The Y coordinate of the instrument (default 0). • <code>-size</code> The size of the instrument (default 100). • <code>-color</code> The color of the lamp (default black). • <code>-outline</code> The outline color of the instrument (default black).

Author

Robert Heller <heller@deepsoft.com>

9.7.2 Constructor & Destructor Documentation

9.7.2.1 CabSignalLamp()

```
Instruments::CabSignalLamp::CabSignalLamp (
    name ,
    _canvas ,
    ... )
```

Constructor – initialize a Cab Signal Lamp.

Parameters

<code>_canvas</code>	The canvas to draw the DialInstrument on.
<code>...</code>	Option list.

9.7.2.2 ~CabSignalLamp()

```
Instruments::CabSignalLamp::~~CabSignalLamp ( )
```

Destructor – free up all resources.

9.7.3 Member Function Documentation

9.7.3.1 `_ConfigureFillColor()`

```
Instruments::CabSignalLamp::_ConfigureFillColor (  
    option ,  
    value ) [private]
```

Method to configure a fill color.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The new value.

9.7.3.2 `_ConfigureOutlineColor()`

```
Instruments::CabSignalLamp::_ConfigureOutlineColor (  
    option ,  
    value ) [private]
```

Method to configure an outline color.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The new value.

9.7.3.3 `_ConfigureSize()`

```
Instruments::CabSignalLamp::_ConfigureSize (  
    option ,  
    value ) [private]
```

Method to configure size.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The new value.

9.7.3.4 _ConfigureXY()

```
Instruments::CabSignalLamp::_ConfigureXY (
    option ,
    value ) [private]
```

Method to configure X or Y.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The new value.

9.7.4 Member Data Documentation

9.7.4.1 canvas

```
Instruments::CabSignalLamp::canvas [private]
```

Canvas the lamp is on.

9.7.4.2 sx

```
Instruments::CabSignalLamp::sx [private]
```

X size offset.

9.7.4.3 sy

```
Instruments::CabSignalLamp::sy [private]
```

Y size offset.

9.8 Icc::CanAlias Class Reference

Implements a CAN Alias.

Public Member Functions

- [getNextAlias](#) ()
Compute next alias.
- [_peelnid](#) (value)
Peel the Node ID into bytes and initializing the 48 bit random number seed for alias generation.
- [CanAlias](#) (name,...)
Construct a CAN Alias.
- [getMyAlias](#) ()
Return the current alias value.
- [getMyNIDList](#) ()
Return the NID list.

Static Public Member Functions

- static [validate](#) (object)
Validate the object as a [CanAlias](#) object.

Public Attributes

- [lfsr1](#)
Sequence value, upper 24 bits.
- [lfsr2](#)
Sequence value, lower 24 bits.
- [nidlist](#)
The Node ID as a list of 6 bytes.
- [myalias](#)
My node alias.

9.8.1 Detailed Description

Implements a CAN Alias.

Options:

- -nid The Node ID that the computer will assume in the format of hh:hh:hh:hh:hh:hh which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:).

9.8.2 Constructor & Destructor Documentation

9.8.2.1 CanAlias()

```
lcc::CanAlias::CanAlias (
    name ,
    ... )
```

Construct a CAN Alias.

Parameters

<i>name</i>	The NodeID
...	Options <ul style="list-style-type: none">-nid The Node ID that the computer will assume in the format of <code>hh:hh:hh:hh:hh:hh</code> which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:).

References [i](#).

9.8.3 Member Function Documentation

9.8.3.1 _peelnid()

```
lcc::CanAlias::_peelnid (
    value )
```

Peel the Node ID into bytes and initializing the 48 bit random number seed for alias generation.

9.8.3.2 getMyAlias()

```
lcc::CanAlias::getMyAlias ( )
```

Return the current alias value.

Returns

The 12 bit node id alias.

9.8.3.3 getMyNIDList()

```
lcc::CanAlias::getMyNIDList ( )
```

Return the NID list.

Returns

The 6 byte list containing the NID.

9.8.3.4 getNextAlias()

```
lcc::CanAlias::getNextAlias ( )
```

Compute next alias.

9.8.3.5 validate()

```
static lcc::CanAlias::validate (
    object ) [static]
```

Validate the object as a [CanAlias](#) object.

Parameters

<i>object</i>	A possible CanAlias object.
---------------	---

9.8.4 Member Data Documentation

9.8.4.1 lfsr1

```
lcc::CanAlias::lfsr1
```

Sequence value, upper 24 bits.

9.8.4.2 lfsr2

```
lcc::CanAlias::lfsr2
```

Sequence value, lower 24 bits.

9.8.4.3 myalias

```
lcc::CanAlias::myalias
```

My node alias.

9.8.4.4 nidlist

```
lcc::CanAlias::nidlist
```

The Node ID as a list of 6 bytes.

9.9 lcc::CANGridConnect Class Reference

Base class to connect to a CAN bus using GridConnect formatted message over.

Public Member Functions

- [CANGridConnect](#) (name,...)
Constructor: create a connection to a Grid Connect CAN bus.
- [getAliasOfNID](#) (nid)
Fetch the alias of a NID.
- [getNIDofAlias](#) (alias)
Get the NID of the alias.
- [getAllNIDs](#) ()
Get all known NIDs.
- [getAllAliases](#) ()
Get all known aliases.
- [updateAliasMap](#) (nid, alias)
Update the alias map with the specified Node ID and Alias.
- [populateAliasMap](#) ()
Send an AME.
- [setMessageHandler](#) (handler)
Set the message handler.
- [setSentMessageHandler](#) (handler)
Set the sent message handler.
- [sendMessage](#) (...)
Send a message on the OpenLCB bus.
- [sendOpenLCBMessage](#) (message)
Send a message on the OpenLCB bus.
- [reserveAlias](#) (canalias)
Reserve an alias.

Private Member Functions

- [_sendDatagram](#) (message)
Send a datagram message.
- [_reserveMyAlias](#) ()
Reserve my alias.
- [_timedout](#) ()
Timeout method.
- [_flags0](#) (srcid, r, doff)
Method to deal with possible multipart messages, with particular handling of multi-part Simple Node Info messages.
- [_messageReader](#) (message)
Handling incoming messages.
- [_sendmessage](#) (canmessage)
Send a low-level CAN bus message using the Grid Connect format.

Static Private Member Functions

- static [listeq](#) (a, b)
Compare two lists.
- static [getBits](#) (top, bottom, [bytelist](#))
Get the selected bitfield.
- static [countNUL](#) (list)
Count NUL bytes in a byte buffer.
- static [listeq](#) (a, b)
Compare two lists.

Private Attributes

- [parent](#)
Parent instance.
- [gcmessage](#)
[GridConnectMessage](#) component.
- [gcreply](#)
[GridConnectReply](#) component.
- [mtidetail](#)
[MTIDetail](#) component.
- [mtiheader](#)
[MTIHeader](#) component.
- [canheader](#)
[CANHeader](#) component.
- [messagehandler](#)
Message handler.
- [sentMessageHandler](#)
Sent Message handler.
- [datagrambuffers](#)
Datagram buffers.

- [messagebuffers](#)
General message buffers (for multi frame messages)
- [simplenodeflags](#)
Simple node info flags.
- [mycanalias](#)
My CanAlias component.
- [aliasMap](#)
Alias to NID map.
- [nidMap](#)
NID to alias map.
- [_timeout](#)
Timeout flag.
- [_timeoutFlag](#)
Timeout or error message received flag.

Static Private Attributes

- static [NIDPATTERN](#)
The regexp for breaking up the Node ID into bytes.

9.9.1 Detailed Description

Base class to connect to a CAN bus using GridConnect formatted message over.

Options:

- -parent The parent instance. Needs to implement read, write, and readevent methods. This is a readonly option only processed at instance creation.
- -nid The Node ID that the computer will assume in the format of `hh:hh:hh:hh:hh:hh` which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:).
- -promiscuousmode Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

9.9.2 Constructor & Destructor Documentation

9.9.2.1 CANGridConnect()

```
lcc::CANGridConnect::CANGridConnect (
    name ,
    ... )
```

Constructor: create a connection to a Grid Connect CAN bus.

Connect to the CAN bus via a Grid Connect CAN bus.

Parameters

<i>name</i>	The name of the instance.
...	<p>The options:</p> <ul style="list-style-type: none"> • <code>-parent</code> The parent instance. Contains the low-level read and write methods. • <code>-nid</code> The Node ID that the computer will assume in the format of <code>hh:hh:hh:hh:hh:hh</code> which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:). • <code>-eventhandler</code> This is a script prefix that is run on incoming messages. The current message as a binary CanMessage is appended. • <code>-promiscuousmode</code> Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

9.9.3 Member Function Documentation

9.9.3.1 `_flags0()`

```
lcc::CANGridConnect::_flags0 (
    srcid ,
    r ,
    doff ) [private]
```

Method to deal with possible multipart messages, with partitular handling of multi-part Simple Node Info messages.

Parameters

<i>srcid</i>	The source alias of the message.
--------------	----------------------------------

References [i](#).

9.9.3.2 `_messageReader()`

```
lcc::CANGridConnect::_messageReader (
    message ) [private]
```

Handling incoming messages.

Handle control (CAN) messages here. OpenLCB messages are assembled possibly from multiple CAN messages and then dispatched to the upper level message handler.

9.9.3.3 _reserveMyAlias()

```
lcc::CANGridConnect::_reserveMyAlias ( ) [private]
```

Reserve my alias.

Returns

A boolean value indicating a successfully reserved alias (true) or failure (false).

9.9.3.4 _sendDatagram()

```
lcc::CANGridConnect::_sendDatagram (
    message ) [private]
```

Send a datagram message.

A possibly multi-part datagram message is sent.

Parameters

<i>message</i>	The OpenLCB message to send.
----------------	------------------------------

9.9.3.5 _sendmessage()

```
lcc::CANGridConnect::_sendmessage (
    canmessage ) [private]
```

Send a low-level CAN bus message using the Grid Connect format.

Parameters

<i>canmessage</i>	The (binary) CANMessage to send.
-------------------	----------------------------------

9.9.3.6 _timeout()

```
lcc::CANGridConnect::_timeout ( ) [private]
```

Timeout method.

Called on timeout.

9.9.3.7 countNUL()

```
static lcc::CANGridConnect::countNUL (
    list ) [static], [private]
```

Count NUL bytes in a byte buffer.

Parameters

<i>list</i>	The list of bytes to search.
-------------	------------------------------

Returns

The number of NUL (0) bytes in the list.

9.9.3.8 getAliasOfNID()

```
lcc::CANGridConnect::getAliasOfNID (
    nid )
```

Fetch the alias of a NID.

Parameters

<i>nid</i>	A full NID of the form hh:hh:hh:hh:hh:hh
------------	--

Returns

The node's alias or the empty string if not known.

9.9.3.9 getAllAliases()

```
lcc::CANGridConnect::getAllAliases ( )
```

Get all known aliases.

Returns

All known aliases.

9.9.3.10 getAllNIDs()

```
lcc::CANGridConnect::getAllNIDs ( )
```

Get all known NIDs.

Returns

All known NIDS.

9.9.3.11 getBits()

```
static lcc::CANGridConnect::getBits (
    top ,
    bottom ,
    bytelist ) [static], [private]
```

Get the selected bitfield.

Extract the bits from a list of 6 8-bit (byte) numbers representing a 48 bit number.

Parameters

<i>top</i>	Topmost (highest) bit number.
<i>bottom</i>	Bottommost (lowest) bit number.
<i>bytelist</i>	List of 6 bytes.

Returns

An integer value.

9.9.3.12 getNIDofAlias()

```
lcc::CANGridConnect::getNIDofAlias (
    alias )
```

Get the NID of the alias.

Parameters

<i>alias</i>	The alias to look up.
--------------	-----------------------

Returns

The NID of the alias or the empty string if not known.

9.9.3.13 listeq() [1/2]

```
static lcc::CANGridConnect::listeq (  
    a ,  
    b ) [static], [private]
```

Compare two lists.

Compares two lists for equality.

Parameters

<i>a</i>	First list to compare.
<i>b</i>	Second list to compare.

Returns

A boolean value: true if the lists are the same, false if not.

9.9.3.14 listeq() [2/2]

```
static lcc::CANGridConnect::listeq (  
    a ,  
    b ) [static], [private]
```

Compare two lists.

Compares two lists for equality.

Parameters

<i>a</i>	First list to compare.
<i>b</i>	Second list to compare.

Returns

A boolean value: true if the lists are the same, false if not.

9.9.3.15 populateAliasMap()

```
lcc::CANGridConnect::populateAliasMap ( )
```

Send an AME.

9.9.3.16 reserveAlias()

```
lcc::CANGridConnect::reserveAlias (
    canalias )
```

Reserve an alias.

Sends out CID messages and eventually RID and AMD messages, if there are no errors.

Parameters

<i>canalias</i>	A CanAlias object.
-----------------	------------------------------------

Returns

A boolean value indicating a successfully reserved alias (true) or failure (false).

9.9.3.17 sendMessage()

```
lcc::CANGridConnect::sendMessage (
    ... )
```

Send a message on the OpenLCB bus.

Parameters

...	Message options. See OpenLCBMessage for possible options.
-----	---

9.9.3.18 sendOpenLCBMessage()

```
lcc::CANGridConnect::sendOpenLCBMessage (
    message )
```

Send a message on the OpenLCB bus.

Parameters

<i>message</i>	An OpenLCBMessage .
----------------	-------------------------------------

9.9.3.19 setMessageHandler()

```
lcc::CANGridConnect::setMessageHandler (
    handler )
```

Set the message handler.

Generally called from the upper level class to gain access to incoming messages asynchronously.

Parameters

<i>handler</i>	The new handler procedure.
----------------	----------------------------

Returns

The old handler or the empty string if there was no old handler.

9.9.3.20 setSentMessageHandler()

```
lcc::CANGridConnect::setSentMessageHandler (
    handler )
```

Set the sent message handler.

Generally called from the upper level class to gain access to outgoing messages asynchronously.

Parameters

<i>handler</i>	The new handler procedure.
----------------	----------------------------

Returns

The old handler or the empty string if there was no old handler.

9.9.3.21 updateAliasMap()

```
lcc::CANGridConnect::updateAliasMap (
    nid ,
    alias )
```

Update the alias map with the specificed Node ID and Alias.

Parameters

<i>nid</i>	An OpenLCB Node ID.
<i>alias</i>	A 12-bit CAN Alias.

9.9.4 Member Data Documentation

9.9.4.1 _timeout

```
lcc::CANGridConnect::_timeout [private]
```

Timeout flag.

9.9.4.2 _timeoutFlag

```
lcc::CANGridConnect::_timeoutFlag [private]
```

Timeout or error message received flag.

9.9.4.3 aliasMap

```
lcc::CANGridConnect::aliasMap [private]
```

Alias to NID map.

9.9.4.4 canheader

```
lcc::CANGridConnect::canheader [private]
```

[CANHeader](#) component.

This component is used to extract and pack fields from and to a CAN header at a CAN Header level.

9.9.4.5 datagrambuffers

```
lcc::CANGridConnect::datagrambuffers [private]
```

Datagram buffers.

9.9.4.6 gcmessage

```
lcc::CANGridConnect::gcmessage [private]
```

[GridConnectMessage](#) component.

This component is used to encode CAN Messages in Grid Connect Message format for transmission.

9.9.4.7 gcreply

```
lcc::CANGridConnect::gcreply [private]
```

[GridConnectReply](#) component.

This component is used to decode received Grid Connect Messages into binary CAN Messages.

9.9.4.8 messagebuffers

```
lcc::CANGridConnect::messagebuffers [private]
```

General message buffers (for multi frame messages)

9.9.4.9 messagehandler

```
lcc::CANGridConnect::messagehandler [private]
```

Message handler.

9.9.4.10 mtidetail

```
lcc::CANGridConnect::mtidetail [private]
```

[MTIDetail](#) component.

This component is used to extract and pack fields from and to a CAN header at a MTI detail level

9.9.4.11 mtiheader

```
lcc::CANGridConnect::mtiheader [private]
```

[MTIHeader](#) component.

This component is used to extract and pack fields from and to a CAN header at a MTI header level.

9.9.4.12 mycanalias

```
lcc::CANGridConnect::mycanalias [private]
```

My [CanAlias](#) component.

9.9.4.13 nidMap

```
lcc::CANGridConnect::nidMap [private]
```

NID to alias map.

9.9.4.14 NIDPATTERN

```
lcc::CANGridConnect::NIDPATTERN [static], [private]
```

The regexp for breaking up the Node ID into bytes.

9.9.4.15 parent

```
lcc::CANGridConnect::parent [private]
```

Parent instance.

9.9.4.16 sendMessageHandler

```
lcc::CANGridConnect::sendMessageHandler [private]
```

Sent Message handler.

9.9.4.17 simplenodeflags

```
lcc::CANGridConnect::simplenodeflags [private]
```

Simple node info flags.

9.10 lcc::CANGridConnectOverCANSocket Class Reference

Connect to a CAN bus using GridConnect formatted message over a CAN Socket connection.

Public Member Functions

- [CANGridConnectOverCANSocket](#) (name,...)
Constructor: create a connection to a Grid Connect USB serial device.

Static Public Member Functions

- static [buildSocketnamenidDialog](#) ()
Function to construct the Dialog to ask the user for a CAN socket name and Node ID.
- static [_CancelOpenTransport](#) ()
Function bound to the Cancel button.
- static [_OpenTransport](#) ()
Function bound to the Open button.
- static [requiredOpts](#) ()
Return the default option list.
- static [drawOptionsDialog](#) (...)
Pop up the Options Dialog box.

Static Public Attributes

- static [socketnamenidDialog](#)
Dialog to ask the user for a socket name and Node ID.
- static [socketnameLEntry](#)
LabelSpinBox containing the socket name.
- static [nidLEntry](#)
LabelEntry containing the Node ID.

Private Attributes

- [gccomponent](#)
GC Component.
- [socket](#)
The CAN socket.

9.10.1 Detailed Description

Connect to a CAN bus using GridConnect formatted message over a CAN Socket connection.

Options:

- -socketname The name of the CAN Socket Device. The default is can0. This is a readonly option only processed at instance creation.
- -nid The Node ID that the computer will assume in the format of `hh:hh:hh:hh:hh:hh` which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:).
- -promiscuousmode Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

9.10.2 Constructor & Destructor Documentation

9.10.2.1 CANGridConnectOverCANSocket()

```
lcc::CANGridConnectOverCANSocket::CANGridConnectOverCANSocket (
    name ,
    ... )
```

Constructor: create a connection to a Grid Connect USB serial device.

Connect to the CAN bus via a Grid Connect USB serial port interface.

Parameters

<i>name</i>	The name of the instance.
...	<p>The options:</p> <ul style="list-style-type: none"> • -socketname The Tcp/lp port number. The default is can0. • -nid The Node ID that the computer will assume in the format of <code>hh:hh:hh:hh:hh:hh</code> which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:). • -eventhandler This is a script prefix that is run on incoming messages. The current message as a binary CanMessage is appended.
Generated by Doxygen	<ul style="list-style-type: none"> • -promiscuousmode Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

9.10.3 Member Function Documentation

9.10.3.1 `_CancelOpenTransport()`

```
static lcc::CANGridConnectOverCANSocket::_CancelOpenTransport ( ) [static]
```

Function bound to the `Cancel` button.

Closes the dialog box and returns the empty string.

Returns

The empty string.

9.10.3.2 `_OpenTransport()`

```
static lcc::CANGridConnectOverCANSocket::_OpenTransport ( ) [static]
```

Function bound to the `Open` button.

Closes the dialog box and returns the options needed to open the transport.

Returns

An option argument list with the `-nid` and `-port` options.

9.10.3.3 `buildSocketnamenidDialog()`

```
static lcc::CANGridConnectOverCANSocket::buildSocketnamenidDialog ( ) [static]
```

Function to construct the Dialog to ask the user for a CAN socket name and Node ID.

Returns

The Dialog box object.

9.10.3.4 `drawOptionsDialog()`

```
static lcc::CANGridConnectOverCANSocket::drawOptionsDialog (
    ... ) [static]
```

Pop up the Options Dialog box.

Pops up the Options Dialog box and collects the options needed to open the [OpenLCBOverTcp](#) object.

Parameters

...	<div>Options:<ul style="list-style-type: none">• -parent Set the parent for this dialog box.• -socketname The default CAN Socket Name option.• -nid The default Node ID to use for the Node ID option.</div>
-----	--

Returns

Either the null string or an options list.

9.10.3.5 requiredOpts()

```
static lcc::CANGridConnectOverCANSocket::requiredOpts ( ) [static]
```

Return the default option list.

Returns the default options for the options dialog.

Returns

The option value list.

9.10.4 Member Data Documentation**9.10.4.1 gccomponent**

```
lcc::CANGridConnectOverCANSocket::gccomponent [private]
```

GC Component.

9.10.4.2 nidLEntry

```
lcc::CANGridConnectOverCANSocket::nidLEntry [static]
```

LabelEntry containing the Node ID.

9.10.4.3 socket

```
lcc::CANGridConnectOverCANSocket::socket [private]
```

The CAN socket.

9.10.4.4 socketnameLEntry

```
lcc::CANGridConnectOverCANSocket::socketnameLEntry [static]
```

[LabelSpinBox](#) containing the socket name.

9.10.4.5 socketnamenidDialog

```
lcc::CANGridConnectOverCANSocket::socketnamenidDialog [static]
```

Dialog to ask the user for a socket name and Node ID.

9.11 lcc::CANGridConnectOverTcp Class Reference

Connect to a CAN bus using GridConnect formatted message over a Tcp/Ip connection.

Public Member Functions

- [CANGridConnectOverTcp](#) (name,...)

Constructor: create a connection to a Grid Connect USB serial device.

Static Public Member Functions

- static [buildPortnidandhostDialog](#) ()
Function to construct the Dialog to ask the user for a port, host, and Node ID.
- static [_CancelOpenTransport](#) ()
Function bound to the `Cancel` button.
- static [_OpenTransport](#) ()
Function bound to the `Open` button.
- static [requiredOpts](#) ()
Return the default option list.
- static [drawOptionsDialog](#) (...)
Pop up the Options Dialog box.

Static Public Attributes

- static [portnidandhostDialog](#)
Dialog to ask the user for a port, host, and Node ID.
- static [portLSpin](#)
`LabelSpinBox` containing possible network ports.
- static [hostLEntry](#)
`LabelEntry` containing the hostname.
- static [nidLEntry](#)
`LabelEntry` containing the Node ID.

Private Attributes

- [gccomponent](#)
GC Component.
- [socket](#)
The Tcp/Ip socket.

9.11.1 Detailed Description

Connect to a CAN bus using GridConnect formatted message over a Tcp/Ip connection.

Options:

- `-port` The Tcp/Ip port. The default is 12021. This is a readonly option only processed at instance creation.
- `-host` The host name to connect to. The default is localhost. This is a readonly option only processed at instance creation.
- `-nid` The Node ID that the computer will assume in the format of `hh:hh:hh:hh:hh:hh` which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:).
- `-promiscuousmode` Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

9.11.2 Constructor & Destructor Documentation

9.11.2.1 CANGridConnectOverTcp()

```
lcc::CANGridConnectOverTcp::CANGridConnectOverTcp (
    name ,
    ... )
```

Constructor: create a connection to a Grid Connect USB serial device.

Connect to the CAN bus via a Grid Connect USB serial port interface.

Parameters

<i>name</i>	The name of the instance.
...	<p>The options:</p> <ul style="list-style-type: none"> • -port The Tcp/Ip port number. The default is 12021. • -host The host to connect to. The default is localhost. • -nid The Node ID that the computer will assume in the format of <code>hh:hh:hh:hh:hh:hh</code> which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:). • -eventhandler This is a script prefix that is run on incoming messages. The current message as a binary CanMessage is appended. • -promiscuousmode Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

9.11.3 Member Function Documentation

9.11.3.1 _CancelOpenTransport()

```
static lcc::CANGridConnectOverTcp::_CancelOpenTransport ( ) [static]
```

Function bound to the `Cancel` button.

Closes the dialog box and returns the empty string.

Returns

The empty string.

9.11.3.2 _OpenTransport()

```
static lcc::CANGridConnectOverTcp::_OpenTransport ( ) [static]
```

Function bound to the `Open` button.

Closes the dialog box and returns the options needed to open the transport.

Returns

An option argument list with the `-nid` and `-port` options.

9.11.3.3 buildPortnidandhostDialog()

```
static lcc::CANGridConnectOverTcp::buildPortnidandhostDialog ( ) [static]
```

Function to construct the Dialog to ask the user for a port, host, and Node ID.

Returns

The Dialog box object.

9.11.3.4 drawOptionsDialog()

```
static lcc::CANGridConnectOverTcp::drawOptionsDialog (
    ... ) [static]
```

Pop up the Options Dialog box.

Pops up the Options Dialog box and collects the options needed to open the [OpenLCBOverTcp](#) object.

Parameters

...	<p>Options:</p> <ul style="list-style-type: none">• <code>-parent</code> Set the parent for this dialog box.• <code>-port</code> The default Tcp/lp port number option.• <code>-host</code> The default Tcp/lp hostname option.• <code>-nid</code> The default Node ID to use for the Node ID option.
-----	--

Returns

Either the null string or an options list.

9.11.3.5 requiredOpts()

```
static lcc::CANGridConnectOverTcp::requiredOpts ( ) [static]
```

Return the default option list.

Returns the default options for the options dialog.

Returns

The option value list.

9.11.4 Member Data Documentation**9.11.4.1 gccomponent**

```
lcc::CANGridConnectOverTcp::gccomponent [private]
```

GC Component.

9.11.4.2 hostLEntry

```
lcc::CANGridConnectOverTcp::hostLEntry [static]
```

LabelEntry containing the hostname.

9.11.4.3 nidLEntry

```
lcc::CANGridConnectOverTcp::nidLEntry [static]
```

LabelEntry containing the Node ID.

9.11.4.4 portLSpin

```
lcc::CANGridConnectOverTcp::portLSpin [static]
```

[LabelSpinBox](#) containing possible network ports.

9.11.4.5 portnidandhostDialog

```
lcc::CANGridConnectOverTcp::portnidandhostDialog [static]
```

Dialog to ask the user for a port, host, and Node ID.

9.11.4.6 socket

```
lcc::CANGridConnectOverTcp::socket [private]
```

The Tcp/Ip socket.

9.12 lcc::CANGridConnectOverUSBSerial Class Reference

Connect to a CAN bus using GridConnect formatted message over a USB Serial port.

Public Member Functions

- [CANGridConnectOverUSBSerial](#) (name,...)

Constructor: create a connection to Grid Connect USB serial device.

Static Public Member Functions

- static [findAvailableComPorts](#) ()
Return a list of available (USB) serial ports.
- static [buildPortandnidDialog](#) ()
Function to construct the Dialog to ask the user for a port and Node ID.
- static [_CancelOpenTransport](#) ()
Function bound to the `Cancel` button.
- static [_OpenTransport](#) ()
Function bound to the `Open` button.
- static [requiredOpts](#) ()
Return the default option list.
- static [drawOptionsDialog](#) (...)
Pop up the Options Dialog box.

Static Public Attributes

- static [portandnidDialog](#)
Dialog to ask the user for a port and Node ID.
- static [portLCombo](#)
[LabelComboBox](#) containing all possible serial port devices.
- static [nidLEntry](#)
LabelEntry containing the Node ID.

Private Attributes

- [gccomponent](#)
GC Component.
- [ttyfd](#)
The tty I/O channel.

9.12.1 Detailed Description

Connect to a CAN bus using GridConnect formatted message over a USB Serial port.

Options:

- `-port` The name of the serial port. Typically `"/dev/ttyACMn"` under Linux (using the `cdc_acm` driver). This is a readonly option only processed at instance creation.
- `-nid` The Node ID that the computer will assume in the format of `hh:hh:hh:hh:hh:hh` which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (`:`).
- `-promiscuousmode` Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

9.12.2 Constructor & Destructor Documentation

9.12.2.1 CANGridConnectOverUSBSerial()

```
lcc::CANGridConnectOverUSBSerial::CANGridConnectOverUSBSerial (
    name ,
    ... )
```

Constructor: create a connection to Grid Connect USB serial device.

Connect to the CAN bus via a Grid Connect USB serial port interface.

Parameters

<i>name</i>	The name of the instance.
...	<p>The options:</p> <ul style="list-style-type: none"> • <code>-port</code> The name of the serial port. Typically <code>"/dev/ttyACMn"</code> under Linux (using the <code>cdc_acm</code> driver). • <code>-nid</code> The Node ID that the computer will assume in the format of <code>hh:hh:hh:hh:hh:hh</code> which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:). • <code>-eventhandler</code> This is a script prefix that is run on incoming messages. The current message as a binary CanMessage is appended. • <code>-promiscuousmode</code> Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

References [i](#).

9.12.3 Member Function Documentation

9.12.3.1 _CancelOpenTransport()

```
static lcc::CANGridConnectOverUSBSerial::_CancelOpenTransport ( ) [static]
```

Function bound to the `Cancel` button.

Closes the dialog box and returns the empty string.

Returns

The empty string.

9.12.3.2 `_OpenTransport()`

```
static lcc::CANGridConnectOverUSBSerial::_OpenTransport ( ) [static]
```

Function bound to the `Open` button.

Closes the dialog box and returns the options needed to open the transport.

Returns

An option argument list with the `-nid` and `-port` options.

9.12.3.3 `buildPortandnidDialog()`

```
static lcc::CANGridConnectOverUSBSerial::buildPortandnidDialog ( ) [static]
```

Function to construct the Dialog to ask the user for a port and Node ID.

Returns

The Dialog box object.

9.12.3.4 `drawOptionsDialog()`

```
static lcc::CANGridConnectOverUSBSerial::drawOptionsDialog (
    ... ) [static]
```

Pop up the Options Dialog box.

Pops up the Options Dialog box and collects the options needed to open the [CANGridConnectOverUSBSerial](#) object.

Parameters

...	<p>Options:</p> <ul style="list-style-type: none">• <code>-parent</code> Set the parent for this dialog box.• <code>-port</code> The default serial port name for the serial port option.• <code>-nid</code> The default Node ID to use for the Node ID option.
-----	---

Returns

Either the null string or an options list.

9.12.3.5 findAvailableComPorts()

```
static lcc::CANGridConnectOverUSBSerial::findAvailableComPorts ( ) [static]
```

Return a list of available (USB) serial ports.

This method does a platform specific search for possible serial ports to use to communicate over the CAN bus.

Returns

A list of serial port device names.

9.12.3.6 requiredOpts()

```
static lcc::CANGridConnectOverUSBSerial::requiredOpts ( ) [static]
```

Return the default option list.

Returns the default options for the options dialog.

Returns

The option value list.

9.12.4 Member Data Documentation**9.12.4.1 gccomponent**

```
lcc::CANGridConnectOverUSBSerial::gccomponent [private]
```

GC Component.

9.12.4.2 nidLEntry

```
lcc::CANGridConnectOverUSBSerial::nidLEntry [static]
```

LabelEntry containing the Node ID.

9.12.4.3 portandnidDialog

```
lcc::CANGridConnectOverUSBSerial::portandnidDialog [static]
```

Dialog to ask the user for a port and Node ID.

9.12.4.4 portLCombo

```
lcc::CANGridConnectOverUSBSerial::portLCombo [static]
```

[LabelComboBox](#) containing all possible serial port devices.

9.12.4.5 ttyfd

```
lcc::CANGridConnectOverUSBSerial::ttyfd [private]
```

The tty I/O channel.

9.13 lcc::CANHeader Class Reference

CAN Header type.

Public Member Functions

- [CANHeader](#) (name,...)
Constructor: create a 29-bit CAN header.
- [getHeader](#) ()
Generate and return the 29-bit header.
- [setHeader](#) (header)
Decode a 29-bit CAN header.

Static Private Attributes

- static [RESERVED_SHIFT](#)
Bit 28 is reserved and always 1.
- static [OPENLCBFRAME_SHIFT](#)
Bit 27 is the OpenLCB bit: 1 == OpenLCB, 0 == other CAN.
- static [OPENLCBFRAME_MASK](#)
Bit 27 is the OpenLCB bit: 1 == OpenLCB, 0 == other CAN.
- static [VARIABLEFIELD_SHIFT](#)
Bits 12-26 are the variable field.
- static [VARIABLEFIELD_MASK](#)
Bits 12-26 are the variable field.
- static [SRCID_SHIFT](#)
Bits 0-11 are the source id.
- static [SRCID_MASK](#)
Bits 0-11 are the source id.

9.13.1 Detailed Description

CAN Header type.

Creates a 29-bit CAN header. The header is generated and decoded ``on the fly'' from/to the supplied options:

- -openlcbframe A boolean flag to indicate an OpenLCB or generic CAN frame.
- -variablefield A 15 bit data field.
- -srcid A 12 bit source id field.

9.13.2 Constructor & Destructor Documentation

9.13.2.1 CANHeader()

```
lcc::CANHeader::CANHeader (
    name ,
    ... )
```

Constructor: create a 29-bit CAN header.

Creates a CAN header object from the supplied options.

Parameters

<i>name</i>	The name of the object.
...	Options:
Generated by Doxygen	
<ul style="list-style-type: none">• -openlcbframe Flag to indicate a OpenLCB frame or not. Default yes, type boolean.• -variablefield Fifteen bit variable field. Default 0, type 15-bit integer.• -srcid Twelve bit source id field. Default 0, type 12-bit integer.	

9.13.3 Member Function Documentation

9.13.3.1 `getHeader()`

```
lcc::CANHeader::getHeader ( )
```

Generate and return the 29-bit header.

Creates a 29-bit header from the supplied options.

Returns

The 29-bit CAN header.

9.13.3.2 `setHeader()`

```
lcc::CANHeader::setHeader (
    header )
```

Decode a 29-bit CAN header.

The 29-bit CAN header is decoded and the various options set.

Parameters

<i>header</i>	The 29-bit CAN header.
---------------	------------------------

9.13.4 Member Data Documentation

9.13.4.1 `OPENLCBFRAME_MASK`

```
lcc::CANHeader::OPENLCBFRAME_MASK [static], [private]
```

Bit 27 is the OpenLCB bit: 1 == OpenLCB, 0 == other CAN.

9.13.4.2 OPENLCBFRAME_SHIFT

```
lcc::CANHeader::OPENLCBFRAME_SHIFT [static], [private]
```

Bit 27 is the OpenLCB bit: 1 == OpenLCB, 0 == other CAN.

9.13.4.3 RESERVED_SHIFT

```
lcc::CANHeader::RESERVED_SHIFT [static], [private]
```

Bit 28 is reserved and always 1.

9.13.4.4 SRCID_MASK

```
lcc::CANHeader::SRCID_MASK [static], [private]
```

Bits 0-11 are the source id.

9.13.4.5 SRCID_SHIFT

```
lcc::CANHeader::SRCID_SHIFT [static], [private]
```

Bits 0-11 are the source id.

9.13.4.6 VARIABLEFIELD_MASK

```
lcc::CANHeader::VARIABLEFIELD_MASK [static], [private]
```

Bits 12-26 are the variable field.

9.13.4.7 VARIABLEFIELD_SHIFT

```
lcc::CANHeader::VARIABLEFIELD_SHIFT [static], [private]
```

Bits 12-26 are the variable field.

9.14 Icc::CanMessage Class Reference

A CAN Message, containing a 29-bit header and upto 8 bytes of data.

Public Member Functions

- [CanMessage](#) (name,...)
Constructor: create a CANMessage object Creates a fresh CANMessage object, with possible initialization.
- [hashCode](#) ()
Return a hash code.
- [equals](#) (a)
Equality check.
- [replyExpected](#) ()
Reply expected.
- [setNumDataElements](#) (n)
Set the number of data elements.
- [setData](#) (d)
Set the data values.
- [getData](#) ()
Return the data vector.
- [getHeader](#) ()
Return the header.
- [setHeader](#) (h)
Set the header.
- [toString](#) ()
Method to create a string version of the message.

Static Public Member Functions

- static [copy](#) (m)
Copy constructor.
- static [validate](#) (o)
Validator typemethod.

Public Attributes

- [_header](#)
The header.

9.14.1 Detailed Description

A CAN Message, containing a 29-bit header and upto 8 bytes of data.

Options:

- -header The 29-bit header. Readonly, used only during creation. Default 0.
- -length The length of the data. Readonly, used only during creation. Default 0.
- -data The initial data. Readonly, used only during creation. Default is the empty list.
- -extended. Boolean flag to indicate an extended protocol frame. Default is false.
- -rtr. Boolean flag to indicate if a reply is expected. Default is false.

Additional methods defined using the macros AbstractMessage and AbstractMRMessage include:

- getElement {n} – Get the nth data element.
- getNumDataElements {} – Get the number of data elements.
- setElement {n v} – Set the nth data element.
- setOpCode {i} – Set the opcode (byte 0).
- getOpCode {} – Get the opcode (byte 0).
- getOpCodeHex {} – Get the opcode (byte 0) in hex.
- setNeededMode {pMode} – Set the needed mode.
- getNeededMode {} – Get the needed mode.
- replyExpected {} – Returns reply expected flag.
- isBinary {} – Returns binary flag.
- setBinary {b} – Set the binary flag.
- setTimeout {t} – Set the timeout.
- getTimeout {} – Get the timeout.
- setRetries {i} – Set the number of retries.
- getRetries {} – Get the number of retries.
- addIntAsThree {val offset} – Insert an integer as three decimal digits (with leading 0s).
- addIntAsTwoHex {val offset} – Insert an integer as two hexadecimal digits (with leading 0s).
- addIntAsThreeHex {val offset} – Insert an integer as three hexadecimal digits (with leading 0s).
- addIntAsFourHex {val offset} – Insert an integer as four hexadecimal digits (with leading 0s).
- setNumDataElements {n} – Set the number of data bytes.
- toString {} – Return the data object as a string.

And these (private) instance variables:

- `_dataChars` {}
- `_nDataChars` 0
- `mNeededMode` 0
- `_isBinary` false
- `mTimeout` 0
- `mRetries` 0

And these (private) static variables:

- `SHORT_TIMEOUT` 2000
- `LONG_TIMEOUT` 60000

9.14.2 Constructor & Destructor Documentation

9.14.2.1 CanMessage()

```
lcc::CanMessage::CanMessage (
    name ,
    ... )
```

Constructor: create a CANMessage object Creates a fresh CANMessage object, with possible initialization.

Parameters

<i>name</i>	The name of the new instance.
...	<p>The options:</p> <ul style="list-style-type: none">• <code>-header</code> The 29-bit header. Readonly, used only during creation.• <code>-length</code> The length of the data. Readonly, used only during creation.• <code>-data</code> The initial data. Readonly, used only during creation.• <code>-extended</code>. Boolean flag to indicate an extended protocol frame.• <code>-rtr</code>. Boolean flag to indicate if a reply is expected.

9.14.3 Member Function Documentation

9.14.3.1 copy()

```
static lcc::CanMessage::copy (
    m ) [static]
```

Copy constructor.

Copies a CANMessage instance.

Parameters

<i>m</i>	The CANMessage to make a copy of.
----------	-----------------------------------

9.14.3.2 equals()

```
lcc::CanMessage::equals (
    a )
```

Equality check.

CANMessages are equal if all of the bits are the same.

Parameters

<i>a</i>	A CANMessage to compare to.
----------	-----------------------------

Returns

A boolean value indication equality.

9.14.3.3 getData()

```
lcc::CanMessage::getData ( )
```

Return the data vector.

Returns

The data vector.

9.14.3.4 getHeader()

```
lcc::CanMessage::getHeader ( )
```

Return the header.

Returns

The header.

9.14.3.5 hashCode()

```
lcc::CanMessage::hashCode ( )
```

Return a hash code.

Returns

The header as the object's hash code.

9.14.3.6 replyExpected()

```
lcc::CanMessage::replyExpected ( )
```

Reply expected.

Returns

A boolean flag indicating if a reply is expected.

9.14.3.7 setData()

```
lcc::CanMessage::setData (
    d )
```

Set the data values.

Copy data into the data vector.

Parameters

<i>d</i>	Replacement data values.
----------	--------------------------

9.14.3.8 setHeader()

```
lcc::CanMessage::setHeader (
    h )
```

Set the header.

Parameters

<i>h</i>	The new header.
----------	-----------------

9.14.3.9 setNumDataElements()

```
lcc::CanMessage::setNumDataElements (
    n )
```

Set the number of data elements.

Sets the number of data elements.

Parameters

<i>n</i>	The number of data elements.
----------	------------------------------

9.14.3.10 toString()

```
lcc::CanMessage::toString ( )
```

Method to create a string version of the message.

Returns

A string representation of the message.

9.14.3.11 validate()

```
static lcc::CanMessage::validate (  
    o ) [static]
```

Validator type method.

Parameters

<i>o</i>	The object to validate.
----------	-------------------------

9.14.4 Member Data Documentation

9.14.4.1 _header

```
lcc::CanMessage::_header
```

The header.

9.15 lcc::CanTransport Class Reference

Logical transport of CAN Messages.

Public Member Functions

- [CanTransport](#) (name,...)
Construct a [CanTransport](#) object.

Private Member Functions

- [_transportlayerconf](#) (opt, value)
Set the transport layer component.

Private Attributes

- [transport](#)
Transport Layer component.

9.15.1 Detailed Description

Logical transport of CAN Messages.

CAN Bus abstraction layer

Options:

- -transportlayer The physical transport layer (eg GridConnectTransport over USB serial, etc.)
- -readhandler The read handler for incoming messages.

9.15.2 Constructor & Destructor Documentation

9.15.2.1 CanTransport()

```
lcc::CanTransport::CanTransport (
    name ,
    ... )
```

Construct a [CanTransport](#) object.

Parameters

<i>name</i>	The name of the transport object.
...	Options: <ul style="list-style-type: none">• -transportlayer The physical transport layer (eg GridConnectTransport over USB serial, etc.)• -readhandler The read handler for incoming messages.

9.15.3 Member Function Documentation

9.15.3.1 `_transportlayerconf()`

```
lcc::CanTransport::_transportlayerconf (
    opt ,
    value ) [private]
```

Set the transport layer component.

Parameters

<i>opt</i>	Always -transportlayer
<i>value</i>	The physical transport object.

9.15.4 Member Data Documentation

9.15.4.1 `transport`

```
lcc::CanTransport::transport [private]
```

Transport Layer component.

9.16 FCFSupport::Car Class Reference

This class holds all of the information for a single car.

```
#include <Car.h>
```

Public Member Functions

- [Car](#) ()
Default constructor.
- [Car](#) ([Car](#) &other)
Copy constructor.
- [Car](#) & [operator=](#) ([Car](#) &other)
Assignment operator.
- [Car](#) (char t, const char *m, const char *n, const char *d, int l, int p, int wc, int lw, int ldw, bool lp, bool mp, bool fp, const [Owner](#) *own, bool dp, const [Train](#) *lt, int mvs, [Industry](#) *loc, [Industry](#) *dest, int trps, int asgns)
Full constructor.
- char [Type](#) () const
Return the car type.
- void [SetType](#) (char t)

- void [SetFixedRouteP](#) (bool f)
Set whether this car is on a fixed route.
- const [Owner](#) * [CarOwner](#) () const
Return the car's owner.
- void [SetCarOwner](#) (const [Owner](#) *o)
Set the car's owner.
- bool [IsDoneP](#) () const
Is this car done?
- void [SetDone](#) ()
Flag this car as done.
- void [SetNotDone](#) ()
Flag this car as not done.
- const [Train](#) * [LastTrain](#) () const
Return the last train to move this car.
- void [SetLastTrain](#) (const [Train](#) *lt)
Set the last train to move this car.
- const [Train](#) * [PrevTrain](#) () const
Return the previous train to move this car.
- void [SetPrevTrain](#) (const [Train](#) *lt)
Set the previous train to move this car.
- int [MovementsThisSession](#) () const
Return the number of movements this session.
- void [ClearMovementsThisSession](#) ()
Clear the number of movements this session.
- void [IncrmentMovementsThisSession](#) ()
Increment the number of movements this session.
- [Industry](#) * [Location](#) () const
Return the location of this car.
- void [SetLocation](#) ([Industry](#) *newloc)
Set the location of this car.
- [Industry](#) * [Destination](#) () const
Return the destination of this car.
- void [SetDestination](#) ([Industry](#) *newdest)
Set the destination of this car.
- int [Trips](#) () const
Return the number of trips this car has had.
- void [ClearTrips](#) ()
Clear the number of trips this car has had.
- void [IncrementTrips](#) ()
Increment the number of trips this car has had.
- int [Assignments](#) () const
Return the number of assignments this car has had.
- void [SetAssignments](#) (int a)
Set the number of assignments this car has had.
- void [ClearAssignments](#) ()
Clear the number of assignments this car has had.
- void [IncrementAssignments](#) ()

Increment the number of assignments this car has had.

- bool `Peek` () const

Return the peek flag.

- void `SetPeek` (bool p=false)

Set or clear the peek flag.

Private Attributes

- const `Owner` * `owner`

The owner of this car.

- const `Train` * `lasttrain`

The last train to handle this car.

- const `Train` * `prevtrain`

The previous train to handle this car.

- `Industry` * `location`

This car's location.

- `Industry` * `destination`

This car's destination.

- string `marks`

This car's reporting marks.

- string `number`

This car's number.

- string `divisions`

This car's division list.

- int `length`

This car's length.

- int `plate`

This car's clearance plate.

- int `weightclass`

This car's weight class.

- int `ltwt`

This car's empty weight.

- int `ldlmt`

This car's loaded weight.

- int `trips`

The number of trips this car has made.

- int `moves`

The number of moves this car has made.

- int `assignments`

The number of assignments this car has had.

- bool `loadedP`

This car's loaded flag.

- bool `mirrorP`

This car's mirror flag.

- bool `fixedP`

This car's fixed route flag.

- bool [doneP](#)
This car's done flag.
- bool [peek](#)
This car's peel flak.
- bool [tmpStatus](#)
Temp status flag.
- char [type](#)
This car's type.

Friends

- class [System](#)
The [System](#) class is a friend.

9.16.1 Detailed Description

This class holds all of the information for a single car.

Including its reporting marks, car number, type, division list, owner, length, weight, and so on.

```
@author Robert Heller <heller@deepsoft.com>
```

9.16.2 Constructor & Destructor Documentation

9.16.2.1 Car() [1/3]

```
FCFSupport::Car::Car ( ) [inline]
```

Default constructor.

All slots are initialized to default values.

References [assignments](#), [destination](#), [divisions](#), [doneP](#), [fixedP](#), [lasttrain](#), [ldlmt](#), [length](#), [loadedP](#), [location](#), [ltwt](#), [marks](#), [mirrorP](#), [moves](#), [number](#), [owner](#), [peek](#), [plate](#), [prevtrain](#), [tmpStatus](#), [trips](#), [type](#), and [weightclass](#).

9.16.2.2 Car() [2/3]

```
FCFSupport::Car::Car (
    Car & other ) [inline]
```

Copy constructor.

All slots are copied.

Parameters

<i>other</i>	The originating instance.
--------------	---------------------------

References [assignments](#), [destination](#), [divisions](#), [doneP](#), [fixedP](#), [lasttrain](#), [ldlmt](#), [length](#), [loadedP](#), [location](#), [ltwt](#), [marks](#), [mirrorP](#), [moves](#), [number](#), [owner](#), [peek](#), [plate](#), [prevtrain](#), [tmpStatus](#), [trips](#), [type](#), and [weightclass](#).

9.16.2.3 Car() [3/3]

```
FCFSupport::Car::Car (
    char t,
    const char * m,
    const char * n,
    const char * d,
    int l,
    int p,
    int wc,
    int lw,
    int ldw,
    bool lp,
    bool mp,
    bool fp,
    const Owner * own,
    bool dp,
    const Train * lt,
    int mvs,
    Industry * loc,
    Industry * dest,
    int trps,
    int asgns ) [inline]
```

Full constructor.

Fill all slots from the argument list.

Parameters

<i>t</i>	Car type.
<i>m</i>	Reporting marks (railroad).
<i>n</i>	Number.
<i>d</i>	Division symbol list.
<i>l</i>	Length.
<i>p</i>	Plate.
<i>wc</i>	Weight class.
<i>lw</i>	Light (empty) weight.
<i>ldw</i>	Load limit (loaded weight).
<i>lp</i>	Is the car loaded?

Parameters

<i>mp</i>	Can the car be mirrored?
<i>fp</i>	Does it have a fixed route?
<i>own</i>	Car owner.
<i>dp</i>	Is it done moving?
<i>lt</i>	The last train to handle this car.
<i>mvs</i>	The number of times this car has been moved this session.
<i>loc</i>	The car's current location.
<i>dest</i>	The car's destination.
<i>trps</i>	The number of trips this car has made.
<i>asgns</i>	The number of times this car has been assigned.

References [assignments](#), [destination](#), [divisions](#), [doneP](#), [fixedP](#), [lasttrain](#), [ldlmt](#), [length](#), [loadedP](#), [location](#), [ltwt](#), [marks](#), [mirrorP](#), [moves](#), [number](#), [owner](#), [plate](#), [prevtrain](#), [trips](#), [type](#), and [weightclass](#).

9.16.3 Member Function Documentation

9.16.3.1 Assignments()

```
int FCFSupport::Car::Assignments ( ) const [inline]
```

Return the number of assignments this car has had.

References [assignments](#).

9.16.3.2 CarOwner()

```
const Owner * FCFSupport::Car::CarOwner ( ) const [inline]
```

Return the car's owner.

References [owner](#).

9.16.3.3 ClearAssignments()

```
void FCFSupport::Car::ClearAssignments ( ) [inline]
```

Clear the number of assignments this car has had.

References [assignments](#).

9.16.3.4 ClearMovementsThisSession()

```
void FCFSupport::Car::ClearMovementsThisSession ( ) [inline]
```

Clear the number of movements this session.

References [moves](#).

9.16.3.5 ClearTrips()

```
void FCFSupport::Car::ClearTrips ( ) [inline]
```

Clear the number of trips this car has had.

References [trips](#).

9.16.3.6 Destination()

```
Industry * FCFSupport::Car::Destination ( ) const [inline]
```

Return the destination of this car.

References [destination](#).

9.16.3.7 Divisions()

```
const char * FCFSupport::Car::Divisions ( ) const [inline]
```

Return the car's division list.

References [divisions](#).

9.16.3.8 EmptyP()

```
bool FCFSupport::Car::EmptyP ( ) const [inline]
```

Is the car empty?

References [loadedP](#).

9.16.3.9 FixedRouteP()

```
bool FCFSupport::Car::FixedRouteP ( ) const [inline]
```

Is this car on a fixed route?

References [fixedP](#).

9.16.3.10 IncrementAssignments()

```
void FCFSupport::Car::IncrementAssignments ( ) [inline]
```

Increment the number of assignments this car has had.

References [assignments](#).

9.16.3.11 IncrementTrips()

```
void FCFSupport::Car::IncrementTrips ( ) [inline]
```

Increment the number of trips this car has had.

References [trips](#).

9.16.3.12 IncrmentMovementsThisSession()

```
void FCFSupport::Car::IncrmentMovementsThisSession ( ) [inline]
```

Increment the number of movements this session.

References [moves](#).

9.16.3.13 IsDoneP()

```
bool FCFSupport::Car::IsDoneP ( ) const [inline]
```

Is this car done?

References [doneP](#).

9.16.3.14 LastTrain()

```
const Train * FCFSupport::Car::LastTrain ( ) const [inline]
```

Return the last train to move this car.

References [lasttrain](#).

9.16.3.15 LdLmt()

```
int FCFSupport::Car::LdLmt ( ) const [inline]
```

Return the car's load limit.

References [ldlmt](#).

9.16.3.16 Length()

```
int FCFSupport::Car::Length ( ) const [inline]
```

Return the car's length.

References [length](#).

9.16.3.17 Load()

```
void FCFSupport::Car::Load ( ) [inline]
```

Load the car.

References [loadedP](#).

9.16.3.18 LoadedP()

```
bool FCFSupport::Car::LoadedP ( ) const [inline]
```

Is the car loaded?

References [loadedP](#).

9.16.3.19 Location()

```
Industry * FCFSupport::Car::Location ( ) const [inline]
```

Return the location of this car.

References [location](#).

9.16.3.20 LtWt()

```
int FCFSupport::Car::LtWt ( ) const [inline]
```

Return the car's empty weight.

References [ltwt](#).

9.16.3.21 Marks()

```
const char * FCFSupport::Car::Marks ( ) const [inline]
```

Return the car's reporting marks (railroad).

References [marks](#).

9.16.3.22 MovementsThisSession()

```
int FCFSupport::Car::MovementsThisSession ( ) const [inline]
```

Return the number of movements this session.

References [moves](#).

9.16.3.23 Number()

```
const char * FCFSupport::Car::Number ( ) const [inline]
```

Return the car's number.

References [number](#).

9.16.3.24 OkToMirrorP()

```
bool FCFSupport::Car::OkToMirrorP ( ) const [inline]
```

Is it OK to mirror this car?

References [mirrorP](#).

9.16.3.25 operator=()

```
Car & FCFSupport::Car::operator= (
    Car & other ) [inline]
```

Assignment operator.

All slots are copied.

Parameters

<i>other</i>	The right hand operand.
--------------	-------------------------

References [assignments](#), [destination](#), [divisions](#), [doneP](#), [fixedP](#), [lasttrain](#), [ldlmt](#), [length](#), [loadedP](#), [location](#), [ltwt](#), [marks](#), [mirrorP](#), [moves](#), [number](#), [owner](#), [peek](#), [plate](#), [prevtrain](#), [tmpStatus](#), [trips](#), [type](#), and [weightclass](#).

9.16.3.26 Peek()

```
bool FCFSupport::Car::Peek ( ) const [inline]
```

Return the peek flag.

References [peek](#).

9.16.3.27 Plate()

```
int FCFSupport::Car::Plate ( ) const [inline]
```

Return the car's clearance plate.

References [plate](#).

9.16.3.28 PrevTrain()

```
const Train * FCFSupport::Car::PrevTrain ( ) const [inline]
```

Return the previous train to move this car.

References [prevtrain](#).

9.16.3.29 SetAssignments()

```
void FCFSupport::Car::SetAssignments (
    int a ) [inline]
```

Set the number of assignments this car has had.

References [assignments](#).

9.16.3.30 SetCarOwner()

```
void FCFSupport::Car::SetCarOwner (
    const Owner * o ) [inline]
```

Set the car's owner.

References [owner](#).

9.16.3.31 SetDestination()

```
void FCFSupport::Car::SetDestination (
    Industry * newdest ) [inline]
```

Set the destination of this car.

References [destination](#).

9.16.3.32 SetDivisions()

```
void FCFSupport::Car::SetDivisions (
    string d ) [inline]
```

Set the car's division list.

References [divisions](#).

9.16.3.33 SetDone()

```
void FCFSupport::Car::SetDone ( ) [inline]
```

Flag this car as done.

References [doneP](#).

9.16.3.34 SetFixedRouteP()

```
void FCFSupport::Car::SetFixedRouteP (
    bool f ) [inline]
```

Set whether this car is on a fixed route.

References [fixedP](#).

9.16.3.35 SetLastTrain()

```
void FCFSupport::Car::SetLastTrain (
    const Train * lt ) [inline]
```

Set the last train to move this car.

References [lasttrain](#).

9.16.3.36 SetLdLmt()

```
void FCFSupport::Car::SetLdLmt (
    int ldw ) [inline]
```

Set the car's load limit.

References [ldlmt](#).

9.16.3.37 SetLength()

```
void FCFSupport::Car::SetLength (
    int l ) [inline]
```

Set the car's length.

References [length](#).

9.16.3.38 SetLocation()

```
void FCFSupport::Car::SetLocation (
    Industry * newloc ) [inline]
```

Set the location of this car.

References [location](#).

9.16.3.39 SetLtWt()

```
void FCFSupport::Car::SetLtWt (
    int lw ) [inline]
```

Set the car's empty weight.

References [ltwt](#).

9.16.3.40 SetMarks()

```
void FCFSupport::Car::SetMarks (
    string m ) [inline]
```

Set the car's reporting marks.

References [marks](#).

9.16.3.41 SetNotDone()

```
void FCFSupport::Car::SetNotDone ( ) [inline]
```

Flag this car as not done.

References [doneP](#).

9.16.3.42 SetNumber()

```
void FCFSupport::Car::SetNumber (
    string n ) [inline]
```

Set the car's number.

References [number](#).

9.16.3.43 SetOkToMirrorP()

```
void FCFSupport::Car::SetOkToMirrorP (
    bool m ) [inline]
```

Set this car's mirror status.

References [mirrorP](#).

9.16.3.44 SetPeek()

```
void FCFSupport::Car::SetPeek (
    bool p = false ) [inline]
```

Set or clear the peek flag.

References [peek](#).

9.16.3.45 SetPlate()

```
void FCFSupport::Car::SetPlate (
    int p ) [inline]
```

Set the car's clearance plate.

References [plate](#).

9.16.3.46 SetPrevTrain()

```
void FCFSupport::Car::SetPrevTrain (
    const Train * lt ) [inline]
```

Set the previous train to move this car.

References [prevtrain](#).

9.16.3.47 SetType()

```
void FCFSupport::Car::SetType (
    char t ) [inline]
```

Set the car type.

Parameters

<i>t</i>	The new car type.
----------	-------------------

References [type](#).

9.16.3.48 SetWeightClass()

```
void FCFSupport::Car::SetWeightClass (
    int wc ) [inline]
```

Set the car's weight class.

References [weightclass](#).

9.16.3.49 Trips()

```
int FCFSupport::Car::Trips ( ) const [inline]
```

Return the number of trips this car has had.

References [trips](#).

9.16.3.50 Type()

```
char FCFSupport::Car::Type ( ) const [inline]
```

Return the car type.

References [type](#).

9.16.3.51 UnLoad()

```
void FCFSupport::Car::UnLoad ( ) [inline]
```

Unload the car.

References [loadedP](#).

9.16.3.52 WeightClass()

```
int FCFSupport::Car::WeightClass ( ) const [inline]
```

Return the car's weight class.

References [weightclass](#).

9.16.4 Friends And Related Function Documentation

9.16.4.1 System

```
friend class System [friend]
```

The [System](#) class is a friend.

9.16.5 Member Data Documentation

9.16.5.1 assignments

```
int FCFSupport::Car::assignments [private]
```

The number of assignments this car has had.

Referenced by [Assignments\(\)](#), [Car\(\)](#), [ClearAssignments\(\)](#), [IncrementAssignments\(\)](#), [operator=\(\)](#), and [SetAssignments\(\)](#).

9.16.5.2 destination

```
Industry\* FCFSupport::Car::destination [private]
```

This car's destination.

Referenced by [Car\(\)](#), [Destination\(\)](#), [operator=\(\)](#), and [SetDestination\(\)](#).

9.16.5.3 divisions

```
string FCFSupport::Car::divisions [private]
```

This car's division list.

Referenced by [Car\(\)](#), [Divisions\(\)](#), [operator=\(\)](#), and [SetDivisions\(\)](#).

9.16.5.4 doneP

```
bool FCFSupport::Car::doneP [private]
```

This car's done flag.

Referenced by [Car\(\)](#), [IsDoneP\(\)](#), [operator=\(\)](#), [SetDone\(\)](#), and [SetNotDone\(\)](#).

9.16.5.5 fixedP

```
bool FCFSupport::Car::fixedP [private]
```

This car's fixed route flag.

Referenced by [Car\(\)](#), [FixedRouteP\(\)](#), [operator=\(\)](#), and [SetFixedRouteP\(\)](#).

9.16.5.6 lasttrain

```
const Train* FCFSupport::Car::lasttrain [private]
```

The last train to handle this car.

Referenced by [Car\(\)](#), [LastTrain\(\)](#), [operator=\(\)](#), and [SetLastTrain\(\)](#).

9.16.5.7 ldLmt

```
int FCFSupport::Car::ldLmt [private]
```

This car's loaded weight.

Referenced by [Car\(\)](#), [LdLmt\(\)](#), [operator=\(\)](#), and [SetLdLmt\(\)](#).

9.16.5.8 length

```
int FCFSupport::Car::length [private]
```

This car's length.

Referenced by [Car\(\)](#), [Length\(\)](#), [operator=\(\)](#), and [SetLength\(\)](#).

9.16.5.9 loadedP

```
bool FCFSupport::Car::loadedP [private]
```

This car's loaded flag.

Referenced by [Car\(\)](#), [EmptyP\(\)](#), [Load\(\)](#), [LoadedP\(\)](#), [operator=\(\)](#), and [UnLoad\(\)](#).

9.16.5.10 location

```
Industry* FCFSupport::Car::location [private]
```

This car's location.

Referenced by [Car\(\)](#), [Location\(\)](#), [operator=\(\)](#), and [SetLocation\(\)](#).

9.16.5.11 ltwt

```
int FCFSupport::Car::ltwt [private]
```

This car's empty weight.

Referenced by [Car\(\)](#), [LtWt\(\)](#), [operator=\(\)](#), and [SetLtWt\(\)](#).

9.16.5.12 marks

```
string FCFSupport::Car::marks [private]
```

This car's reporting marks.

Referenced by [Car\(\)](#), [Marks\(\)](#), [operator=\(\)](#), and [SetMarks\(\)](#).

9.16.5.13 mirrorP

```
bool FCFSupport::Car::mirrorP [private]
```

This car's mirror flag.

Referenced by [Car\(\)](#), [OkToMirrorP\(\)](#), [operator=\(\)](#), and [SetOkToMirrorP\(\)](#).

9.16.5.14 moves

```
int FCFSupport::Car::moves [private]
```

The number of moves this car has made.

Referenced by [Car\(\)](#), [ClearMovementsThisSession\(\)](#), [IncrmentMovementsThisSession\(\)](#), [MovementsThisSession\(\)](#), and [operator=\(\)](#).

9.16.5.15 number

```
string FCFSupport::Car::number [private]
```

This car's number.

Referenced by [Car\(\)](#), [Number\(\)](#), [operator=\(\)](#), and [SetNumber\(\)](#).

9.16.5.16 owner

```
const Owner* FCFSupport::Car::owner [private]
```

The owner of this car.

Referenced by [Car\(\)](#), [CarOwner\(\)](#), [operator=\(\)](#), and [SetCarOwner\(\)](#).

9.16.5.17 peek

```
bool FCFSupport::Car::peek [private]
```

This car's peel flak.

Referenced by [Car\(\)](#), [operator=\(\)](#), [Peek\(\)](#), and [SetPeek\(\)](#).

9.16.5.18 plate

```
int FCFSupport::Car::plate [private]
```

This car's clearance plate.

Referenced by [Car\(\)](#), [operator=\(\)](#), [Plate\(\)](#), and [SetPlate\(\)](#).

9.16.5.19 prevtrain

```
const Train\* FCFSupport::Car::prevtrain [private]
```

The previous train to handle this car.

Referenced by [Car\(\)](#), [operator=\(\)](#), [PrevTrain\(\)](#), and [SetPrevTrain\(\)](#).

9.16.5.20 tmpStatus

```
bool FCFSupport::Car::tmpStatus [private]
```

Temp status flag.

Referenced by [Car\(\)](#), and [operator=\(\)](#).

9.16.5.21 trips

```
int FCFSupport::Car::trips [private]
```

The number of trips this car has made.

Referenced by [Car\(\)](#), [ClearTrips\(\)](#), [IncrementTrips\(\)](#), [operator=\(\)](#), and [Trips\(\)](#).

9.16.5.22 type

```
char FCFSupport::Car::type [private]
```

This car's type.

Referenced by [Car\(\)](#), [operator=\(\)](#), [SetType\(\)](#), and [Type\(\)](#).

9.16.5.23 weightclass

```
int FCFSupport::Car::weightclass [private]
```

This car's weight class.

Referenced by [Car\(\)](#), [operator=\(\)](#), [SetWeightClass\(\)](#), and [WeightClass\(\)](#).

9.17 FCFSupport::CarGroup Class Reference

Car group class.

```
#include <CarType.h>
```

Public Types

- enum [CarGroupConsts](#) { [MaxCarGroup](#) = 16 }
Car group constants.

Public Member Functions

- [CarGroup](#) ()
Default constructor.
- [CarGroup](#) ([CarGroup](#) &other)
Copy constructor.
- [CarGroup](#) & [operator=](#) ([CarGroup](#) &other)
Assignment operator.
- [CarGroup](#) (char g, const char *d)
Full constructor.
- char [Group](#) () const
Return the group code.
- const char * [Description](#) () const
Return the description string.

Private Attributes

- string [description](#)
The description string.
- char [group](#)
The car group code.

9.17.1 Detailed Description

Car group class.

Not presently used.

```
@author Robert Heller \<heller\@deepsoft.com\>
```

9.17.2 Member Enumeration Documentation

9.17.2.1 CarGroupConsts

```
enum FCFSupport::CarGroup::CarGroupConsts
```

Car group constants.

Enumerator

MaxCarGroup	The maximum number of car groups.
-------------	-----------------------------------

9.17.3 Constructor & Destructor Documentation

9.17.3.1 CarGroup() [1/3]

```
FCFSupport::CarGroup::CarGroup ( ) [inline]
```

Default constructor.

Initialize all slots to me empty.

References [description](#), and [group](#).

9.17.3.2 CarGroup() [2/3]

```
FCFSupport::CarGroup::CarGroup (
    CarGroup & other ) [inline]
```

Copy constructor.

Create a car group that is a clone of another.

Parameters

<i>other</i>	The other car group instance.
--------------	-------------------------------

References [description](#), and [group](#).

9.17.3.3 CarGroup() [3/3]

```
FCFSupport::CarGroup::CarGroup (
    char g,
    const char * d ) [inline]
```

Full constructor.

Parameters

<i>g</i>	Car group character code.
<i>d</i>	Description of this car group.

References [description](#), and [group](#).

9.17.4 Member Function Documentation

9.17.4.1 Description()

```
const char * FCFSupport::CarGroup::Description ( ) const [inline]
```

Return the description string.

References [description](#).

9.17.4.2 Group()

```
char FCFSupport::CarGroup::Group ( ) const [inline]
```

Return the group code.

References [group](#).

9.17.4.3 operator=()

```
CarGroup & FCFSupport::CarGroup::operator= (   
    CarGroup & other ) [inline]
```

Assignment operator.

Create a car group that is a clone of another.

Parameters

<i>other</i>	The other car group instance.
--------------	-------------------------------

References [description](#), and [group](#).

9.17.5 Member Data Documentation

9.17.5.1 description

```
string FCFSupport::CarGroup::description [private]
```

The description string.

Referenced by [CarGroup\(\)](#), [Description\(\)](#), and [operator=\(\)](#).

9.17.5.2 group

```
char FCFSupport::CarGroup::group [private]
```

The car group code.

Referenced by [CarGroup\(\)](#), [Group\(\)](#), and [operator=\(\)](#).

9.18 FCFSupport::CarType Class Reference

The [CarType](#) class represents a type of railroad car (rolling stock).

```
#include <CarType.h>
```

Public Types

- enum [CarTypeConsts](#) { [NumberOfCarTypes](#) = 91 , [MaxCarTypes](#) = 128 }

Some specific constants relating to car types.

Public Member Functions

- [CarType](#) ()
Default constructor.
- [CarType](#) ([CarType](#) &other)
Copy constructor.
- [CarType](#) & [operator=](#) ([CarType](#) &other)
Assignment operator.
- [CarType](#) (const char *c, const char *t, char g)
Full constructor.
- [~CarType](#) ()
Destructor.
- const char * [Comment](#) () const
Return the car type's commentary.
- const char * [Type](#) () const
Return the car type name.
- char [Group](#) () const
Return the car type's group code.

Private Attributes

- string [comment](#)
The commentary string.
- string [type](#)
The type name.
- char [group](#)
The group code.

Friends

- class [System](#)
The [System](#) class is a friend.

9.18.1 Detailed Description

The [CarType](#) class represents a type of railroad car (rolling stock).

[Car](#) types are represented as a single printable character and have associated with that printable character is a type name and possibly a short commentary.

[Car](#) types are also collected into groups as well.

@author Robert Heller \<heller\@deepsoft.com\>

9.18.2 Member Enumeration Documentation

9.18.2.1 CarTypeConsts

```
enum FCFSupport::CarType::CarTypeConsts
```

Some specific constants relating to car types.

Enumerator

NumberOfCarTypes	The number of usable car type characters.
MaxCarTypes	The maximum number of car types (based on 7-bit ASCII).

9.18.3 Constructor & Destructor Documentation

9.18.3.1 CarType() [1/3]

```
FCFSupport::CarType::CarType ( ) [inline]
```

Default constructor.

Create a default instance.

References [comment](#), [group](#), and [type](#).

9.18.3.2 CarType() [2/3]

```
FCFSupport::CarType::CarType (
    CarType & other ) [inline]
```

Copy constructor.

Copy a car type from another instance.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [comment](#), [group](#), and [type](#).

9.18.3.3 CarType() [3/3]

```
FCFSupport::CarType::CarType (
    const char * c,
    const char * t,
    char g ) [inline]
```

Full constructor.

Create a fully qualified car type object.

Parameters

<i>c</i>	The name of the car type.
<i>t</i>	The brief commentary about the car type.
<i>g</i>	The car type's group code.

References [comment](#), [group](#), and [type](#).

9.18.3.4 ~CarType()

```
FCFSupport::CarType::~~CarType ( ) [inline]
```

Destructor.

9.18.4 Member Function Documentation

9.18.4.1 Comment()

```
const char * FCFSupport::CarType::Comment ( ) const [inline]
```

Return the car type's commentary.

References [comment](#).

9.18.4.2 Group()

```
char FCFSupport::CarType::Group ( ) const [inline]
```

Return the car type's group code.

References [group](#).

9.18.4.3 operator=()

```
CarType & FCFSupport::CarType::operator= (
    CarType & other ) [inline]
```

Assignment operator.

Copy a car type from another instance.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [comment](#), [group](#), and [type](#).

9.18.4.4 Type()

```
const char * FCFSupport::CarType::Type ( ) const [inline]
```

Return the car type name.

References [type](#).

9.18.5 Friends And Related Function Documentation

9.18.5.1 System

```
friend class System [friend]
```

The [System](#) class is a friend.

9.18.6 Member Data Documentation

9.18.6.1 comment

```
string FCFSupport::CarType::comment [private]
```

The commentary string.

Referenced by [CarType\(\)](#), [Comment\(\)](#), and [operator=\(\)](#).

9.18.6.2 group

```
char FCFSupport::CarType::group [private]
```

The group code.

Referenced by [CarType\(\)](#), [Group\(\)](#), and [operator=\(\)](#).

9.18.6.3 type

```
string FCFSupport::CarType::type [private]
```

The type name.

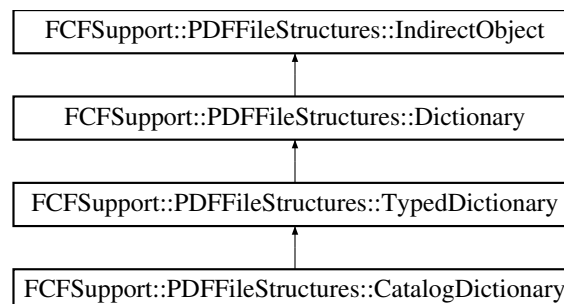
Referenced by [CarType\(\)](#), [operator=\(\)](#), and [Type\(\)](#).

9.19 FCFSupport::PDFFileStructures::CatalogDictionary Class Reference

Master catalog of the PDF file.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::CatalogDictionary:



Public Member Functions

- [CatalogDictionary](#) (unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~CatalogDictionary](#) ()
Destructor.
- void [AddPage](#) ([Page](#) *thepage)
Add a page.
- void [AddPageTree](#) ([PageTree](#) *thepagetree)
Add a tree of pages.
- void [AddPageLabelTree](#) ([PageLabelTree](#) *node)
Add a page label tree node.
- void [AddPageLabelDictionary](#) (int number, [PageLabelDictionary](#) *pld)
Add a page label dictionary.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const
Write an object directly.

Private Attributes

- [PageTree](#) * [pages](#)
Pages.
- [PageLabelTree](#) * [labels](#)
Page labels.

9.19.1 Detailed Description

Master catalog of the PDF file.

Author

Robert Heller <heller@deepsoft.com>

9.19.2 Constructor & Destructor Documentation

9.19.2.1 CatalogDictionary()

```
FCFSSupport::PDFFileStructures::CatalogDictionary::CatalogDictionary (
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Parameters

<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [labels](#), and [pages](#).

9.19.2.2 ~CatalogDictionary()

```
FCFSupport::PDFFileStructures::CatalogDictionary::~~CatalogDictionary ( ) [inline]
```

Destructor.

9.19.3 Member Function Documentation

9.19.3.1 AddPage()

```
void FCFSupport::PDFFileStructures::CatalogDictionary::AddPage (
    Page * thepage ) [inline]
```

Add a page.

Parameters

<i>thepage</i>	The page to add.
----------------	------------------

References [FCFSupport::PDFFileStructures::PageTree::AddPage\(\)](#), and [pages](#).

9.19.3.2 AddPageLabelDictionary()

```
void FCFSupport::PDFFileStructures::CatalogDictionary::AddPageLabelDictionary (
    int number,
    PageLabelDictionary * pld ) [inline]
```

Add a page label dictionary.

Parameters

<i>number</i>	The page label dictionary start page number.
<i>pld</i>	Page label dictionary pointer.

References [FCFSupport::PDFFileStructures::PageLabelTree::AddPageLabelDictionary\(\)](#), and [labels](#).

9.19.3.3 AddPageLabelTree()

```
void FCFSupport::PDFFileStructures::CatalogDictionary::AddPageLabelTree (
    PageLabelTree * node ) [inline]
```

Add a page label tree node.

Parameters

<i>node</i>	The page label tree node.
-------------	---------------------------

References [FCFSupport::PDFFileStructures::PageLabelTree::AddPageLabelTree\(\)](#), and [labels](#).

9.19.3.4 AddPageTree()

```
void FCFSupport::PDFFileStructures::CatalogDictionary::AddPageTree (
    PageTree * thepagetree ) [inline]
```

Add a tree of pages.

Parameters

<i>thepagetree</i>	The page tree to add.
--------------------	-----------------------

References [FCFSupport::PDFFileStructures::PageTree::AddPageTree\(\)](#), and [pages](#).

9.19.3.5 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::CatalogDictionary::WriteDictionaryElements (
    ostream & stream ) const [protected], [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::TypedDictionary](#).

9.19.4 Member Data Documentation

9.19.4.1 labels

[PageLabelTree](#)* [FCFSupport::PDFFileStructures::CatalogDictionary::labels](#) [private]

[Page](#) labels.

Referenced by [AddPageLabelDictionary\(\)](#), [AddPageLabelTree\(\)](#), and [CatalogDictionary\(\)](#).

9.19.4.2 pages

[PageTree](#)* [FCFSupport::PDFFileStructures::CatalogDictionary::pages](#) [private]

Pages.

Referenced by [AddPage\(\)](#), [AddPageTree\(\)](#), and [CatalogDictionary\(\)](#).

9.20 cmri::CMri Class Reference

Main C/MRI interface class.

Public Member Functions

- [CMri](#) (name, port,...)
Constructor.
- [~CMri](#) ()
The destructor restores the serial port's state and closes it.
- [Inputs](#) (ni, ua=0)
The [Inputs\(\)](#) function polls the interface and collects the input port values returned by the serial card.
- [Outputs](#) (ports, ua=0)
The [Outputs\(\)](#) function sends bytes to the output ports managed by the specified card.
- [InitBoard](#) (CT, ni, no, ns, ua, card, dl)
The [InitBoard\(\)](#) function initializes a given USIC, SUSIC, or SMINI card.

Private Member Functions

- [_transmit](#) (ua, mt, ob)
Data transmitter.
- [_readevent](#) ()
Read event method.
- [_readbyte](#) (thebytevar)
Read a single byte from the serial interface.

Private Attributes

- [ttyfd](#)
Terminal file descriptor.
- [_timeout](#)
Timeout flag.

Static Private Attributes

- static [CardType_Byte](#)
Array of CardType code bytes.
- static [STX](#)
Start of Text.
- static [ETX](#)
End of text.
- static [DLE](#)
Data Link Escape.
- static [AddressCode](#)
Address code.
- static [Init](#)
Initialize message.
- static [Transmit](#)
Transmit message.
- static [Poll](#)
Poll message.
- static [Read](#)
Read message.

9.20.1 Detailed Description

Main C/MRI interface class.

This class implements the interface logic for all of the boards on a given serial bus, attached to a given serial (COM) port. This class effectively implements in Tcl what the QBasic serial I/O subroutines implemented by Bruce Chubb implement under MS-Windows.

The constructor opens the serial port and does low-level serial I/O setup (BAUD rate, etc.). This is the first part of the INIT subroutine.

The [InitBoard\(\)](#) member function initializes a selected board (the second part of the INIT subroutine) and the [Inputs\(\)](#) and [Output\(\)](#) member functions correspond to the INPUTS and OUTPUTS subroutines.

The private members, [_transmit\(\)](#) and [_readbyte\(\)](#) correspond to the TXPACK and RXBYTE subroutines.

Parameters

<i>port</i>	Name of the serial port connected to the Chubb RS485 bus.
...	Options: <ul style="list-style-type: none">• -baud Data rate, readonly, defaults to 9600, can be one of 9600, 19200, 28800, 57600, or 115200.• -maxtries The maximum number of tries when reading the bus. It is readonly and defaults to 10000. Must be an integer between 1000 and 100000.

Author

Robert Heller <heller@deepsoft.com>

9.20.2 Constructor & Destructor Documentation

9.20.2.1 CMri()

```
cmri::CMri::CMri (  
    name ,  
    port ,  
    ... )
```

Constructor.

Parameters

<i>port</i>	Name of the serial port connected to the Chubb RS485 bus.
...	Options: <ul style="list-style-type: none">• -baud Data rate, readonly, defaults to 9600, can be one of 9600, 19200, 28800, 57600, or 115200.• -maxtries The maximum number of tries when reading the bus. It is readonly and defaults to 10000. Must be an integer between 1000 and 100000.

9.20.2.2 ~CMri()

```
cmri::CMri::~~CMri ( )
```

The destructor restores the serial port's state and closes it.

9.20.3 Member Function Documentation

9.20.3.1 _readbyte()

```
cmri::CMri::_readbyte (
    thebytevar ) [private]
```

Read a single byte from the serial interface.

Used by the [Inputs\(\)](#) function. Returns false on error and true on success.

Parameters

<i>thabytevar</i>	A name of a variable to put the byte read. Undefined if there was an error.
-------------------	--

References [gettext::_\(\)](#), and [i](#).

9.20.3.2 _readevent()

```
cmri::CMri::_readevent ( ) [private]
```

Read event method.

9.20.3.3 _transmit()

```
cmri::CMri::_transmit (
    ua ,
    mt ,
    ob ) [private]
```

Data transmitter.

The data is built into a proper message and sent out the serial port to the selected card. Returns false on error and true on success.

Parameters

<i>ua</i>	The card address.
<i>mt</i>	The message type.
<i>ob</i>	The data buffer (not used for Poll messages).

9.20.3.4 InitBoard()

```
cmri::CMri::InitBoard (
    CT ,
    ni ,
    no ,
    ns ,
    ua ,
    card ,
    dl )
```

The [InitBoard\(\)](#) function initializes a given USIC, SUSIC, or SMINI card.

Parameters

<i>CT</i>	The card type / yellow bi-color LED map. For USIC and SUSIC cards this is the card type map. For the SMINI card this is a 6 element list containing the port pairs for any simulated yellow bi-color LEDs.
-----------	--

The card type map for USIC and SUSIC is a packed array of 2-bit values, packed 4 per element (byte) from low to high. Each 2-bit value is one of 0 (for no card), 1 (for an input card), or 2 (for an output card). The cards must be "packed" with no open slots except at the end of the bus.

For the simulated yellow LEDs (SMINI card) the paired bits must be adjacent red/green bits and cannot span ports.

Parameters

<i>ni</i>	The total number of input ports (must be 3 for SMINI).
<i>no</i>	The total number of output ports (must be 6 or SMINI).
<i>ns</i>	The number of yellow bi-color LED signals. Only used for SMINI cards. For USIC and SUSIC cards the Length() member function of the CT parameter is used.
<i>ua</i>	The card address.
<i>card</i>	The card type.
<i>dl</i>	The delay value to use.

9.20.3.5 Inputs()

```
cmri::CMri::Inputs (
```

```
ni ,  
ua = 0 )
```

The [Inputs\(\)](#) function polls the interface and collects the input port values returned by the serial card.

The result is a freshly allocated List object. The calling program should free this memory with `delete()`.

[Inputs\(\)](#) returns a NULL pointer if there was an error.

Parameters

<i>ni</i>	The number of input ports to be read. Must equal the number of ports on the specified card.
<i>ua</i>	The card address.

9.20.3.6 Outputs()

```
cmri::CMri::Outputs (  
    ports ,  
    ua = 0 )
```

The [Outputs\(\)](#) function sends bytes to the output ports managed by the specified card.

Since each element is written to one 8-bit output port, each element is presumed to be a integer in the range of 0 to 255.

Parameters

<i>ports</i>	The list of port values. Should have as many elements as there are output ports.
<i>ua</i>	The card address.

9.20.4 Member Data Documentation

9.20.4.1 _timeout

```
cmri::CMri::_timeout [private]
```

Timeout flag.

9.20.4.2 AddressCode

```
cmri::CMri::AddressCode [static], [private]
```

Address code.

9.20.4.3 CardType_Byte

```
cmri::CMri::CardType_Byte [static], [private]
```

Array of CardType code bytes.

9.20.4.4 DLE

```
cmri::CMri::DLE [static], [private]
```

Data Link Escape.

Used to escape special codes.

9.20.4.5 ETX

```
cmri::CMri::ETX [static], [private]
```

End of text.

Used at the end of message blocks.

9.20.4.6 Init

```
cmri::CMri::Init [static], [private]
```

Initialize message.

Initialize a serial interface board.

9.20.4.7 Poll

```
cmri::CMri::Poll [static], [private]
```

Poll message.

Request the board to read its input ports.

9.20.4.8 Read

```
cmri::CMri::Read [static], [private]
```

Read message.

Generated by a board in response to a Poll message.

9.20.4.9 STX

```
cmri::CMri::STX [static], [private]
```

Start of Text.

Used at the start of message blocks.

9.20.4.10 Transmit

```
cmri::CMri::Transmit [static], [private]
```

Transmit message.

Send data to output ports.

9.20.4.11 ttyfd

```
cmri::CMri::ttyfd [private]
```

Terminal file descriptor.

9.21 CmriSupport::CmriNode Class Reference

CMR/I node type.

Public Member Functions

- [CmriNode](#) (name,...)
Constructor – initialize a board.
- [inputs](#) ()
Method to fetch input port values.
- [outputs](#) (portvector="")
Method to set output ports.
- [setport](#) (portnum, byte)
Set and send one byte to a port (rewrites all ports).
- [setbitfield](#) (portnum, mask, bits)
Set and send a bitfield to a port (rewrites all ports).

Static Public Member Functions

- static [validate](#) (object)
Type validating code Raises an error if object is not either the empty string or a C4TSMINI_Block type.
- static [openport](#) (port="/dev/ttyS0", baud=9600, maxtries=10000)
Open the CMR/I port.
- static [closeport](#) ()
Close the CMR/I port.
- static [portopenp](#) ()
Return port status.

Public Attributes

- [outputbuffer](#)
Output buffer.

Private Member Functions

- [_ValidateType](#) (option, value)
Method to validate the card type.
- [_ValidateAddress](#) (option, value)
Method to validate a card address.
- [_ValidateListOfBytes](#) (option, value)
Method to validate a list of bytes.
- [_ValidateSixElementListOfBytes](#) (option, value)
Method to validate a six element list of bytes.
- [_ValidateByte](#) (option, value)
Method to validate a byte value.
- [_ValidateWord](#) (option, value)
Method to validate a word (16-bit) value.

Static Private Attributes

- static [_TypeCodes](#)
Node type codes.

9.21.1 Detailed Description

CMR/I node type.

This Snit type defines CMR/I nodes (SUSIC, USIC, or SMINI boards) on a CMR/I network. All options are readonly.

Author

Robert Heller <heller@deepsoft.com>

9.21.2 Constructor & Destructor Documentation

9.21.2.1 CmriNode()

```
CmriSupport::CmriNode::CmriNode (
    name ,
    ... )
```

Constructor – initialize a board.

Parameters

<i>name</i>	Name of the node.
...	Options: <ul style="list-style-type: none"> • -type The type of node, one of SUSIC, USIC, or SMINI. No default value. • -address The address of the node. Default is 0. • -cardmap The card type map. Only used with SUSIC and USIC. Default is {}. • -yellowmap The yellow bi-color LED map. Only used with the SMINI card type. Default is {0 0 0 0 0 0}. • -numberofyellow The number of yellow bi-color LED signals. Only for SMINI cards. Default is 0. • -inputports The number of 8-bit input ports. Default 0 (3 for SMINI cards). • -outputports The number of 8-bit output ports. Default 0 (6 for SMINI cards). • -delay The delay value to use. Only meaningful for older (USIC) cards. Default is 0.

9.21.3 Member Function Documentation

9.21.3.1 _ValidateAddress()

```
CmriSupport::CmriNode::_ValidateAddress (
    option ,
    value ) [private]
```

Method to validate a card address.

Parameters

<i>option</i>	The option to validate.
<i>value</i>	The value to validate.

9.21.3.2 _ValidateByte()

```
CmriSupport::CmriNode::_ValidateByte (
    option ,
    value ) [private]
```

Method to validate a byte value.

Parameters

<i>option</i>	The option to validate.
<i>value</i>	The value to validate.

9.21.3.3 _ValidateListOfBytes()

```
CmriSupport::CmriNode::_ValidateListOfBytes (
    option ,
    value ) [private]
```

Method to validate a list of bytes.

Parameters

<i>option</i>	The option to validate.
<i>value</i>	The value to validate.

9.21.3.4 _ValidateSixElementListOfBytes()

```
CmriSupport::CmriNode::_ValidateSixElementListOfBytes (
    option ,
    value ) [private]
```

Method to validate a six element list of bytes.

Parameters

<i>option</i>	The option to validate.
<i>value</i>	The value to validate.

9.21.3.5 _ValidateType()

```

CmriSupport::CmriNode::_ValidateType (
    option ,
    value ) [private]

```

Method to validate the card type.

Parameters

<i>option</i>	The option to validate.
<i>value</i>	The value to validate.

9.21.3.6 _ValidateWord()

```

CmriSupport::CmriNode::_ValidateWord (
    option ,
    value ) [private]

```

Method to validate a word (16-bit) value.

Parameters

<i>option</i>	The option to validate.
<i>value</i>	The value to validate.

9.21.3.7 closeport()

```

static CmriSupport::CmriNode::closeport ( ) [static]

```

Close the CMR/I port.

This type method closes the CMR/I port.

9.21.3.8 inputs()

```
CmriSupport::CmriNode::inputs ( )
```

Method to fetch input port values.

9.21.3.9 openport()

```
static CmriSupport::CmriNode::openport (
    port   = "/dev/ttyS0",
    baud   = 9600,
    maxtries = 10000 ) [static]
```

Open the CMR/I port.

This type method opens the CMR/I port.

Parameters

<i>port</i>	The serial port connected to the CMR/I network.
<i>baud</i>	The BAUD rate to be used.
<i>maxtries</i>	The maximum number of retries.

9.21.3.10 outputs()

```
CmriSupport::CmriNode::outputs (
    portvector = "" )
```

Method to set output ports.

Parameters

<i>portvector</i>	Vector of output ports.
-------------------	-------------------------

9.21.3.11 portopenp()

```
static CmriSupport::CmriNode::portopenp ( ) [static]
```

Return port status.

9.21.3.12 setbitfield()

```
CmriSupport::CmriNode::setbitfield (
    portnum ,
    mask ,
    bits )
```

Set and send a bitfield to a port (rewrites all ports).

Parameters

<i>portnum</i>	Number of the output port.
<i>mask</i>	Bit mask.
<i>bits</i>	Bits (must already shifted into position!).

9.21.3.13 setport()

```
CmriSupport::CmriNode::setport (
    portnum ,
    byte )
```

Set and send one byte to a port (rewrites all ports).

Parameters

<i>portnum</i>	Number of the output port.
<i>byte</i>	Value to write.

9.21.3.14 validate()

```
static CmriSupport::CmriNode::validate (
    object ) [static]
```

Type validating code Raises an error if object is not either the empty string or a C4TSMINI_Block type.

9.21.4 Member Data Documentation

9.21.4.1 _TypeCodes

`CmriSupport::CmriNode::_TypeCodes` [static], [private]

Node type codes.

9.21.4.2 outputbuffer

`CmriSupport::CmriNode::outputbuffer`

Output buffer.

9.22 CTCPanel::CodeButton Class Reference

Code button object type.

Public Member Functions

- [CodeButton](#) (name, _ctcpanel, _canvas,...)
Construct a Code Button object.
- [~CodeButton](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (none).
- [setv](#) (state)
Method to set our value (none).
- [geti](#) (ind)
Method to get an indicator state (none).
- [seti](#) (ind, value)
Method to set an indicator state (none).
- [invoke](#) ()
Method to invoke the code button.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

9.22.1 Detailed Description

Code button object type.

These are on the control panel and represent buttons that enact the settings of the SWPlates and SIGPlates for a given control point.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the switch plate on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The x coordinate of the object (readonly, default 0). • <code>-y</code> The y coordinate of the object (readonly, default 0). • <code>-controlpoint</code> The name of the control point this switch is part of (readonly, default CP1). • <code>-command</code> The Tcl script to run when the code button is invoked.

Defined coords terminals: none. Defined values (states): none. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.22.2 Constructor & Destructor Documentation

9.22.2.1 CodeButton()

```
CTCPanel::CodeButton::CodeButton (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a Code Button object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the Code Button on.
<code>...</code>	Option list.

9.22.2.2 ~CodeButton()

```
CTCPanel::CodeButton::~~CodeButton ( )
```


Clean up all data objects and free up all resources.

9.22.3 Member Function Documentation

9.22.3.1 geti()

```
CTCPanel::CodeButton::geti (
    ind )
```

Method to get an indicator state (none).

9.22.3.2 getv()

```
CTCPanel::CodeButton::getv ( )
```

Method to get our value (none).

9.22.3.3 invoke()

```
CTCPanel::CodeButton::invoke ( )
```

Method to invoke the code button.

The command script is executed.

9.22.3.4 seti()

```
CTCPanel::CodeButton::seti (
    ind ,
    value )
```

Method to set an indicator state (none).

9.22.3.5 setv()

```
CTCPanel::CodeButton::setv (  
    state )
```

Method to set our value (none).

9.22.4 Member Data Documentation

9.22.4.1 canvas

```
CTCPanel::CodeButton::canvas [private]
```

The canvas component (parent widget component).

9.22.4.2 ctcpnl

```
CTCPanel::CodeButton::ctcpnl [private]
```

The CTC Panel component (parent widget).

9.23 xpressnet::CommandStationResponse Class Reference

General response class.

Public Member Functions

- [TimeStamp](#) ()
Return the time stamp of the response.
- [ResponseType](#) ()
Return the response type.
- [CommandStationResponse](#) (name,...)
Constructor.

Private Attributes

- [_time_stamp](#)
Holds the time stamp of the response.

9.23.1 Detailed Description

General response class.

All responses are delegated from this class, via a component element.

Parameters

<i>-responsetype</i>	This readonly option contains the response type and determines the type of object installed in the actual response component.
----------------------	---

Additional parameters are passed to the actual response constructors.

Author

Robert Heller <heller@deepsoft.com>

9.23.2 Constructor & Destructor Documentation

9.23.2.1 CommandStationResponse()

```
xpressnet::CommandStationResponse::CommandStationResponse (
    name ,
    ... )
```

Constructor.

Construct a response object. The actual response is installed as a component of this object.

Parameters

<i>-responsetype</i>	This readonly option contains the response type and determines the type of object installed in the actual response component.
----------------------	---

Additional parameters are passed to the actual response constructors.

9.23.3 Member Function Documentation

9.23.3.1 ResponseType()

```
xpressnet::CommandStationResponse::ResponseType ( )
```

Return the response type.

9.23.3.2 TimeStamp()

```
xpressnet::CommandStationResponse::TimeStamp ( )
```

Return the time stamp of the response.

9.23.4 Member Data Documentation

9.23.4.1 _time_stamp

```
xpressnet::CommandStationResponse::_time_stamp [private]
```

Holds the time stamp of the response.

9.24 xpressnet::CommandStationStatus Class Reference

Command station status.

Public Member Functions

- [CommandStationStatus](#) (name, statusbyte)
Constructor.
- [EmergencyOff](#) ()
Return emergency off flag.
- [EmergencyStop](#) ()
Return emergency stop flag.
- [StartMode](#) ()
Return start mode.
- [ServiceMode](#) ()
Return service mode.
- [PoweringUp](#) ()
Return powering up flag.
- [RAMCheckError](#) ()
Return RAM check error flag.

Private Attributes

- [_emergency_off](#)
Emergency off flag.
- [_emergency_stop](#)
Emergency stop flag.
- [_start_mode](#)
Start mode.
- [_service_mode](#)
Service mode flag.
- [_poweringup](#)
Powering up flag.
- [_RAM_check_error](#)
RAM check error flag.

9.24.1 Detailed Description

Command station status.

Author

Robert Heller <heller@deepsoft.com>

9.24.2 Constructor & Destructor Documentation

9.24.2.1 CommandStationStatus()

```
xpressnet::CommandStationStatus::CommandStationStatus (
    name ,
    statusbyte )
```

Constructor.

Parameters

<i>statusbyte</i>	Status byte.
-------------------	--------------

9.24.3 Member Function Documentation

9.24.3.1 EmergencyOff()

```
xpressnet::CommandStationStatus::EmergencyOff ( )
```

Return emergency off flag.

9.24.3.2 EmergencyStop()

```
xpressnet::CommandStationStatus::EmergencyStop ( )
```

Return emergency stop flag.

9.24.3.3 PoweringUp()

```
xpressnet::CommandStationStatus::PoweringUp ( )
```

Return powering up flag.

9.24.3.4 RAMCheckError()

```
xpressnet::CommandStationStatus::RAMCheckError ( )
```

Return RAM check error flag.

9.24.3.5 ServiceMode()

```
xpressnet::CommandStationStatus::ServiceMode ( )
```

Return service mode.

9.24.3.6 StartMode()

```
xpressnet::CommandStationStatus::StartMode ( )
```

Return start mode.

9.24.4 Member Data Documentation

9.24.4.1 `_emergency_off`

`xpressnet::CommandStationStatus::_emergency_off` [private]

Emergency off flag.

9.24.4.2 `_emergency_stop`

`xpressnet::CommandStationStatus::_emergency_stop` [private]

Emergency stop flag.

9.24.4.3 `_poweringup`

`xpressnet::CommandStationStatus::_poweringup` [private]

Powering up flag.

9.24.4.4 `_RAM_check_error`

`xpressnet::CommandStationStatus::_RAM_check_error` [private]

RAM check error flag.

9.24.4.5 `_service_mode`

`xpressnet::CommandStationStatus::_service_mode` [private]

Service mode flag.

9.24.4.6 `_start_mode`

```
xpressnet::CommandStationStatus::_start_mode [private]
```

Start mode.

9.25 `Parsers::TrackGraph::CompressedEdgeValues` Struct Reference

Compressed graph edge values.

Public Member Functions

- [CompressedEdgeValues](#) (float `_length`=0.0)
Default constructor.

Public Attributes

- float [length](#)
Track length from opposite edge.

9.25.1 Detailed Description

Compressed graph edge values.

9.25.2 Constructor & Destructor Documentation

9.25.2.1 `CompressedEdgeValues()`

```
Parsers::TrackGraph::CompressedEdgeValues::CompressedEdgeValues (
    float _length = 0.0 ) [inline]
```

Default constructor.

References [length](#).

9.25.3 Member Data Documentation

9.25.3.1 length

```
float Parsers::TrackGraph::CompressedEdgeValues::length
```

Track length from opposite edge.

Author

Robert Heller <heller@deepsoft.com>

Referenced by [CompressedEdgeValues\(\)](#).

9.26 Parsers::TrackGraph::CompressedNodeValues Struct Reference

Compressed graph node values.

Public Member Functions

- `std::list< int >::size_type` [FindSegmentIndex](#) (int segment) const
Return the segment index for a given segment.
- [CompressedNodeValues](#) (int _id=-1)
Default constructor.

Public Attributes

- int [id](#)
Node number.
- [Node rawnode](#)
Uncompressed head node for this compressed node.
- [Point position](#)
Node's graphical position.
- `std::list< int >` [segments](#)
List of uncompressed node ids.

9.26.1 Detailed Description

Compressed graph node values.

Author

Robert Heller <heller@deepsoft.com>

9.26.2 Constructor & Destructor Documentation

9.26.2.1 CompressedNodeValues()

```
Parsers::TrackGraph::CompressedNodeValues::CompressedNodeValues (
    int _id = -1 ) [inline]
```

Default constructor.

References [position](#), [Parsers::TrackGraph::Point::x](#), and [Parsers::TrackGraph::Point::y](#).

9.26.3 Member Function Documentation

9.26.3.1 FindSegmentIndex()

```
std::list< int >::size_type Parsers::TrackGraph::CompressedNodeValues::FindSegmentIndex (
    int segment ) const [inline]
```

Return the segment index for a given segment.

References [segments](#).

9.26.4 Member Data Documentation

9.26.4.1 id

```
int Parsers::TrackGraph::CompressedNodeValues::id
```

Node number.

9.26.4.2 position

```
Point Parsers::TrackGraph::CompressedNodeValues::position
```

Node's graphical position.

Referenced by [CompressedNodeValues\(\)](#).

9.26.4.3 rawnode

`Node` `Parsers::TrackGraph::CompressedNodeValues::rawnode`

Uncompressed head node for this compressed node.

9.26.4.4 segments

`std::list<int>` `Parsers::TrackGraph::CompressedNodeValues::segments`

List of uncompressed node ids.

Referenced by [FindSegmentIndex\(\)](#).

9.27 lcc::ConfigMemory Class Reference

Configure memory.

Public Member Functions

- [ConfigMemory](#) (name,...)
Construct a memory config dialog.
- [_Close](#) ()
Close and destroy the dialog box.
- [_Read](#) ()
Bound to the `Read` button.
- [_Write](#) ()
Bound to the `Write` button.
- [_getAddressRange](#) (thespace)
Get the address range of the specified space.
- [_Dump](#) ()
Bound to the `Dump` button.
- [_dumpAsText](#) (thespace, startaddress, endaddress)
Dump a space as text (typically the CDI).
- [_dumpAsHex](#) (thespace, startaddress, endaddress)
Dump a space as hex (typically the configuration memory).
- [_Restore](#) ()
Bound to the `Restore` button.

Private Member Functions

- [_datagramhandler](#) (command, sourcenid,...)
Datagram message handler.
- [_messagehandler](#) (message)
Message handler – handle incoming messages.
- [_readmemory](#) (_space, _address, [length](#), status_var)
Method to read a block of configuration memory.
- [_writememory](#) (_space, _address, databuffer)
Write a block of data to configuration memory.
- [putdebug](#) (message)
Print message using debug output, if any.

Private Attributes

- [readlist](#)
Read list.
- [writelist](#)
Write list.
- [count](#)
Byte count.
- [address](#)
Start address.
- [space](#)
Space select.
- [_ioComplete](#)
I/O Completion Flag.
- [olddatagramhandler](#)
Old datagram handler.
- [oldgeneralmessagehandler](#)
Old general message handler.
- [datagrambuffer](#)
Datagram message buffer.
- [_datagramrejecterror](#)
Last datagram rejection error.
- [writeReplyCheck](#)
Flag to check for a write reply.

Static Private Attributes

- static [_spaces](#)
Space values.

9.27.1 Detailed Description

Configure memory.

Create a dialog box that reads and writes the configuration memory of an OpenLCB node.

Options:

- -destnid Node ID to send to.
- -transport LCC Transport object.
- -debugprint A function to handle debug output.

9.27.2 Constructor & Destructor Documentation

9.27.2.1 ConfigMemory()

```
lcc::ConfigMemory::ConfigMemory (
    name ,
    ... )
```

Construct a memory config dialog.

Parameters

<i>name</i>	Pathname of the widget.
...	Options: <ul style="list-style-type: none">• -destnid Node ID to send to.• -transport LCC Transport object.

9.27.3 Member Function Documentation

9.27.3.1 `_Close()`

```
lcc::ConfigMemory::_Close ( )
```

Close and destroy the dialog box.

9.27.3.2 `_datagramhandler()`

```
lcc::ConfigMemory::_datagramhandler (
    command ,
    sourcenid ,
    ... ) [private]
```

Datagram message handler.

This method is called when a datagram type message arrives.

Parameters

<i>command</i>	One of datagramreceivedok, datagramrejected, or datagramcontent.
<i>sourcenid</i>	The Node ID of the node sending the datagram.
...	The data buffer, if any. <ul style="list-style-type: none"> -debugprint A function to handle debug output.

9.27.3.3 `_Dump()`

```
lcc::ConfigMemory::_Dump ( )
```

Bound to the Dump button.

Dump the configuration memory to a file. Either as text (if space is CDI) or Hex (if space is NOT CDI).

9.27.3.4 `_dumpAsHex()`

```
lcc::ConfigMemory::_dumpAsHex (
    thespace ,
    startaddress ,
    endaddress )
```

Dump a space as hex (typically the configuration memory).

Dump a device's memory as a hex file. This is typically the device's configuration memory.

Parameters

<i>thespace</i>	The space.
<i>startaddress</i>	The start address
<i>endaddress</i>	The end address

9.27.3.5 _dumpAsText()

```
lcc::ConfigMemory::_dumpAsText (
    thespace ,
    startaddress ,
    endaddress )
```

Dump a space as text (typically the CDI).

Dump a device's memory as a text file. This is typically the device's CDI.

Parameters

<i>thespace</i>	The space.
<i>startaddress</i>	The start address
<i>endaddress</i>	The end address

9.27.3.6 _getAddressRange()

```
lcc::ConfigMemory::_getAddressRange (
    thespace )
```

Get the address range of the specified space.

This performs a Get Address Space Information Command and then returns the address range info.

Parameters

<i>thespace</i>	The space.
-----------------	------------

9.27.3.7 _messagehandler()

```
lcc::ConfigMemory::_messagehandler (
    message ) [private]
```

Message handler – handle incoming messages.

Certain messages are processed:

Initialization Complete Messages – This is a possible response to freeze, unfreeze, reset, or reinitialize commands.

9.27.3.8 `_Read()`

```
lcc::ConfigMemory::_Read ( )
```

Bound to the `Read` button.

Read a block of memory and display the results.

9.27.3.9 `_readmemory()`

```
lcc::ConfigMemory::_readmemory (
    _space ,
    _address ,
    length ,
    status_var ) [private]
```

Method to read a block of configuration memory.

Read a block of memory, return the data bytes. The variable named by the `status_var` is side effected with the status code.

Parameters

<code>_space</code>	The memory space to read from.
<code>_address</code>	The address to start reading from.
<code>length</code>	The number of bytes to read.
<code>status_var</code>	The name of a status variable.

Returns

The data block read.

9.27.3.10 `_Restore()`

```
lcc::ConfigMemory::_Restore ( )
```

Bound to the `Restore` button.

Reload configuration memory from a hex dump file.

9.27.3.11 _Write()

```
lcc::ConfigMemory::_Write ( )
```

Bound to the `Write` button.

Write a block of memory.

9.27.3.12 _writememory()

```
lcc::ConfigMemory::_writememory (
    _space ,
    _address ,
    databuffer ) [private]
```

Write a block of data to configuration memory.

This method writes a block of memory to configuration memory of an OpenLCB node.

Parameters

<i>_space</i>	The memory space to write to.
<i>_address</i>	The address to start writing to.
<i>databuffer</i>	The list of bytes to write.

Returns

The result status: 0 if successful, otherwise an error code.

9.27.3.13 putdebug()

```
lcc::ConfigMemory::putdebug (
    message ) [private]
```

Print message using debug output, if any.

Parameters

<i>message</i>	The message to print.
----------------	-----------------------

9.27.4 Member Data Documentation

9.27.4.1 `_datagramrejecterror`

```
lcc::ConfigMemory::_datagramrejecterror [private]
```

Last datagram rejection error.

9.27.4.2 `_ioComplete`

```
lcc::ConfigMemory::_ioComplete [private]
```

I/O Completion Flag.

9.27.4.3 `_spaces`

```
lcc::ConfigMemory::_spaces [static], [private]
```

Space values.

9.27.4.4 `address`

```
lcc::ConfigMemory::address [private]
```

Start address.

9.27.4.5 `count`

```
lcc::ConfigMemory::count [private]
```

Byte count.

9.27.4.6 `datagrambuffer`

```
lcc::ConfigMemory::datagrambuffer [private]
```

Datagram message buffer.

9.27.4.7 olddatagramhandler

```
lcc::ConfigMemory::olddatagramhandler [private]
```

Old datagram handler.

9.27.4.8 oldgeneralmessagehandler

```
lcc::ConfigMemory::oldgeneralmessagehandler [private]
```

Old general message handler.

9.27.4.9 readlist

```
lcc::ConfigMemory::readlist [private]
```

Read list.

9.27.4.10 space

```
lcc::ConfigMemory::space [private]
```

Space select.

9.27.4.11 writelist

```
lcc::ConfigMemory::writelist [private]
```

Write list.

9.27.4.12 writeReplyCheck

```
lcc::ConfigMemory::writeReplyCheck [private]
```

Flag to check for a write reply.

9.28 Icc::ConfigOptions Class Reference

Display memory config options.

Public Member Functions

- [ConfigOptions](#) (name,...)
Construct a Config Options dialog.
- [_Close](#) ()
Close and destroy the dialog box.

Private Member Functions

- [putdebug](#) (message)
Print message using debug output, if any.

Private Attributes

- [nodeid](#)
Node ID.
- [available](#)
Available bits.
- [writelengths](#)
Write lengths.
- [highest](#)
Highest memory space.
- [lowest](#)
Lowest memory space.
- [name](#)
Name string.

9.28.1 Detailed Description

Display memory config options.

Options

- -nid Node ID.
- -available Available bitmask.
- -writelengths Write length bitmask.
- -highest Highest memory space.
- -lowest Lowest memory space.
- -name Name string.
- -debugprint A function to handle debug output.

9.28.2 Constructor & Destructor Documentation

9.28.2.1 ConfigOptions()

```
lcc::ConfigOptions::ConfigOptions (
    name ,
    ... )
```

Construct a Config Options dialog.

Parameters

<i>name</i>	The widget pathname.
...	Options: <ul style="list-style-type: none">• -nid Node ID.• -available Available bitmask.• -writelengths Write length bitmask.• -highest Highest memory space.• -lowest Lowest memory space.• -name Name string.• -debugprint A function to handle debug output.

9.28.3 Member Function Documentation

9.28.3.1 _Close()

```
lcc::ConfigOptions::_Close ( )
```

Close and destroy the dialog box.

9.28.3.2 putdebug()

```
lcc::ConfigOptions::putdebug (
    message ) [private]
```

Print message using debug output, if any.

Parameters

<i>message</i>	The message to print.
----------------	-----------------------

9.28.4 Member Data Documentation

9.28.4.1 available

`lcc::ConfigOptions::available` [private]

Available bits.

9.28.4.2 highest

`lcc::ConfigOptions::highest` [private]

Highest memory space.

9.28.4.3 lowest

`lcc::ConfigOptions::lowest` [private]

Lowest memory space.

9.28.4.4 name

`lcc::ConfigOptions::name` [private]

Name string.

9.28.4.5 nodeid

```
lcc::ConfigOptions::nodeid [private]
```

Node ID.

9.28.4.6 writelengths

```
lcc::ConfigOptions::writelengths [private]
```

Write lengths.

9.29 lcc::ConfigurationEditor Class Reference

Generate OpenLCB Memory Configuration Window.

Public Member Functions

- [ConfigurationEditor](#) (name,...)
Constructor: create the configuration editor.

Private Member Functions

- [putdebug](#) (message)
Print message using debug output, if any.
- [_processXMLnode](#) (n, frame, space, address_var, prefix="")
Process one node in the XML tree.
- [_printexport](#) (node, frame, name)
Print or export a segment or group.
- [_printexport_pdf](#) (node, frame, name, outfile)
Export a segment or group to a printable PDF file.
- [_printexport_xml](#) (node, frame, name, outfile)
Export a segment or group to an XML file.
- [_printexport_csv](#) (node, frame, name, outfile)
Export a segment or group to a CSV file (can be imported into Excel).
- [_printexport_txt](#) (node, frame, name, outfile)
Export a segment or group to a text file.
- [_close](#) ()
Close the window.
- [_datagramhandler](#) (command, sourcenid,...)
Datagram handler.
- [_readmemory](#) (space, address, length, status_var)

- Read memory from a space.*

 - [_writememory](#) (space, address, databuffer)

Write to configuration memory.
- [_intComboRead](#) (widget, space, address, size)

Read an integer value and map it to a ComboBox widget.
- [_intComboWrite](#) (widget, space, address, size, min, max)

Write an integer value mapped from a ComboBox widget.
- [_intRBRead](#) (widget, space, address, size)

Read an integer value and stash it in a Radiobutton group.
- [_intRBWrite](#) (widget, space, address, size, min, max)

Write an integer value mapped from a Radiobutton group.
- [_intCBRead](#) (widget, space, address, size)

Read an integer value and stash it in a Checkbutton widget.
- [_intCBWrite](#) (widget, space, address, size, min, max)

Write an integer value mapped from a Checkbutton widget.
- [_intScaleRead](#) (widget, space, address, size)

Read an integer value and stash it in a Scale widget.
- [_intScaleWrite](#) (widget, space, address, size, min, max)

Write an integer value mapped from a Scale widget.
- [_intSpinRead](#) (widget, space, address, size)

Read an integer value and stash it in a SpinBox widget.
- [_intSpinWrite](#) (widget, space, address, size, min, max)

Write an integer value mapped from a SpinBox widget.
- [_actionWrite](#) (widget, space, address, size, value, dislogText)

Write an integer value from an Action button.
- [_stringComboRead](#) (widget, space, address, size)

Read a string value and map it to a ComboBox widget.
- [_stringComboWrite](#) (widget, space, address, size)

Write a string value mapped from a ComboBox widget.
- [_stringEntryRead](#) (widget, space, address, size)

Read a string value and stash it in an Entry widget.
- [_stringEntryWrite](#) (widget, space, address, size)

Write a string value from an Entry widget.
- [_eventidComboRead](#) (widget, space, address, size)

Read an event id value and map it to a ComboBox widget.
- [_eventidComboWrite](#) (widget, space, address, size)

Write an event id value mapped from a ComboBox widget.
- [_eventidEntryRead](#) (widget, space, address, size)

Read an event id value and stash it in an Entry widget as an event id string.
- [_eventidEntryWrite](#) (widget, space, address, size)

Write an event id value from an Entry widget.
- [_readall](#) (space)

Read all parameters stored in a specified space.

Static Private Member Functions

- static [_printexport_pdf_frame](#) (n, indent, pdfobj, frame, curyVar, curpageVar, pageheader)
Export a node frame to a PDF file.
- static [_printexport_pdf_vframe](#) (n, indent, pdfobj, frame, curyVar, curpageVar, pageheader)
Export a node scaler value frame to a PDF file.
- static [_printexport_pdf_newpage](#) (pdfobj, pageheader, pageno)
Print a new PDF page.
- static [_printexport_xml_frame](#) (n, frame)
Export a node frame as an XML tree.
- static [_printexport_xml_vframe](#) (n, frame)
Export a scaler node's value frame as an XML tree.
- static [_printexport_csv_frame](#) (n, matrix, frame)
Add a node's GUI frame values to a matrix (to be exported as a CSV file).
- static [_printexport_csv_vframe](#) (n, matrix, frame)
Add a scaler node's GUI value frame values to a matrix (to be exported as a CSV file).
- static [_printexport_csv_framesAcross](#) (n, tabnb, tabs, matrix)
Add a replicated group to a matrix as a single row.
- static [_printexport_csv_frameAcross](#) (n, rowVar, frame)
Add a group to a matrix as elements to a single row.
- static [_printexport_csv_vframeAcross](#) (n, rowVar, frame)
Add a scaler node's value frame to a matrix as elements to a single row.
- static [_printexport_txt_frame](#) (n, indent, outfp, frame)
Export a segment or group frame to a text file.
- static [_printexport_txt_vframe](#) (n, indent, outfp, frame)
Export a node scaler value frame to a text file.

Private Attributes

- [main](#)
Main Frame.
- [scroll](#)
Scrolled Window.
- [editframe](#)
Scrollable Frame.
- [buttons](#)
Button box.
- [cdi](#)
CDI XML Object.
- [_ioComplete](#)
I/O Completion Flag.
- [statusline](#)
Status variable.
- [_readall](#)
Holds all of the Read buttons for each segment.
- [_segmentnumber](#)
Segment number, used to insure unique widget names.

- [_groupnumber](#)
Group number, used to insure unique widget names.
- [_intnumber](#)
Integer number, used to insure unique widget names.
- [_stringnumber](#)
String number, used to insure unique widget names.
- [_eventidnumber](#)
Eventid number, used to insure unique widget names.
- [_mkbuttons](#)
Flag for Make Sensor / Make Turnout etc.
- [olddatagramhandler](#)
Variable holding the old Datagram handler.
- [datagrambuffer](#)
Datagram buffer.
- [_datagramrejecterror](#)
Datagram reject error flag.
- [writeReplyCheck](#)
Datagram write trply check flag.

Static Private Attributes

- static [_menu](#)
Generic menu.
- static [idheaders](#)
Locale versions of the identification headers.
- static [printexportfiletypes](#)
Print and Export file types.

9.29.1 Detailed Description

Generate OpenLCB Memory Configuration Window.

Create a toplevel to configure a node's Memory using that node's (parsed) CDI. This GUI uses tabbed notebook widgets for segments and replicated groups to reduce the amount of scrolling (and because a ginormous scrollable frame dies with a X11 Pixmap allocation error).

Parameters

<i>Options</i>	<ul style="list-style-type: none"> • <code>-cdi</code> The unparsed CDI xml. Required and there is no default. • <code>-nid</code> The Node ID of the node to be configured. Required and there is no default. • <code>-transport</code> The transport object. Needs to implement <code>SendDatagram</code>, <code>DatagramReceivedOK</code>, and <code>DatagramRejected</code> methods and have an <code>-datagramhandler</code> option. • <code>-displayonly</code> A flag indicating that the CDI is just to be displayed. The default is false. • <code>-offlineedit</code> A flag indicating that the this is an offline editor. The default is false. • <code>-loadfile</code> The backup config filename to load from. Only checked if <code>-offlineedit</code> is true. Default is an empty string. • <code>-debugprint</code> A function to handle debug output. • <code>-class</code> Delegated to the toplevel. • <code>-menu</code> Delegated to the toplevel • <code>-height</code> Delegated to the ScrollableFrame • <code>-areaheight</code> Delegated to the ScrollableFrame • <code>-width</code> Delegated to the ScrollableFrame • <code>-areawidth</code> Delegated to the ScrollableFrame
----------------	---

9.29.2 Constructor & Destructor Documentation

9.29.2.1 ConfigurationEditor()

```
lcc::ConfigurationEditor::ConfigurationEditor (
    name ,
    ... )
```

Constructor: create the configuration editor.

Construct a memory configuration window to edit the configuration memory of an OpenLCB node. The window is created from the toplevel up.

Parameters

<i>name</i>	Widget path.
-------------	--------------

Parameters

...	<p>Options:</p> <ul style="list-style-type: none"> • <code>-cdi</code> The unparsed CDI xml. Required and there is no default. • <code>-nid</code> The Node ID of the node to be configured. Required and there is no default. • <code>-transport</code> The transport object. Needs to implement <code>SendDatagram</code>, <code>DatagramReceivedOK</code>, and <code>DatagramRejected</code> methods and have an <code>-datagramhandler</code> option. • <code>-displayonly</code> A flag indicating that the CDI is just to be displayed. The default is false. • <code>-offlineedit</code> A flag indicating that the this is an offline editor. The default is false. • <code>-loadfile</code> The backup config filename to load from. Only checked if <code>-offlineedit</code> is true. Default is an empty string. • <code>-debugprint</code> A function to handle debug output. • <code>-class</code> Delegated to the toplevel. • <code>-menu</code> Delegated to the toplevel • <code>-height</code> Delegated to the ScrollableFrame • <code>-areaheight</code> Delegated to the ScrollableFrame • <code>-width</code> Delegated to the ScrollableFrame • <code>-areawidth</code> Delegated to the ScrollableFrame
-----	---

9.29.3 Member Function Documentation

9.29.3.1 `_actionWrite()`

```
lcc::ConfigurationEditor::_actionWrite (
    widget ,
    space ,
    address ,
    size ,
    value ,
    dislogText ) [private]
```

Write an integer value from an Action button.

Parameters

<i>widget</i>	A ttk::button widget
<i>space</i>	The space to write to.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.
<i>value</i>	The value to write
<i>dislogText</i>	The dialog text to display after writing

9.29.3.2 _close()

```
lcc::ConfigurationEditor::_close ( ) [private]
```

Close the window.

The window is destroyed

9.29.3.3 _datagramhandler()

```
lcc::ConfigurationEditor::_datagramhandler (
    command ,
    sourcenid ,
    ... ) [private]
```

Datagram handler.

Parameters

<i>command</i>	Type of Datagram handling.
<i>sourcenid</i>	Source NID of the datagram.
...	The datagram data stream.

9.29.3.4 _eventidComboRead()

```
lcc::ConfigurationEditor::_eventidComboRead (
    widget ,
    space ,
    address ,
    size ) [private]
```

Read an event id value and map it to a ComboBox widget.

Parameters

<i>widget</i>	A ttk::combobox widget to update. This is also used to map to the value map.
<i>space</i>	The space to read from.
<i>address</i>	The address of the event id.
<i>size</i>	The size of the event id (should always be 8).

9.29.3.5 _eventidComboWrite()

```
lcc::ConfigurationEditor::_eventidComboWrite (
    widget ,
    space ,
    address ,
    size ) [private]
```

Write an event id value mapped from a ComboBox widget.

Parameters

<i>widget</i>	A ttk::combobox widget to get the value from. This is also used to map to the value map.
<i>space</i>	The space to read from.
<i>address</i>	The address of the event id.
<i>size</i>	The size of the event id (should always be 8).

9.29.3.6 _eventidEntryRead()

```
lcc::ConfigurationEditor::_eventidEntryRead (
    widget ,
    space ,
    address ,
    size ) [private]
```

Read an event id value and stash it in an Entry widget as an event id string.

Parameters

<i>widget</i>	A ttk::entry widget to update.
<i>space</i>	The space to read from.
<i>address</i>	The address of the event id.
<i>size</i>	The size of the event id (should always be 8).

9.29.3.7 _eventIdEntryWrite()

```
lcc::ConfigurationEditor::_eventIdEntryWrite (
    widget ,
    space ,
    address ,
    size ) [private]
```

Write an event id value from an Entry widget.

Parameters

<i>widget</i>	A ttk::entry widget to get the value from.
<i>space</i>	The space to read from.
<i>address</i>	The address of the event id.
<i>size</i>	The size of the event id (should always be 8).

9.29.3.8 _intCBRead()

```
lcc::ConfigurationEditor::_intCBRead (
    widget ,
    space ,
    address ,
    size ) [private]
```

Read an integer value and stash it in a Checkbutton widget.

Parameters

<i>widget</i>	A ttk::checkbutton widget.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.

9.29.3.9 _intCBWrite()

```
lcc::ConfigurationEditor::_intCBWrite (
    widget ,
```

```

        space ,
        address ,
        size ,
        min ,
        max ) [private]

```

Write an integer value mapped from a Checkbutton widget.

Parameters

<i>widget</i>	A ttk::combobox widget to get the value from. This is also used to map to the value map.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.
<i>min</i>	The minimum allowed value of the integer.
<i>max</i>	The maximum allowed value of the integer.

9.29.3.10 _intComboRead()

```

lcc::ConfigurationEditor::_intComboRead (
    widget ,
    space ,
    address ,
    size ) [private]

```

Read an integer value and map it to a ComboBox widget.

Parameters

<i>widget</i>	A ttk::combobox widget to update. This is also used to map to the value map.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.

9.29.3.11 _intComboWrite()

```

lcc::ConfigurationEditor::_intComboWrite (
    widget ,
    space ,
    address ,
    size ,

```



```

        min ,
        max ) [private]

```

Write an integer value mapped from a ComboBox widget.

Parameters

<i>widget</i>	A ttk::combobox widget to get the value from. This is also used to map to the value map.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.
<i>min</i>	The minimum allowed value of the integer.
<i>max</i>	The maximum allowed value of the integer.

9.29.3.12 _intRBRead()

```

lcc::ConfigurationEditor::_intRBRead (
    widget ,
    space ,
    address ,
    size ) [private]

```

Read an integer value and stash it in a Radiobutton group.

Parameters

<i>widget</i>	A ttk::frame widget containing ttk::radiobuttons.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.

9.29.3.13 _intRBWrite()

```

lcc::ConfigurationEditor::_intRBWrite (
    widget ,
    space ,
    address ,
    size ,
    min ,
    max ) [private]

```

Write an integer value mapped from a Radiobutton group.

Parameters

<i>widget</i>	A ttk::combobox widget to get the value from. This is also used to map to the value map.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.
<i>min</i>	The minimum allowed value of the integer.
<i>max</i>	The maximum allowed value of the integer.

9.29.3.14 _intScaleRead()

```
lcc::ConfigurationEditor::_intScaleRead (
    widget ,
    space ,
    address ,
    size ) [private]
```

Read an integer value and stash it in a Scale widget.

Parameters

<i>widget</i>	A ttk::scale widget.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.

9.29.3.15 _intScaleWrite()

```
lcc::ConfigurationEditor::_intScaleWrite (
    widget ,
    space ,
    address ,
    size ,
    min ,
    max ) [private]
```

Write an integer value mapped from a Scale widget.

Parameters

<i>widget</i>	A ttk::combobox widget to get the value from. This is also used to map to the value map.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.
<i>min</i>	The minimum allowed value of the integer.
<i>max</i>	The maximum allowed value of the integer.

9.29.3.16 _intSpinRead()

```
lcc::ConfigurationEditor::_intSpinRead (
    widget ,
    space ,
    address ,
    size ) [private]
```

Read an integer value and stash it in a SpinBox widget.

Parameters

<i>widget</i>	A spinbox widget to update.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.

9.29.3.17 _intSpinWrite()

```
lcc::ConfigurationEditor::_intSpinWrite (
    widget ,
    space ,
    address ,
    size ,
    min ,
    max ) [private]
```

Write an integer value mapped from a SpinBox widget.

Parameters

<i>widget</i>	A spinbox widget to get the value from.
<i>space</i>	The space to read from.
<i>address</i>	The address of the integer.
<i>size</i>	The size of the integer.
<i>min</i>	The minimum allowed value of the integer.
<i>max</i>	The maximum allowed value of the integer.

9.29.3.18 `_printexport()`

```
lcc::ConfigurationEditor::_printexport (
    node ,
    frame ,
    name ) [private]
```

Print or export a segment or group.

The current contents of the specified segment or group GUI frame are exported to a data file for use in another program or printed.

Parameters

<i>node</i>	The XML node in the CDI for the segment or group to export or print.
<i>frame</i>	The GUI frame containing the values to be exported or printed.
<i>name</i>	The name of the segment or group to be exported or printed.

9.29.3.19 `_printexport_csv()`

```
lcc::ConfigurationEditor::_printexport_csv (
    node ,
    frame ,
    name ,
    outfile ) [private]
```

Export a segment or group to a CSV file (can be imported into Excel).

Parameters

<i>node</i>	The XML node in the CDI for the segment or group to export or print.
<i>frame</i>	The GUI frame containing the values to be exported or printed.
<i>name</i>	The name of the segment or group to be exported or printed.
<i>outfile</i>	The file to export to.

9.29.3.20 _printexport_csv_frame()

```
static lcc::ConfigurationEditor::_printexport_csv_frame (
    n ,
    matrix ,
    frame ) [static], [private]
```

Add a node's GUI frame values to a matrix (to be exported as a CSV file).

Parameters

<i>n</i>	The node in the CDI XML tree.
<i>matrix</i>	The matrix to populate.
<i>frame</i>	The GUI frame to extract values from.

9.29.3.21 _printexport_csv_frameAcross()

```
static lcc::ConfigurationEditor::_printexport_csv_frameAcross (
    n ,
    rowVar ,
    frame ) [static], [private]
```

Add a group to a matrix as elements to a single row.

Parameters

<i>n</i>	The node in the CDI XML tree.
<i>rowVar</i>	The name of the variable containing the row to add to.
<i>frame</i>	The GUI frame.

9.29.3.22 _printexport_csv_framesAcross()

```
static lcc::ConfigurationEditor::_printexport_csv_framesAcross (
    n ,
    tabnb ,
    tabs ,
    matrix ) [static], [private]
```

Add a replicated group to a matrix as a single row.

Parameters

<i>n</i>	The node in the CDI XML tree.
<i>tabnb</i>	Tabbed notebook containing the replicated group.
<i>tabs</i>	The tabs in the tabbed notebook (the replications).
<i>matrix</i>	The matrix to populate.

9.29.3.23 _printexport_csv_vframe()

```
static lcc::ConfigurationEditor::_printexport_csv_vframe (
    n ,
    matrix ,
    frame ) [static], [private]
```

Add a scaler node's GUI value frame values to a matrix (to be exported as a CSV file).

Parameters

<i>n</i>	The node in the CDI XML tree.
<i>matrix</i>	The matrix to populate
<i>frame</i>	The GUI frame to extract values from.

9.29.3.24 _printexport_csv_vframeAcross()

```
static lcc::ConfigurationEditor::_printexport_csv_vframeAcross (
    n ,
    rowVar ,
    frame ) [static], [private]
```

Add a scaler node's value frame to a matrix as elements to a single row.

Parameters

<i>n</i>	The node in the CDI XML tree.
<i>rowVar</i>	The name of the variable containing the row to add to.
<i>frame</i>	The GUI frame.

9.29.3.25 _printexport_pdf()

```
lcc::ConfigurationEditor::_printexport_pdf (
    node ,
    frame ,
    name ,
    outfile ) [private]
```

Export a segment or group to a printable PDF file.

Parameters

<i>node</i>	The XML node in the CDI for the segment or group to export or print.
<i>frame</i>	The GUI frame containing the values to be exported or printed.
<i>name</i>	The name of the segment or group to be exported or printed.
<i>outfile</i>	The file to export to.

9.29.3.26 _printexport_pdf_frame()

```
static lcc::ConfigurationEditor::_printexport_pdf_frame (
    n ,
    indent ,
    pdfobj ,
    frame ,
    curyVar ,
    curpageVar ,
    pageheader ) [static], [private]
```

Export a node frame to a PDF file.

Parameters

<i>n</i>	The node.
<i>indent</i>	The indentation string.
<i>pdfobj</i>	The PDF file object.
<i>frame</i>	The GUI frame.
<i>curyVar</i>	The name of the variable containing the current y location.
<i>curpageVar</i>	The name of the variable containing the current page number.
<i>pageheader</i>	The running page header text.

9.29.3.27 _printexport_pdf_newpage()

```
static lcc::ConfigurationEditor::_printexport_pdf_newpage (
```

```

    pdfobj ,
    pageheader ,
    pageno ) [static], [private]

```

Print a new PDF page.

Parameters

<i>pdfobj</i>	The PDF file object
<i>pageheader</i>	The running page header text.
<i>pageno</i>	The new page's number.

Returns

The fresh current y value.

9.29.3.28 _printexport_pdf_vframe()

```

static lcc::ConfigurationEditor::_printexport_pdf_vframe (
    n ,
    indent ,
    pdfobj ,
    frame ,
    curyVar ,
    curpageVar ,
    pageheader ) [static], [private]

```

Export a node scaler value frame to a PDF file.

Parameters

<i>n</i>	The node.
<i>indent</i>	The indentation string.
<i>pdfobj</i>	The PDF file object.
<i>frame</i>	The GUI frame.
<i>curyVar</i>	The name of the variable containing the current y location.
<i>curpageVar</i>	The name of the variable containing the current page number.
<i>pageheader</i>	The running page header text.

9.29.3.29 _printexport_txt()

```

lcc::ConfigurationEditor::_printexport_txt (
    node ,

```



```

    frame ,
    name ,
    outfile ) [private]

```

Export a segment or group to a text file.

Parameters

<i>node</i>	The XML node in the CDI for the segment or group to export or print.
<i>frame</i>	The GUI frame containing the values to be exported or printed.
<i>name</i>	The name of the segment or group to be exported or printed.
<i>outfile</i>	The file to export to.

9.29.3.30 _printexport_txt_frame()

```

static lcc::ConfigurationEditor::_printexport_txt_frame (
    n ,
    indent ,
    outfp ,
    frame ) [static], [private]

```

Export a segment or group frame to a text file.

Parameters

<i>n</i>	The node.
<i>indent</i>	The indentation string.
<i>outfp</i>	The output file channel.
<i>frame</i>	The GUI frame.

9.29.3.31 _printexport_txt_vframe()

```

static lcc::ConfigurationEditor::_printexport_txt_vframe (
    n ,
    indent ,
    outfp ,
    frame ) [static], [private]

```

Export a node scaler value frame to a text file.

Parameters

<i>n</i>	The node.
----------	-----------

Parameters

<i>indent</i>	The indentation string.
<i>outfp</i>	The output channel.
<i>frame</i>	The GUI frame.

9.29.3.32 _printexport_xml()

```
lcc::ConfigurationEditor::_printexport_xml (
    node ,
    frame ,
    name ,
    outfile ) [private]
```

Export a segment or group to an XML file.

Parameters

<i>node</i>	The XML node in the CDI for the segment or group to export or print.
<i>frame</i>	The GUI frame containing the values to be exported or printed.
<i>name</i>	The name of the segment or group to be exported or printed.
<i>outfile</i>	The file to export to.

9.29.3.33 _printexport_xml_frame()

```
static lcc::ConfigurationEditor::_printexport_xml_frame (
    n ,
    frame ) [static], [private]
```

Export a node frame as an XML tree.

Parameters

<i>n</i>	The XML node in the CDI.
<i>frame</i>	The GUI frame for the node in the CDI.

Returns

An XML tree of the contents of the GUI frame.

9.29.3.34 _printexport_xml_vframe()

```
static lcc::ConfigurationEditor::_printexport_xml_vframe (
    n ,
    frame ) [static], [private]
```

Export a scaler node's value frame as an XML tree.

Parameters

<i>n</i>	The XML node in the CDI.
<i>frame</i>	The GUI frame for the node in the CDI.

Returns

An XML tree of the contents of the GUI frame.

9.29.3.35 _processXMLnode()

```
lcc::ConfigurationEditor::_processXMLnode (
    n ,
    frame ,
    space ,
    address_var ,
    prefix = "" ) [private]
```

Process one node in the XML tree.

Process a single node in the XML tree. Will recurse to process Children nodes.

Ttk::labelframes are used for variables with names. Ttk::notebooks, except segments and groups. A ttk::labelframe is also used for the information block.

Parameters

<i>n</i>	The node.
<i>frame</i>	The parent frame.
<i>space</i>	The current space.
<i>address_var</i>	The name of the address variable.

9.29.3.36 _readall()

```
lcc::ConfigurationEditor::_readall (
    space ) [private]
```

Read all parameters stored in a specified space.

Reads each parameter one at a time by invoking the parameter's `Read` button.

Parameters

<i>space</i>	The parameter space to read from.
--------------	-----------------------------------

References [gettext::_m\(\)](#), [FileEntry::bind\(\)](#), and [FileEntry::configure\(\)](#).

9.29.3.37 `_readmemory()`

```
lcc::ConfigurationEditor::_readmemory (  
    space ,  
    address ,  
    length ,  
    status_var ) [private]
```

Read memory from a space.

Parameters

<i>space</i>	The space to read from.
<i>address</i>	The start address to read.
<i>length</i>	Number of bytes to read.
<i>status_var</i>	The name of a variable to receive the status code.

Returns

The data read (if successful).

9.29.3.38 `_stringComboRead()`

```
lcc::ConfigurationEditor::_stringComboRead (  
    widget ,  
    space ,  
    address ,  
    size ) [private]
```

Read a string value and map it to a `ComboBox` widget.

Parameters

<i>widget</i>	A ttk::combobox widget to update. This is also used to map to the value map.
<i>space</i>	The space to read from.
<i>address</i>	The address of the string.
<i>size</i>	The size of the string.

9.29.3.39 _stringComboWrite()

```
lcc::ConfigurationEditor::_stringComboWrite (
    widget ,
    space ,
    address ,
    size ) [private]
```

Write a string value mapped from a ComboBox widget.

Parameters

<i>widget</i>	A ttk::combobox widget to get the value from. This is also used to map to the value map.
<i>space</i>	The space to read from.
<i>address</i>	The address of the string.
<i>size</i>	The size of the string.

9.29.3.40 _stringEntryRead()

```
lcc::ConfigurationEditor::_stringEntryRead (
    widget ,
    space ,
    address ,
    size ) [private]
```

Read a string value and stash it in an Entry widget.

Parameters

<i>widget</i>	A ttk::entry widget to update.
<i>space</i>	The space to read from.
<i>address</i>	The address of the string.
<i>size</i>	The size of the string.

9.29.3.41 _stringEntryWrite()

```
lcc::ConfigurationEditor::_stringEntryWrite (
    widget ,
    space ,
    address ,
    size ) [private]
```

Write a string value from an Entry widget.

Parameters

<i>widget</i>	A ttk::entry widget to get the value from.
<i>space</i>	The space to read from.
<i>address</i>	The address of the string.
<i>size</i>	The size of the string.

9.29.3.42 _writememory()

```
lcc::ConfigurationEditor::_writememory (
    space ,
    address ,
    databuffer ) [private]
```

Write to configuration memory.

Parameters

<i>space</i>	The space to write to.
<i>address</i>	The address to write to.
<i>databuffer</i>	The data to write.

Returns

The write status.

9.29.3.43 putdebug()

```
lcc::ConfigurationEditor::putdebug (
    message ) [private]
```

Print message using debug output, if any.

Parameters

<i>message</i>	The message to print.
----------------	-----------------------

9.29.4 Member Data Documentation

9.29.4.1 _datagramrejecterror

`lcc::ConfigurationEditor::_datagramrejecterror` [private]

Datagram reject error flag.

9.29.4.2 _eventidnumber

`lcc::ConfigurationEditor::_eventidnumber` [private]

Eventid number, used to insure unique widget names.

9.29.4.3 _groupnumber

`lcc::ConfigurationEditor::_groupnumber` [private]

Group number, used to insure unique widget names.

9.29.4.4 _intnumber

`lcc::ConfigurationEditor::_intnumber` [private]

Integer number, used to insure unique widget names.

9.29.4.5 `_ioComplete`

```
lcc::ConfigurationEditor::_ioComplete [private]
```

I/O Completion Flag.

9.29.4.6 `_menu`

```
lcc::ConfigurationEditor::_menu [static], [private]
```

Generic menu.

9.29.4.7 `_mkbuttons`

```
lcc::ConfigurationEditor::_mkbuttons [private]
```

Flag for Make Sensor / Make Turnout etc.

buttons

9.29.4.8 `_readall`

```
lcc::ConfigurationEditor::_readall [private]
```

Holds all of the Read buttons for each segment.

This allows for Reading all of the variables in a segment.

9.29.4.9 `_segmentnumber`

```
lcc::ConfigurationEditor::_segmentnumber [private]
```

Segment number, used to insure unique widget names.

9.29.4.10 `_stringnumber`

```
lcc::ConfigurationEditor::_stringnumber [private]
```

String number, used to insure unique widget names.

9.29.4.11 buttons

`lcc::ConfigurationEditor::buttons` [private]

Button box.

9.29.4.12 cdi

`lcc::ConfigurationEditor::cdi` [private]

CDI XML Object.

9.29.4.13 datagrambuffer

`lcc::ConfigurationEditor::datagrambuffer` [private]

Datagram buffer.

9.29.4.14 editframe

`lcc::ConfigurationEditor::editframe` [private]

Scrollable Frame.

9.29.4.15 idheaders

`lcc::ConfigurationEditor::idheaders` [static], [private]

Locale versions of the identification headers.

9.29.4.16 main

`lcc::ConfigurationEditor::main` [private]

Main Frame.

9.29.4.17 olddatagramhandler

```
lcc::ConfigurationEditor::olddatagramhandler [private]
```

Variable holding the old Datagram handler.

9.29.4.18 printexportfiletypes

```
lcc::ConfigurationEditor::printexportfiletypes [static], [private]
```

Print and Export file types.

9.29.4.19 scroll

```
lcc::ConfigurationEditor::scroll [private]
```

Scrolled Window.

9.29.4.20 statusline

```
lcc::ConfigurationEditor::statusline [private]
```

Status variable.

9.29.4.21 writeReplyCheck

```
lcc::ConfigurationEditor::writeReplyCheck [private]
```

Datagram write trply check flag.

9.30 Parsers::CornuBody Class Reference

List of Cornu body lines (T, E, S, and C lines).

```
#include <CornuBody.h>
```

Public Member Functions

- [CornuBody](#) ([CornuBodyElt](#) *e, [CornuBody](#) *n)
Basic constructor.
- [TrackBody](#) * [CornuEnds](#) ()
Create a track endpoint list.
- int [CornuSegmentCount](#) ()
Count segments (S, C, and J lines).
- const [CornuBodyElt](#) * [Element](#) () const
Return current element.

Static Public Member Functions

- static [CornuBody](#) * [ConsCornuBody](#) ([CornuBodyElt](#) *trbe, [CornuBody](#) *trb)
Alternative constructor function.
- static [CornuBody](#) * [ConcatCornuBody](#) ([CornuBody](#) *trba, [CornuBody](#) *trb)
- static void [CleanUpCornuBody](#) ([CornuBody](#) *trb)
Free up memory.

Private Member Functions

- void [CleanUpElement](#) ()
Free up memory.

Private Attributes

- [CornuBodyElt](#) * [element](#)
Current element.
- [CornuBody](#) * [next](#)
Next element.

Friends

- class [CornuBodyElt](#)
- class [TrackGraph](#)

9.30.1 Detailed Description

List of Cornu body lines (T, E, S, and C lines).

Author

Robert Heller <heller@deepsoft.com>

9.30.2 Constructor & Destructor Documentation

9.30.2.1 CornuBody()

```
Parsers::CornuBody::CornuBody (
    CornuBodyElt * e,
    CornuBody * n ) [inline]
```

Basic constructor.

References [element](#), and [next](#).

Referenced by [ConsCornuBody\(\)](#).

9.30.3 Member Function Documentation

9.30.3.1 CleanUpCornuBody()

```
static void Parsers::CornuBody::CleanUpCornuBody (
    CornuBody * trb ) [inline], [static]
```

Free up memory.

References [CleanUpElement\(\)](#), [element](#), and [next](#).

9.30.3.2 CleanUpElement()

```
void Parsers::CornuBody::CleanUpElement ( ) [inline], [private]
```

Free up memory.

References [Parsers::CornuBodyElt::CornuCurvedSegment](#), [Parsers::CornuBodyElt::CornuEnd](#), [Parsers::CornuBodyElt::CornuStraightSegment](#), [element](#), [Parsers::CornuBodyElt::None](#), [Parsers::CornuBodyElt::theEnd](#), and [Parsers::CornuBodyElt::theType](#).

Referenced by [CleanUpCornuBody\(\)](#).

9.30.3.3 ConcatCornuBody()

```
static CornuBody * Parsers::CornuBody::ConcatCornuBody (
    CornuBody * trba,
    CornuBody * trb ) [inline], [static]
```

References [next](#).

9.30.3.4 ConsCornuBody()

```
static CornuBody * Parsers::CornuBody::ConsCornuBody (
    CornuBodyElt * trbe,
    CornuBody * trb ) [inline], [static]
```

Alternative constructor function.

References [CornuBody\(\)](#).

9.30.3.5 CornuEnds()

```
TrackBody * Parsers::CornuBody::CornuEnds ( ) [inline]
```

Create a track endpoint list.

References [Parsers::TrackBody::AppendTrackBodyElt\(\)](#), [Parsers::CornuBodyElt::CornuEnd](#), [element](#), [next](#), [Parsers::CornuBodyElt::theEnd](#), and [Parsers::CornuBodyElt::theType](#).

9.30.3.6 CornuSegmentCount()

```
int Parsers::CornuBody::CornuSegmentCount ( ) [inline]
```

Count segments (S, C, and J lines).

References [Parsers::CornuBodyElt::CornuCurvedSegment](#), [Parsers::CornuBodyElt::CornuStraightSegment](#), [element](#), [next](#), and [Parsers::CornuBodyElt::theType](#).

9.30.3.7 Element()

```
const CornuBodyElt * Parsers::CornuBody::Element ( ) const [inline]
```

Return current element.

References [element](#).

9.30.4 Friends And Related Function Documentation

9.30.4.1 CornuBodyElt

```
friend class CornuBodyElt [friend]
```

9.30.4.2 TrackGraph

```
friend class TrackGraph [friend]
```

9.30.5 Member Data Documentation

9.30.5.1 element

```
CornuBodyElt* Parsers::CornuBody::element [private]
```

Current element.

Referenced by [CleanUpCornuBody\(\)](#), [CleanUpElement\(\)](#), [CornuBody\(\)](#), [CornuEnds\(\)](#), [CornuSegmentCount\(\)](#), and [Element\(\)](#).

9.30.5.2 next

```
CornuBody* Parsers::CornuBody::next [private]
```

Next element.

Referenced by [CleanUpCornuBody\(\)](#), [ConcatCornuBody\(\)](#), [CornuBody\(\)](#), [CornuEnds\(\)](#), and [CornuSegmentCount\(\)](#).

9.31 Parsers::CornuBodyElt Class Reference

Cornu Body elements: T, E, S, and C lines are collected.

```
#include <CornuBody.h>
```

Classes

- struct [Pos](#)
Position structure.

Public Types

- enum [CornuBodyEltType](#) { [None](#) , [CornuEnd](#) , [CornuStraightSegment](#) , [CornuCurvedSegment](#) }
Element types.

Public Member Functions

- [CornuBodyElt](#) ()
Constructor.
- [~CornuBodyElt](#) ()
Destructor.
- [CornuBodyEltType TheType](#) () const
Type accessor.
- int [GetStraightSegment](#) (float &x1, float &y1, float &x2, float &y2) const
Fetch straight segment data.
- int [GetCurveSegment](#) (float &r, float &x, float &y, float &a0, float &a1) const
Fetch curve segment data.

Static Public Member Functions

- static void [InitTSegId](#) ()
Segment count initializer.
- static [CornuBodyElt](#) * [MakeTrackEnd](#) ([TrackBodyElt](#) *tbe)
Create an endpoint (T or E lines).
- static [CornuBodyElt](#) * [MakeStraightSegment](#) (float x1, float y1, float x2, float y2)
Create a straight segment (S lines).
- static [CornuBodyElt](#) * [MakeCurveSegment](#) (float r, float x, float y, float a0, float a1)
Create a curve segment (C lines).

Private Attributes

- [CornuBodyEltType](#) `theType`
Element type.
- [TrackBodyElt](#) * `theEnd`
Pointer to T or E line data.
- `int` [segmentId](#)
Segment index (S or C lines).
- `Pos` `pos1`
First position.
- `Pos` `pos2`
Second position.
- `float` [radius](#)
A radius value.
- `float` [ang0](#)
An angle value.
- `float` [ang1](#)
Another angle value.

Static Private Attributes

- `static int` [segCount](#)
Counter for S and C segments.

Friends

- `class` [TrackGraph](#)
- `class` [CornuBody](#)

9.31.1 Detailed Description

Cornu Body elements: T, E, S, and C lines are collected.
others are discarded.

Author

Robert Heller <heller@deepsoft.com>

9.31.2 Member Enumeration Documentation

9.31.2.1 CornuBodyEltType

```
enum Parsers::CornuBodyElt::CornuBodyEltType
```

Element types.

Enumerator

None	Placeholder.
CornuEnd	T or E line.
CornuStraightSegment	S line.
CornuCurvedSegment	C line.

9.31.3 Constructor & Destructor Documentation

9.31.3.1 CornuBodyElt()

```
Parsers::CornuBodyElt::CornuBodyElt ( ) [inline]
```

Constructor.

References [None](#), [theEnd](#), and [theType](#).

Referenced by [MakeCurveSegment\(\)](#), [MakeStraightSegment\(\)](#), and [MakeTrackEnd\(\)](#).

9.31.3.2 ~CornuBodyElt()

```
Parsers::CornuBodyElt::~~CornuBodyElt ( ) [inline]
```

Destructor.

9.31.4 Member Function Documentation

9.31.4.1 GetCurveSegment()

```
int Parsers::CornuBodyElt::GetCurveSegment (
    float & r,
    float & x,
    float & y,
    float & a0,
    float & a1 ) const [inline]
```

Fetch curve segment data.

References [ang0](#), [ang1](#), [pos1](#), [radius](#), [segmentId](#), [Parsers::CornuBodyElt::Pos::x](#), and [Parsers::CornuBodyElt::Pos::y](#).

9.31.4.2 GetStraightSegment()

```
int Parsers::CornuBodyElt::GetStraightSegment (
    float & x1,
    float & y1,
    float & x2,
    float & y2 ) const [inline]
```

Fetch straight segment data.

References [pos1](#), [pos2](#), [segmentId](#), [Parsers::CornuBodyElt::Pos::x](#), and [Parsers::CornuBodyElt::Pos::y](#).

9.31.4.3 InitTSegId()

```
static void Parsers::CornuBodyElt::InitTSegId ( ) [inline], [static]
```

Segment count initializer.

References [segCount](#).

9.31.4.4 MakeCurveSegment()

```
static CornuBodyElt * Parsers::CornuBodyElt::MakeCurveSegment (
    float r,
    float x,
    float y,
    float a0,
    float a1 ) [inline], [static]
```

Create a curve segment (C lines).

References [ang0](#), [ang1](#), [CornuBodyElt\(\)](#), [CornuCurvedSegment](#), [pos1](#), [radius](#), [segCount](#), [segmentId](#), [theType](#), [Parsers::CornuBodyElt::Pos::x](#), and [Parsers::CornuBodyElt::Pos::y](#).

9.31.4.5 MakeStraightSegment()

```
static CornuBodyElt * Parsers::CornuBodyElt::MakeStraightSegment (
    float x1,
    float y1,
    float x2,
    float y2 ) [inline], [static]
```

Create a straight segment (S lines).

References [CornuBodyElt\(\)](#), [CornuStraightSegment](#), [pos1](#), [pos2](#), [segCount](#), [segmentId](#), [theType](#), [Parsers::CornuBodyElt::Pos::x](#), and [Parsers::CornuBodyElt::Pos::y](#).

9.31.4.6 MakeTrackEnd()

```
static CornuBodyElt * Parsers::CornuBodyElt::MakeTrackEnd (
    TrackBodyElt * tbe ) [inline], [static]
```

Create an endpoint (T or E lines).

References [CornuBodyElt\(\)](#), [CornuEnd](#), [theEnd](#), and [theType](#).

9.31.4.7 TheType()

```
CornuBodyEltType Parsers::CornuBodyElt::TheType ( ) const [inline]
```

Type accessor.

References [theType](#).

9.31.5 Friends And Related Function Documentation

9.31.5.1 CornuBody

```
friend class CornuBody [friend]
```

9.31.5.2 TrackGraph

```
friend class TrackGraph [friend]
```

9.31.6 Member Data Documentation

9.31.6.1 ang0

```
float Parsers::CornuBodyElt::ang0 [private]
```

An angle value.

Referenced by [GetCurveSegment\(\)](#), and [MakeCurveSegment\(\)](#).

9.31.6.2 ang1

```
float Parsers::CornuBodyElt::ang1 [private]
```

Another angle value.

Referenced by [GetCurveSegment\(\)](#), and [MakeCurveSegment\(\)](#).

9.31.6.3 pos1

```
Pos Parsers::CornuBodyElt::pos1 [private]
```

First position.

Referenced by [GetCurveSegment\(\)](#), [GetStraightSegment\(\)](#), [MakeCurveSegment\(\)](#), and [MakeStraightSegment\(\)](#).

9.31.6.4 pos2

```
Pos Parsers::CornuBodyElt::pos2 [private]
```

Second position.

Referenced by [GetStraightSegment\(\)](#), and [MakeStraightSegment\(\)](#).

9.31.6.5 radius

```
float Parsers::CornuBodyElt::radius [private]
```

A radius value.

Referenced by [GetCurveSegment\(\)](#), and [MakeCurveSegment\(\)](#).

9.31.6.6 segCount

```
int Parsers::CornuBodyElt::segCount [static], [private]
```

Counter for S and C segments.

Referenced by [InitTSegId\(\)](#), [MakeCurveSegment\(\)](#), and [MakeStraightSegment\(\)](#).

9.31.6.7 segmentId

```
int Parsers::CornuBodyElt::segmentId [private]
```

Segment index (S or C lines).

Referenced by [GetCurveSegment\(\)](#), [GetStraightSegment\(\)](#), [MakeCurveSegment\(\)](#), and [MakeStraightSegment\(\)](#).

9.31.6.8 theEnd

```
TrackBodyElt* Parsers::CornuBodyElt::theEnd [private]
```

Pointer to T or E line data.

Referenced by [Parsers::CornuBody::CleanUpElement\(\)](#), [CornuBodyElt\(\)](#), [Parsers::CornuBody::CornuEnds\(\)](#), and [MakeTrackEnd\(\)](#).

9.31.6.9 theType

```
CornuBodyEltType Parsers::CornuBodyElt::theType [private]
```

Element type.

Referenced by [Parsers::CornuBody::CleanUpElement\(\)](#), [CornuBodyElt\(\)](#), [Parsers::CornuBody::CornuEnds\(\)](#), [Parsers::CornuBody::CornuSegmentCount\(\)](#), [MakeCurveSegment\(\)](#), [MakeStraightSegment\(\)](#), [MakeTrackEnd\(\)](#), and [TheType\(\)](#).

9.32 CTCPanel::Crossing Class Reference

Crossing object type.

Public Member Functions

- [Crossing](#) (name, _ctcpanel, _canvas,...)
Construct a [Crossing](#) object.
- [~Crossing](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the switch.

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.
- [_VerifyCrossingType](#) (option, value)

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

9.32.1 Detailed Description

Crossing object type.

These are on the schematic and represent a piece of track on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the switch on.
...	Options: <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -label The label of the switch (default "1"). • -orientation The orientation (8-way) of the switch (readonly, default 0). • -flipped Whether or not the switch is flipped (readonly, default no). • -type The type of crossing (x90 or x45) (readonly, default x90). • -occupiedcommand A command to run to find out if the switch is occupied (default {}).

Defined coords terminals:

- MainL Mainline left.
- MainR Mainline right.
- AltL Alternative line left.
- AltR Alternative line right.

Defined values (states): none. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.32.2 Constructor & Destructor Documentation**9.32.2.1 Crossing()**

```
CTCPanel::Crossing::Crossing (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [Crossing](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the Crossing on.
<code>...</code>	Option list.

9.32.2.2 ~Crossing()

```
CTCPanel::Crossing::~~Crossing ( )
```

Clean up all data objects and free up all resources.

9.32.3 Member Function Documentation**9.32.3.1 _configureLabel()**

```
CTCPanel::Crossing::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.32.3.2 `_VerifyCrossingType()`

```
CTCPanel::Crossing::_VerifyCrossingType (
    option ,
    value ) [private]
```

References [FileEntry::create\(\)](#).

9.32.3.3 `geti()`

```
CTCPanel::Crossing::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.32.3.4 `getv()`

```
CTCPanel::Crossing::getv ( )
```

Method to get our value (state).

9.32.3.5 `invoke()`

```
CTCPanel::Crossing::invoke ( )
```

Method to invoke the switch.

9.32.3.6 `seti()`

```
CTCPanel::Crossing::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.32.3.7 `setv()`

```
CTCPanel::Crossing::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.32.4 Member Data Documentation

9.32.4.1 canvas

CTCPanel::Crossing::canvas [private]

The canvas component (parent widget component).

9.32.4.2 ctcpnl

CTCPanel::Crossing::ctcpnl [private]

The CTC Panel component (parent widget).

9.33 CTCPanel::Crossover Class Reference

[Crossover](#) (turnout) object type.

Public Member Functions

- [Crossover](#) (name, _ctcpnl, _canvas,...)
Construct a [Crossover](#) object.
- [~Crossover](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the switch.

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).
- [state](#)
The state of the points.

9.33.1 Detailed Description

[Crossover](#) (turnout) object type.

These are on the schematic and represent a [Crossover](#) on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the switch on.
...	Options: <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -label The label of the switch (default "1"). • -orientation The orientation (8-way) of the switch (readonly, default 0). • -flipped Whether or not the switch is flipped (readonly, default no). • -statecommand A command to run to get the switch's state (default {}). • -occupiedcommand A command to run to find out if the switch is occupied (default {}).

Defined coords terminals:

- Main1L Upper left mainline.
- Main2L Lower left mainline.
- Main1R Upper right mainline.
- Main2R Lower right mainline.

Defined values (states):

- Normal Points are aligned for the mainline.
- Reverse Points are aligned for the branchline.
- Unknown Point are not aligned for any route (eg points are in motion).

Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.33.2 Constructor & Destructor Documentation

9.33.2.1 Crossover()

```
CTCPanel::Crossover::Crossover (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [Crossover](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the Crossover on.
<code>...</code>	Option list.

9.33.2.2 ~Crossover()

```
CTCPanel::Crossover::~~Crossover ( )
```

Clean up all data objects and free up all resources.

9.33.3 Member Function Documentation

9.33.3.1 `_configureLabel()`

```
CTCPanel::Crossover::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.33.3.2 `geti()`

```
CTCPanel::Crossover::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.33.3.3 `getv()`

```
CTCPanel::Crossover::getv ( )
```

Method to get our value (state).

9.33.3.4 `invoke()`

```
CTCPanel::Crossover::invoke ( )
```

Method to invoke the switch.

References [FileEntry::create\(\)](#).

9.33.3.5 `seti()`

```
CTCPanel::Crossover::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.33.3.6 `setv()`

```
CTCPanel::Crossover::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.33.4 Member Data Documentation

9.33.4.1 canvas

CTCPanel::Crossover::canvas [private]

The canvas component (parent widget component).

9.33.4.2 ctcpnl

CTCPanel::Crossover::ctcpnl [private]

The CTC Panel component (parent widget).

9.33.4.3 state

CTCPanel::Crossover::state [private]

The state of the points.

9.34 FCFSupport::PDFFileStructures::CrossReferenceTable Class Reference

The cross reference table object.

```
#include <PDFPrinterSupport.h>
```

Public Member Functions

- [CrossReferenceTable](#) ()
Constructor.
- [~CrossReferenceTable](#) ()
Destructor.
- void [AddIndirectObjectToTable](#) ([IndirectObject](#) *obj)
Add an indirect object to the cross reference table.
- streampos [WriteTable](#) (ostream &stream) const
Write this cross reference table out.
- unsigned long int [HighestObjectNumber](#) () const
Return the highest object number.

Private Types

- typedef map< unsigned long int, [IndirectObject](#) *, less< unsigned long int > > [objectMap](#)
The object table type.

Private Member Functions

- void [FreeObject](#) (unsigned long int objNum)
Free up a object slot in the cross reference table.

Private Attributes

- [objectMap](#) [objectTable](#)
The table of objects.

Static Private Attributes

- static unsigned long int [lastObjectNumber](#)
The last used object number.

Friends

- class [IndirectObject](#)

9.34.1 Detailed Description

The cross reference table object.

The stricture holds the cross-reference table, which is used to index and access indirect objects of various sorts.

Author

Robert Heller <heller@deepsoft.com>

9.34.2 Member Typedef Documentation

9.34.2.1 objectMap

```
typedef map<unsigned long int, IndirectObject*, less<unsigned long int> > FCFSupport::PDFFileStructures::CrossReferenceTable  
[private]
```

The object table type.

9.34.3 Constructor & Destructor Documentation

9.34.3.1 CrossReferenceTable()

```
FCFSupport::PDFFileStructures::CrossReferenceTable::CrossReferenceTable ( )
```

Constructor.

Initialize a cross reference table object.

9.34.3.2 ~CrossReferenceTable()

```
FCFSupport::PDFFileStructures::CrossReferenceTable::~~CrossReferenceTable ( ) [inline]
```

Destructor.

Cleans things up.

9.34.4 Member Function Documentation

9.34.4.1 AddIndirectObjectToTable()

```
void FCFSupport::PDFFileStructures::CrossReferenceTable::AddIndirectObjectToTable (   
    IndirectObject * obj )
```

Add an indirect object to the cross reference table.

Parameters

<i>obj</i>	The object to add.
------------	--------------------

9.34.4.2 FreeObject()

```
void FCFSupport::PDFFileStructures::CrossReferenceTable::FreeObject (
    unsigned long int objNum ) [private]
```

Free up a object slot in the cross reference table.

Parameters

<i>objNum</i>	The object number to free up.
---------------	-------------------------------

Referenced by [FCFSupport::PDFFileStructures::IndirectObject::~~IndirectObject\(\)](#).

9.34.4.3 HighestObjectNumber()

```
unsigned long int FCFSupport::PDFFileStructures::CrossReferenceTable::HighestObjectNumber ( )
const [inline]
```

Return the highest object number.

References [lastObjectNumber](#).

9.34.4.4 WriteTable()

```
streampos FCFSupport::PDFFileStructures::CrossReferenceTable::WriteTable (
    ostream & stream ) const
```

Write this cross reference table out.

Returns the file position.

Parameters

<i>stream</i>	The stream to write to.
---------------	-------------------------

9.34.5 Friends And Related Function Documentation

9.34.5.1 IndirectObject

```
friend class IndirectObject [friend]
```

9.34.6 Member Data Documentation

9.34.6.1 lastObjectNumber

```
unsigned long int FCFSupport::PDFFileStructures::CrossReferenceTable::lastObjectNumber [static],  
[private]
```

The last used object number.

Referenced by [HighestObjectNumber\(\)](#).

9.34.6.2 objectTable

```
objectMap FCFSupport::PDFFileStructures::CrossReferenceTable::objectTable [private]
```

The table of objects.

9.35 CTCPanel::CTCLabel Class Reference

CTC Label object type.

Public Member Functions

- [CTCLabel](#) (name, _ctcpanel, _canvas,...)
Construct a Label object.
- [~CTCLabel](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (none).
- [setv](#) (state)
Method to set out value (level position).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the label.

Private Member Functions

- [_configureColor](#) (option, value)
Method to update the color of the label.
- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

9.35.1 Detailed Description

CTC Label object type.

These are on the control panel and represent a label on the CTC Panel

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The control panel canvas to draw the label on.
...	Options: <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -color The color of the label (default white). • -label The label of the label (default "").

Defined coords terminals: none. Defined values (states): none. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.35.2 Constructor & Destructor Documentation

9.35.2.1 CTCLabel()

```
CTCPanel::CTCLabel::CTCLabel (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a Label object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the CTCLabel on.
<code>...</code>	Option list.

9.35.2.2 ~CTCLabel()

```
CTCPanel::CTCLabel::~~CTCLabel ( )
```

Clean up all data objects and free up all resources.

9.35.3 Member Function Documentation

9.35.3.1 _configureColor()

```
CTCPanel::CTCLabel::_configureColor (
    option ,
    value ) [private]
```

Method to update the color of the label.

9.35.3.2 `_configureLabel()`

```
CTCPanel::CTCLabel::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.35.3.3 `geti()`

```
CTCPanel::CTCLabel::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.35.3.4 `getv()`

```
CTCPanel::CTCLabel::getv ( )
```

Method to get our value (none).

9.35.3.5 `invoke()`

```
CTCPanel::CTCLabel::invoke ( )
```

Method to invoke the label.

9.35.3.6 `seti()`

```
CTCPanel::CTCLabel::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.35.3.7 setv()

```
CTCPanel::CTCLabel::setv (  
    state )
```

Method to set out value (level position).

9.35.4 Member Data Documentation

9.35.4.1 canvas

```
CTCPanel::CTCLabel::canvas [private]
```

The canvas component (parent widget component).

9.35.4.2 ctcpnl

```
CTCPanel::CTCLabel::ctcpnl [private]
```

The CTC Panel component (parent widget).

9.36 CTCPanel::CTCPanel Class Reference

Main CTC Panel megawidget.

Public Member Functions

- [CTCPanel](#) (name,...)
Build and install all component widgets and process configuration.
- [updateSR](#) (canvas, newheight, newwidth)
Method to update one of the canvases scroll region.
- [zoomBy](#) (zoomFactor)
Method to zoom the display by a zoom factor.
- [setZoom](#) (zoomFactor)
Method to set the zoom factor to a specific factor.
- [getZoom](#) ()
Return the zoom (scaling) factor.
- [getv](#) (name)
Method to get the value (or state) of an object.

- [setv](#) (name, value)
Method to set the value (or state) of an object.
- [geti](#) (name, ind)
Method to get the indicator state of an object.
- [seti](#) (name, ind, value)
Method to set the indicator state of an object.
- [itemcget](#) (name, option)
Method to get a configuration option from an object.
- [itemconfigure](#) (name,...)
Method to set a configuration option from an object.
- [exists](#) (name)
Test if the named object exists.
- [delete](#) (name)
Delete a named object.
- [move](#) (name, x, y)
Move a named object.
- [invoke](#) (name)
Method to invoke an object.
- [coords](#) (name, tname)
Method to fetch the coordinates of some part of an object.
- [bind](#) (name,...)
Method to set a binding on an Object.
- [print](#) (name, fp)
Method to print the named object to the specified file channel.
- [objectlist](#) (cp="", class="")
Method to return the list of objects.
- [cplist](#) ()
Method to return the list of controlpoints.
- [create_SWPlate](#) (name,...)
Method to create a switch plate object.
- [create_SIGPlate](#) (name,...)
Method to create a signal plate object.
- [create_CodeButton](#) (name,...)
Method to create a code button object.
- [create_Toggle](#) (name,...)
Method to create a toggle switch object.
- [create_Lamp](#) (name,...)
Method to create a lamp object.
- [create_CTCLabel](#) (name,...)
Method to create a CTC Label label object.
- [create_Switch](#) (name,...)
Method to create a switch (turnout) object.
- [create_SchLabel](#) (name,...)
Method to create a schematic label object.
- [create_StraightBlock](#) (name,...)
Method to create a straight block of track object.
- [create_EndBumper](#) (name,...)

- Method to create a end bumper of track object.*

 - [create_CurvedBlock](#) (name,...)
- Method to create a curved block of track object.*

 - [create_ScissorCrossover](#) (name,...)
- Method to create a scissor crossover object.*

 - [create_Crossover](#) (name,...)
- Method to create a crossover object.*

 - [create_Crossing](#) (name,...)
- Method to create a track crossing object.*

 - [create_SingleSlip](#) (name,...)
- Method to create a single slip object.*

 - [create_DoubleSlip](#) (name,...)
- Method to create a double slip object.*

 - [create_ThreeWaySW](#) (name,...)
- Method to create a three way switch object.*

 - [create_HiddenBlock](#) (name,...)
- Method to create a hidden block of track object.*

 - [create_StubYard](#) (name,...)
- Method to create a stub (deadend) yard object.*

 - [create_ThroughYard](#) (name,...)
- Method to create a through yard object.*

 - [create_PushButton](#) (name,...)
- Method to create a push button object.*

 - [create_Signal](#) (name,...)
- Method to create a signal object.*

 - [schematic_crosshair](#) (...)
- Display crosshairs on the schematic canvas.*

 - [controls_crosshair](#) (...)
- Display crosshairs on the controls canvas.*

Protected Member Functions

- [checkInitCP](#) (cp)

Method to check that a control point has been initialized.
- [updateAndSyncCP](#) (cp)

Method to update and synchronize a control point.
- [lappendCP](#) (cp, slot, what)

Method to lappend something to a slot in a control point's data.
- [lremoveCP](#) (cp, slot, what)

Method to remove something from a slot in a control point's data.

Private Member Functions

- [_PosInteger](#) (option, value)
Method to validate a positive non zero integer option.
- [_CtcMainSyncX](#) (this, other, first, last)
Internal method to x scroll updates.
- [_CtcMainHScroll2](#) (...)
Internal method to scroll two canvases at the same time.
- [_crosshairStart](#) (canvas, xvar, yvar)
Start using the crosshairs.
- [_crosshairMove](#) (canvas, xvar, yvar, mx, my)
Bound to mouse movement events.
- [_crosshairEnd](#) (canvas, xvar, yvar, mx, my)
Bound to left button down.

Private Attributes

- [schematic](#)
The schematic component.
- [schematicYscroll](#)
The schematic y scroll bar component.
- [xscroll](#)
The shared x scroll bar component.
- [controls](#)
The controls component.
- [controlsYscroll](#)
The controls y scroll bar component.
- [scale](#)
The current scale value.
- [CPList](#)
The list of control points.
- [CPData](#)
The Control point data array.
- [Objects](#)
The object array.
- [_ch_oldgrab](#)
Used save the old grab.
- [_ch_oldfocus](#)
Used save the old focus.

9.36.1 Detailed Description

Main CTC Panel megawidget.

This megawidget implements two display areas, each with a vertical (Y) scrollbar. They share a horizontal (X) scrollbar. The upper display area contains schematic trackwork and the lower display area contains various switches, buttons, and lamps that deal with trackage control points.

Parameters

<i>path</i>	Pathname of the widget.
...	Options: <ul style="list-style-type: none"> • <code>-schematicbackground</code> The background color of the schematic display. Defaults to black. • <code>-controlbackground</code> The background color of the control display. Defaults to darkgreen. • <code>-width</code> The total width of the megawidget. • <code>-height</code> The total height of the megawidget.

Author

Robert Heller <heller@deepsoft.com>

9.36.2 Constructor & Destructor Documentation

9.36.2.1 CTCPanel()

```
CTCPanel::CTCPanel::CTCPanel (
    name ,
    ... )
```

Build and install all component widgets and process configuration.

Parameters

...	Argument list (option value pairs). Gets passed to the implicitly defined <code>configurelist</code> method.
-----	--

9.36.3 Member Function Documentation

9.36.3.1 _crosshairEnd()

```
CTCPanel::CTCPanel::_crosshairEnd (
    canvas ,
```

```

        xvar ,
        yvar ,
        mx ,
        my ) [private]

```

Bound to left button down.

Ends crosshairs and returns the results.

Parameters

<i>canvas</i>	The canvas the crosshairs are on.
<i>xvar</i>	The name of the global variable to receive the X result.
<i>yvar</i>	The name of the global variable to receive the Y result.
<i>mx</i>	The X mouse position.
<i>my</i>	The Y mouse position.

9.36.3.2 `_crosshairMove()`

```

CTCPanel::CTCPanel::_crosshairMove (
    canvas ,
    xvar ,
    yvar ,
    mx ,
    my ) [private]

```

Bound to mouse movement events.

Parameters

<i>canvas</i>	The canvas the crosshairs are on.
<i>xvar</i>	The name of the global variable to receive the X result.
<i>yvar</i>	The name of the global variable to receive the Y result.
<i>mx</i>	The X mouse position.
<i>my</i>	The Y mouse position.

9.36.3.3 `_crosshairStart()`

```

CTCPanel::CTCPanel::_crosshairStart (
    canvas ,
    xvar ,
    yvar ) [private]

```

Start using the crosshairs.

Parameters

<i>canvas</i>	The canvas the crosshairs are on.
<i>xvar</i>	The name of the global variable to receive the X result.
<i>yvar</i>	The name of the global variable to receive the Y result.

9.36.3.4 _CtcMainHScroll2()

```
CTCPanel::CTCPanel::_CtcMainHScroll2 (  
    ... ) [private]
```

Internal method to scroll two canvases at the same time.

Bound to the horizontal scrollbar's -command.

Parameters

...	The arguments passed from the scroll bar.
-----	---

9.36.3.5 _CtcMainSyncX()

```
CTCPanel::CTCPanel::_CtcMainSyncX (  
    this ,  
    other ,  
    first ,  
    last ) [private]
```

Internal method to x scroll updates.

Updates the scrolling for both canvases, making sure that they are in sync. The scrollbar is also updated. This method is bound to the -xscrollcommands of the schematic and controls canvases.

Parameters

<i>this</i>	The canvas whose scrolling changed.
<i>other</i>	The other canvas, which needs to be synchronized.
<i>first</i>	The coordinate of the first (left most) visible part of the canvas. Passed from the canvas.
<i>last</i>	The coordinate of the last (right most) visible part of the canvas. Passed from the canvas.

9.36.3.6 `_PosInteger()`

```
CTCPanel::CTCPanel::_PosInteger (
    option ,
    value ) [private]
```

Method to validate a positive non zero integer option.

Parameters

<i>option</i>	The option name.
<i>value</i>	The value to validate.

9.36.3.7 `bind()`

```
CTCPanel::CTCPanel::bind (
    name ,
    ... )
```

Method to set a binding on an Object.

Parameters

<i>name</i>	The name of the object to set a binding on.
<i>sequence</i>	The event sequence to bind to.
<i>script</i>	The script to run when the binding event occurs. If the script is prefixed with a "+", it is appended to any existing script.

Returns

The empty string in all cases where script is non-empty. If the script is missing, returns the current binding for the specified sequence. If neither sequence nor script is supplied, then returns a list of all bindings. See the bind sub-command of canvas.

9.36.3.8 `checkInitCP()`

```
CTCPanel::CTCPanel::checkInitCP (
    cp ) [protected]
```

Method to check that a control point has been initialized.

Should only be called from object constructors.

Parameters

<i>cp</i>	The name of the control point.
-----------	--------------------------------

9.36.3.9 controls_crosshair()

```
CTCPanel::CTCPanel::controls_crosshair (
    ... )
```

Display crosshairs on the controls canvas.

Parameters

...	Options: <ul style="list-style-type: none">• -xvar Global variable to receive the X result.• -yvar Global variable to receive the Y result.
-----	--

9.36.3.10 coords()

```
CTCPanel::CTCPanel::coords (
    name ,
    tname )
```

Method to fetch the coordinates of some part of an object.

Parameters

<i>name</i>	The name of the object to fetch coordinates from.
<i>tname</i>	The name of the terminal of the object to fetch the coordinates of. See the individual element descriptions for valid terminal names.

9.36.3.11 cplist()

```
CTCPanel::CTCPanel::cplist ( )
```

Method to return the list of controlpoints.

9.36.3.12 create_CodeButton()

```
CTCPanel::CTCPanel::create_CodeButton (
    name ,
    ... )
```

Method to create a code button object.

Parameters

<i>name</i>	The name of the new code button.
...	The argument list for the object constructor.

See [CodeButton](#) for details.

9.36.3.13 create_Crossing()

```
CTCPanel::CTCPanel::create_Crossing (
    name ,
    ... )
```

Method to create a track crossing object.

Parameters

<i>name</i>	The name of the new crossing.
...	The argument list for the object constructor.

See [Crossing](#) for details.

9.36.3.14 create_Crossover()

```
CTCPanel::CTCPanel::create_Crossover (
    name ,
    ... )
```

Method to create a crossover object.

Parameters

<i>name</i>	The name of the new crossover.
...	The argument list for the object constructor.

See [Crossover](#) for details.

9.36.3.15 create_CTCLabel()

```
CTCPanel::CTCPanel::create_CTCLabel (
    name ,
    ... )
```

Method to create a CTC Label label object.

Parameters

<i>name</i>	The name of the new label.
...	The argument list for the object constructor.

See [CTCLabel](#) for details.

9.36.3.16 create_CurvedBlock()

```
CTCPanel::CTCPanel::create_CurvedBlock (
    name ,
    ... )
```

Method to create a curved block of track object.

Parameters

<i>name</i>	The name of the new track block.
...	The argument list for the object constructor.

See [CurvedBlock](#) for details.

9.36.3.17 create_DoubleSlip()

```
CTCPanel::CTCPanel::create_DoubleSlip (
    name ,
    ... )
```

Method to create a double slip object.

Parameters

<i>name</i>	The name of the new switch.
...	The argument list for the object constructor.

See [DoubleSlip](#) for details.

9.36.3.18 create_EndBumper()

```
CTCPanel::CTCPanel::create_EndBumper (
    name ,
    ... )
```

Method to create a end bumper of track object.

Parameters

<i>name</i>	The name of the new track block.
...	The argument list for the object constructor.

See [EndBumper](#) for details.

9.36.3.19 create_HiddenBlock()

```
CTCPanel::CTCPanel::create_HiddenBlock (
    name ,
    ... )
```

Method to create a hidden block of track object.

Parameters

<i>name</i>	The name of the new track block.
...	The argument list for the object constructor.

See [HiddenBlock](#) for details.

9.36.3.20 create_Lamp()

```
CTCPanel::CTCPanel::create_Lamp (
    name ,
    ... )
```

Method to create a lamp object.

Parameters

<i>name</i>	The name of the new lamp.
...	The argument list for the object constructor.

See [Lamp](#) for details.

9.36.3.21 create_PushButton()

```
CTCPanel::CTCPanel::create_PushButton (
    name ,
    ... )
```

Method to create a push button object.

Parameters

<i>name</i>	The name of the push button.
...	The argument list for the object constructor.

See [PushButton](#) for details.

9.36.3.22 create_SchLabel()

```
CTCPanel::CTCPanel::create_SchLabel (
    name ,
    ... )
```

Method to create a schematic label object.

Parameters

<i>name</i>	The name of the new label.
...	The argument list for the object constructor.

See [SchLabel](#) for details.

9.36.3.23 create_ScissorCrossover()

```
CTCPanel::CTCPanel::create_ScissorCrossover (
    name ,
    ... )
```

Method to create a scissor crossover object.

Parameters

<i>name</i>	The name of the new crossover.
...	The argument list for the object constructor.

See [ScissorCrossover](#) for details.

9.36.3.24 create_Signal()

```
CTCPanel::CTCPanel::create_Signal (
    name ,
    ... )
```

Method to create a signal object.

Parameters

<i>name</i>	The name of the signal.
...	The argument list for the object constructor.

See [Signal](#) for details.

9.36.3.25 create_SIGPlate()

```
CTCPanel::CTCPanel::create_SIGPlate (
    name ,
    ... )
```

Method to create a signal plate object.

Parameters

<i>name</i>	The name of the new signal plate.
...	The argument list for the object constructor.

See [SIGPlate](#) for details.

9.36.3.26 create_SingleSlip()

```
CTCPanel::CTCPanel::create_SingleSlip (
    name ,
    ... )
```

Method to create a single slip object.

Parameters

<i>name</i>	The name of the new switch.
...	The argument list for the object constructor.

See [SingleSlip](#) for details.

9.36.3.27 create_StraightBlock()

```
CTCPanel::CTCPanel::create_StraightBlock (
    name ,
    ... )
```

Method to create a straight block of track object.

Parameters

<i>name</i>	The name of the new track block.
...	The argument list for the object constructor.

See [StraightBlock](#) for details.

9.36.3.28 create_StubYard()

```
CTCPanel::CTCPanel::create_StubYard (
    name ,
    ... )
```

Method to create a stub (deadend) yard object.

Parameters

<i>name</i>	The name of the new yard.
...	The argument list for the object constructor.

See [StubYard](#) for details.

9.36.3.29 create_Switch()

```
CTCPanel::CTCPanel::create_Switch (
    name ,
    ... )
```

Method to create a switch (turnout) object.

Parameters

<i>name</i>	The name of the new switch.
...	The argument list for the object constructor.

See [Switch](#) for details.

9.36.3.30 create_SWPlate()

```
CTCPanel::CTCPanel::create_SWPlate (
    name ,
    ... )
```

Method to create a switch plate object.

Parameters

<i>name</i>	The name of the new switch plate.
...	The argument list for the object constructor.

See [SWPlate](#) for details.

9.36.3.31 create_ThreeWaySW()

```
CTCPanel::CTCPanel::create_ThreeWaySW (
    name ,
    ... )
```

Method to create a three way switch object.

Parameters

<i>name</i>	The name of the new switch.
...	The argument list for the object constructor.

See [ThreeWaySW](#) for details.

9.36.3.32 create_ThroughYard()

```
CTCPanel::CTCPanel::create_ThroughYard (
    name ,
    ... )
```

Method to create a through yard object.

Parameters

<i>name</i>	The name of the new yard.
...	The argument list for the object constructor.

See [ThroughYard](#) for details.

9.36.3.33 create_Toggle()

```
CTCPanel::CTCPanel::create_Toggle (
    name ,
    ... )
```

Method to create a toggle switch object.

Parameters

<i>name</i>	The name of the new toggle switch.
...	The argument list for the object constructor.

See [Toggle](#) for details.

9.36.3.34 delete()

```
CTCPanel::CTCPanel::delete (
    name )
```

Delete a named object.

Parameters

<i>name</i>	The name of the object to delete.
-------------	-----------------------------------

9.36.3.35 exists()

```
CTCPanel::CTCPanel::exists (
    name )
```

Test if the named object exists.

Parameters

<i>name</i>	The object to test for.
-------------	-------------------------

9.36.3.36 geti()

```
CTCPanel::CTCPanel::geti (
    name ,
    ind )
```

Method to get the indicator state of an object.

Parameters

<i>name</i>	The name of the object to fetch the indicator state of.
<i>ind</i>	The indicator whose state is return. See the individual element descriptions for valid indicator names.

9.36.3.37 getv()

```
CTCPanel::CTCPanel::getv (
    name )
```

Method to get the value (or state) of an object.

Parameters

<i>name</i>	The name of the object to fetch the value of.
-------------	---

9.36.3.38 getZoom()

```
CTCPanel::CTCPanel::getZoom ( )
```

Return the zoom (scaling) factor.

9.36.3.39 invoke()

```
CTCPanel::CTCPanel::invoke (
    name )
```

Method to invoke an object.

Returns true if the element is occupied.

Parameters

<i>name</i>	The name of the object to invoke.
-------------	-----------------------------------

See the individual object invoke methods for details.

9.36.3.40 itemcget()

```
CTCPanel::CTCPanel::itemcget (
    name ,
    option )
```

Method to get a configuration option from an object.

Parameters

<i>name</i>	The object whose configuration option is to be fetched from.
<i>option</i>	The option to fetch. See the individual element descriptions for valid options.

9.36.3.41 itemconfigure()

```
CTCPanel::CTCPanel::itemconfigure (
    name ,
    ... )
```

Method to set a configuration option from an object.

Parameters

<i>name</i>	The object whose configuration option is to be configured.
...	The configuration arguments.

9.36.3.42 lappendCP()

```
CTCPanel::CTCPanel::lappendCP (
    cp ,
    slot ,
    what ) [protected]
```

Method to lappend something to a slot in a control point's data.

Should only be called from object constructors.

Parameters

<i>cp</i>	The control point to update.
<i>slot</i>	The slot to update.
<i>what</i>	The object to add to the slot.

9.36.3.43 lremoveCP()

```
CTCPanel::CTCPanel::lremoveCP (
    cp ,
    slot ,
    what ) [protected]
```

Method to remove something from a slot in a control point's data.

Should only be called from object destructors.

Parameters

<i>cp</i>	The control point to update.
<i>slot</i>	The slot to update.
<i>what</i>	The object to remove from the slot.

9.36.3.44 move()

```
CTCPanel::CTCPanel::move (
    name ,
    x ,
    y )
```

Move a named object.

Parameters

<i>name</i>	The name of the object to be moved.
<i>x</i>	The amount of the x movement.
<i>y</i>	The amount of the y movement.

9.36.3.45 objectlist()

```
CTCPanel::CTCPanel::objectlist (
    cp    = "",
    class  = "" )
```

Method to return the list of objects.

Parameters

<i>cp</i>	(optional) The name of control point to return the object of. If cp is the empty string, return all objects.
<i>class</i>	(optional) The class of objects to return. If class is the empty string, return all classes of objects.

9.36.3.46 print()

```
CTCPanel::CTCPanel::print (
    name ,
    fp   )
```

Method to print the named object to the specified file channel.

Parameters

<i>name</i>	The object to print.
<i>fp</i>	The file channel to print to.

9.36.3.47 schematic_crosshair()

```
CTCPanel::CTCPanel::schematic_crosshair (
    ... )
```

Display crosshairs on the schematic canvas.

Parameters

...	Options: <ul style="list-style-type: none">• -xvar Global variable to receive the X result.• -yvar Global variable to receive the Y result.
-----	--

9.36.3.48 seti()

```
CTCPanel::CTCPanel::seti (
    name ,
    ind ,
    value )
```

Method to set the indicator state of an object.

Parameters

<i>name</i>	The name of the object whose indicator state is to be set.
<i>ind</i>	The indicator to update. See the individual element descriptions for valid indicator names.
<i>value</i>	The new indicator value, generally on or off.

9.36.3.49 setv()

```
CTCPanel::CTCPanel::setv (
    name ,
    value )
```

Method to set the value (or state) of an object.

Parameters

<i>name</i>	The name of the object to update.
<i>value</i>	The value to set it to. See the individual element descriptions for valid values.

9.36.3.50 setZoom()

```
CTCPanel::CTCPanel::setZoom (
    zoomFactor )
```

Method to set the zoom factor to a specific factor.

Parameters

<i>zoomFactor</i>	The zoom factor.
-------------------	------------------

9.36.3.51 updateAndSyncCP()

```
CTCPanel::CTCPanel::updateAndSyncCP (
    cp ) [protected]
```

Method to update and synchronize a control point.

Should only be called from object methods.

Parameters

<i>cp</i>	The name of the control point.
-----------	--------------------------------

9.36.3.52 updateSR()

```
CTCPanel::CTCPanel::updateSR (
    canvas ,
    newheight ,
    newwidth )
```

Method to update one of the canvases scroll region.

Bound to the Configure event of each of the canvases.

Parameters

<i>canvas</i>	The canvas to update.
<i>newheight</i>	The new height.
<i>newwidth</i>	The new width.

9.36.3.53 zoomBy()

```
CTCPanel::CTCPanel::zoomBy (
    zoomFactor )
```

Method to zoom the display by a zoom factor.

Parameters

<i>zoomFactor</i>	The zoom factor.
-------------------	------------------

9.36.4 Member Data Documentation

9.36.4.1 `_ch_oldfocus`

`CTCPanel::CTCPanel::_ch_oldfocus` [private]

Used save the old focus.

9.36.4.2 `_ch_oldgrab`

`CTCPanel::CTCPanel::_ch_oldgrab` [private]

Used save the old grab.

9.36.4.3 `controls`

`CTCPanel::CTCPanel::controls` [private]

The controls component.

9.36.4.4 `controlsYscroll`

`CTCPanel::CTCPanel::controlsYscroll` [private]

The controls y scroll bar component.

9.36.4.5 CPData

CTCPanel::CTCPanel::CPData [private]

The Control point data array.

9.36.4.6 CPList

CTCPanel::CTCPanel::CPList [private]

The list of control points.

9.36.4.7 Objects

CTCPanel::CTCPanel::Objects [private]

The object array.

9.36.4.8 scale

CTCPanel::CTCPanel::scale [private]

The current scale value.

9.36.4.9 schematic

CTCPanel::CTCPanel::schematic [private]

The schematic component.

9.36.4.10 schematicYscroll

CTCPanel::CTCPanel::schematicYscroll [private]

The schematic y scroll bar component.

9.36.4.11 xscroll

CTCPanel::CTCPanel::xscroll [private]

The shared x scroll bar component.

9.37 ctiacela::CTIAcela Class Reference

Main [CTIAcela](#) interface class.

Public Member Functions

- [CTIAcela](#) (name, port,...)
Constructor: open a connection to the CTI Acela.
- [~CTIAcela](#) ()
The destructor restores the serial port's state and closes it.
- [HaveData](#) ()
- [OnlineP](#) ()
- [Activate](#) (address)
Activate a control.
- [Deactive](#) (address)
Deactive a control.
- [PulseOn](#) (address, pulsewidth)
Pulse On a control.
- [PulseOff](#) (address, pulsewidth)
Pulse Off a control.
- [Blink](#) (address, pulsewidth)
Blink a control.
- [ReverseBlink](#) (address, pulsewidth)
Reverse Blink a control.
- [Control4](#) (address, c1, c2, c3, c4)
Configure 4 controls simultaneously.
- [Control8](#) (address, c1, c2, c3, c4, c5, c6, c7, c8)
Configure 8 controls simultaneously.
- [Control16](#) (address, c1, c2, c3, c4, c5, c6, c7, c8, c9, c10, c11, c12, c13, c14, c15, c16)
Configure 16 controls simultaneously.
- [Throttle](#) (address, speed, momentum, brake, direction, idle)
Throttle command.
- [EmergencyStop](#) ()
Emergency Stop.
- [Signal2](#) (address, lamp1, lamp2, yellow="off")
Control 2-lamp signals.
- [Signal3](#) (address, lamp1, lamp2, lamp3)
Control 3-lamp signals.
- [Signal4](#) (address, lamp1, lamp2, lamp3, lamp4)

- Control 4-lamp signals.*
- [SignalSettings](#) (blinkrate, yellowhue)
Set Signal Settings.
- [SignalBrightness](#) (brightness)
Set signal brightness.
- [ConfigureSensor](#) (address, threshold, select, polarity)
Configure a sensor.
- [Read](#) (address)
Read the state of a sensor.
- [Read4](#) (address)
Read the state of four sensors.
- [Read8](#) (address)
Read the state of eight sensors.
- [Read16](#) (address)
Read the state of sixteen sensors.
- [ReadAll](#) ()
Read all sensors.
- [SRQControl](#) (enable="yes")
Enable or disable SRQ messages.
- [Query](#) ()
Query sensor change state.
- [ResetNetwork](#) ()
Reset the network.
- [NetworkOnline](#) ()
Bring the network online.
- [NetworkOffline](#) ()
Bring the network offline.
- [Poll](#) ()
Poll the network configuration.
- [ReadRevision](#) ()
Read CTI Acela firmware revision.

Static Public Member Functions

- static [validate](#) (object)
Type validation method.

Private Member Functions

- [_handleSRQ](#) ()
Handle a service request.
- [_transmit](#) (buffer, responsebytes=0)
Transmit buffer and wait for response.
- [_readevent](#) ()
Read event method.
- [_readbyte](#) (thebytevar)
Read a single byte from the serial interface.

Static Private Member Functions

- static [highbyte](#) (addr)
Return the high byte of address.
- static [lowbyte](#) (addr)
Return the low byte of address.
- static [pack4](#) (b1, b2, b3, b4)
pack 4 bits
- static [pack8](#) (b1, b2, b3, b4, b5, b6, b7, b8)
pack 4 bits

Private Attributes

- [ttyfd](#)
Terminal file descriptor.
- [dataavailable](#)
Flag set to true (yes) when sensor data is available.
- [networkonline](#)
Flag set to false (no) when the network goes offline.
- [_timeout](#)
Timeout flag.

Static Private Attributes

- static [Responses](#)
Responses.
- static [Opcodes](#)
Opcodes.
- static [LampBits](#)
Lamp Bits.
- static [FilterSelectBits](#)
Filter Select Bits.
- static [CTI_DeviceMap](#)
CTI Module Map.
- static [maxtries](#)
Loop control for read attempts.

9.37.1 Detailed Description

Main [CTIAcela](#) interface class.

Parameters

<i>name</i>	Name of the CTIAcela interface instance.
<i>port</i>	Name of the serial port connected to the CTI Acela. Either something like /dev/ttySN for real serial ports or /dev/ttyACM0 for a USB connected Acela.

Author

Robert Heller <heller@deepsoft.com>

9.38 CTCPanel::CurvedBlock Class Reference

Curved Block object type.

Public Member Functions

- [CurvedBlock](#) (name, _ctcpanel, _canvas,...)
Construct a [CurvedBlock](#) object.
- [~CurvedBlock](#) ()
Clean up all data objects and free up all resources.
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the [CurvedBlock](#).

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Static Private Member Functions

- static [_square](#) (x)
Typemethod to compute the square of a number.
- static [_RadiansToDegrees](#) (rads)
Typemethod to convert from radians to degrees.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

Static Private Attributes

- static `_PI`
PI is π .

9.38.1 Detailed Description

Curved Block object type.

These are on the schematic and represent a piece of track on the Schematic.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the CurvedBlock on.
...	Options: <ul style="list-style-type: none"> • <code>-x1</code> The first x coordinate of the object (readonly, default 0). • <code>-y1</code> The first y coordinate of the object (readonly, default 0). • <code>-x2</code> The second x coordinate of the object (readonly, default 0). • <code>-y2</code> The second y coordinate of the object (readonly, default 0). • <code>-radius</code> The radius of the curve (readonly, default 10). • <code>-controlpoint</code> The name of the control point this label is part of (readonly, default MainLine). • <code>-label</code> The label of the CurvedBlock (default ""). • <code>-position</code> The position of the label (readonly, default below). • <code>-occupiedcommand</code> A command to run to find out if the block is occupied (default {}).

Defined coords terminals:

- E1 First endpoint.
- E2 Second endpoint.

Defined values (states): none. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.38.2 Constructor & Destructor Documentation

9.38.2.1 CurvedBlock()

```
CTCPanel::CurvedBlock::CurvedBlock (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [CurvedBlock](#) object.

See @FinnApr04@ for an explanation of the underlying math.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the CurvedBlock on.
<code>...</code>	Option list.

9.38.2.2 ~CurvedBlock()

```
CTCPanel::CurvedBlock::~~CurvedBlock ( )
```

Clean up all data objects and free up all resources.

9.38.3 Member Function Documentation

9.38.3.1 _configureLabel()

```
CTCPanel::CurvedBlock::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.38.3.2 `_RadiansToDegrees()`

```
static CTCPanel::CurvedBlock::_RadiansToDegrees (
    rads ) [static], [private]
```

Typemethod to convert from radians to degrees.

9.38.3.3 `_square()`

```
static CTCPanel::CurvedBlock::_square (
    x ) [static], [private]
```

Typemethod to compute the square of a number.

9.38.3.4 `geti()`

```
CTCPanel::CurvedBlock::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.38.3.5 `invoke()`

```
CTCPanel::CurvedBlock::invoke ( )
```

Method to invoke the [CurvedBlock](#).

9.38.3.6 `seti()`

```
CTCPanel::CurvedBlock::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.38.3.7 `setv()`

```
CTCPanel::CurvedBlock::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.38.4 Member Data Documentation

9.38.4.1 `_PI`

`CTCPanel::CurvedBlock::_PI` [static], [private]

PI is π .

9.38.4.2 `canvas`

`CTCPanel::CurvedBlock::canvas` [private]

The canvas component (parent widget component).

9.38.4.3 `ctcpanel`

`CTCPanel::CurvedBlock::ctcpanel` [private]

The CTC Panel component (parent widget).

9.39 Instruments::DialInstrument Class Reference

Generic dial instrument.

Public Member Functions

- [DialInstrument](#) (name, _canvas,...)
Constructor – initialize a [DialInstrument](#).
- [~DialInstrument](#) ()
Destructor – free up all resources.
- [setvalue](#) (value, value2=0)
Method to set the value of the dial instrument.

Private Attributes

- [ValueRange](#)
Value range.
- [dTextX](#)
X position of the dial text.
- [dTextY](#)
Y position of the dial text.

9.39.1 Detailed Description

Generic dial instrument.

Parameters

<code>_canvas</code>	The canvas to draw the dial instrument on.
----------------------	--

Parameters

...	<p>Options:</p> <ul style="list-style-type: none"> • -x The X coordinate of the instrument (default 0). • -y The Y coordinate of the instrument (default 0). • -size The size of the instrument (default 100). • -label The label of the instrument (default DialInstrument). • -labelcolor The color of the label (default black). • -labelfont The font of the label (default {Times 14 bold}). • -background The background color of the instrument (default blue). • -outline The outline color of the instrument (default black). • -scaleback The background color of the scale (default white). • -scaleticks The color of the scale ticks (default black). • -fontfamily The font family used on the instrument (default Courier). • -maxvalue The maximum value (default 100). • -minvalue The minimum value (default 0). • -minat The pointer position, in degrees, of the minimum value (default 225). • -maxat The pointer position, in degrees, of the maximum value (default 315). • -pointercolor The color of the pointer (default black). • -secondpointerp Should a second pointer be drawn (default no)? • -secondpointercolor The color of the second pointer (default red). • -scaleticksinterval The interval of the scale ticks (default 10). • -digitalp Should a digital display also be included (default yes)? • -digits How many digits for the digital display (default 3). • -digitalbackground The background color of the digital display (default white). • -digitaldigitcolor The foreground color of the digital display (default black).
-----	---

Author

Robert Heller <heller@deepsoft.com>

9.39.2 Constructor & Destructor Documentation

9.39.2.1 DialInstrument()

```
Instruments::DialInstrument::DialInstrument (
    name ,
    _canvas ,
    ... )
```

Constructor – initialize a [DialInstrument](#).

Parameters

<code>_canvas</code>	The canvas to draw the DialInstrument on.
<code>...</code>	Option list.

9.39.2.2 ~DialInstrument()

```
Instruments::DialInstrument::~~DialInstrument ( )
```

Destructor – free up all resources.

9.39.3 Member Function Documentation

9.39.3.1 setvalue()

```
Instruments::DialInstrument::setvalue (
    value ,
    value2 = 0 )
```

Method to set the value of the dial instrument.

Parameters

<code>value</code>	The value to set the instrument to.
<code>value2</code>	The value for the second pointer.

9.39.4 Member Data Documentation

9.39.4.1 dTextX

Instruments::DialInstrument::dTextX [private]

X position of the dial text.

9.39.4.2 dTextY

Instruments::DialInstrument::dTextY [private]

Y position of the dial text.

9.39.4.3 ValueRange

Instruments::DialInstrument::ValueRange [private]

Value range.

9.40 FCFSupport::PDFFileStructures::Dictionary Class Reference

PDF [Dictionary](#) class.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::Dictionary:



Public Member Functions

- [Dictionary](#) (unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- virtual [~Dictionary](#) ()
Destructor.
- virtual ostream & [WriteDirect](#) (ostream &stream) const
Write an object directly.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const

Write the elements of a dictionary.

9.40.1 Detailed Description

PDF [Dictionary](#) class.

This base class is useless by itself. Real specific dictionaries will be derived from this class.

Author

Robert Heller <heller@deepsoft.com>

9.40.2 Constructor & Destructor Documentation

9.40.2.1 Dictionary()

```
FCFSupport::PDFFileStructures::Dictionary::Dictionary (
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a new dictionary.

Parameters

<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

9.40.2.2 ~Dictionary()

```
virtual FCFSupport::PDFFileStructures::Dictionary::~~Dictionary ( ) [inline], [virtual]
```

Destructor.

Clean everything up.

9.40.3 Member Function Documentation

9.40.3.1 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::Dictionary::WriteDictionaryElements (
    ostream & stream ) const [inline], [protected], [virtual]
```

Write the elements of a dictionary.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented in [FCFSupport::PDFFileStructures::TypedDictionary](#), [FCFSupport::PDFFileStructures::IndirectObjectDictionary](#), [FCFSupport::PDFFileStructures::ResourceDictionary](#), [FCFSupport::PDFFileStructures::Page](#), [FCFSupport::PDFFileStructures::PageTree](#), [FCFSupport::PDFFileStructures::PageLabelDictionary](#), [FCFSupport::PDFFileStructures::PageLabelTree](#), [FCFSupport::PDFFileStructures::Type1FontDictionary](#), [FCFSupport::PDFFileStructures::CatalogDictionary](#), and [FCFSupport::PDFFileStructures::InformationDirectory](#).

References [lcc::stream](#).

Referenced by [WriteDirect\(\)](#).

9.40.3.2 WriteDirect()

```
virtual ostream & FCFSupport::PDFFileStructures::Dictionary::WriteDirect (
    ostream & stream ) const [inline], [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Implements [FCFSupport::PDFFileStructures::IndirectObject](#).

References [lcc::stream](#), and [WriteDictionaryElements\(\)](#).

9.41 Instruments::DigitalClock Class Reference

Digital clock instrument.

Public Member Functions

- [DigitalClock](#) (name, _canvas,...)
Constructor – initialize a digital clock.
- [~DigitalClock](#) ()
Destructor – free up all resources.
- [settime](#) (hour, minute)
Method to set the time.

9.41.1 Detailed Description

Digital clock instrument.

Parameters

<code>_canvas</code>	The canvas to draw the digital clock instrument on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The X coordinate of the instrument (default 0). • <code>-y</code> The Y coordinate of the instrument (default 0). • <code>-size</code> The size of the instrument (default 100). • <code>-label</code> The label of the instrument (default Clock). • <code>-labelcolor</code> The color of the label (default black). • <code>-labelfont</code> The font of the label (default {Times 14 bold}). • <code>-background</code> The background color of the instrument (default blue). • <code>-outline</code> The outline color of the instrument (default black). • <code>-scaleback</code> The background color of the scale (default white). • <code>-scaleticks</code> The color of the scale ticks (default black). • <code>-fontfamily</code> The font family used on the instrument (default Courier). • <code>-digitcolor</code> The color of the digits (default black).

Author

Robert Heller <heller@deepsoft.com>

9.41.2 Constructor & Destructor Documentation

9.41.2.1 DigitalClock()

```
Instruments::DigitalClock::DigitalClock (
    name ,
    _canvas ,
    ... )
```

Constructor – initialize a digital clock.

Parameters

<code>_canvas</code>	The canvas to draw the DialInstrument on.
<code>...</code>	Option list.

9.41.2.2 ~DigitalClock()

```
Instruments::DigitalClock::~~DigitalClock ( )
```

Destructor – free up all resources.

9.41.3 Member Function Documentation

9.41.3.1 settime()

```
Instruments::DigitalClock::settime (
    hour ,
    minute )
```

Method to set the time.

Parameters

<i>hour</i>	The hour, an integer between 1 and 12.
<i>minute</i>	The minute, an integer between 0 and 59.

9.42 Instruments::DigitalInstrument Class Reference

Digital instrument.

Public Member Functions

- [DigitalInstrument](#) (name, _canvas,...)
Constructor – initialize a digital instrument.
- [~DigitalInstrument](#) ()
Destructor – free up all resources.
- [setvalue](#) (value)
Method to set the value of the digital instrument.

9.42.1 Detailed Description

Digital instrument.

Parameters

<code>_canvas</code>	The canvas to draw the digital instrument on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The X coordinate of the instrument (default 0). • <code>-y</code> The Y coordinate of the instrument (default 0). • <code>-size</code> The size of the instrument (default 100). • <code>-label</code> The label of the instrument (default DigitalInstrument). • <code>-labelcolor</code> The color of the label (default black). • <code>-labelfont</code> The font of the label (default {Times 14 bold}). • <code>-background</code> The background color of the instrument (default blue). • <code>-outline</code> The outline color of the instrument (default black). • <code>-scaleback</code> The background color of the scale (default white). • <code>-scaleticks</code> The color of the scale ticks (default black). • <code>-fontfamily</code> The font family used on the instrument (default Courier). • <code>-digitcolor</code> The color of the digits (default black). • <code>-digits</code> The number of digits (default 3).

Author

Robert Heller <heller@deepsoft.com>

9.42.2 Constructor & Destructor Documentation

9.42.2.1 DigitalInstrument()

```
Instruments::DigitalInstrument::DigitalInstrument (
    name ,
    _canvas ,
    ... )
```

Constructor – initialize a digital instrument.

Parameters

<code>_canvas</code>	The canvas to draw the DialInstrument on.
<code>...</code>	Option list.

9.42.2.2 ~DigitalInstrument()

```
Instruments::DigitalInstrument::~~DigitalInstrument ( )
```

Destructor – free up all resources.

9.42.3 Member Function Documentation

9.42.3.1 setvalue()

```
Instruments::DigitalInstrument::setvalue (
    value )
```

Method to set the value of the digital instrument.

Parameters

<code>value</code>	The value to set the instrument to.
--------------------	-------------------------------------

9.43 FCFSupport::Division Class Reference

The [Division](#) class implements a single division, which contains a number of contiguous stations.

```
#include <Division.h>
```

Public Member Functions

- [Division](#) ()
Default constructor.
- [Division](#) ([Division](#) &other)
Copy constructor.
- [Division](#) & [operator=](#) ([Division](#) &other)
Assignment operator.
- [Division](#) (char s, [FCFSupport::Industry](#) *h, char a, const char *n)
Constructor given a set of field values.
- [~Division](#) ()
Destructor.
- const char * [Name](#) () const
Return the division's name.
- [FCFSupport::Industry](#) * [Home](#) () const
Return the division's home yard.
- char [Symbol](#) () const
Return the division's Symbol.
- char [Area](#) () const
Return the division's area.
- int [NumberOfStations](#) () const
Return the number of stations in this division.
- const [FCFSupport::Station](#) * [TheStation](#) (int i) const
Return a selected station in the division.
- void [AppendStation](#) ([FCFSupport::Station](#) *station)
Append an additional station to this division.

Private Attributes

- string [name](#)
The name of the division.
- [StationVector](#) [stations](#)
The vector of stations in the division.
- [Industry](#) * [home](#)
The division's home yard.
- char [symbol](#)
The division's symbol.
- char [area](#)
The division's area.

Friends

- class [System](#)

The [System](#) class is a friend.

9.43.1 Detailed Description

The [Division](#) class implements a single division, which contains a number of contiguous stations.

A division has a name, a symbol, an area, a home yard, and a list of stations.

```
@author Robert Heller \<heller\@deepsoft.com\>
```

9.43.2 Constructor & Destructor Documentation

9.43.2.1 Division() [1/3]

```
FCFSupport::Division::Division ( ) [inline]
```

Default constructor.

All fields are initialized to empty or NULL values.

References [area](#), [home](#), [name](#), and [symbol](#).

9.43.2.2 Division() [2/3]

```
FCFSupport::Division::Division (
    Division & other ) [inline]
```

Copy constructor.

A new division is created as a copy of an existing division.

Parameters

<i>other</i>	The other division.
--------------	---------------------

References [area](#), [home](#), [name](#), [stations](#), and [symbol](#).

9.43.2.3 Division() [3/3]

```
FCFSupport::Division::Division (
    char s,
    FCFSupport::Industry * h,
    char a,
    const char * n ) [inline]
```

Constructor given a set of field values.

Parameters

<i>s</i>	The division's symbol.
<i>h</i>	The division's home yard.
<i>a</i>	The division's area.
<i>n</i>	The division's name.

References [area](#), [home](#), [name](#), and [symbol](#).

9.43.2.4 ~Division()

```
FCFSupport::Division::~~Division ( ) [inline]
```

Destructor.

9.43.3 Member Function Documentation

9.43.3.1 AppendStation()

```
void FCFSupport::Division::AppendStation (
    FCFSupport::Station * station ) [inline]
```

Append an additional station to this division.

Parameters

<i>station</i>	The station to append.
----------------	------------------------

References [stations](#).

9.43.3.2 Area()

```
char FCFSupport::Division::Area ( ) const [inline]
```

Return the division's area.

References [area](#).

9.43.3.3 Home()

```
FCFSupport::Industry * FCFSupport::Division::Home ( ) const [inline]
```

Return the division's home yard.

References [home](#).

9.43.3.4 Name()

```
const char * FCFSupport::Division::Name ( ) const [inline]
```

Return the division's name.

References [name](#).

9.43.3.5 NumberOfStations()

```
int FCFSupport::Division::NumberOfStations ( ) const [inline]
```

Return the number of stations in this division.

References [stations](#).

9.43.3.6 operator=()

```
Division & FCFSupport::Division::operator= (
    Division & other ) [inline]
```

Assignment operator.

Copy one division to another.

Parameters

<i>other</i>	The other division.
--------------	---------------------

References [area](#), [home](#), [name](#), [stations](#), and [symbol](#).

9.43.3.7 Symbol()

```
char FCFSupport::Division::Symbol ( ) const [inline]
```

Return the division's Symbol.

References [symbol](#).

9.43.3.8 TheStation()

```
const FCFSupport::Station * FCFSupport::Division::TheStation (
    int i ) const [inline]
```

Return a selected station in the division.

Parameters

<i>i</i>	The station index.
----------	--------------------

References [i](#), and [stations](#).

9.43.4 Friends And Related Function Documentation**9.43.4.1 System**

```
friend class System [friend]
```

The [System](#) class is a friend.

9.43.5 Member Data Documentation

9.43.5.1 area

```
char FCFSupport::Division::area [private]
```

The division's area.

Referenced by [Area\(\)](#), [Division\(\)](#), and [operator=\(\)](#).

9.43.5.2 home

```
Industry* FCFSupport::Division::home [private]
```

The division's home yard.

Referenced by [Division\(\)](#), [Home\(\)](#), and [operator=\(\)](#).

9.43.5.3 name

```
string FCFSupport::Division::name [private]
```

The name of the division.

Referenced by [Division\(\)](#), [Name\(\)](#), and [operator=\(\)](#).

9.43.5.4 stations

```
StationVector FCFSupport::Division::stations [private]
```

The vector of stations in the division.

Referenced by [AppendStation\(\)](#), [Division\(\)](#), [NumberOfStations\(\)](#), [operator=\(\)](#), and [TheStation\(\)](#).

9.43.5.5 symbol

```
char FCFSupport::Division::symbol [private]
```

The division's symbol.

Referenced by [Division\(\)](#), [operator=\(\)](#), and [Symbol\(\)](#).

9.44 xpressnet::DoubleHeaderInformation Class Reference

Double header information.

Public Member Functions

- [Address](#) ()
Return address.
- [Available](#) ()
Return available flag.
- [Direction](#) ()
Return direction.
- [SpeedStepMode](#) ()
Return speed step mode.
- [Speed](#) ()
Return speed.
- [Address2](#) ()
Return the address of second unit in double header.
- [Function](#) (f)
Return function status.
- [DoubleHeaderInformation](#) (name, a, addr2, avail, dir, ssm, s, f0, f1, f2, f3, f4, f5=0, f6=0, f7=0, f8=0, f9=0, f10=0, f11=0, f12=0)
Constructor.

Private Attributes

- [_address](#)
Locomotive address.
- [_available](#)
Locomotive is available.
- [_direction](#)
Locomotive direction.
- [_speedstep](#)
Locomotive speed step mode.
- [_speed](#)
Locomotive speed.
- [_function0](#)
Function 0.
- [_function1](#)
Function 1.
- [_function2](#)
Function 2.
- [_function3](#)
Function 3.
- [_function4](#)

- Function 4.*

 - [_function5](#)
 - Function 5.*

 - [_function6](#)
 - Function 6.*

 - [_function7](#)
 - Function 7.*

 - [_function8](#)
 - Function 8.*

 - [_function9](#)
 - Function 9.*

 - [_function10](#)
 - Function 10.*

 - [_function11](#)
 - Function 11.*

 - [_function12](#)
 - Function 12.*

 - [_address2](#)
- Double header address.*

9.44.1 Detailed Description

Double header information.

Author

Robert Heller <heller@deepsoft.com>

9.44.2 Constructor & Destructor Documentation

9.44.2.1 DoubleHeaderInformation()

```
xpressnet::DoubleHeaderInformation::DoubleHeaderInformation (
    name ,
    a ,
    addr2 ,
    avail ,
    dir ,
    ssm ,
    s ,
    f0 ,
    f1 ,
    f2 ,
    f3 ,
```

```

f4 ,
f5  = 0,
f6  = 0,
f7  = 0,
f8  = 0,
f9  = 0,
f10 = 0,
f11 = 0,
f12 = 0 )

```

Constructor.

Parameters

<i>a</i>	Locomotive address.
<i>addr2</i>	Double header address.
<i>avail</i>	Available flag.
<i>dir</i>	Direction.
<i>ssm</i>	Speed step mode.
<i>s</i>	Locomotive speed.
<i>f0</i>	Function 0 status.
<i>f1</i>	Function 1 status.
<i>f2</i>	Function 2 status.
<i>f3</i>	Function 3 status.
<i>f4</i>	Function 4 status.
<i>f5</i>	Function 5 status.
<i>f6</i>	Function 6 status.
<i>f7</i>	Function 7 status.
<i>f8</i>	Function 8 status.
<i>f9</i>	Function 9 status.
<i>f10</i>	Function 10 status.
<i>f11</i>	Function 11 status.
<i>f12</i>	Function 12 status.

9.44.3 Member Function Documentation

9.44.3.1 Address()

```
xpressnet::DoubleHeaderInformation::Address ( )
```

Return address.

9.44.3.2 Address2()

```
xpressnet::DoubleHeaderInformation::Address2 ( )
```

Return the address of second unit in double header.

9.44.3.3 Available()

```
xpressnet::DoubleHeaderInformation::Available ( )
```

Return available flag.

9.44.3.4 Direction()

```
xpressnet::DoubleHeaderInformation::Direction ( )
```

Return direction.

9.44.3.5 Function()

```
xpressnet::DoubleHeaderInformation::Function (
    f )
```

Return function status.

Parameters

<i>f</i>	Function whose status to return.
----------	----------------------------------

9.44.3.6 Speed()

```
xpressnet::DoubleHeaderInformation::Speed ( )
```

Return speed.

9.44.3.7 SpeedStepMode()

```
xpressnet::DoubleHeaderInformation::SpeedStepMode ( )
```

Return speed step mode.

9.44.4 Member Data Documentation

9.44.4.1 _address

```
xpressnet::DoubleHeaderInformation::_address [private]
```

Locomotive address.

9.44.4.2 _address2

```
xpressnet::DoubleHeaderInformation::_address2 [private]
```

Double header address.

9.44.4.3 _available

```
xpressnet::DoubleHeaderInformation::_available [private]
```

Locomotive is available.

9.44.4.4 _direction

```
xpressnet::DoubleHeaderInformation::_direction [private]
```

Locomotive direction.

9.44.4.5 _function0

xpressnet::DoubleHeaderInformation::_function0 [private]

Function 0.

9.44.4.6 _function1

xpressnet::DoubleHeaderInformation::_function1 [private]

Function 1.

9.44.4.7 _function10

xpressnet::DoubleHeaderInformation::_function10 [private]

Function 10.

9.44.4.8 _function11

xpressnet::DoubleHeaderInformation::_function11 [private]

Function 11.

9.44.4.9 _function12

xpressnet::DoubleHeaderInformation::_function12 [private]

Function 12.

9.44.4.10 _function2

xpressnet::DoubleHeaderInformation::_function2 [private]

Function 2.

9.44.4.11 _function3

```
xpressnet::DoubleHeaderInformation::_function3 [private]
```

Function 3.

9.44.4.12 _function4

```
xpressnet::DoubleHeaderInformation::_function4 [private]
```

Function 4.

9.44.4.13 _function5

```
xpressnet::DoubleHeaderInformation::_function5 [private]
```

Function 5.

9.44.4.14 _function6

```
xpressnet::DoubleHeaderInformation::_function6 [private]
```

Function 6.

9.44.4.15 _function7

```
xpressnet::DoubleHeaderInformation::_function7 [private]
```

Function 7.

9.44.4.16 _function8

```
xpressnet::DoubleHeaderInformation::_function8 [private]
```

Function 8.

9.44.4.17 `_function9`

`xpressnet::DoubleHeaderInformation::_function9` [private]

Function 9.

9.44.4.18 `_speed`

`xpressnet::DoubleHeaderInformation::_speed` [private]

Locomotive speed.

9.44.4.19 `_speedstep`

`xpressnet::DoubleHeaderInformation::_speedstep` [private]

Locomotive speed step mode.

9.45 `xpressnet::DoubleHeaderMuError` Class Reference

Double header or MU error.

Public Member Functions

- [`DoubleHeaderMuError`](#) (name, e)
Constructor.
- [`Error`](#) ()
Return error type code.

Private Attributes

- [`_error`](#)
Error type.

9.45.1 Detailed Description

Double header or MU error.

Author

Robert Heller <heller@deepsoft.com>

9.45.2 Constructor & Destructor Documentation

9.45.2.1 DoubleHeaderMuError()

```
xpressnet::DoubleHeaderMuError::DoubleHeaderMuError (
    name ,
    e )
```

Constructor.

Parameters

<i>e</i>	Error type.
----------	-------------

9.45.3 Member Function Documentation

9.45.3.1 Error()

```
xpressnet::DoubleHeaderMuError::Error ( )
```

Return error type code.

9.45.4 Member Data Documentation

9.45.4.1 _error

```
xpressnet::DoubleHeaderMuError::_error [private]
```

Error type.

9.46 CTCPanel::DoubleSlip Class Reference

Double Slip (turnout) object type.

Public Member Functions

- [DoubleSlip](#) (name, _ctcpanel, _canvas,...)
Construct a [DoubleSlip](#) object.
- [~DoubleSlip](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the switch.

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).
- [state](#)
The state of the points.

9.46.1 Detailed Description

Double Slip (turnout) object type.

These are on the schematic and represent a switch on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the switch on.

Parameters

...	<p>Options:</p> <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -label The label of the switch (default "1"). • -orientation The orientation (8-way) of the switch (readonly, default 0). • -flipped Whether or not the switch is flipped (readonly, default no). • -statecommand A command to run to get the switch's state (default {}). • -occupiedcommand A command to run to find out if the switch is occupied (default {}).
-----	--

Defined coords terminals:

- MainL Mainline left.
- MainR Mainline right.
- AltL Alternative line left.
- AltR Alternative line right.

Defined values (states):

- Normal Points are aligned for the mainline.
- Reverse Points are aligned for the branchline.
- Unknown Point are not aligned for any route (eg the points are in motion).

Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.46.2 Constructor & Destructor Documentation

9.46.2.1 DoubleSlip()

```
CTCPanel::DoubleSlip::DoubleSlip (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [DoubleSlip](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the DoubleSlip on.
<code>...</code>	Option list.

9.46.2.2 ~DoubleSlip()

```
CTCPanel::DoubleSlip::~~DoubleSlip ( )
```

Clean up all data objects and free up all resources.

9.46.3 Member Function Documentation

9.46.3.1 _configureLabel()

```
CTCPanel::DoubleSlip::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.46.3.2 geti()

```
CTCPanel::DoubleSlip::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.46.3.3 getv()

```
CTCPanel::DoubleSlip::getv ( )
```

Method to get our value (state).

9.46.3.4 `invoke()`

```
CTCPanel::DoubleSlip::invoke ( )
```

Method to invoke the switch.

9.46.3.5 `seti()`

```
CTCPanel::DoubleSlip::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.46.3.6 `setv()`

```
CTCPanel::DoubleSlip::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.46.4 Member Data Documentation

9.46.4.1 `canvas`

```
CTCPanel::DoubleSlip::canvas [private]
```

The canvas component (parent widget component).

9.46.4.2 ctcpnl

```
CTCPanel::DoubleSlip::ctcpnl [private]
```

The CTC Panel component (parent widget).

9.46.4.3 state

```
CTCPanel::DoubleSlip::state [private]
```

The state of the points.

9.47 Parsers::TrackGraph::EdgeValues Struct Reference

Uncompressed graph edge values.

Public Member Functions

- [EdgeValues](#) (int _index=-1, float _x=0.0, float _y=0.0, float _a=0.0, float _length=0.0)
Default constructor.

Public Attributes

- int [index](#)
Index of next segment.
- float [x](#)
X value of edge.
- float [y](#)
Y value of edge.
- float [a](#)
A value of edge.
- float [length](#)
Track length from opposite edge.

9.47.1 Detailed Description

Uncompressed graph edge values.

Author

Robert Heller <heller@deepsoft.com>

9.47.2 Constructor & Destructor Documentation

9.47.2.1 EdgeValues()

```
Parsers::TrackGraph::EdgeValues::EdgeValues (
    int _index = -1,
    float _x = 0.0,
    float _y = 0.0,
    float _a = 0.0,
    float _length = 0.0 ) [inline]
```

Default constructor.

References [a](#), [index](#), [length](#), [x](#), and [y](#).

9.47.3 Member Data Documentation

9.47.3.1 a

```
float Parsers::TrackGraph::EdgeValues::a
```

A value of edge.

Referenced by [EdgeValues\(\)](#).

9.47.3.2 index

```
int Parsers::TrackGraph::EdgeValues::index
```

Index of next segment.

Referenced by [EdgeValues\(\)](#).

9.47.3.3 length

```
float Parsers::TrackGraph::EdgeValues::length
```

Track length from opposite edge.

Referenced by [EdgeValues\(\)](#).

9.47.3.4 x

```
float Parsers::TrackGraph::EdgeValues::x
```

X value of edge.

Referenced by [EdgeValues\(\)](#).

9.47.3.5 y

```
float Parsers::TrackGraph::EdgeValues::y
```

Y value of edge.

Referenced by [EdgeValues\(\)](#).

9.48 CTCPanel::EndBumper Class Reference

End Bumper object type.

Public Member Functions

- [EndBumper](#) (name, _ctcpanel, _canvas,...)
Construct a [ScissorCrossover](#) object.
- [~EndBumper](#) ()
Clean up all data objects and free up all resources.
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the [EndBumper](#).

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

9.48.1 Detailed Description

End Bumper object type.

These are on the schematic and represent an End Bumper on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the switch on.
...	Options: <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -label The label of the switch (default "1"). • -position The position of the label (readonly, default below). • -orientation The orientation (8-way) of the switch (readonly, default 0). • -flipped Whether or not the switch is flipped (readonly, default no). • -occupiedcommand A command to run to find out if the switch is occupied (default {}).

Defined coords terminals:

- E End Point

Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.48.2 Constructor & Destructor Documentation

9.48.2.1 EndBumper()

```
CTCPanel::EndBumper::EndBumper (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [ScissorCrossover](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the ScissorCrossover on.
<code>...</code>	Option list.

9.48.2.2 ~EndBumper()

```
CTCPanel::EndBumper::~~EndBumper ( )
```

Clean up all data objects and free up all resources.

9.48.3 Member Function Documentation

9.48.3.1 _configureLabel()

```
CTCPanel::EndBumper::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.48.3.2 `geti()`

```
CTCPanel::EndBumper::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.48.3.3 `invoke()`

```
CTCPanel::EndBumper::invoke ( )
```

Method to invoke the [EndBumper](#).

9.48.3.4 `seti()`

```
CTCPanel::EndBumper::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.48.3.5 `setv()`

```
CTCPanel::EndBumper::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.48.4 Member Data Documentation

9.48.4.1 canvas

```
CTCPanel::EndBumper::canvas [private]
```

The canvas component (parent widget component).

9.48.4.2 ctcpnl

```
CTCPanel::EndBumper::ctcpnl [private]
```

The CTC Panel component (parent widget).

9.49 TTSupport::eqstr Struct Reference

```
#include <TimeTableSystem.h>
```

Public Member Functions

- bool [operator\(\)](#) (const char *s1, const char *s2) const

9.49.1 Member Function Documentation

9.49.1.1 operator>()

```
bool TTSupport::eqstr::operator() (
    const char * s1,
    const char * s2 ) const [inline]
```

9.50 Icc::EventID Class Reference

An event id structure.

Public Member Functions

- [EventID](#) (name,...)
Constructor: create the event id.

Static Public Member Functions

- static [validate](#) (object)
Validation method.

Private Member Functions

- [_setEventID](#) (option, value)
Set (as in configure) the event ID.
- [_getEventID](#) (option)
Get (as in cget) the event id.

Private Attributes

- [_eventID](#)
Internal representation of an event id, as an 8 byte list.

Static Private Attributes

- static [EVENTIDFMT](#)
Event ID format string.

9.50.1 Detailed Description

An event id structure.

Parameters

...	<p>The options:</p> <ul style="list-style-type: none"> • -eventidstring The event ID as a string. • -eventidlist The event ID as a list.
-----	--

9.50.2 Constructor & Destructor Documentation

9.50.2.1 EventID()

```
lcc::EventID::EventID (
    name ,
    ... )
```

Constructor: create the event id.

Create an eventid structure.

Parameters

<i>name</i>	The name of the structure.
...	The options: <ul style="list-style-type: none"> • -eventidstring The event ID as a string. • -eventidlist The event ID as a list.

9.50.3 Member Function Documentation

9.50.3.1 __getEventID()

```
lcc::EventID::__getEventID (
    option ) [private]
```

Get (as in cget) the event id.

The event id is returned, either as a string or a list.

Parameters

<i>option</i>	Either -eventidstring or -eventidlist. If it is -eventidstring, the event id list is formatted as a string. If it is -eventidlist the event id list is just returned.
---------------	---

Returns

The eventid as a string or a list.

9.50.3.2 __setEventID()

```
lcc::EventID::__setEventID (
    option ,
    value ) [private]
```

Set (as in configure) the event ID.

Converts the value argument to the internal representation of the event id,

Parameters

<i>option</i>	Either -eventidstring or -eventidlist. If it is -eventidstring, the string is parsed and converted to a list of 8 bytes. If it is -eventidlist the list is just stored.
<i>value</i>	Either an eventidstring or an eventidlist.

9.50.3.3 validate()

```
static lcc::EventID::validate (  
    object ) [static]
```

Validation method.

Validate [EventID](#) objects.

Parameters

<i>object</i>	The object to type check.
---------------	---------------------------

Returns

The object or raise an error.

9.50.4 Member Data Documentation**9.50.4.1 _eventID**

```
lcc::EventID::_eventID [private]
```

Internal representation of an event id, as an 8 byte list.

9.50.4.2 EVENTIDFMT

```
lcc::EventID::EVENTIDFMT [static], [private]
```

Event ID format string.

Event format string, used for both format and scan.

9.51 lcc::EventID_or_null Class Reference

An [EventID](#) or empty string.

Static Public Member Functions

- static [validate](#) (value)
Validate a possible [EventID](#), but allow a null string value.

9.51.1 Detailed Description

An [EventID](#) or empty string.

9.51.2 Member Function Documentation

9.51.2.1 validate()

```
static lcc::EventID_or_null::validate (
    value ) [static]
```

Validate a possible [EventID](#), but allow a null string value.

Parameters

<i>value</i>	The value to validate.
--------------	------------------------

9.52 lcc::EventLog Class Reference

Event received log, with event sender.

Public Member Functions

- [EventLog](#) (name,...)
Construct an [EventLog](#) widget.
- [open](#) ()
Open window.
- [eventReceived](#) (eventid)
Log a received event.

Private Member Functions

- [_sendtheevent](#) ()
Send an event.
- [_close](#) ()
Close the window.
- [_clear](#) ()
Clear the log.

Private Attributes

- [logscroll](#)
Log Scroll Widget.
- [logtext](#)
Log text Widget (readonly).
- [sendevent](#)
Send event entry.

9.52.1 Detailed Description

Event received log, with event sender.

Options:

- `-transport` The transport to use.

9.52.2 Constructor & Destructor Documentation

9.52.2.1 EventLog()

```
lcc::EventLog::EventLog (  
    name ,  
    ... )
```

Construct an [EventLog](#) widget.

This is a toplevel window with a scrolling log of received events. There is also an entry to send an event.

Parameters

...	Options: <ul style="list-style-type: none">• -transport The transport to use.
-----	---

9.52.3 Member Function Documentation

9.52.3.1 _clear()

```
lcc::EventLog::_clear ( ) [private]
```

Clear the log.

9.52.3.2 _close()

```
lcc::EventLog::_close ( ) [private]
```

Close the window.

9.52.3.3 _sendtheevent()

```
lcc::EventLog::_sendtheevent ( ) [private]
```

Send an event.

9.52.3.4 eventReceived()

```
lcc::EventLog::eventReceived (
    eventId )
```

Log a received event.

Parameters

<i>eventid</i>	EventID object to log.
----------------	--

9.52.3.5 open()

```
lcc::EventLog::open ( )
```

Open window.

9.52.4 Member Data Documentation

9.52.4.1 logscroll

```
lcc::EventLog::logscroll [private]
```

Log Scroll Widget.

9.52.4.2 logtext

```
lcc::EventLog::logtext [private]
```

Log text Widget (readonly).

9.52.4.3 sendevent

```
lcc::EventLog::sendevent [private]
```

Send event entry.

9.53 lcc::EventReceived Class Reference

Display a received event.

Public Member Functions

- [EventReceived](#) (name,...)
Construct an [EventReceived](#) dialog.
- [_Close](#) ()
Close and destroy the dialog box.

Private Attributes

- [eventid](#)
LabelEntry (RO) containing the eventId.

9.53.1 Detailed Description

Display a received event.

Options:

- -eventid The event id – this is required.

9.53.2 Constructor & Destructor Documentation

9.53.2.1 EventReceived()

```
lcc::EventReceived::EventReceived (
    name ,
    ... )
```

Construct an [EventReceived](#) dialog.

Parameters

<i>name</i>	The widget path.
...	The options: <ul style="list-style-type: none">• -eventid The event id – this is required.

9.53.3 Member Function Documentation

9.53.3.1 _Close()

```
lcc::EventReceived::_Close ( )
```

Close and destroy the dialog box.

9.53.4 Member Data Documentation

9.53.4.1 eventid

```
lcc::EventReceived::eventid [private]
```

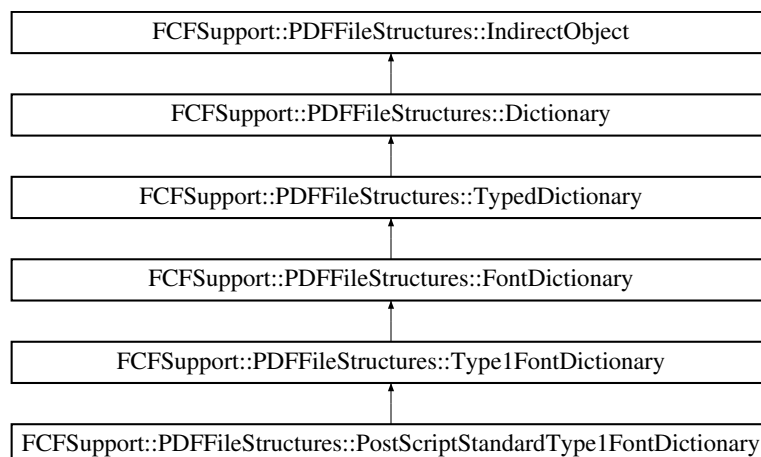
LabelEntry (RO) containing the eventId.

9.54 FCFSupport::PDFFFileStructures::FontDictionary Class Reference

A Font dictionary object.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFFileStructures::FontDictionary:



Public Member Functions

- [FontDictionary](#) (const string subtype, unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~FontDictionary](#) ()
Destructor.

Protected Member Functions

- ostream & [WriteFontType](#) (ostream &stream) const
Write the font's subtype.
- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const
Write this dictionary's elements.

Private Attributes

- string [subType](#)
The type of the font.

9.54.1 Detailed Description

A Font dictionary object.

Author

Robert Heller <heller@deepsoft.com>

9.54.2 Constructor & Destructor Documentation

9.54.2.1 FontDictionary()

```
FCFSupport::PDFFileStructures::FontDictionary::FontDictionary (  
    const string subtype,  
    unsigned long int objNum = 0L,  
    unsigned short int genNum = 0,  
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a generic font dictionary.

Parameters

<i>subtype</i>	The type of the font.
<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [subType](#).

9.54.2.2 ~FontDictionary()

```
FCFSupport::PDFFileStructures::FontDictionary::~~FontDictionary ( ) [inline]
```

Destructor.

9.54.3 Member Function Documentation

9.54.3.1 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::FontDictionary::WriteDictionaryElements (
    ostream & stream ) const [inline], [protected], [virtual]
```

Write this dictionary's elements.

Start with its type.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::TypedDictionary](#).

Reimplemented in [FCFSupport::PDFFileStructures::Type1FontDictionary](#).

References [lcc::stream](#), [FCFSupport::PDFFileStructures::TypedDictionary::WriteDictionaryType\(\)](#), and [WriteFontType\(\)](#).

9.54.3.2 WriteFontType()

```
ostream & FCFSupport::PDFFileStructures::FontDictionary::WriteFontType (
    ostream & stream ) const [inline], [protected]
```

Write the font's subtype.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

References [lcc::stream](#), and [subType](#).

Referenced by [WriteDictionaryElements\(\)](#).

9.54.4 Member Data Documentation

9.54.4.1 subType

```
string FCFSupport::PDFFileStructures::FontDictionary::subType [private]
```

The type of the font.

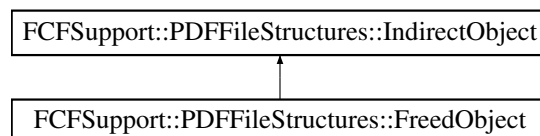
Referenced by [FontDictionary\(\)](#), and [WriteFontType\(\)](#).

9.55 FCFSupport::PDFFileStructures::FreedObject Class Reference

A deleted indirect object.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::FreedObject:



Public Member Functions

- [FreedObject](#) (unsigned long int objNum, unsigned short int genNum, [CrossReferenceTable](#) *tab)
Constructor.
- virtual [~FreedObject](#) ()
Destructor.
- virtual ostream & [WriteDirect](#) (ostream &stream) const
Dummy function for direct writing (should never be called).

9.55.1 Detailed Description

A deleted indirect object.

Just a place holder in the linked list of freed indirect objects.

Author

Robert Heller <heller@deepsoft.com>

9.55.2 Constructor & Destructor Documentation

9.55.2.1 FreedObject()

```
FCFSupport::PDFFileStructures::FreedObject::FreedObject (
    unsigned long int objNum,
    unsigned short int genNum,
    CrossReferenceTable * tab ) [inline]
```

Constructor.

Create a freed object.

Parameters

<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

9.55.2.2 ~FreedObject()

```
virtual FCFSupport::PDFFileStructures::FreedObject::~~FreedObject ( ) [inline], [virtual]
```

Destructor.

Clean everything up.

9.55.3 Member Function Documentation

9.55.3.1 WriteDirect()

```
virtual ostream & FCFSupport::PDFFileStructures::FreedObject::WriteDirect (
    ostream & stream ) const [inline], [virtual]
```

Dummy function for direct writing (should never be called).

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Implements [FCFSupport::PDFFileStructures::IndirectObject](#).

References [lcc::stream](#).

9.56 xpressnet::FunctionStatus Class Reference

Function status.

Public Member Functions

- [FunctionStatus](#) (name, s0, s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12)
Constructor.
- [Status](#) (f)
Return selected status flag.

Private Attributes

- [_status0](#)
Status 0.
- [_status1](#)
Status 1.
- [_status2](#)
Status 2.

- [_status3](#)
Status 3.
- [_status4](#)
Status 4.
- [_status5](#)
Status 5.
- [_status6](#)
Status 6.
- [_status7](#)
Status 7.
- [_status8](#)
Status 8.
- [_status9](#)
Status 9.
- [_status10](#)
Status 10.
- [_status11](#)
Status 11.
- [_status12](#)
Status 12.

9.56.1 Detailed Description

Function status.

Author

Robert Heller <heller@deepsoft.com>

9.56.2 Constructor & Destructor Documentation

9.56.2.1 FunctionStatus()

```
xpressnet::FunctionStatus::FunctionStatus (
    name ,
    s0 ,
    s1 ,
    s2 ,
    s3 ,
    s4 ,
    s5 ,
    s6 ,
    s7 ,
    s8 ,
    s9 ,
    s10 ,
    s11 ,
    s12 )
```

Constructor.

Parameters

<i>s0</i>	Function 0 is monemtary flag.
<i>s1</i>	Function 1 is monemtary flag.
<i>s2</i>	Function 2 is monemtary flag.
<i>s3</i>	Function 3 is monemtary flag.
<i>s4</i>	Function 4 is monemtary flag.
<i>s5</i>	Function 5 is monemtary flag.
<i>s6</i>	Function 6 is monemtary flag.
<i>s7</i>	Function 7 is monemtary flag.
<i>s8</i>	Function 8 is monemtary flag.
<i>s9</i>	Function 9 is monemtary flag.
<i>s10</i>	Function 10 is monemtary flag.
<i>s11</i>	Function 11 is monemtary flag.
<i>s12</i>	Function 12 is monemtary flag.

9.56.3 Member Function Documentation

9.56.3.1 Status()

```
xpressnet::FunctionStatus::Status (
    f )
```

Return selected status flag.

Parameters

<i>f</i>	Function whose status to return.
----------	----------------------------------

9.56.4 Member Data Documentation

9.56.4.1 _status0

```
xpressnet::FunctionStatus::_status0 [private]
```

Status 0.

9.56.4.2 `_status1`

`xpressnet::FunctionStatus::_status1` [private]

Status 1.

9.56.4.3 `_status10`

`xpressnet::FunctionStatus::_status10` [private]

Status 10.

9.56.4.4 `_status11`

`xpressnet::FunctionStatus::_status11` [private]

Status 11.

9.56.4.5 `_status12`

`xpressnet::FunctionStatus::_status12` [private]

Status 12.

9.56.4.6 `_status2`

`xpressnet::FunctionStatus::_status2` [private]

Status 2.

9.56.4.7 `_status3`

`xpressnet::FunctionStatus::_status3` [private]

Status 3.

9.56.4.8 `_status4`

`xpressnet::FunctionStatus::_status4` [private]

Status 4.

9.56.4.9 `_status5`

`xpressnet::FunctionStatus::_status5` [private]

Status 5.

9.56.4.10 `_status6`

`xpressnet::FunctionStatus::_status6` [private]

Status 6.

9.56.4.11 `_status7`

`xpressnet::FunctionStatus::_status7` [private]

Status 7.

9.56.4.12 `_status8`

`xpressnet::FunctionStatus::_status8` [private]

Status 8.

9.56.4.13 `_status9`

`xpressnet::FunctionStatus::_status9` [private]

Status 9.

9.57 linuxgpio::GpioInputActiveHigh Class Reference

Input pin, active high (high is true).

Public Member Functions

- [GpioInputActiveHigh](#) (name,...)
Constructor, used to set up the GPIO pin.
- [~GpioInputActiveHigh](#) ()
Destructor.

Private Attributes

- [basepin](#)
The base pin.

9.57.1 Detailed Description

Input pin, active high (high is true).

Parameters

<i>name</i>	Name of the pin.
...	Options: <ul style="list-style-type: none">• -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.57.2 Constructor & Destructor Documentation

9.57.2.1 GpioInputActiveHigh()

```
linuxgpio::GpioInputActiveHigh::GpioInputActiveHigh (
    name ,
    ... )
```

Constructor, used to set up the GPIO pin.

The pin number is written to the export control file and then the pin's direction control file is computed and the pin's direction is written.

Parameters

<i>name</i>	The name of the pin.
...	Options: <ul style="list-style-type: none">• -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.57.2.2 ~GpioInputActiveHigh()

```
linuxgpio::GpioInputActiveHigh::~~GpioInputActiveHigh ( )
```

Destructor.

Unexport the pin.

9.57.3 Member Data Documentation

9.57.3.1 basepin

```
linuxgpio::GpioInputActiveHigh::basepin [private]
```

The base pin.

9.58 linuxgpio::GpioInputActiveLow Class Reference

Input pin, active low (low is true).

Public Member Functions

- [GpioInputActiveLow](#) (name,...)
Constructor, used to set up the GPIO pin.
- [~GpioInputActiveLow](#) ()
Destructor.
- [Get](#) ()
Get the pin's logic state.

Private Attributes

- [basepin](#)
The base pin.

9.58.1 Detailed Description

Input pin, active low (low is true).

Parameters

<i>name</i>	Name of the pin.
...	Options: <ul style="list-style-type: none">• -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.58.2 Constructor & Destructor Documentation

9.58.2.1 GpioInputActiveLow()

```
linuxgpio::GpioInputActiveLow::GpioInputActiveLow (
    name ,
    ... )
```

Constructor, used to set up the GPIO pin.

The pin number is written to the export control file and then the pin's direction control file is computed and the pin's direction is written.

Parameters

<i>name</i>	The name of the pin.
...	Options: <ul style="list-style-type: none">• -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.58.2.2 ~GpioInputActiveLow()

```
linuxgpio::GpioInputActiveLow::~~GpioInputActiveLow ( )
```

Destructor.

Unexport the pin.

9.58.3 Member Function Documentation

9.58.3.1 Get()

```
linuxgpio::GpioInputActiveLow::Get ( )
```

Get the pin's logic state.

Returns

The pin state (low is true, high is false).

9.58.4 Member Data Documentation

9.58.4.1 basepin

```
linuxgpio::GpioInputActiveLow::basepin [private]
```

The base pin.

9.59 linuxgpio::GpioOutputSafeHigh Class Reference

Output pin, initialized to high.

Public Member Functions

- [GpioOutputSafeHigh](#) (name,...)
Constructor, used to set up the GPIO pin.
- [~GpioOutputSafeHigh](#) ()
Destructor.

Private Attributes

- [basepin](#)
The base pin.

9.59.1 Detailed Description

Output pin, initialized to high.

Parameters

<i>name</i>	Name of the pin.
...	Options: <ul style="list-style-type: none"> • -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.59.2 Constructor & Destructor Documentation

9.59.2.1 GpioOutputSafeHigh()

```
linuxgpio::GpioOutputSafeHigh::GpioOutputSafeHigh (
    name ,
    ... )
```

Constructor, used to set up the GPIO pin.

The pin number is written to the export control file and then the pin's direction control file is computed and the pin's direction is written.

Parameters

<i>name</i>	The name of the pin.
...	Options: <ul style="list-style-type: none">• <code>-pinnumber</code> The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.59.2.2 ~GpioOutputSafeHigh()

```
linuxgpio::GpioOutputSafeHigh::~~GpioOutputSafeHigh ( )
```

Destructor.

Unexport the pin.

9.59.3 Member Data Documentation

9.59.3.1 basepin

```
linuxgpio::GpioOutputSafeHigh::basepin [private]
```

The base pin.

9.60 linuxgpio::GpioOutputSafeHighInvert Class Reference

Output pin, initialized to high, inverted.

Public Member Functions

- [GpioOutputSafeHighInvert](#) (name,...)
Constructor, used to set up the GPIO pin.
- [~GpioOutputSafeHighInvert](#) ()
Destructor.
- [Set](#) ()
Set the pin to true (logic low).
- [Clr](#) ()
Set the pin to false (logic high).
- [Get](#) ()
Get the pin's logic state.

Private Attributes

- [basepin](#)
The base pin.

9.60.1 Detailed Description

Output pin, initialized to high, inverted.

Parameters

<i>name</i>	Name of the pin.
...	Options: <ul style="list-style-type: none">• -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.60.2 Constructor & Destructor Documentation

9.60.2.1 GpioOutputSafeHighInvert()

```
linuxgpio::GpioOutputSafeHighInvert::GpioOutputSafeHighInvert (
    name ,
    ... )
```

Constructor, used to set up the GPIO pin.

The pin number is written to the export control file and then the pin's direction control file is computed and the pin's direction is written.

Parameters

<i>name</i>	The name of the pin.
...	Options: <ul style="list-style-type: none">• -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.60.2.2 ~GpioOutputSafeHighInvert()

```
linuxgpio::GpioOutputSafeHighInvert::~~GpioOutputSafeHighInvert ( )
```

Destructor.

Unexport the pin.

9.60.3 Member Function Documentation

9.60.3.1 Clr()

```
linuxgpio::GpioOutputSafeHighInvert::Clr ( )
```

Set the pin to false (logic high).

9.60.3.2 Get()

```
linuxgpio::GpioOutputSafeHighInvert::Get ( )
```

Get the pin's logic state.

Returns

The pin state (low is true, high is false).

9.60.3.3 Set()

```
linuxgpio::GpioOutputSafeHighInvert::Set ( )
```

Set the pin to true (logic low).

9.60.4 Member Data Documentation

9.60.4.1 basepin

```
linuxgpio::GpioOutputSafeHighInvert::basepin [private]
```

The base pin.

9.61 linuxgpio::GpioOutputSafeLow Class Reference

Output pin, initialized to low.

Public Member Functions

- [GpioOutputSafeLow](#) (name,...)
Constructor, used to set up the GPIO pin.
- [~GpioOutputSafeLow](#) ()
Destructor.

Private Attributes

- [basepin](#)
The base pin.

9.61.1 Detailed Description

Output pin, initialized to low.

Parameters

<i>name</i>	Name of the pin.
...	Options: <ul style="list-style-type: none">• -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.61.2 Constructor & Destructor Documentation

9.61.2.1 GpioOutputSafeLow()

```
linuxgpio::GpioOutputSafeLow::GpioOutputSafeLow (  
    name ,  
    ... )
```

Constructor, used to set up the GPIO pin.

The pin number is written to the export control file and then the pin's direction control file is computed and the pin's direction is written.

Parameters

<i>name</i>	The name of the pin.
...	Options: <ul style="list-style-type: none">• <code>-pinnumber</code> The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

```
puts stderr "$type create $self $args"
```

9.61.2.2 ~GpioOutputSafeLow()

```
linuxgpio::GpioOutputSafeLow::~GpioOutputSafeLow ( )
```

Destructor.

Unexport the pin.

9.61.3 Member Data Documentation

9.61.3.1 basepin

```
linuxgpio::GpioOutputSafeLow::basepin [private]
```

The base pin.

9.62 linuxgpio::GpioOutputSafeLowInverted Class Reference

Output pin, initialized to low, with inverted logic.

Public Member Functions

- [GpioOutputSafeLowInverted](#) (name,...)
Constructor, used to set up the GPIO pin.
- [Set](#) ()
Set the pin to true (logic low).
- [Clr](#) ()
Set the pin to false (logic high).
- [Get](#) ()
Get the pin's logic state.
- [~GpioOutputSafeLowInverted](#) ()
Destructor.

Private Attributes

- [basepin](#)
The base pin.

9.62.1 Detailed Description

Output pin, initialized to low, with inverted logic.

Parameters

<i>name</i>	Name of the pin.
...	Options: <ul style="list-style-type: none">• -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.62.2 Constructor & Destructor Documentation

9.62.2.1 GpioOutputSafeLowInverted()

```
linuxgpio::GpioOutputSafeLowInverted::GpioOutputSafeLowInverted (
    name ,
    ... )
```

Constructor, used to set up the GPIO pin.

The pin number is written to the export control file and then the pin's direction control file is computed and the pin's direction is written.

Parameters

<i>name</i>	The name of the pin.
...	Options: <ul style="list-style-type: none">• -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer.

Author

Robert Heller <heller@deepsoft.com>

9.62.2.2 ~GpioOutputSafeLowInverted()

```
linuxgpio::GpioOutputSafeLowInverted::~~GpioOutputSafeLowInverted ( )
```

Destructor.

Unexport the pin.

9.62.3 Member Function Documentation

9.62.3.1 Clr()

```
linuxgpio::GpioOutputSafeLowInverted::Clr ( )
```

Set the pin to false (logic high).

9.62.3.2 Get()

```
linuxgpio::GpioOutputSafeLowInverted::Get ( )
```

Get the pin's logic state.

Returns

The pin state (low is true, high is false).

9.62.3.3 Set()

```
linuxgpio::GpioOutputSafeLowInverted::Set ( )
```

Set the pin to true (logic low).

9.62.4 Member Data Documentation

9.62.4.1 basepin

```
linuxgpio::GpioOutputSafeLowInverted::basepin [private]
```

The base pin.

9.63 lcc::GridConnectMessage Class Reference

A Grid Connect formatted CAN message.

Public Member Functions

- [GridConnectMessage](#) (name,...)
Constructor: create a Grid Connect Message object.
- [setHeader](#) (header)
Set the header.
- [setByte](#) (val, n)
Set a data byte.
- [setHexDigit](#) (val, n)
Set a hex digit.

Private Member Functions

- [_set_extended](#) (opt, extended)
Configure method for the -extended option.
- [_get_extended](#) (opt)
CGet method for the -extended option.
- [_set_rtr](#) (opt, rtr)
Configure method for the -rtr option.
- [_get_rtr](#) (opt)
CGet method for the -rtr option.
- [_copyCM](#) (option, m)
Configure method for the -canmessage option.

9.63.1 Detailed Description

A Grid Connect formatted CAN message.

This is an ASCII formatted version of a CAN message, used by some USB connected CAN interface devices.

This class is used to convert from **binary** CAN Messages to **ASCII** Grid Connect messages. See [GridConnectReply](#) for converting from **ASCII** Grid Connect messages to **binary** CAN Messages.

Options:

- -canmessage A binary CANMessage to be converted to a Grid Connect message. A write only option.
- -extended A boolean flag to indicate if this is an extended protocol message. Default no.
- -rtr A boolean flag to indicate if this is a reply expected message. Default no.

Additional methods defined using the macros AbstractMessage and AbstractMRMessage include:

- getElement {n} – Get the nth data element.
- getNumDataElements {} – Get the number of data elements.
- setElement {n v} – Set the nth data element.
- setOpCode {i} – Set the opcode (byte 0).
- getOpCode {} – Get the opcode (byte 0).
- getOpCodeHex {} – Get the opcode (byte 0) in hex.
- setNeededMode {pMode} – Set the needed mode.
- getNeededMode {} – Get the needed mode.
- replyExpected {} – Returns reply expected flag.
- isBinary {} – Returns binary flag.
- setBinary {b} – Set the binary flag.
- setTimeout {t} – Set the timeout.

- `getTimeout {}` – Get the timeout.
- `setRetries {i}` – Set the number of retries.
- `getRetries {}` – Get the number of retries.
- `addIntAsThree {val offset}` – Insert an integer as three decimal digits (with leading 0s).
- `addIntAsTwoHex {val offset}` – Insert an integer as two hexadecimal digits (with leading 0s).
- `addIntAsThreeHex {val offset}` – Insert an integer as three hexadecimal digits (with leading 0s).
- `addIntAsFourHex {val offset}` – Insert an integer as four hexadecimal digits (with leading 0s).
- `setNumDataElements {n}` – Set the number of data bytes.
- `toString {}` – Return the data object as a string.

And these (private) instance variables:

- `_dataChars {}`
- `_nDataChars 0`
- `mNeededMode 0`
- `_isBinary false`
- `mTimeout 0`
- `mRetries 0`

And these (private) static variables:

- `SHORT_TIMEOUT 2000`
- `LONG_TIMEOUT 60000`

9.63.2 Constructor & Destructor Documentation

9.63.2.1 GridConnectMessage()

```
lcc::GridConnectMessage::GridConnectMessage (
    name ,
    ... )
```

Constructor: create a Grid Connect Message object.

Create a Grid Connect Message. Typically, a CANMessage is configured with the `-canmessage` option and then the `toString` method is used to get a printable Grid Connect Message string.

Parameters

<i>name</i>	The name of the object.
...	The options: <ul style="list-style-type: none"> • <code>-canmessage</code> A binary CANMessage to be converted to a Grid Connect message. A write only option. • <code>-extended</code> A boolean flag to indicate if this is an extended protocol message. • <code>-rtr</code> A boolean flag to indicate if this is a reply expected message.

9.63.3 Member Function Documentation

9.63.3.1 `_copyCM()`

```
lcc::GridConnectMessage::_copyCM (
    option ,
    m ) [private]
```

Configure method for the `-canmessage` option.

Copies in a CANMessage and in the process formats a Grid Connect Message string.

Parameters

<i>option</i>	Always <code>-canmessage</code> . Ignored.
<i>m</i>	A CANMessage object.

9.63.3.2 `_get_extended()`

```
lcc::GridConnectMessage::_get_extended (
    opt ) [private]
```

CGet method for the `-extended` option.

Gets the extended flag character.

Parameters

<i>opt</i>	Always -extended. Ignored.
------------	----------------------------

Returns

A boolean flag indicating extendedness.

9.63.3.3 _get_rtr()

```
lcc::GridConnectMessage::_get_rtr (
    opt ) [private]
```

CGet method for the -rtr option.

Gets the rtr flag character.

Parameters

<i>opt</i>	Always -rtr. Ignored. @returnA boolean flag indicating rtness.
------------	--

9.63.3.4 _set_extended()

```
lcc::GridConnectMessage::_set_extended (
    opt ,
    extended ) [private]
```

Configure method for the -extended option.

Sets the extended flag character.

Parameters

<i>opt</i>	Always -extended. Ignored.
<i>extended</i>	Boolean flag indicating extendedness.

9.63.3.5 _set_rtr()

```
lcc::GridConnectMessage::_set_rtr (
```

```

    opt ,
    rtr ) [private]

```

Configure method for the -rtr option.

Sets the rtr flag character.

Parameters

<i>opt</i>	Always -rtr. Ignored.
<i>rtr</i>	Boolean flag indicating rtness.

References [FileEntry::configure\(\)](#).

9.63.3.6 setByte()

```

lcc::GridConnectMessage::setByte (
    val ,
    n )

```

Set a data byte.

Stores a data byte as two hex digits.

Parameters

<i>val</i>	The data byte value, 0-255.
<i>n</i>	The data index, 0-7.

References [FileEntry::cget\(\)](#), [lcc::complete](#), and [lcc::first](#).

9.63.3.7 setHeader()

```

lcc::GridConnectMessage::setHeader (
    header )

```

Set the header.

Sets the header. The header is converted to hex digits and stored in the data buffer.

Parameters

<i>header</i>	The binary 29-bit header.
---------------	---------------------------

9.63.3.8 setHexDigit()

```
lcc::GridConnectMessage::setHexDigit (
    val ,
    n )
```

Set a hex digit.

Stores a single nibble (0-16) at the specified index as an ASCII hex digit.

Parameters

<i>val</i>	The nibble (0-16) to store.
<i>n</i>	The data index.

References [lcc::middle](#).

9.64 lcc::GridConnectReply Class Reference

A Grid Connect formatted CAN message (reply).

Public Member Functions

- [GridConnectReply](#) (name,...)
Constructor: create a [GridConnectReply](#) instance.
- [createReply](#) ()
*Convert to a **binary** [CanMessage](#) object.*
- [setElement](#) (n, v)
Set the element.
- [maxSize](#) ()
Return the maximum size of a Grid Connect Message.
- [setData](#) (d)
Set the data Copy the data bytes into the structure.
- [getHeader](#) ()
Extract the header as a 29-bit integer.
- [getNumBytes](#) ()
Return the number of data bytes.
- [getByte](#) (b)
Return a selected data byte.
- [getHexDigit](#) (index)
Get one hexadecimal digit.

Private Member Functions

- [_get_extended](#) (opt)
CGet method for the -extended option.
- [_get_rtr](#) (opt)
CGet method for the -rtr option.
- [_copyGCM](#) (option, s)
Configure method for the -message option.
- [basicFormatCheck](#) ()
Perform a basic format check.

Private Attributes

- [_RTRoffset](#)
The offset to the RTR flag.

Static Private Attributes

- static [MAXLEN](#)
The maximum length for a Grid Connect Message.

9.64.1 Detailed Description

A Grid Connect formatted CAN message (reply).

This is an ASCII formatted version of a CAN message, used by some USB connected CAN interface devices.

This class is used to convert to **binary** CAN Messages from **ASCII** Grid Connect messages. See [GridConnectMessage](#) for converting to **ASCII** Grid Connect messages from **binary** CAN Messages.

Options:

- -extended A boolean flag to indicate if this is an extended protocol message. Readonly and not settable.
- -rtr A boolean flag to indicate if this is a reply expected message. Readonly and not settable.
- -message A received [GridConnectMessage](#) to be converted to a binary [CanMessage](#). Settable only.

Additional methods defined using the macros AbstractMessage and AbstractMRMessage include:

- getElement {n} – Get the nth data element.
- getNumDataElements {} – Get the number of data elements.
- setElement {n v} – Set the nth data element.
- setOpCode {i} – Set the opcode (byte 0).
- getOpCode {} – Get the opcode (byte 0).
- getOpCodeHex {} – Get the opcode (byte 0) in hex.
- setNeededMode {pMode} – Set the needed mode.
- getNeededMode {} – Get the needed mode.
- replyExpected {} – Returns reply expected flag.
- isBinary {} – Returns binary flag.
- setBinary {b} – Set the binary flag.
- setTimeout {t} – Set the timeout.
- getTimeout {} – Get the timeout.
- setRetries {i} – Set the number of retries.
- getRetries {} – Get the number of retries.
- addIntAsThree {val offset} – Insert an integer as three decimal digits (with leading 0s).
- addIntAsTwoHex {val offset} – Insert an integer as two hexadecimal digits (with leading 0s).
- addIntAsThreeHex {val offset} – Insert an integer as three hexadecimal digits (with leading 0s).
- addIntAsFourHex {val offset} – Insert an integer as four hexadecimal digits (with leading 0s).
- setNumDataElements {n} – Set the number of data bytes.
- toString {} – Return the data object as a string.

And these (private) instance variables:

- _dataChars {}
- _nDataChars 0
- mNeededMode 0
- _isBinary false
- mTimeout 0
- mRetries 0

And these (private) static variables:

- SHORT_TIMEOUT 2000
- LONG_TIMEOUT 60000

9.64.2 Constructor & Destructor Documentation

9.64.2.1 GridConnectReply()

```
lcc::GridConnectReply::GridConnectReply (
    name ,
    ... )
```

Constructor: create a [GridConnectReply](#) instance.

A [GridConnectReply](#) object is created.

Parameters

<i>name</i>	The name of the new instance.
...	The options: <ul style="list-style-type: none">• -message An optional Grid Connect Message string.

9.64.3 Member Function Documentation

9.64.3.1 _copyGCM()

```
lcc::GridConnectReply::_copyGCM (
    option ,
    s ) [private]
```

Configure method for the -message option.

Send in an ASCII Grid Connect Message for conversion.

Parameters

<i>option</i>	Allways -message. Ignored.
<i>s</i>	The ASCII Grid Connect Message as a string.

9.64.3.2 `_get_extended()`

```
lcc::GridConnectReply::_get_extended (
    opt ) [private]
```

CGet method for the -extended option.

Gets the extended protocol flag for this message.

Parameters

<i>opt</i>	Allways -extended. Ignored.
------------	-----------------------------

Returns

The extended protocol flag for this message.

9.64.3.3 `_get_rtr()`

```
lcc::GridConnectReply::_get_rtr (
    opt ) [private]
```

CGet method for the -rtr option.

Gets the reply flag for this message.

Parameters

<i>opt</i>	Allways -rtr. Ignored.
------------	------------------------

Returns

The reply flag for this message.

9.64.3.4 `basicFormatCheck()`

```
lcc::GridConnectReply::basicFormatCheck ( ) [private]
```

Perform a basic format check.

Check for a basicly correct formatted string.

Returns

A boolean flag indicating that the message passed a basic format check.

References [i](#).

9.64.3.5 createReply()

```
lcc::GridConnectReply::createReply ( )
```

Convert to a **binary** [CanMessage](#) object.

Decode a Grid Connect Message into a binary [CanMessage](#) object.

Returns

A [CanMessage](#) object.

9.64.3.6 getByte()

```
lcc::GridConnectReply::getByte (
    b )
```

Return a selected data byte.

Parameters

<i>b</i>	The index of the byte (0-7) to return.
----------	--

Returns

The data bytes or 0.

9.64.3.7 getHeader()

```
lcc::GridConnectReply::getHeader ( )
```

Extract the header as a 29-bit integer.

Peel the hexadecimal digits between the simple/extended flag character and the reply/noreply character as a 29-bit CAN header word.

Returns

A 29-bit integer.

9.64.3.8 getHexDigit()

```
lcc::GridConnectReply::getHexDigit (
    index )
```

Get one hexadecimal digit.

Parameters

<i>index</i>	The low-level data index of the nibble to return.
--------------	---

Returns

The nibble.

9.64.3.9 getNumBytes()

```
lcc::GridConnectReply::getNumBytes ( )
```

Return the number of data bytes.

Returns

The number of data bytes.

9.64.3.10 maxSize()

```
lcc::GridConnectReply::maxSize ( )
```

Return the maximum size of a Grid Connect Message.

Returns

The maximum size of a Grid Connect Message.

9.64.3.11 setData()

```
lcc::GridConnectReply::setData (
    d )
```

Set the data Copy the data bytes into the structure.

Parameters

<i>d</i>	A list of data bytes (characters).
----------	------------------------------------

9.64.3.12 setElement()

```
lcc::GridConnectReply::setElement (
    n ,
    v )
```

Set the element.

Set the element at the specified index.

Parameters

<i>n</i>	The index to set.
<i>v</i>	The value to set.

9.64.4 Member Data Documentation**9.64.4.1 _RTRoffset**

```
lcc::GridConnectReply::_RTRoffset [private]
```

The offset to the RTR flag.

9.64.4.2 MAXLEN

```
lcc::GridConnectReply::MAXLEN [static], [private]
```

The maximum length for a Grid Connect Message.

9.65 TTSupport::hash Struct Reference

Option hash map, used for Print options.

```
#include <TimeTableSystem.h>
```

Public Member Functions

- `std::size_t operator()` (const char *s) const

9.65.1 Detailed Description

Option hash map, used for Print options.

Author

Robert Heller <heller@deepsoft.com>

9.65.2 Member Function Documentation

9.65.2.1 operator>()

```
std::size_t TTSupport::hash::operator() (
    const char * s ) const [inline]
```

9.66 CTCPanel::HiddenBlock Class Reference

Hidden Block object type.

Public Member Functions

- [HiddenBlock](#) (name, _ctcpanel, _canvas,...)
Construct a [HiddenBlock](#) object.
- [~HiddenBlock](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the [HiddenBlock](#).

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

9.66.1 Detailed Description

Hidden Block object type.

These are on the schematic and represent a piece of track on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the HiddenBlock on.
...	Options: <ul style="list-style-type: none"> • -x1 The first x coordinate of the object (readonly, default 0). • -y1 The first y coordinate of the object (readonly, default 0). • -x2 The second x coordinate of the object (readonly, default 0). • -y2 The second y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default MainLine). • -label The label of the HiddenBlock (default ""). • -position The position of the label (readonly, default below). • -orientation The orientation of the bridge (8-way) (readonly, default 0). • -flipped Whether the bridge is flipped (readonly, default no). • -occupiedcommand A command to run to find out if the HiddenBlock is occupied (default {}).

Defined coords terminals:

- E1 First endpoint.
- E2 Second endpoint.

Defined values (states): none. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.66.2 Constructor & Destructor Documentation

9.66.2.1 HiddenBlock()

```
CTCPanel::HiddenBlock::HiddenBlock (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [HiddenBlock](#) object.

Parameters

<i>_ctcpanel</i>	The CTCPanel megawidget.
<i>_canvas</i>	The schematic canvas to draw the HiddenBlock on.
...	Option list.

9.66.2.2 ~HiddenBlock()

```
CTCPanel::HiddenBlock::~~HiddenBlock ( )
```

Clean up all data objects and free up all resources.

9.66.3 Member Function Documentation

9.66.3.1 _configureLabel()

```
CTCPanel::HiddenBlock::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.66.3.2 `geti()`

```
CTCPanel::HiddenBlock::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.66.3.3 `getv()`

```
CTCPanel::HiddenBlock::getv ( )
```

Method to get our value (state).

9.66.3.4 `invoke()`

```
CTCPanel::HiddenBlock::invoke ( )
```

Method to invoke the [HiddenBlock](#).

9.66.3.5 `seti()`

```
CTCPanel::HiddenBlock::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.66.3.6 `setv()`

```
CTCPanel::HiddenBlock::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.66.4 Member Data Documentation

9.66.4.1 canvas

CTCPanel::HiddenBlock::canvas [private]

The canvas component (parent widget component).

9.66.4.2 ctcp panel

CTCPanel::HiddenBlock::ctcp panel [private]

The CTC Panel component (parent widget).

9.67 HTMLHelp::HTMLHelp Class Reference

A widget that implements a help dialog that renders HTML coded help pages (generally generated from LaTeX using tex4ht's htlatex script).

Public Member Functions

- [HTMLHelp](#) (name,...)
HTMLHelp constructor method.
- [helpTopic](#) (topic="Help")
Public method to display help on a specific topic.

Static Public Member Functions

- static [GetInstance](#) (widget)
Returns the parent object given the specified child widget.
- static [setDefault](#)s (helpdir, [toc](#))
A public typemethod to set the default values for the -helpdirectory and -tableofcontents options.
- static [help](#) (topic)
A public typemethod to create and launch a default help dialog.

Private Member Functions

- [_Close](#) ()
- [back](#) ()
- [forward](#) ()
- [nextlink](#) (w)
- [prevlink](#) (w)
- [searchforward](#) (w)
- [_SForward](#) (w)
- [searchbackward](#) (w)
- [_SBackward](#) (w)

Static Private Member Functions

- static [findtopicintoc](#) (selfns, topic)
- static [pushcurrenttopic](#) (selfns, url)
- static [backcurrenttopic](#) (selfns)
- static [forwardcurrenttopic](#) (selfns)
- static [render](#) (selfns, win, url, push="yes")
- static [HMininit_win](#) (selfns, win)
- static [HMset_indent](#) (win, cm)

set the indent spacing (in cm) for lists TK uses a "weird" tabbing model that causes \t to insert a single space if the current line position is past the tab setting
- static [HMreset_win](#) (win)

reset the state of window - get ready for the next page remove all but the font tags, and remove all form state
- static [HMininit_state](#) (win)

initialize the window's state array Parameters beginning with S_ are NOT reset adjust_size: global font size adjuster unknown: character to use for unknown entities tab: tab stop (in cm) stop: enabled to stop processing update: how many tags between update calls tags: number of tags processed so far symbols: Symbols to use on un-ordered lists
- static [HMset_state](#) (win,...)
- static [HMrender](#) (selfns, win, tag, not, param, text)

HMrender gets called for every html tag win: The name of the text widget to render into tag: The html tag (in arbitrary case) not: a "/" or the empty string param: The un-interpreted parameter list text: The plain text until the next html tag.
- static [HMtag_hmstart](#) (selfns, win, param, text)

A pair of pseudo tags are added automatically as the 1st and last html tags in the document.
- static [HMtag_hmstart](#) (selfns, win, param, text)
- static [HMtag_title](#) (selfns, win, param, text)

put the document title in the window banner, and remove the title text from the document
- static [HMtag_hr](#) (selfns, win, param, text)
- static [HMtag_ol](#) (selfns, win, param, text)
- static [HMtag_ul](#) (selfns, win, param, text)
- static [HMtag_menu](#) (selfns, win, param, text)
- static [HMtag_menu](#) (selfns, win, param, text)
- static [HMtag_dt](#) (selfns, win, param, text)
- static [HMtag_li](#) (selfns, win, param, text)
- static [HMtag_a](#) (selfns, win, param, text)

Manage hypertext "anchor" links.
- static [HMgoto](#) (selfns, win, where, callback="HMwent_to")

The application should call here with the fragment name to cause the display to go to this spot.

- static [HMwent_to](#) (selfns, win, where, count=0, color="orange")
We actually got to the spot, so highlight it! This should/could be replaced by the application We'll flash it orange a couple of times.
- static [HMtag_a](#) (selfns, win, param, text)
- static [HMtag_img](#) (selfns, win, param, text)
Inline Images This interface is subject to change Most of the work is getting around a limitation of TK that prevents setting the size of a label to a widthxheight in pixels.
- static [HMgot_image](#) (win, image_error)
When the image is available, the application should call back here.
- static [HMLink_setup](#) (win, href)
We need to escape any 's in the href tag name so the bind command doesn't try to substitute them.
- static [HMLink_hit](#) (selfns, win, x, y)
generic link-hit callback This gets called upon button hits on hypertext links Applications are expected to supply their own HMLink_callback routine win: The name of the text widget to render into x,y: The cursor position at the "click"
- static [HMcheck_tocRelative](#) (link, tocfiler)
- static [HMextract_param](#) (param, key, val="")
extract a value from parameter list (this needs a re-do) returns "1" if the keyword is found, "0" otherwise param: A parameter list.
- static [HMstack](#) (win, push, list)
Push or pop tags to/from stack.
- static [HMcurrent_tags](#) (selfns, win)
extract set of current text tags tags starting with T map directly to text tags, all others are handled specially.
- static [HMx_font](#) (family, size, weight, style, adjust_size=0)
generate an X font name
- static [HMOptimize](#) ()
Optimize HMrender (hee hee) This is experimental.
- static [HMparse_html](#) (html, cmd="HMtest_parse", start="hmstart")
Turn HTML into TCL commands html A string containing an html document cmd A command to run for each html tag found start The name of the dummy html start/stop tags.
- static [HMtest_parse](#) (command, tag, slash, text_after_tag)
- static [HMzap_white](#) (data)
Convert multiple white space into a single space.
- static [HMmap_esc](#) (text)
find HTML escape characters of the form &xxx;
- static [HMdo_map](#) (text, unknown="?")
convert an HTML escape sequence into character
- static [HMtag_isindex](#) (selfns, win, param, text)
html isindex tag.
- static [HMsubmit_index](#) (selfns, win, param, text)
This is called when the isindex form is submitted.
- static [HMtag_form](#) (selfns, win, param, text)
initialize form state.
- static [HMtag_form](#) (selfns, win, param, text)
Where we're done try to get all of the state into the widgets so we can free up the form structure here.
- static [HMtag_input](#) (selfns, win, param, text)
handle form input items each item type is handled in a separate procedure Each "type" procedure needs to:
- static [HMinput_text](#) (win, param, show="")
input type=text parameters NAME (reqd), MAXLENGTH, SIZE, VALUE

- static [HMinput_password](#) (win, param)
password fields - same as text, only don't show data parameters NAME (reqd), MAXLENGTH, SIZE, VALUE
- static [HMinput_checkbox](#) (win, param)
checkboxes are missing a "get" option, so we must use a global variable to store the value.
- static [HMinput_radio](#) (win, param)
radio buttons.
- static [HMinput_hidden](#) (win, param)
hidden fields, just append to the "submit" data params: NAME, VALUE (reqd)
- static [HMinput_image](#) (win, param)
handle input images.
- static [HMinput_reset](#) (win, param)
Set up the reset button.
- static [HMinput_submit](#) (win, param)
Set up the submit button.
- static [HMTag_select](#) (selfns, win, param, text)
selection items They all go into a list box.
- static [HMTag_option](#) (selfns, win, param, text)
select options The values returned in the query may be different from those displayed in the listbox, so we need to keep a separate list of query values.
- static [HMTag__select](#) (selfns, win, param, text)
do most of the work here! if SIZE > 1, make the listbox.
- static [HMTag_textarea](#) (selfns, win, param, text)
do a text area (multi-line text) params: COLS, NAME, ROWS (all reqd, but default rows and cols anyway)
- static [HMwin_install](#) (win, item)
procedure to install windows into the text widget
- static [HMsubmit_button](#) (win, form_id, param, stuff)
Assemble and submit the query each list element in "stuff" is a name/value pair.
- static [HMsubmit_form](#) (win, param, query)
sample user callback for form submission should be replaced by the application Sample version generates a string suitable for http
- static [HMmap_reply](#) (string)
1 leave alphanumerics characters alone 2 Convert every other character to an array lookup 3 Escape constructs that are "special" to the tcl parser 4 "subst" the result, doing all the array substitutions
- static [HMcgiDecode](#) (data)
convert a x-www-urlencoded string into a list of name/value pairs 1 convert a=b&c=d... to {a} {b} {c} {d}... 2, convert + to " " 3, convert xx to char equiv
- static [HMcgiMap](#) (data)
- static [get_html](#) (file)
given a file name, return its html, or invent some html if the file can't be opened.
- static [HMLink_callback](#) (selfns, win, href)
Override the library link-callback routine for the sample app.
- static [HMset_image](#) (selfns, win, handle, src)
Supply an image callback function Read in an image if we don't already have one callback to library for display.
- static [HMset_font](#) (selfns, win, tag, font)
downloading fonts can take a long time.
- static [HMTag_color](#) (selfns, win, param, text)
Lets invent a new HTML tag, just for fun.
- static [HMTag__color](#) (selfns, win, param, text)

- static [HMTag_font](#) (selfns, win, param, text)
Add a font size manipulation primitive, so we can use this sample program for on-line presentations.
- static [HMTag_font](#) (selfns, win, param, text)
This version is closer to what Netscape does.
- static [HMTag_font](#) (selfns, win, param, text)
- static [HMTag_link](#) (selfns, win, param, text)
- static [HMLoad_css](#) (selfns, win, href)
- static [HMappend_css](#) (varName, cssBlock)

Private Attributes

- [panes](#)
PaneWindow component.
- [tocscroll](#)
ScrolledWindow for the Table Of Contents component.
- [toc](#)
The Table Of Contents component.
- [toc_css](#)
The Table Of Contents stylesheet.
- [textscroll](#)
The text area ScrolledWindow component.
- [helptext](#)
The text area component.
- [helptext_css](#)
The text area stylesheet.
- [status](#)
The Help status component.
- [command](#)
The Help command component.
- [Url](#)
The current URL.
- [topicstack](#)
- [curtopicindex](#)
- [lastsearch](#)
initialize the window and stack state
- [Fonts](#)

Static Private Attributes

- static [_WidgetMap](#)
Widget map.
- static [defaultHelpDirectory](#)
The default help directory.
- static [defaultTableOfContents](#)
The default Table Of Contents file.
- static [defaultHelpWindow](#)

The default Help file.

- static [Hntag_map](#)
- static [HMinert_map](#)
- static [HMList_elements](#)
- static [HMparam_map](#)
- static [HMevents](#)
- static [HMform_map](#)
- static [HMesc_map](#)
- static [HMalphanumeric](#)

9.67.1 Detailed Description

A widget that implements a help dialog that renders HTML coded help pages (generally generated from LaTeX using tex4ht's htlatex script).

This widget contains two panes, a narrow contents (a link menu) pane on the left and a wider help text pane on the right. Below these panes is a status label and a search text labeled entry, with a set of four buttons along the bottom.

Parameters

<i>path</i>	Pathname of the widget.
...	Options: <ul style="list-style-type: none"> • -textwidth The initial width of the text pane. • -width The overall width of the help dialog. • -height The overall height of the help dialog. • -side The side, top or bottom to put the sash. Default top. • -helpdirectory The directory where the HTML files reside. • -tableofcontents The file in the help directory that contains the table of contents (link menu).

Author

Stephen Uhler <stephen.uhler@sun.com>, Clif Flynt <clif@cflynt.com>, and Robert Heller <heller@deepsoft.com>.

9.67.2 Constructor & Destructor Documentation

9.67.2.1 HTMLHelp()

```
HTMLHelp::HTMLHelp::HTMLHelp (
    name ,
    ... )
```


[HTMLHelp](#) constructor method.

The [HTMLHelp](#) is constructed here.

Parameters

...	Option value pairs.
-----	---------------------

9.67.3 Member Function Documentation

9.67.3.1 _Close()

```
HTMLHelp::HTMLHelp::_Close ( ) [private]
```

9.67.3.2 _SBackward()

```
HTMLHelp::HTMLHelp::_SBackward (
    w ) [private]
```

9.67.3.3 _SForward()

```
HTMLHelp::HTMLHelp::_SForward (
    w ) [private]
```

9.67.3.4 a()

```
static HMTAG_ HTMLHelp::HTMLHelp::a (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.5 back()

```
HTMLHelp::HTMLHelp::back ( ) [private]
```

9.67.3.6 backcurrenttopic()

```
static HTMLHelp::HTMLHelp::backcurrenttopic (
    selfns ) [static], [private]
```

9.67.3.7 color()

```
static HMTAG_ HTMLHelp::HTMLHelp::color (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.8 findtopicintoc()

```
static HTMLHelp::HTMLHelp::findtopicintoc (
    selfns ,
    topic ) [static], [private]
```

9.67.3.9 font()

```
static HMTAG_ HTMLHelp::HTMLHelp::font (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.10 form()

```
static HMTAG_HTMLHelp::HTMLHelp::form (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

Where we're done try to get all of the state into the widgets so we can free up the form structure here.

Unfortunately, we can't!

9.67.3.11 forward()

```
HTMLHelp::HTMLHelp::forward ( ) [private]
```

9.67.3.12 forwardcurrenttopic()

```
static HTMLHelp::HTMLHelp::forwardcurrenttopic (
    selfns ) [static], [private]
```

9.67.3.13 get_html()

```
static HTMLHelp::HTMLHelp::get_html (
    file ) [static], [private]
```

given a file name, return its html, or invent some html if the file can't be opened.

9.67.3.14 GetInstance()

```
static HTMLHelp::HTMLHelp::GetInstance (
    widget ) [static]
```

Returns the parent object given the specified child widget.

9.67.3.15 help()

```
static HTMLHelp::HTMLHelp::help (
    topic ) [static]
```

A public typemethod to create and launch a default help dialog.

The setDefaults typemethod must be called before this typemethod!

Parameters

<i>topic</i>	The help topic text to display help for.
--------------	--

9.67.3.16 helpTopic()

```
HTMLHelp::HTMLHelp::helpTopic (  
    topic = "Help" )
```

Public method to display help on a specific topic.

Parameters

<i>topic</i>	The topic text to display help for.
--------------	-------------------------------------

9.67.3.17 HMappend_css()

```
static HTMLHelp::HTMLHelp::HMappend_css (  
    varName ,  
    cssBlock ) [static], [private]
```

9.67.3.18 HMcgiDecode()

```
static HTMLHelp::HTMLHelp::HMcgiDecode (  
    data ) [static], [private]
```

convert a x-www-urlencoded string into a list of name/value pairs 1 convert a=b&c=d... to {a} {b} {c} {d}... 2, convert + to " " 3, convert xx to char equiv

9.67.3.19 HMcgiMap()

```
static HTMLHelp::HTMLHelp::HMcgiMap (  
    data ) [static], [private]
```

9.67.3.20 HMcheck_tocRelative()

```
static HTMLHelp::HTMLHelp::HMcheck_tocRelative (
    link ,
    tocfile ) [static], [private]
```

9.67.3.21 HMcurrent_tags()

```
static HTMLHelp::HTMLHelp::HMcurrent_tags (
    selfns ,
    win ) [static], [private]
```

extract set of current text tags tags starting with T map directly to text tags, all others are handled specially.

There is an application callback, HMset_font to allow the application to do font error handling

9.67.3.22 HMdo_map()

```
static HTMLHelp::HTMLHelp::HMdo_map (
    text ,
    unknown = "?" ) [static], [private]
```

convert an HTML escape sequence into character

9.67.3.23 HMextract_param()

```
static HTMLHelp::HTMLHelp::HMextract_param (
    param ,
    key ,
    val = "" ) [static], [private]
```

extract a value from parameter list (this needs a re-do) returns "1" if the keyword is found, "0" otherwise param: A parameter list.

It should already have been processed to remove any entity references key: The parameter name val: The variable to put the value into (use key as default)

9.67.3.24 HMgot_image()

```
static HTMLHelp::HTMLHelp::HMgot_image (
    win ,
    image_error ) [static], [private]
```

When the image is available, the application should call back here.

If we have the image, put it in the label, otherwise display the error message. If we don't get a callback, the "alt" text remains. if we have a clickable image, arrange for a callback

9.67.3.25 HMgoto()

```
static HTMLHelp::HTMLHelp::HMgoto (
    selfns ,
    win ,
    where ,
    callback = "HMwent_to" ) [static], [private]
```

The application should call here with the fragment name to cause the display to go to this spot.

If the target exists, go there (and do the callback), otherwise schedule the goto to happen when we see the reference.

9.67.3.26 HMininit_state()

```
static HTMLHelp::HTMLHelp::HMininit_state (
    win ) [static], [private]
```

initialize the window's state array Parameters beginning with S_ are NOT reset adjust_size: global font size adjuster
unknown: character to use for unknown entities tab: tab stop (in cm) stop: enabled to stop processing update: how
many tags between update calls tags: number of tags processed so far symbols: Symbols to use on un-ordered lists

9.67.3.27 HMininit_win()

```
static HTMLHelp::HTMLHelp::HMininit_win (
    selfns ,
    win ) [static], [private]
```

9.67.3.28 HMininput_checkbox()

```
static HTMLHelp::HTMLHelp::HMininput_checkbox (
    win ,
    param ) [static], [private]
```

checkboxbuttons are missing a "get" option, so we must use a global variable to store the value.

Parameters NAME, VALUE, (reqd), CHECKED

9.67.3.29 HMininput_hidden()

```
static HTMLHelp::HTMLHelp::HMininput_hidden (
    win ,
    param ) [static], [private]
```

hidden fields, just append to the "submit" data params: NAME, VALUE (reqd)

9.67.3.30 HInput_image()

```
static HTMLHelp::HTMLHelp::HInput_image (
    win ,
    param ) [static], [private]
```

handle input images.

The spec isn't very clear on these, so I'm not sure its quite right Use std image tag, only set up our own callbacks (e.g. make sure ismap isn't set) params: NAME, SRC (reqd) ALIGN

9.67.3.31 HInput_password()

```
static HTMLHelp::HTMLHelp::HInput_password (
    win ,
    param ) [static], [private]
```

password fields - same as text, only don't show data parameters NAME (reqd), MAXLENGTH, SIZE, VALUE

9.67.3.32 HInput_radio()

```
static HTMLHelp::HTMLHelp::HInput_radio (
    win ,
    param ) [static], [private]
```

radio buttons.

These are like check buttons, but only one can be selected

9.67.3.33 HInput_reset()

```
static HTMLHelp::HTMLHelp::HInput_reset (
    win ,
    param ) [static], [private]
```

Set up the reset button.

Wait for the /form to attach the -command option. There could be more that 1 reset button params VALUE

9.67.3.34 HInput_submit()

```
static HTMLHelp::HTMLHelp::HInput_submit (
    win ,
    param ) [static], [private]
```

Set up the submit button.

Wait for the /form to attach the -command option. There could be more that 1 submit button params: NAME, VALUE

9.67.3.35 HMinput_text()

```
static HTMLHelp::HTMLHelp::HMinput_text (
    win ,
    param ,
    show = "" ) [static], [private]
```

input type=text parameters NAME (reqd), MAXLENGTH, SIZE, VALUE

9.67.3.36 Hmlink_callback()

```
static HTMLHelp::HTMLHelp::Hmlink_callback (
    selfns ,
    win ,
    href ) [static], [private]
```

Override the library link-callback routine for the sample app.

It only handles the simple cases.

9.67.3.37 Hmlink_hit()

```
static HTMLHelp::HTMLHelp::Hmlink_hit (
    selfns ,
    win ,
    x ,
    y ) [static], [private]
```

generic link-hit callback This gets called upon button hits on hypertext links Applications are expected to supply their own Hmlink_callback routine win: The name of the text widget to render into x,y: The cursor position at the "click"

9.67.3.38 Hmlink_setup()

```
static HTMLHelp::HTMLHelp::Hmlink_setup (
    win ,
    href ) [static], [private]
```

We need to escape any 's in the href tag name so the bind command doesn't try to substitute them.

9.67.3.39 HMload_css()

```
static HTMLHelp::HTMLHelp::HMload_css (
    selfns ,
    win ,
    href ) [static], [private]
```

9.67.3.40 HMmap_esc()

```
static HTMLHelp::HTMLHelp::HMmap_esc (
    text ) [static], [private]
```

find HTML escape characters of the form &xxx;

9.67.3.41 HMmap_reply()

```
static HTMLHelp::HTMLHelp::HMmap_reply (
    string ) [static], [private]
```

1 leave alphanumerics characters alone 2 Convert every other character to an array lookup 3 Escape constructs that are "special" to the tcl parser 4 "subst" the result, doing all the array substitutions

9.67.3.42 HMOptimize()

```
static HTMLHelp::HTMLHelp::HMOptimize ( ) [static], [private]
```

Optimize HMrender (hee hee) This is experimental.

9.67.3.43 HMparse_html()

```
static HTMLHelp::HTMLHelp::HMparse_html (
    html ,
    cmd = "HMtest_parse",
    start = "hmstart" ) [static], [private]
```

Turn HTML into TCL commands html A string containing an html document cmd A command to run for each html tag found start The name of the dummy html start/stop tags.

9.67.3.44 HMrender()

```
static HTMLHelp::HTMLHelp::HMrender (
    selfns ,
    win ,
    tag ,
    not ,
    param ,
    text ) [static], [private]
```

HMrender gets called for every html tag win: The name of the text widget to render into tag: The html tag (in arbitrary case) not: a "/" or the empty string param: The un-interpreted parameter list text: The plain text until the next html tag.

9.67.3.45 HMreset_win()

```
static HTMLHelp::HTMLHelp::HMreset_win (
    win ) [static], [private]
```

reset the state of window - get ready for the next page remove all but the font tags, and remove all form state

9.67.3.46 HMset_font()

```
static HTMLHelp::HTMLHelp::HMset_font (
    selfns ,
    win ,
    tag ,
    font ) [static], [private]
```

downloading fonts can take a long time.

We'll override the default font-setting routine to permit better user feedback on fonts. We'll keep our own list of installed fonts on the side, to guess when delays are likely

9.67.3.47 HMset_image()

```
static HTMLHelp::HTMLHelp::HMset_image (
    selfns ,
    win ,
    handle ,
    src ) [static], [private]
```

Supply an image callback function Read in an image if we don't already have one callback to library for display.

9.67.3.48 HMset_indent()

```
static HTMLHelp::HTMLHelp::HMset_indent (
    win ,
    cm ) [static], [private]
```

set the indent spacing (in cm) for lists TK uses a "weird" tabbing model that causes \t to insert a single space if the current line position is past the tab setting

9.67.3.49 HMset_state()

```
static HTMLHelp::HTMLHelp::HMset_state (
    win ,
    ... ) [static], [private]
```

9.67.3.50 HMstack()

```
static HTMLHelp::HTMLHelp::HMstack (
    win ,
    push ,
    list ) [static], [private]
```

Push or pop tags to/from stack.

Each orthogonal text property has its own stack, stored as a list. The current (most recent) tag is the last item on the list. Push is {} for pushing and {} for popping

9.67.3.51 hmstart()

```
static HMTAG_ HTMLHelp::HTMLHelp::hmstart (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.52 HSubmit_button()

```
static HTMLHelp::HTMLHelp::HSubmit_button (
    win ,
    form_id ,
    param ,
    stuff ) [static], [private]
```

Assemble and submit the query each list element in "stuff" is a name/value pair.

- The names are the NAME parameters of the various fields
- The values get run through "subst" to extract the values
- We do the user callback with the list of name value pairs

9.67.3.53 HSubmit_form()

```
static HTMLHelp::HTMLHelp::HSubmit_form (
    win ,
    param ,
    query ) [static], [private]
```

sample user callback for form submission should be replaced by the application Sample version generates a string suitable for http

9.67.3.54 HSubmit_index()

```
static HTMLHelp::HTMLHelp::HSubmit_index (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

This is called when the isindex form is submitted.

The default version calls Hmlink_callback. Isindex tags should either be deprecated, or fully supported (e.g. they need an href parameter)

9.67.3.55 HMTag_a()

```
static HTMLHelp::HTMLHelp::HMTag_a (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

Manage hypertext "anchor" links.

A link can be either a source (href) a destination (name) or both. If its a source, register it via a callback, and set its default behavior. If its a destination, check to see if we need to go there now, as a result of a previous HMgoto request. If so, schedule it to happen with the closing tag, so we can highlight the text up to the .

9.67.3.56 HMTag_color()

```
static HTMLHelp::HTMLHelp::HMTag_color (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

Lets invent a new HTML tag, just for fun.

Change the color of the text. Use html tags of the form: <color value=blue>> ... </color> We can invent a new tag for the display stack. If it starts with "T" it will automatically get mapped directly to a text widget tag.

9.67.3.57 HMTag_dt()

```
static HTMLHelp::HTMLHelp::HMTag_dt (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.58 HMTag_font() [1/2]

```
static HTMLHelp::HTMLHelp::HMTag_font (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

Add a font size manipulation primitive, so we can use this sample program for on-line presentations.

sizes prefixed with + or - are relative. Note that this is not the same as Netscape's tag.

9.67.3.59 HMTag_font() [2/2]

```
static HTMLHelp::HTMLHelp::HMTag_font (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

This version is closer to what Netscape does.

9.67.3.60 HMTag_form()

```
static HTMLHelp::HTMLHelp::HMTag_form (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

initialize form state.

All of the state for this form is kept in a global array whose name is stored in the form_id field of the main window array.
Parameters: ACTION, METHOD, ENCTYPE

9.67.3.61 HMTag_hmstart()

```
static HTMLHelp::HTMLHelp::HMTag_hmstart (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

A pair of pseudo tags are added automatically as the 1st and last html tags in the document.

The default is <HMstart> and </HMstart>. Append enough blank space at the end of the text widget while rendering so HMgoto can place the target near the top of the page, then remove the extra space when done rendering.

9.67.3.62 HMTag_hr()

```
static HTMLHelp::HTMLHelp::HMTag_hr (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.63 HMTag_img()

```
static HTMLHelp::HTMLHelp::HMTag_img (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

Inline Images This interface is subject to change Most of the work is getting around a limitation of TK that prevents setting the size of a label to a widthxheight in pixels.

Images have the following parameters: align: top,middle,bottom alt: alternate text ismap: A clickable image map src: The URL link Netscape supports (and so do we) width: A width hint (in pixels) height: A height hint (in pixels) border: The size of the window border

9.67.3.64 HMTag_input()

```
static HTMLHelp::HTMLHelp::HMTag_input (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

handle form input items each item type is handled in a separate procedure Each "type" procedure needs to:

- create the window
- initialize it
- add the "submit" and "reset" commands onto the proper Q's "submit" is subst'd "reset" is eval'd

9.67.3.65 HMTag_isindex()

```
static HTMLHelp::HTMLHelp::HMTag_isindex (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

html isindex tag.

Although not strictly forms, they're close enough to be in this file is-index forms make a frame with a label, entry, and submit button

9.67.3.66 HMTag_li()

```
static HTMLHelp::HTMLHelp::HMTag_li (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.67 HMTag_link()

```
static HTMLHelp::HTMLHelp::HMTag_link (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.68 HMTag_menu()

```
static HTMLHelp::HTMLHelp::HMTag_menu (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.69 HMTag_ol()

```
static HTMLHelp::HTMLHelp::HMTag_ol (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.70 HMTag_option()

```
static HTMLHelp::HTMLHelp::HMTag_option (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

select options The values returned in the query may be different from those displayed in the listbox, so we need to keep a separate list of query values.

form(select_default) - contains the default query value
form(select_frame) - name of the listbox's containing frame
form(select_values) - list of query values
params: VALUE, SELECTED

9.67.3.71 HMTag_select()

```
static HTMLHelp::HTMLHelp::HMTag_select (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

selection items They all go into a list box.

We don't what to do with the listbox until we know how many items end up in it. Gather up the data for the "options" and finish up in the /select tag params: NAME (reqd), MULTIPLE, SIZE

9.67.3.72 HMTag_textarea()

```
static HTMLHelp::HTMLHelp::HMTag_textarea (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

do a text area (multi-line text) params: COLS, NAME, ROWS (all reqd, but default rows and cols anyway)

9.67.3.73 HMTag_title()

```
static HTMLHelp::HTMLHelp::HMTag_title (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

put the document title in the window banner, and remove the title text from the document

9.67.3.74 HMTag_ul()

```
static HTMLHelp::HTMLHelp::HMTag_ul (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.75 HMtest_parse()

```
static HTMLHelp::HTMLHelp::HMtest_parse (
    command ,
    tag ,
    slash ,
    text_after_tag ) [static], [private]
```

9.67.3.76 HMwent_to()

```
static HTMLHelp::HTMLHelp::HMwent_to (
    selfns ,
    win ,
    where ,
    count = 0,
    color = "orange" ) [static], [private]
```

We actually got to the spot, so highlight it! This should/could be replaced by the application We'll flash it orange a couple of times.

9.67.3.77 HMwin_install()

```
static HTMLHelp::HTMLHelp::HMwin_install (
    win ,
    item ) [static], [private]
```

procedure to install windows into the text widget

- win: name of the text widget
- item: name of widget to install

9.67.3.78 HMx_font()

```
static HTMLHelp::HTMLHelp::HMx_font (
    family ,
    size ,
    weight ,
    style ,
    adjust_size = 0 ) [static], [private]
```

generate an X font name

9.67.3.79 HMzap_white()

```
static HTMLHelp::HTMLHelp::HMzap_white (
    data ) [static], [private]
```

Convert multiple white space into a single space.

9.67.3.80 menu()

```
static HMTAG_ HTMLHelp::HTMLHelp::menu (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

9.67.3.81 nextlink()

```
HTMLHelp::HTMLHelp::nextlink (
    w ) [private]
```

9.67.3.82 prevlink()

```
HTMLHelp::HTMLHelp::prevlink (
    w ) [private]
```

9.67.3.83 pushcurrenttopic()

```
static HTMLHelp::HTMLHelp::pushcurrenttopic (
    selfns ,
    url ) [static], [private]
```

9.67.3.84 render()

```
static HTMLHelp::HTMLHelp::render (
    selfns ,
    win ,
    url ,
    push = "yes" ) [static], [private]
```

9.67.3.85 searchbackward()

```
HTMLHelp::HTMLHelp::searchbackward (
    w ) [private]
```

9.67.3.86 searchforward()

```
HTMLHelp::HTMLHelp::searchforward (
    w ) [private]
```

9.67.3.87 select()

```
static HMTAG_ HTMLHelp::HTMLHelp::select (
    selfns ,
    win ,
    param ,
    text ) [static], [private]
```

do most of the work here! if SIZE>1, make the listbox.

Otherwise make a "drop-down" listbox with a label in it If the # of items > size, add a scroll bar This should probably be broken up into callbacks to make it easier to override the "look".

9.67.3.88 setDefaults()

```
static HTMLHelp::HTMLHelp::setDefaults (
    helpdir ,
    toc ) [static]
```

A public typemethod to set the default values for the -helpdirectory and -tableofcontents options.

Parameters

<i>helpdir</i>	The default value for -helpdirectory.
<i>toc</i>	The default value for -tableofcontents.

9.67.4 Member Data Documentation**9.67.4.1 _WidgetMap**

HTMLHelp::HTMLHelp::_WidgetMap [static], [private]

Widget map.

9.67.4.2 command

HTMLHelp::HTMLHelp::command [private]

The Help command component.

9.67.4.3 curtopicindex

HTMLHelp::HTMLHelp::curtopicindex [private]

9.67.4.4 defaultHelpDirectory

HTMLHelp::HTMLHelp::defaultHelpDirectory [static], [private]

The default help directory.

9.67.4.5 defaultHelpWindow

HTMLHelp::HTMLHelp::defaultHelpWindow [static], [private]

The default Help file.

9.67.4.6 defaultTableOfContents

HTMLHelp::HTMLHelp::defaultTableOfContents [static], [private]

The default Table Of Contents file.

9.67.4.7 Fonts

HTMLHelp::HTMLHelp::Fonts [private]

9.67.4.8 helptext

HTMLHelp::HTMLHelp::helptext [private]

The text area component.

9.67.4.9 helptext_css

HTMLHelp::HTMLHelp::helptext_css [private]

The text area stylesheet.

9.67.4.10 HMalphanumeric

HTMLHelp::HTMLHelp::HMalphanumeric [static], [private]

9.67.4.11 HMesc_map

HTMLHelp::HTMLHelp::HMesc_map [static], [private]

9.67.4.12 HMevents

HTMLHelp::HTMLHelp::HMevents [static], [private]

9.67.4.13 HMform_map

HTMLHelp::HTMLHelp::HMform_map [static], [private]

9.67.4.14 HMinert_map

HTMLHelp::HTMLHelp::HMinert_map [static], [private]

9.67.4.15 HMList_elements

HTMLHelp::HTMLHelp::HMList_elements [static], [private]

9.67.4.16 HMparam_map

HTMLHelp::HTMLHelp::HMparam_map [static], [private]

9.67.4.17 HMTag_map

HTMLHelp::HTMLHelp::HMTag_map [static], [private]

9.67.4.18 lastsearch

HTMLHelp::HTMLHelp::lastsearch [private]

initialize the window and stack state

html forms management commands

manage the display of html

9.67.4.19 panes

HTMLHelp::HTMLHelp::panes [private]

PaneWindow component.

9.67.4.20 status

HTMLHelp::HTMLHelp::status [private]

The Help status component.

9.67.4.21 textscroll

HTMLHelp::HTMLHelp::textscroll [private]

The text area ScrolledWindow component.

9.67.4.22 toc

HTMLHelp::HTMLHelp::toc [private]

The Table Of Contents component.

9.67.4.23 toc_css

```
HTMLHelp::HTMLHelp::toc_css [private]
```

The Table Of Contents stylesheet.

9.67.4.24 tocscroll

```
HTMLHelp::HTMLHelp::tocscroll [private]
```

ScrolledWindow for the Table Of Contents component.

9.67.4.25 topicstack

```
HTMLHelp::HTMLHelp::topicstack [private]
```

9.67.4.26 Url

```
HTMLHelp::HTMLHelp::Url [private]
```

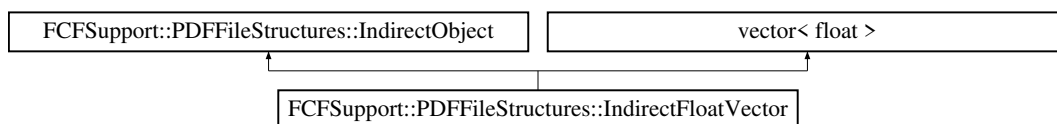
The current URL.

9.68 FCFSupport::PDFFileStructures::IndirectFloatVector Class Reference

Indirect array of floats.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::IndirectFloatVector:



Public Member Functions

- [IndirectFloatVector](#) (unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~IndirectFloatVector](#) ()
Destructor.
- virtual ostream & [WriteDirect](#) (ostream &stream) const
Write an object directly.

9.68.1 Detailed Description

Indirect array of floats.

Author

Robert Heller <heller@deepsoft.com>

9.68.2 Constructor & Destructor Documentation

9.68.2.1 IndirectFloatVector()

```
FCFSupport::PDFFileStructures::IndirectFloatVector::IndirectFloatVector (
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create an indirect object of floats.

Parameters

<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

9.68.2.2 ~IndirectFloatVector()

```
FCFSupport::PDFFileStructures::IndirectFloatVector::~~IndirectFloatVector ( )
```

Destructor.

Write an object directly.

- unsigned long int [ObjectNumber](#) () const

Return this object's object number.

- unsigned short int [GenerationNumber](#) () const

Return this object's generation number.

- streampos [FileOffset](#) () const

Return this object's file offset.

- bool [HasOffset](#) () const

Does the object have a file offset?

Private Member Functions

- void [SetObjectNumber](#) (unsigned long int on, [CrossReferenceTable](#) *tab)

Set this object's object number.

- void [IncrementGenerationNumber](#) ()

Increment the generation number.

Private Attributes

- unsigned long int [objectNumber](#)

The object number.

- unsigned short int [generationNumber](#)

The generation number.

- streampos [fileOffset](#)

The file position.

- [CrossReferenceTable](#) * [table](#)

The cross referece table we are in.

Friends

- class [CrossReferenceTable](#)

9.69.1 Detailed Description

Indirect object base class.

All PDF objects that might be referenced as indirect objects are derived from this class.

Author

Robert Heller <heller@deepsoft.com>

9.69.2 Constructor & Destructor Documentation

9.69.2.1 IndirectObject()

```
FCFSupport::PDFFileStructures::IndirectObject::IndirectObject (
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Perform base initialization.

Parameters

<i>objNum</i>	The object number. Zero means no object number yet.
<i>genNum</i>	The generation number. Zero means first generation.
<i>tab</i>	The cross reference table we are in.

References [fileOffset](#), [generationNumber](#), [objectNumber](#), and [table](#).

9.69.2.2 ~IndirectObject()

```
virtual FCFSupport::PDFFileStructures::IndirectObject::~~IndirectObject ( ) [inline], [virtual]
```

Destructor.

Clean everything up.

References [FCFSupport::PDFFileStructures::CrossReferenceTable::FreeObject\(\)](#), [objectNumber](#), and [table](#).

9.69.3 Member Function Documentation

9.69.3.1 FileOffset()

```
streampos FCFSupport::PDFFileStructures::IndirectObject::FileOffset ( ) const [inline]
```

Return this object's file offset.

References [fileOffset](#).

9.69.3.2 GenerationNumber()

```
unsigned short int FCFSupport::PDFFileStructures::IndirectObject::GenerationNumber ( ) const [inline]
```

Return this object's generation number.

References [generationNumber](#).

9.69.3.3 HasOffset()

```
bool FCFSupport::PDFFileStructures::IndirectObject::HasOffset ( ) const [inline]
```

Does the object have a file offset?

References [fileOffset](#).

Referenced by [FCFSupport::PDFFileStructures::IndirectObjectDictionary::WriteDictionaryElements\(\)](#), and [WriteObjectToFile\(\)](#).

9.69.3.4 IncrementGenerationNumber()

```
void FCFSupport::PDFFileStructures::IndirectObject::IncrementGenerationNumber ( ) [inline], [private]
```

Increment the generation number.

References [generationNumber](#).

9.69.3.5 ObjectNumber()

```
unsigned long int FCFSupport::PDFFileStructures::IndirectObject::ObjectNumber ( ) const [inline]
```

Return this object's object number.

References [objectNumber](#).

9.69.3.6 SetObjectNumber()

```
void FCFSupport::PDFFileStructures::IndirectObject::SetObjectNumber (
    unsigned long int on,
    CrossReferenceTable * tab ) [inline], [private]
```

Set this object's object number.

Should only be called when this object is inserted into a cross reference table. The object number cannot be reset!

Parameters

<i>on</i>	The object number to set this object to. Can't be zero. If the object number is already set, this can be the same number, in which case the generation number gets incremented.
<i>tab</i>	The cross reference table this object is being added to.

References [generationNumber](#), [objectNumber](#), and [table](#).

9.69.3.7 WriteDirect()

```
virtual ostream & FCFSupport::PDFFileStructures::IndirectObject::WriteDirect (
    ostream & stream ) const [pure virtual]
```

Write an object directly.

Needs to be overloaded by derived classes.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Implemented in [FCFSupport::PDFFileStructures::FreedObject](#), [FCFSupport::PDFFileStructures::Dictionary](#), [FCFSupport::PDFFileStructures::PDFStream](#), and [FCFSupport::PDFFileStructures::IndirectFloatVector](#).

Referenced by [FCFSupport::PDFFileStructures::IndirectObjectDictionary::WriteDictionaryElements\(\)](#), and [WriteObjectToFile\(\)](#).

9.69.3.8 WriteIndirectReference()

```
ostream & FCFSupport::PDFFileStructures::IndirectObject::WriteIndirectReference (
    ostream & stream ) const [inline]
```

Write an object indirectly.

Assumes that the non-const version has already been called. This version only writes an indirect reference.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

References [generationNumber](#), [objectNumber](#), and [lcc::stream](#).

Referenced by [FCFSupport::PDFFileStructures::IndirectObjectDictionary::WriteDictionaryElements\(\)](#).

9.69.3.9 WriteObjectToFile()

```
ostream & FCFSupport::PDFFileStructures::IndirectObject::WriteObjectToFile (
    ostream & stream ) [inline]
```

Write an object indirectly.

The first time this is called, an obj ... endobj block is written. Later times an indirect reference is written.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

References [fileOffset](#), [generationNumber](#), [HasOffset\(\)](#), [objectNumber](#), [lcc::stream](#), and [WriteDirect\(\)](#).

9.69.4 Friends And Related Function Documentation

9.69.4.1 CrossReferenceTable

```
friend class CrossReferenceTable [friend]
```

9.69.5 Member Data Documentation

9.69.5.1 fileOffset

```
streampos FCFSupport::PDFFileStructures::IndirectObject::fileOffset [private]
```

The file position.

Referenced by [FileOffset\(\)](#), [HasOffset\(\)](#), [IndirectObject\(\)](#), and [WriteObjectToFile\(\)](#).

9.69.5.2 generationNumber

```
unsigned short int FCFSupport::PDFFileStructures::IndirectObject::generationNumber [private]
```

The generation number.

Referenced by [GenerationNumber\(\)](#), [IncrementGenerationNumber\(\)](#), [IndirectObject\(\)](#), [SetObjectNumber\(\)](#), [WriteIndirectReference\(\)](#), and [WriteObjectToFile\(\)](#).

9.69.5.3 objectNumber

```
unsigned long int FCFSupport::PDFFileStructures::IndirectObject::objectNumber [private]
```

The object number.

Referenced by [IndirectObject\(\)](#), [ObjectNumber\(\)](#), [SetObjectNumber\(\)](#), [WriteIndirectReference\(\)](#), [WriteObjectToFile\(\)](#), and [~IndirectObject\(\)](#).

9.69.5.4 table

```
CrossReferenceTable* FCFSupport::PDFFileStructures::IndirectObject::table [private]
```

The cross referece table we are in.

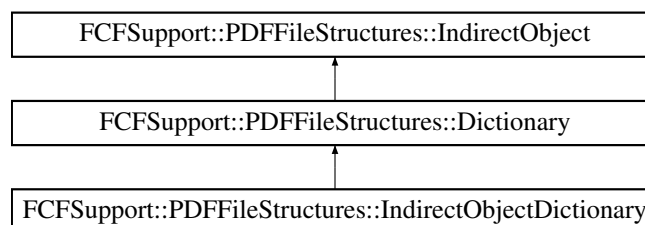
Referenced by [IndirectObject\(\)](#), [SetObjectNumber\(\)](#), and [~IndirectObject\(\)](#).

9.70 FCFSupport::PDFFileStructures::IndirectObjectDictionary Class Reference

PDF Indirect Object [Dictionary](#), used for named resources in a Resource [Dictionary](#).

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::IndirectObjectDictionary:



Public Member Functions

- [IndirectObjectDictionary](#) (unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~IndirectObjectDictionary](#) ()
Destructor.
- void [AddIndirectObject](#) (const string name, [IndirectObject](#) *obj)
Add an indirect object.
- int [Size](#) () const
Return the number of elements in this dictionary.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const
Write the elements of a dictionary.

Private Attributes

- [NamedIndirectObjectMap](#) elements
The elements in this dictionary.

9.70.1 Detailed Description

PDF Indirect Object [Dictionary](#), used for named resources in a Resource [Dictionary](#).

9.70.2 Constructor & Destructor Documentation

9.70.2.1 IndirectObjectDictionary()

```
FCFSupport::PDFFileStructures::IndirectObjectDictionary::IndirectObjectDictionary (
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a new dictionary.

Parameters

<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

9.70.2.2 ~IndirectObjectDictionary()

```
FCFSupport::PDFFileStructures::IndirectObjectDictionary::~~IndirectObjectDictionary ( ) [inline]
```

Destructor.

Clean everything up.

9.70.3 Member Function Documentation

9.70.3.1 AddIndirectObject()

```
void FCFSupport::PDFFileStructures::IndirectObjectDictionary::AddIndirectObject (
    const string name,
    IndirectObject * obj ) [inline]
```

Add an indirect object.

Parameters

<i>name</i>	The name of the object.
<i>obj</i>	The object itself.

References [elements](#).

Referenced by [FCFSupport::PDFFileStructures::ResourceDictionary::AddColorSpace\(\)](#), [FCFSupport::PDFFileStructures::ResourceDictionary::AddFont\(\)](#), [FCFSupport::PDFFileStructures::ResourceDictionary::AddPattern\(\)](#), [FCFSupport::PDFFileStructures::ResourceDictionary::AddProperties\(\)](#), [FCFSupport::PDFFileStructures::ResourceDictionary::AddShading\(\)](#) and [FCFSupport::PDFFileStructures::ResourceDictionary::AddXObject\(\)](#).

9.70.3.2 Size()

```
int FCFSupport::PDFFileStructures::IndirectObjectDictionary::Size ( ) const [inline]
```

Return the number of elements in this dictionary.

References [elements](#).

9.70.3.3 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::IndirectObjectDictionary::WriteDictionaryElements
(
    ostream & stream ) const    [inline], [protected], [virtual]
```

Write the elements of a dictionary.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::Dictionary](#).

References [elements](#), [FCFSupport::PDFFileStructures::IndirectObject::HasOffset\(\)](#), [lcc::stream](#), [FCFSupport::PDFFileStructures::IndirectObject::WriteIndirectReference\(\)](#), and [FCFSupport::PDFFileStructures::IndirectObject::WriteIndirectReference\(\)](#).

9.70.4 Member Data Documentation

9.70.4.1 elements

```
NamedIndirectObjectMap FCFSupport::PDFFileStructures::IndirectObjectDictionary::elements    [private]
```

The elements in this dictionary.

Referenced by [AddIndirectObject\(\)](#), [Size\(\)](#), and [WriteDictionaryElements\(\)](#).

9.71 FCFSupport::Industry Class Reference

The [Industry](#) class represents an industry.

```
#include <Industry.h>
```

Public Member Functions

- [Industry](#) ()
Default constructor.
- [Industry](#) ([Industry](#) &other)
Copy constructor.
- [Industry](#) & operator= ([Industry](#) &other)
Assignment operator.
- [Industry](#) (char t, [Station](#) *st, const char *n, int tl, int al, int p, bool r, char h, [Industry](#) *m, int pl, int c, const char *dcl, int mcl, const char *lt, const char *et)
Full constructor.
- char [Type](#) () const
Return the type of the industry.
- [Station](#) * [MyStation](#) () const
Return the industry's station.
- const char * [Name](#) () const
Return the industry's name.
- int [TrackLen](#) () const
Return the amount of track at this industry.
- int [AssignLen](#) () const
Return the assignable amount of track at this industry.
- int [Priority](#) () const
Return this industry's priority.
- bool [Reload](#) () const
Can this industry reload cars?
- char [Hazard](#) () const
What sorts of hazardous material classes can this industry handle?
- [Industry](#) * [MyMirror](#) () const
This industry's mirror industry (if any).
- int [MaxPlate](#) () const
Maximum clearance plate this industry can handle.
- int [MaxWeightClass](#) () const
Maximum weight class this industry can handle.
- const char * [DivisionControlList](#) () const
This industry's division control list.
- int [MaxCarLen](#) () const
The maximum car length this industry can handle.
- const char * [LoadsAccepted](#) () const
The types of loads this industry can handle.
- const char * [EmptiesAccepted](#) () const
The types of empties this industry can handle.
- [FCFSupport::Car](#) * [TheCar](#) (int i) const
Return the indexed car at this industry.
- int [NumberOfCars](#) () const
Return the number of cars at this industry.
- void [IncrementStatsLen](#) (int i=1)
Increment the stats length.

- int [CarsNum](#) () const
Return the number of cars.
- int [CarsLen](#) () const
Return the length of all of the cars.
- int [StatsLen](#) () const
Return the stats length.

Private Attributes

- [CarVector](#) cars
The vector of cars at this industry.
- [Station](#) * station
The station this industry is at.
- [Industry](#) * mirror
The mirror industry or NULL if there is no mirror industry.
- string name
The name of the industry.
- string loadTypes
The vector of loaded car type charactes.
- string emptyTypes
The vector of empty car type characters.
- string divisionControllist
The division control list.
- int trackLen
The track length.
- int assignLen
The assignable length.
- int priority
The industry's priority.
- int plate
The industry's clearance plate.
- int weightclass
The industry's weight class.
- int maxCarLen
The maximum car length.
- int carsNum
The number of cars.
- int carsLen
The length of the cars.
- int statsLen
The stats length.
- int usedLen
The used length.
- int remLen
The remaining length.
- bool reload

The reload flag.

- char [type](#)

The industry type.

- char [hazard](#)

The hazard type character.

Friends

- class [System](#)

The [System](#) class is a friend.

9.71.1 Detailed Description

The [Industry](#) class represents an industry.

There are several types of industries, including yards, on line industries, and off line industries. An industry has track where cars can be spotted for storage, loading, and unloading. On-line industries and yards have this trackage on the layout. off line industries have this trackage either in the form of a hidden staging yard or don't have any real trackage at all.

An industry takes specific loaded and empty car types, has a maximum weight and clearance plate, in at a specific station and has a division control list. Some industries are mirrors of others and some industries can re-load cars.

```
@author Robert Heller \<heller\@deepsoft.com\>
```

9.71.2 Constructor & Destructor Documentation

9.71.2.1 Industry() [1/3]

```
FCFSupport::Industry::Industry ( ) [inline]
```

Default constructor.

Fill all slots with default values.

References [assignLen](#), [carsLen](#), [carsNum](#), [divisionControlList](#), [emptyTypes](#), [hazard](#), [loadTypes](#), [maxCarLen](#), [mirror](#), [name](#), [plate](#), [priority](#), [reload](#), [remLen](#), [station](#), [statsLen](#), [trackLen](#), [type](#), [usedLen](#), and [weightclass](#).

9.71.2.2 Industry() [2/3]

```
FCFSupport::Industry::Industry (
    Industry & other ) [inline]
```

Copy constructor.

Initialize this industry from another existing industry.

Parameters

<i>other</i>	The other industry.
--------------	---------------------

References [assignLen](#), [cars](#), [carsLen](#), [carsNum](#), [divisionControlList](#), [emptyTypes](#), [hazard](#), [loadTypes](#), [maxCarLen](#), [mirror](#), [name](#), [plate](#), [priority](#), [reload](#), [remLen](#), [station](#), [statsLen](#), [trackLen](#), [type](#), [usedLen](#), and [weightclass](#).

9.71.2.3 Industry() [3/3]

```
FCFSupport::Industry::Industry (
    char t,
    Station * st,
    const char * n,
    int tl,
    int al,
    int p,
    bool r,
    char h,
    Industry * m,
    int pl,
    int c,
    const char * dcl,
    int mcl,
    const char * lt,
    const char * et ) [inline]
```

Full constructor.

Create a new industry from a full set of parameters.

Parameters

<i>t</i>	The type of industry ('Y' for yard, 'O' for offline, 'I' for online).
<i>st</i>	Station this industry is at.
<i>n</i>	The name of the industry.
<i>tl</i>	The track length at this industry.
<i>al</i>	The assignable length at this industry.
<i>p</i>	This industry's priority.
<i>r</i>	Car reload flag.
<i>h</i>	Hazard code.
<i>m</i>	Mirror industry.
<i>pl</i>	Maximum clearance plate.
<i>c</i>	Maximum weight class.
<i>dcl</i>	Division control list.
<i>mcl</i>	Maximum car length.
<i>lt</i>	Loaded car types accepted here.
<i>et</i>	Empty car type accepted here.

References [assignLen](#), [carsLen](#), [carsNum](#), [divisionControlList](#), [emptyTypes](#), [hazard](#), [loadTypes](#), [maxCarLen](#), [mirror](#), [name](#), [plate](#), [priority](#), [reload](#), [remLen](#), [station](#), [statsLen](#), [trackLen](#), [type](#), [usedLen](#), and [weightclass](#).

9.71.3 Member Function Documentation

9.71.3.1 AssignLen()

```
int FCFSupport::Industry::AssignLen ( ) const [inline]
```

Return the assignable amount of track at this industry.

References [assignLen](#).

9.71.3.2 CarsLen()

```
int FCFSupport::Industry::CarsLen ( ) const [inline]
```

Return the length of all of the cars.

References [carsLen](#).

9.71.3.3 CarsNum()

```
int FCFSupport::Industry::CarsNum ( ) const [inline]
```

Return the number of cars.

References [carsNum](#).

9.71.3.4 DivisionControlList()

```
const char * FCFSupport::Industry::DivisionControlList ( ) const [inline]
```

This industry's division control list.

References [divisionControlList](#).

9.71.3.5 EmptiesAccepted()

```
const char * FCFSupport::Industry::EmptiesAccepted ( ) const [inline]
```

The types of empties this industry can handle.

References [emptyTypes](#).

9.71.3.6 Hazard()

```
char FCFSupport::Industry::Hazard ( ) const [inline]
```

What sorts of hazardous material classes can this industry handle?

References [hazard](#).

9.71.3.7 IncrementStatsLen()

```
void FCFSupport::Industry::IncrementStatsLen (
    int i = 1 ) [inline]
```

Increment the stats length.

References [i](#), and [statsLen](#).

9.71.3.8 LoadsAccepted()

```
const char * FCFSupport::Industry::LoadsAccepted ( ) const [inline]
```

The types of loads this industry can handle.

References [loadTypes](#).

9.71.3.9 MaxCarLen()

```
int FCFSupport::Industry::MaxCarLen ( ) const [inline]
```

The maximum car length this industry can handle.

References [maxCarLen](#).

9.71.3.10 MaxPlate()

```
int FCFSupport::Industry::MaxPlate ( ) const [inline]
```

Maximum clearance plate this industry can handle.

References [plate](#).

9.71.3.11 MaxWeightClass()

```
int FCFSupport::Industry::MaxWeightClass ( ) const [inline]
```

Maximum weight class this industry can handle.

References [weightclass](#).

9.71.3.12 MyMirror()

```
Industry * FCFSupport::Industry::MyMirror ( ) const [inline]
```

This industry's mirror industry (if any).

References [mirror](#).

9.71.3.13 MyStation()

```
Station * FCFSupport::Industry::MyStation ( ) const [inline]
```

Return the industry's station.

References [station](#).

Referenced by [FCFSupport::SwitchListElement::DropStopStation\(\)](#).

9.71.3.14 Name()

```
const char * FCFSupport::Industry::Name ( ) const [inline]
```

Return the industry's name.

References [name](#).

9.71.3.15 NumberOfCars()

```
int FCFSupport::Industry::NumberOfCars ( ) const [inline]
```

Return the number of cars at this industry.

References [cars](#).

9.71.3.16 operator=()

```
Industry & FCFSupport::Industry::operator= (
    Industry & other ) [inline]
```

Assignment operator.

Initialize this industry from another existing industry.

Parameters

<i>other</i>	The other industry.
--------------	---------------------

References [assignLen](#), [cars](#), [carsLen](#), [carsNum](#), [divisionControlList](#), [emptyTypes](#), [hazard](#), [loadTypes](#), [maxCarLen](#), [mirror](#), [name](#), [plate](#), [priority](#), [reload](#), [remLen](#), [station](#), [statsLen](#), [trackLen](#), [type](#), [usedLen](#), and [weightclass](#).

9.71.3.17 Priority()

```
int FCFSupport::Industry::Priority ( ) const [inline]
```

Return this industry's priority.

References [priority](#).

9.71.3.18 Reload()

```
bool FCFSupport::Industry::Reload ( ) const [inline]
```

Can this industry reload cars?

References [reload](#).

9.71.3.19 StatsLen()

```
int FCFSupport::Industry::StatsLen ( ) const [inline]
```

Return the stats length.

References [statsLen](#).

9.71.3.20 TheCar()

```
FCFSupport::Car * FCFSupport::Industry::TheCar (
    int i ) const [inline]
```

Return the indexed car at this industry.

Parameters

<i>i</i>	This car index.
----------	-----------------

References [cars](#), and [i](#).

9.71.3.21 TrackLen()

```
int FCFSupport::Industry::TrackLen ( ) const [inline]
```

Return the amount of track at this industry.

References [trackLen](#).

9.71.3.22 Type()

```
char FCFSupport::Industry::Type ( ) const [inline]
```

Return the type of the industry.

References [type](#).

9.71.4 Friends And Related Function Documentation

9.71.4.1 System

```
friend class System [friend]
```

The [System](#) class is a friend.

9.71.5 Member Data Documentation

9.71.5.1 assignLen

```
int FCFSupport::Industry::assignLen [private]
```

The assignable length.

Referenced by [AssignLen\(\)](#), [Industry\(\)](#), and [operator=\(\)](#).

9.71.5.2 cars

```
CarVector FCFSupport::Industry::cars [private]
```

The vector of cars at this industry.

Referenced by [Industry\(\)](#), [NumberOfCars\(\)](#), [operator=\(\)](#), and [TheCar\(\)](#).

9.71.5.3 carsLen

```
int FCFSupport::Industry::carsLen [private]
```

The length of the cars.

Referenced by [CarsLen\(\)](#), [Industry\(\)](#), and [operator=\(\)](#).

9.71.5.4 carsNum

```
int FCFSupport::Industry::carsNum [private]
```

The number of cars.

Referenced by [CarsNum\(\)](#), [Industry\(\)](#), and [operator=\(\)](#).

9.71.5.5 divisionControlList

```
string FCFSupport::Industry::divisionControlList [private]
```

The division control list.

Referenced by [DivisionControlList\(\)](#), [Industry\(\)](#), and [operator=\(\)](#).

9.71.5.6 emptyTypes

```
string FCFSupport::Industry::emptyTypes [private]
```

The vector of empty car type characters.

Referenced by [EmptiesAccepted\(\)](#), [Industry\(\)](#), and [operator=\(\)](#).

9.71.5.7 hazard

```
char FCFSupport::Industry::hazard [private]
```

The hazard type character.

Referenced by [Hazard\(\)](#), [Industry\(\)](#), and [operator=\(\)](#).

9.71.5.8 loadTypes

```
string FCFSupport::Industry::loadTypes [private]
```

The vector of loaded car type charactes.

Referenced by [Industry\(\)](#), [LoadsAccepted\(\)](#), and [operator=\(\)](#).

9.71.5.9 maxCarLen

```
int FCFSupport::Industry::maxCarLen [private]
```

The maximum car length.

Referenced by [Industry\(\)](#), [MaxCarLen\(\)](#), and [operator=\(\)](#).

9.71.5.10 mirror

```
Industry* FCFSupport::Industry::mirror [private]
```

The mirror industry or NULL if there is no mirror industry.

Referenced by [Industry\(\)](#), [MyMirror\(\)](#), and [operator=\(\)](#).

9.71.5.11 name

```
string FCFSupport::Industry::name [private]
```

The name of the industry.

Referenced by [Industry\(\)](#), [Name\(\)](#), and [operator=\(\)](#).

9.71.5.12 plate

```
int FCFSupport::Industry::plate [private]
```

The industry's clearance plate.

Referenced by [Industry\(\)](#), [MaxPlate\(\)](#), and [operator=\(\)](#).

9.71.5.13 priority

```
int FCFSupport::Industry::priority [private]
```

The industry's priority.

Referenced by [Industry\(\)](#), [operator=\(\)](#), and [Priority\(\)](#).

9.71.5.14 reload

```
bool FCFSupport::Industry::reload [private]
```

The reload flag.

Referenced by [Industry\(\)](#), [operator=\(\)](#), and [Reload\(\)](#).

9.71.5.15 remLen

```
int FCFSupport::Industry::remLen [private]
```

The remaining length.

Referenced by [Industry\(\)](#), and [operator=\(\)](#).

9.71.5.16 station

```
Station* FCFSupport::Industry::station [private]
```

The station this industry is at.

Referenced by [Industry\(\)](#), [MyStation\(\)](#), and [operator=\(\)](#).

9.71.5.17 statsLen

```
int FCFSupport::Industry::statsLen [private]
```

The stats length.

Referenced by [IncrementStatsLen\(\)](#), [Industry\(\)](#), [operator=\(\)](#), and [StatsLen\(\)](#).

9.71.5.18 trackLen

```
int FCFSupport::Industry::trackLen [private]
```

The track length.

Referenced by [Industry\(\)](#), [operator=\(\)](#), and [TrackLen\(\)](#).

9.71.5.19 type

```
char FCFSupport::Industry::type [private]
```

The industry type.

Referenced by [Industry\(\)](#), [operator=\(\)](#), and [Type\(\)](#).

9.71.5.20 usedLen

```
int FCFSupport::Industry::usedLen [private]
```

The used length.

Referenced by [Industry\(\)](#), and [operator=\(\)](#).

9.71.5.21 weightclass

```
int FCFSupport::Industry::weightclass [private]
```

The industry's weight class.

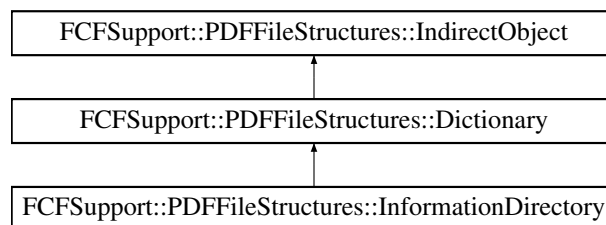
Referenced by [Industry\(\)](#), [MaxWeightClass\(\)](#), and [operator=\(\)](#).

9.72 FCFSupport::PDFFileStructures::InformationDirectory Class Reference

Information directory.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::InformationDirectory:



Public Member Functions

- [InformationDirectory](#) (unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~InformationDirectory](#) ()
Destructor.

Public Attributes

- string [title](#)
The title.
- string [author](#)
The author.
- string [subject](#)
The subject.
- string [keywords](#)
The keywords.
- string [creator](#)
The creator.
- string [producer](#)
The producer.
- time_t [creationDate](#)
The creationDate.
- time_t [modificationDate](#)
The modificationDate.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const
Write an object directly.

9.72.1 Detailed Description

Information directory.

Contains random extra information about the document.

Author

Robert Heller <heller@deepsoft.com>

9.72.2 Constructor & Destructor Documentation

9.72.2.1 InformationDirectory()

```
FCFSupport::PDFFileStructures::InformationDirectory::InformationDirectory (  
    unsigned long int objNum = 0L,  
    unsigned short int genNum = 0,  
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a basic information directory.

Parameters

<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [author](#), [creator](#), [creationDate](#), [keywords](#), [modificationDate](#), [producer](#), [subject](#), and [title](#).

9.72.2.2 ~InformationDirectory()

```
FCFSupport::PDFFileStructures::InformationDirectory::~~InformationDirectory ( ) [inline]
```

Destructor.

9.72.3 Member Function Documentation**9.72.3.1 WriteDictionaryElements()**

```
virtual ostream & FCFSupport::PDFFileStructures::InformationDirectory::WriteDictionaryElements (
    ostream & stream ) const [protected], [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::Dictionary](#).

9.72.4 Member Data Documentation**9.72.4.1 author**

```
string FCFSupport::PDFFileStructures::InformationDirectory::author
```

The author.

Referenced by [InformationDirectory\(\)](#).

9.72.4.2 creator

```
string FCFSupport::PDFFileStructures::InformationDirectory::creator
```

The creator.

Referenced by [InformationDirectory\(\)](#).

9.72.4.3 creationDate

```
time_t FCFSupport::PDFFileStructures::InformationDirectory::creationDate
```

The creationDate.

Referenced by [InformationDirectory\(\)](#).

9.72.4.4 keywords

```
string FCFSupport::PDFFileStructures::InformationDirectory::keywords
```

The keywords.

Referenced by [InformationDirectory\(\)](#).

9.72.4.5 modificationDate

```
time_t FCFSupport::PDFFileStructures::InformationDirectory::modificationDate
```

The modificationDate.

Referenced by [InformationDirectory\(\)](#).

9.72.4.6 producer

```
string FCFSupport::PDFFileStructures::InformationDirectory::producer
```

The producer.

Referenced by [InformationDirectory\(\)](#).

9.72.4.7 subject

```
string FCFSupport::PDFFileStructures::InformationDirectory::subject
```

The subject.

Referenced by [InformationDirectory\(\)](#).

9.72.4.8 title

```
string FCFSupport::PDFFileStructures::InformationDirectory::title
```

The title.

Referenced by [InformationDirectory\(\)](#).

9.73 Parsers::IntegerList Class Reference

The [IntegerList](#) class implements a linked list of integers, used for turnout route lists.

```
#include <IntegerList.h>
```

Public Member Functions

- [IntegerList](#) (int car=0, [IntegerList](#) *cdr=NULL)
Base constructor.
- int [Element](#) () const
Element accessor.
- const [IntegerList](#) * [Next](#) () const
Next pointer accessor (Const version).
- [IntegerList](#) * [Next](#) ()
Next pointer accessor (non-Const version).
- bool [ElementP](#) (int v) const
Is value in the list?

Static Public Member Functions

- static [IntegerList](#) * [IntAppend](#) ([IntegerList](#) *head, int newTail)
Add an element to the {end} of the list.
- static void [CleanUpIntegerList](#) ([IntegerList](#) *list)
Free up used memory.
- static [IntegerList](#) * [CopyList](#) (const [IntegerList](#) *src)

Private Attributes

- int [iElt](#)
The current element.
- [IntegerList](#) * [next](#)
The pointer to the next element.

Friends

- class [TurnoutBodyElt](#)
- ostream & [operator<<](#) (ostream &stream, [IntegerList](#) list)
Output operator.

9.73.1 Detailed Description

The [IntegerList](#) class implements a linked list of integers, used for turnout route lists.

Author

Robert Heller <heller@deepsoft.com>

9.73.2 Constructor & Destructor Documentation

9.73.2.1 IntegerList()

```
Parsers::IntegerList::IntegerList (  
    int car = 0,  
    IntegerList * cdr = NULL ) [inline]
```

Base constructor.

References [iElt](#), and [next](#).

Referenced by [IntAppend\(\)](#).

9.73.3 Member Function Documentation

9.73.3.1 CleanupIntegerList()

```
static void Parsers::IntegerList::CleanupIntegerList (  
    IntegerList * list ) [inline], [static]
```

Free up used memory.

References [next](#).

Referenced by [Parsers::TrackGraph::NodeValues::Cleanup\(\)](#).

9.73.3.2 CopyList()

```
static IntegerList * Parsers::IntegerList::CopyList (  
    const IntegerList * src ) [inline], [static]
```

References [iElt](#), [IntAppend\(\)](#), and [next](#).

9.73.3.3 Element()

```
int Parsers::IntegerList::Element ( ) const [inline]
```

Element accessor.

References [iElt](#).

9.73.3.4 ElementP()

```
bool Parsers::IntegerList::ElementP (  
    int v ) const [inline]
```

Is value in the list?

References [iElt](#), and [next](#).

9.73.3.5 IntAppend()

```
static IntegerList * Parsers::IntegerList::IntAppend (
    IntegerList * head,
    int newTail ) [inline], [static]
```

Add an element to the {end} of the list.

References [IntegerList\(\)](#), and [next](#).

Referenced by [CopyList\(\)](#).

9.73.3.6 Next() [1/2]

```
IntegerList * Parsers::IntegerList::Next ( ) [inline]
```

Next pointer accessor (non-Const version).

References [next](#).

9.73.3.7 Next() [2/2]

```
const IntegerList * Parsers::IntegerList::Next ( ) const [inline]
```

Next pointer accessor (Const version).

References [next](#).

9.73.4 Friends And Related Function Documentation

9.73.4.1 operator<<

```
ostream & operator<< (
    ostream & stream,
    IntegerList list ) [friend]
```

Output operator.

9.73.4.2 TurnoutBodyElt

```
friend class TurnoutBodyElt [friend]
```

9.73.5 Member Data Documentation

9.73.5.1 iElt

```
int Parsers::IntegerList::iElt [private]
```

The current element.

Referenced by [CopyList\(\)](#), [Element\(\)](#), [ElementP\(\)](#), and [IntegerList\(\)](#).

9.73.5.2 next

```
IntegerList* Parsers::IntegerList::next [private]
```

The pointer to the next element.

Referenced by [CleanUpIntegerList\(\)](#), [CopyList\(\)](#), [ElementP\(\)](#), [IntAppend\(\)](#), [IntegerList\(\)](#), and [Next\(\)](#).

9.74 CTCPanel::Lamp Class Reference

Lamp object type.

Public Member Functions

- [Lamp](#) (name, _ctcpanel, _canvas,...)
Construct a [Lamp](#) object.
- [~Lamp](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (lamp state).
- [setv](#) (newstate)
Method to set out value (lamp state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the lamp.

Private Member Functions

- [_configureColor](#) (option, value)
Method to update the lamp color.
- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).
- [state](#)
The state of the lamp.

9.74.1 Detailed Description

Lamp object type.

These are on the control panel and represent simple single-color lamps.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The control panel canvas to draw the lamp on.
...	Options: <ul style="list-style-type: none">• -x The x coordinate of the object (readonly, default 0).• -y The y coordinate of the object (readonly, default 0).• -controlpoint The name of the control point this lamp is part of (readonly, default CP1).• -color The color of the lamp (default white).• -label The label of the lamp (default "lamp").

Defined coords terminals: none. Defined values (states):

- on [Lamp](#) is on.
- off [Lamp](#) is off.

Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.74.2 Constructor & Destructor Documentation

9.74.2.1 Lamp()

```
CTCPanel::Lamp::Lamp (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [Lamp](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the Lamp on.
<code>...</code>	Option list.

9.74.2.2 ~Lamp()

```
CTCPanel::Lamp::~~Lamp ( )
```

Clean up all data objects and free up all resources.

9.74.3 Member Function Documentation

9.74.3.1 _configureColor()

```
CTCPanel::Lamp::_configureColor (
    option ,
    value ) [private]
```

Method to update the lamp color.

9.74.3.2 _configureLabel()

```
CTCPanel::Lamp::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.74.3.3 geti()

```
CTCPanel::Lamp::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.74.3.4 getv()

```
CTCPanel::Lamp::getv ( )
```

Method to get our value (lamp state).

9.74.3.5 invoke()

```
CTCPanel::Lamp::invoke ( )
```

Method to invoke the lamp.

9.74.3.6 seti()

```
CTCPanel::Lamp::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.74.3.7 setv()

```
CTCPanel::Lamp::setv (
    newstate )
```

Method to set out value (lamp state).

Parameters

<i>newstate</i>	The new lamp state.
-----------------	---------------------

9.74.4 Member Data Documentation

9.74.4.1 canvas

```
CTCPanel::Lamp::canvas [private]
```

The canvas component (parent widget component).

9.74.4.2 ctcpnl

```
CTCPanel::Lamp::ctcpnl [private]
```

The CTC Panel component (parent widget).

9.74.4.3 state

```
CTCPanel::Lamp::state [private]
```

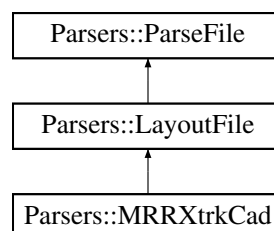
The state of the lamp.

9.75 Parsers::LayoutFile Class Reference

File to parse an XTrkCad layout file and create a track graph.

```
#include <ParseFile.h>
```

Inheritance diagram for Parsers::LayoutFile:



Public Member Functions

- [LayoutFile](#) (const char *filename, [MRRXtrkCad](#) *p)
Constructor.
- virtual [~LayoutFile](#) ()
Destructor.
- void [Emit](#) (ostream &ostream)
Function to Emit a track graph to an output stream.
- bool [IsNodeP](#) (int nid) const
Tests if a node id exists in the graph.
- int [NumEdges](#) (int nid) const
Returns the number of edges for the specificed node id.
- int [EdgeIndex](#) (int nid, int edgenum) const
Returns the node id of the specificed edge of the node.
- float [EdgeX](#) (int nid, int edgenum) const
Returns the \$X\$ coordinate of the specificed edge of the node.
- float [EdgeY](#) (int nid, int edgenum) const
Returns the \$Y\$ coordinate of the specificed edge of the node.
- float [EdgeA](#) (int nid, int edgenum) const
Returns the angle of the specificed edge of the node.
- float [EdgeLength](#) (int nid, int edgenum) const
Returns the length of an edge.
- [TrackGraph::NodeType](#) [TypeOfNode](#) (int nid) const
Returns the type of the node.
- const [TurnoutGraphic](#) * [NodeTurnoutGraphic](#) (int nid) const
Returns the [TurnoutGraphic](#) of the node.
- const [TurnoutRoutelist](#) * [NodeTurnoutRoutelist](#) (int nid) const
Returns the [TurnoutRoutelist](#) of the node.
- float [LengthOfNode](#) (int nid) const
Return the track length of a node.
- const [IntegerList](#) * [TrackList](#) (int nid) const
Return a block's tracklist.
- int [TurnoutNumber](#) (int nid) const
Return a switchmotor's turnout number.
- const char * [NameOfNode](#) (int nid) const
Return a block's or switchmotor's name.
- const char * [SenseScript](#) (int nid) const
Return a block's or switchmotor's sense script.
- const char * [NormalActionScript](#) (int nid) const
Return a switchmotor's normal action script.
- const char * [ReverseActionScript](#) (int nid) const
Return a block's or switchmotor's reverse action script.
- int [NumberOfHeads](#) (int nid) const
Return a Signal's number of heads.
- const [StringPairList](#) * [SignalAspects](#) (int nid) const
Return a Signal's aspect list.
- float [OrigX](#) (int nid) const

- Return the x coordinate of the signal base.*
 - float [OrigY](#) (int nid) const
- Return the y coordinate of the signal base.*
 - float [Angle](#) (int nid) const
- Return the angle of the signal.*
 - const char * [OnScript](#) (int nid) const
- Return the on action script.*
 - const char * [OffScript](#) (int nid) const
- Return the off action script.*
 - int [LowestNode](#) () const
- Returns the lowest numbered node id.*
 - int [HighestNode](#) () const
- Returns the highest numbered node id.*
 - void [CompressGraph](#) ()
- Create a compressed graph.*
 - int [CompressedEdgeCount](#) (int cnid) const
- Number of compressed graph edges.*
 - float [CompressedEdgeLength](#) (int cnid, int edgenum) const
- Length of a compressed graph edge.*
 - int [CompressedEdgeNode](#) (int cnid, int edgenum) const
- Next Edge node.*
 - [IntegerList](#) * [CompressedNodeSegments](#) (int cnid) const
- Raw nodes in a compressed graph node.*
 - bool [IsCompressed](#) () const
- const [IntegerList](#) * [Heads](#) ()
- bool [IsCompressedNode](#) (int cnid) const
- Is cid a node in the compressed graph?*
 - const [IntegerList](#) * [Roots](#) ()
- Compressed graph roots.*
 - double [CompressedNodePositionX](#) (int cnid) const
- X Coordinate of a Compressed Node position.*
 - double [CompressedNodePositionY](#) (int cnid) const
- X Coordinate of a Compressed Node position.*
 - void [CompressedGraphCircleLayout](#) (double radius)
- Run the BGL circle_graph_layout for a given radius.*
 - bool [CompressedGraphKamadaKawaiSpring](#) (double sidelength)
- Run the BGL kamada_kawai_spring_layout for a given side length.*
 - [TrackGraph::CompressedEdgePairVector](#) [CompressedGraphKruskalMinimumSpanningTree](#) ()
- Run the kruskal_minimum_spanning_tree algorithm and return a vector of edge pairs.*
 - [TrackGraph::CompressedEdgePairVector](#) [CompressedGraphPrimMinimumSpanningTree](#) ()
- Run the prim_minimum_spanning_tree algorithm and return a vector of edge pairs.*

Protected Member Functions

- virtual int [Parse](#) ()
- Parseer function.*
- virtual void [ParseError](#) (const char *m)
- Parse error handler.*

Protected Attributes

- [MRRXtrkCad](#) * [parser](#)
Parser.
- [TrackGraph](#) * [trackGraph](#)
Track graph, a graph of all of the trackwork in the layout file.

Additional Inherited Members

9.75.1 Detailed Description

File to parse an XTrkCad layout file and create a track graph.

Author

Robert Heller <heller@deepsoft.com>

9.75.2 Constructor & Destructor Documentation

9.75.2.1 LayoutFile()

```
Parsers::LayoutFile::LayoutFile (
    const char * filename,
    MRRXtrkCad * p )
```

Constructor.

See [MRRXtrkCad](#). User code normally creates a [MRRXtrkCad](#) object and the [MRRXtrkCad](#) constructor calls this constructor. User code then accesses the inherited methods of [LayoutFile](#) and [ParseFile](#) from the [MRRXtrkCad](#) object.

9.75.2.2 ~LayoutFile()

```
virtual Parsers::LayoutFile::~~LayoutFile ( ) [virtual]
```

Destructor.

9.75.3 Member Function Documentation

9.75.3.1 Angle()

```
float Parsers::LayoutFile::Angle (
    int nid ) const [inline]
```

Return the angle of the signal.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

References [Parsers::TrackGraph::Angle\(\)](#), and [trackGraph](#).

9.75.3.2 CompressedEdgeCount()

```
int Parsers::LayoutFile::CompressedEdgeCount (  
    int cnid ) const [inline]
```

Number of compressed graph edges.

References [Parsers::TrackGraph::CompressedEdgeCount\(\)](#), and [trackGraph](#).

9.75.3.3 CompressedEdgeLength()

```
float Parsers::LayoutFile::CompressedEdgeLength (  
    int cnid,  
    int edgenum ) const [inline]
```

Length of a compressed graph edge.

References [Parsers::TrackGraph::CompressedEdgeLength\(\)](#), and [trackGraph](#).

9.75.3.4 CompressedEdgeNode()

```
int Parsers::LayoutFile::CompressedEdgeNode (  
    int cnid,  
    int edgenum ) const [inline]
```

Next Edge node.

References [Parsers::TrackGraph::CompressedEdgeNode\(\)](#), and [trackGraph](#).

9.75.3.5 CompressedGraphCircleLayout()

```
void Parsers::LayoutFile::CompressedGraphCircleLayout (
    double radius ) [inline]
```

Run the BGL `circle_graph_layout` for a given radius.

References [Parsers::TrackGraph::CompressedGraphCircleLayout\(\)](#), and [trackGraph](#).

9.75.3.6 CompressedGraphKamadaKawaiSpring()

```
bool Parsers::LayoutFile::CompressedGraphKamadaKawaiSpring (
    double sidelength ) [inline]
```

Run the BGL `kamada_kawai_spring_layout` for a given side length.

References [Parsers::TrackGraph::CompressedGraphKamadaKawaiSpring\(\)](#), and [trackGraph](#).

9.75.3.7 CompressedGraphKruskalMinimumSpanningTree()

```
TrackGraph::CompressedEdgePairVector Parsers::LayoutFile::CompressedGraphKruskalMinimumSpanning↵
Tree ( ) [inline]
```

Run the `kruskal_minimum_spanning_tree` algorithm and return a vector of edge pairs.

References [Parsers::TrackGraph::CompressedGraphKruskalMinimumSpanningTree\(\)](#), and [trackGraph](#).

9.75.3.8 CompressedGraphPrimMinimumSpanningTree()

```
TrackGraph::CompressedEdgePairVector Parsers::LayoutFile::CompressedGraphPrimMinimumSpanningTree (
) [inline]
```

Run the `prim_minimum_spanning_tree` algorithm and return a vector of edge pairs.

References [Parsers::TrackGraph::CompressedGraphPrimMinimumSpanningTree\(\)](#), and [trackGraph](#).

9.75.3.9 CompressedNodePositionX()

```
double Parsers::LayoutFile::CompressedNodePositionX (
    int cnid ) const [inline]
```

X Coordinate of a Compressed Node position.

References [Parsers::TrackGraph::CompressedNodePositionX\(\)](#), and [trackGraph](#).

9.75.3.10 CompressedNodePositionY()

```
double Parsers::LayoutFile::CompressedNodePositionY (
    int cnid ) const [inline]
```

X Coordinate of a Compressed Node position.

References [Parsers::TrackGraph::CompressedNodePositionY\(\)](#), and [trackGraph](#).

9.75.3.11 CompressedNodeSegments()

```
IntegerList * Parsers::LayoutFile::CompressedNodeSegments (
    int cnid ) const [inline]
```

Raw nodes in a compressed graph node.

References [Parsers::TrackGraph::CompressedNodeSegments\(\)](#), and [trackGraph](#).

9.75.3.12 CompressGraph()

```
void Parsers::LayoutFile::CompressGraph ( ) [inline]
```

Create a compressed graph.

References [Parsers::TrackGraph::CompressGraph\(\)](#), and [trackGraph](#).

9.75.3.13 EdgeA()

```
float Parsers::LayoutFile::EdgeA (
    int nid,
    int edgenum ) const [inline]
```

Returns the angle of the specified edge of the node.

References [Parsers::TrackGraph::EdgeA\(\)](#), and [trackGraph](#).

9.75.3.14 EdgeIndex()

```
int Parsers::LayoutFile::EdgeIndex (
    int nid,
    int edgenum ) const [inline]
```

Returns the node id of the specified edge of the node.

References [Parsers::TrackGraph::EdgeIndex\(\)](#), and [trackGraph](#).

9.75.3.15 EdgeLength()

```
float Parsers::LayoutFile::EdgeLength (
    int nid,
    int edgenum ) const [inline]
```

Returns the length of an edge.

References [Parsers::TrackGraph::EdgeLength\(\)](#), and [trackGraph](#).

9.75.3.16 EdgeX()

```
float Parsers::LayoutFile::EdgeX (
    int nid,
    int edgenum ) const [inline]
```

Returns the X coordinate of the specified edge of the node.

References [Parsers::TrackGraph::EdgeX\(\)](#), and [trackGraph](#).

9.75.3.17 EdgeY()

```
float Parsers::LayoutFile::EdgeY (
    int nid,
    int edgenum ) const [inline]
```

Returns the Y coordinate of the specified edge of the node.

References [Parsers::TrackGraph::EdgeY\(\)](#), and [trackGraph](#).

9.75.3.18 Emit()

```
void Parsers::LayoutFile::Emit (
    ostream & ostream )
```

Function to Emit a track graph to an output stream.

Parameters

<i>ostream</i>	The output stream to write the graph to.
----------------	--

9.75.3.19 Heads()

```
const IntegerList * Parsers::LayoutFile::Heads ( ) [inline]
```

References [Parsers::TrackGraph::Heads\(\)](#), and [trackGraph](#).

9.75.3.20 HighestNode()

```
int Parsers::LayoutFile::HighestNode ( ) const [inline]
```

Returns the highest numbered node id.

References [Parsers::TrackGraph::HighestNode\(\)](#), and [trackGraph](#).

9.75.3.21 IsCompressed()

```
bool Parsers::LayoutFile::IsCompressed ( ) const [inline]
```

References [Parsers::TrackGraph::IsCompressed\(\)](#), and [trackGraph](#).

9.75.3.22 IsCompressedNode()

```
bool Parsers::LayoutFile::IsCompressedNode (
    int cnid ) const [inline]
```

Is *cid* a node in the compressed graph?

References [Parsers::TrackGraph::IsCompressedNode\(\)](#), and [trackGraph](#).

9.75.3.23 IsNodeP()

```
bool Parsers::LayoutFile::IsNodeP (
    int nid ) const [inline]
```

Tests if a node id exists in the graph.

References [Parsers::TrackGraph::IsNodeP\(\)](#), and [trackGraph](#).

9.75.3.24 LengthOfNode()

```
float Parsers::LayoutFile::LengthOfNode (
    int nid ) const [inline]
```

Return the track length of a node.

References [Parsers::TrackGraph::LengthOfNode\(\)](#), and [trackGraph](#).

9.75.3.25 LowestNode()

```
int Parsers::LayoutFile::LowestNode ( ) const [inline]
```

Returns the lowest numbered node id.

References [Parsers::TrackGraph::LowestNode\(\)](#), and [trackGraph](#).

9.75.3.26 NameOfNode()

```
const char * Parsers::LayoutFile::NameOfNode (
    int nid ) const [inline]
```

Return a block's or switchmotor's name.

References [Parsers::TrackGraph::NameOfNode\(\)](#), and [trackGraph](#).

9.75.3.27 NodeTurnoutGraphic()

```
const TurnoutGraphic * Parsers::LayoutFile::NodeTurnoutGraphic (
    int nid ) const [inline]
```

Returns the [TurnoutGraphic](#) of the node.

References [Parsers::TrackGraph::NodeTurnoutGraphic\(\)](#), and [trackGraph](#).

9.75.3.28 NodeTurnoutRoutelist()

```
const TurnoutRoutelist * Parsers::LayoutFile::NodeTurnoutRoutelist (
    int nid ) const [inline]
```

Returns the [TurnoutRoutelist](#) of the node.

References [Parsers::TrackGraph::NodeTurnoutRoutelist\(\)](#), and [trackGraph](#).

9.75.3.29 NormalActionScript()

```
const char * Parsers::LayoutFile::NormalActionScript (
    int nid ) const [inline]
```

Return a switchmotor's normal action script.

References [Parsers::TrackGraph::NormalActionScript\(\)](#), and [trackGraph](#).

9.75.3.30 NumberOfHeads()

```
int Parsers::LayoutFile::NumberOfHeads (
    int nid ) const [inline]
```

Return a Signal's number of heads.

References [Parsers::TrackGraph::NumberOfHeads\(\)](#), and [trackGraph](#).

9.75.3.31 NumEdges()

```
int Parsers::LayoutFile::NumEdges (
    int nid ) const [inline]
```

Returns the number of edges for the specified node id.

References [Parsers::TrackGraph::NumEdges\(\)](#), and [trackGraph](#).

9.75.3.32 OffScript()

```
const char * Parsers::LayoutFile::OffScript (
    int nid ) const [inline]
```

Return the off action script.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

References [Parsers::TrackGraph::OffScript\(\)](#), and [trackGraph](#).

9.75.3.33 OnScript()

```
const char * Parsers::LayoutFile::OnScript (
    int nid ) const [inline]
```

Return the on action script.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

References [Parsers::TrackGraph::OnScript\(\)](#), and [trackGraph](#).

9.75.3.34 OrigX()

```
float Parsers::LayoutFile::OrigX (  
    int nid ) const [inline]
```

Return the x coordinate of the signal base.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

References [Parsers::TrackGraph::OrigX\(\)](#), and [trackGraph](#).

9.75.3.35 OrigY()

```
float Parsers::LayoutFile::OrigY (  
    int nid ) const [inline]
```

Return the y coordinate of the signal base.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

References [Parsers::TrackGraph::OrigY\(\)](#), and [trackGraph](#).

9.75.3.36 Parse()

```
virtual int Parsers::LayoutFile::Parse ( ) [protected], [virtual]
```

Parser function.

Implements [Parsers::ParseFile](#).

9.75.3.37 ParseError()

```
virtual void Parsers::LayoutFile::ParseError (
    const char * m ) [protected], [virtual]
```

Parse error handler.

Implements [Parsers::ParseFile](#).

9.75.3.38 ReverseActionScript()

```
const char * Parsers::LayoutFile::ReverseActionScript (
    int nid ) const [inline]
```

Return a block's or switchmotor's reverse action script.

References [Parsers::TrackGraph::ReverseActionScript\(\)](#), and [trackGraph](#).

9.75.3.39 Roots()

```
const IntegerList * Parsers::LayoutFile::Roots ( ) [inline]
```

Compressed graph roots.

References [Parsers::TrackGraph::Roots\(\)](#), and [trackGraph](#).

9.75.3.40 SenseScript()

```
const char * Parsers::LayoutFile::SenseScript (
    int nid ) const [inline]
```

Return a block's or switchmotor's sense script.

References [Parsers::TrackGraph::SenseScript\(\)](#), and [trackGraph](#).

9.75.3.41 SignalAspects()

```
const StringPairList * Parsers::LayoutFile::SignalAspects (
    int nid ) const [inline]
```

Return a Signal's aspect list.

References [Parsers::TrackGraph::SignalAspects\(\)](#), and [trackGraph](#).

9.75.3.42 TrackList()

```
const IntegerList * Parsers::LayoutFile::TrackList (
    int nid ) const [inline]
```

Return a block's tracklist.

References [trackGraph](#), and [Parsers::TrackGraph::TrackList\(\)](#).

9.75.3.43 TurnoutNumber()

```
int Parsers::LayoutFile::TurnoutNumber (
    int nid ) const [inline]
```

Return a switchmotor's turnout number.

References [trackGraph](#), and [Parsers::TrackGraph::TurnoutNumber\(\)](#).

9.75.3.44 TypeOfNode()

```
TrackGraph::NodeType Parsers::LayoutFile::TypeOfNode (
    int nid ) const [inline]
```

Returns the type of the node.

References [trackGraph](#), and [Parsers::TrackGraph::TypeOfNode\(\)](#).

9.75.4 Member Data Documentation

9.75.4.1 parser

`MRRXtrkCad* Parsers::LayoutFile::parser` [protected]

Parser.

9.75.4.2 trackGraph

`TrackGraph* Parsers::LayoutFile::trackGraph` [protected]

Track graph, a graph of all of the trackwork in the layout file.

Referenced by [Angle\(\)](#), [CompressedEdgeCount\(\)](#), [CompressedEdgeLength\(\)](#), [CompressedEdgeNode\(\)](#), [CompressedGraphCircleLayout\(\)](#), [CompressedGraphKamadaKawaiSpring\(\)](#), [CompressedGraphKruskalMinimumSpanningTree\(\)](#), [CompressedGraphPrimMinimumSpanningTree\(\)](#), [CompressedNodePositionX\(\)](#), [CompressedNodePositionY\(\)](#), [CompressedNodeSegments\(\)](#), [CompressGraph\(\)](#), [EdgeA\(\)](#), [EdgeIndex\(\)](#), [EdgeLength\(\)](#), [EdgeX\(\)](#), [EdgeY\(\)](#), [Heads\(\)](#), [HighestNode\(\)](#), [IsCompressed\(\)](#), [IsCompressedNode\(\)](#), [IsNodeP\(\)](#), [LengthOfNode\(\)](#), [LowestNode\(\)](#), [NameOfNode\(\)](#), [NodeTurnoutGraphic\(\)](#), [NodeTurnoutRoutelist\(\)](#), [NormalActionScript\(\)](#), [NumberOfHeads\(\)](#), [NumEdges\(\)](#), [OffScript\(\)](#), [OnScript\(\)](#), [OrigX\(\)](#), [OrigY\(\)](#), [ReverseActionScript\(\)](#), [Roots\(\)](#), [SenseScript\(\)](#), [SignalAspects\(\)](#), [TrackList\(\)](#), [TurnoutNumber\(\)](#), and [TypeOfNode\(\)](#).

9.76 xpressnet::LI100Message Class Reference

LI100 messages.

Public Member Functions

- [LI100Message](#) (name, mbyte)
Constructor.
- [MessageType](#) ()
Return the message type.

Private Attributes

- [_message_type](#)
The message type.

9.76.1 Detailed Description

LI100 messages.

Author

Robert Heller <heller@deepsoft.com>

9.76.2 Constructor & Destructor Documentation

9.76.2.1 LI100Message()

```
xpressnet::LI100Message::LI100Message (
    name ,
    mbyte )
```

Constructor.

Parameters

<i>mbyte</i>	Message byte.
--------------	---------------

9.76.3 Member Function Documentation

9.76.3.1 MessageType()

```
xpressnet::LI100Message::MessageType ( )
```

Return the message type.

9.76.4 Member Data Documentation

9.76.4.1 _message_type

```
xpressnet::LI100Message::_message_type [private]
```

The message type.

9.77 xpressnet::LI100VersionNumbers Class Reference

LI100 Version Numbers.

Public Member Functions

- [LI100VersionNumbers](#) (name, hv, sv)
Constructor.
- [HardwareVersion](#) ()
Return hardware version.
- [SoftwareVersion](#) ()
Return software version.

Private Attributes

- [_hardware_version](#)
Hardware version.
- [_software_version](#)
Software version.

9.77.1 Detailed Description

LI100 Version Numbers.

Author

Robert Heller <heller@deepsoft.com>

9.77.2 Constructor & Destructor Documentation

9.77.2.1 LI100VersionNumbers()

```
xpressnet::LI100VersionNumbers::LI100VersionNumbers (
    name ,
    hv ,
    sv )
```

Constructor.

Parameters

<i>mbyte</i>	Message byte.
--------------	---------------

9.77.3 Member Function Documentation

9.77.3.1 HardwareVersion()

```
xpressnet::LI100VersionNumbers::HardwareVersion ( )
```

Return hardware version.

9.77.3.2 SoftwareVersion()

```
xpressnet::LI100VersionNumbers::SoftwareVersion ( )
```

Return software version.

9.77.4 Member Data Documentation

9.77.4.1 _hardware_version

```
xpressnet::LI100VersionNumbers::_hardware_version [private]
```

Hardware version.

9.77.4.2 _software_version

```
xpressnet::LI100VersionNumbers::_software_version [private]
```

Software version.

9.78 xpressnet::LI101XPressNetAddress Class Reference

LI101 XPress Net Address.

Public Member Functions

- [LI101XPressNetAddress](#) (name, addr)
Constructor.
- [Address](#) ()
Return [XPressNet](#) address.

Private Attributes

- [_address](#)
Address.

9.78.1 Detailed Description

LI101 XPress Net Address.

Author

Robert Heller <heller@deepsoft.com>

9.78.2 Constructor & Destructor Documentation

9.78.2.1 LI101XPressNetAddress()

```
xpressnet::LI101XPressNetAddress::LI101XPressNetAddress (
    name ,
    addr )
```

Constructor.

Parameters

<i>mbyte</i>	Message byte.
--------------	---------------

9.78.3 Member Function Documentation

9.78.3.1 Address()

```
xpressnet::LI101XPressNetAddress::Address ( )
```

Return [XPressNet](#) address.

9.78.4 Member Data Documentation

9.78.4.1 _address

```
xpressnet::LI101XPressNetAddress::_address [private]
```

Address.

9.79 linuxgpio::LinuxGpio Class Reference

Base generic GPIO interface class.

Public Member Functions

- [LinuxGpio](#) (name,...)
Constructor, used to set up the GPIO pin.
- [read](#) ()
Read the value of the pin.
- [write](#) (value)
Write value to the pin.
- [is_output](#) ()
Returns a boolean value indicating whether the pin is an output pin or not.
- [~LinuxGpio](#) ()
Destructor.
- [Set](#) ()
Set the pin to logic true.
- [Clr](#) ()
Set the pin to logic false.
- [Get](#) ()
Get the pin's logic state.

Static Private Attributes

- static [EXPORT](#)
The name of the export control file.
- static [UNEXPORT](#)
The name of the unexport control file.
- static [DIRECTIONFMT](#)
The format string to generate the name of the direction control file.
- static [VALUEFMT](#)
The format string to generate the name of the value file.

9.79.1 Detailed Description

Base generic GPIO interface class.

(Use one of the specialized classes.)

This class implements the basic interface for a GPIO pin. The pin is set up, its direction configured and its value is optionally initialized.

9.79.2 Constructor & Destructor Documentation

9.79.2.1 LinuxGpio()

```
linuxgpio::LinuxGpio::LinuxGpio (
    name ,
    ... )
```

Constructor, used to set up the GPIO pin.

The pin number is written to the export control file and then the pin's direction control file is computed and the pin's direction is written.

Parameters

<i>name</i>	The name of the pin.
...	Options: <ul style="list-style-type: none"> • -pinnumber The pin number, readonly, defaults to 0 and can be any positive integer. • -direction The pin direction, readonly, defaults to in can be one of in, out, high, or low.

Author

Robert Heller <heller@deepsoft.com>

9.79.2.2 ~LinuxGpio()

```
linuxgpio::LinuxGpio::~~LinuxGpio ( )
```

Destructor.

Unexport the pin.

9.79.3 Member Function Documentation**9.79.3.1 Clr()**

```
linuxgpio::LinuxGpio::Clr ( )
```

Set the pin to logic false.

9.79.3.2 Get()

```
linuxgpio::LinuxGpio::Get ( )
```

Get the pin's logic state.

9.79.3.3 is_output()

```
linuxgpio::LinuxGpio::is_output ( )
```

Returns a boolean value indicating whether the pin is an output pin or not.

Returns

A boolean flag, true if this is an output, false if it is an input.

9.79.3.4 read()

```
linuxgpio::LinuxGpio::read ( )
```

Read the value of the pin.

Returns

The value of the pin, 1 or 0.

9.79.3.5 Set()

```
linuxgpio::LinuxGpio::Set ( )
```

Set the pin to logic true.

9.79.3.6 write()

```
linuxgpio::LinuxGpio::write (
    value )
```

Write value to the pin.

Parameters

<i>value</i>	The value to write, either 1 or any non-zero value for high or 0 for low.
--------------	---

9.79.4 Member Data Documentation

9.79.4.1 DIRECTIONFMT

```
linuxgpio::LinuxGpio::DIRECTIONFMT [static], [private]
```

The format string to generate the name of the direction control file.

9.79.4.2 EXPORT

```
linuxgpio::LinuxGpio::EXPORT [static], [private]
```

The name of the export control file.

9.79.4.3 UNEXPORT

```
linuxgpio::LinuxGpio::UNEXPORT [static], [private]
```

The name of the unexport control file.

9.79.4.4 VALUEFMT

```
linuxgpio::LinuxGpio::VALUEFMT [static], [private]
```

The format string to generate the name of the value file.

9.80 xpressnet::LocomotiveAddress Class Reference

Locomotive address.

Public Member Functions

- [LocomotiveAddress](#) (name, k, a)
Constructor.
- [AddressType](#) ()
Return address type.
- [Address](#) ()
Return address.

Private Attributes

- [_addressType](#)
Address type.
- [_address](#)
Address.

9.80.1 Detailed Description

Locomotive address.

Author

Robert Heller <heller@deepsoft.com>

9.80.2 Constructor & Destructor Documentation

9.80.2.1 LocomotiveAddress()

```
xpressnet::LocomotiveAddress::LocomotiveAddress (
    name ,
    k ,
    a )
```

Constructor.

Parameters

<i>k</i>	K (address type code).
<i>a</i>	Address.

9.80.3 Member Function Documentation

9.80.3.1 Address()

```
xpressnet::LocomotiveAddress::Address ( )
```

Return address.

9.80.3.2 AddressType()

```
xpressnet::LocomotiveAddress::AddressType ( )
```

Return address type.

9.80.4 Member Data Documentation

9.80.4.1 `_address`

`xpressnet::LocomotiveAddress::_address` [private]

Address.

9.80.4.2 `_addressType`

`xpressnet::LocomotiveAddress::_addressType` [private]

Address type.

9.81 CabWidgets::LocomotiveDirection Class Reference

Locomotive Direction widget.

Public Member Functions

- [direction](#) ()
Return the current direction.
- [LocomotiveDirection](#) (name,...)
Build and install all component widgets and process configuration.
- [invoke](#) ()
Method to invoke the widget.
- [direction_sense](#) (dir)
Method to set the sensed direction.

Private Member Functions

- [_setdirection](#) (dir)
Set the current direction.

Private Attributes

- [reverse](#)
Reverse button component.
- [currentDirection](#)
Current direction label component.
- [forward](#)
Forward button component.
- [_direction](#)
The current direction.

Static Private Attributes

- static [_left](#)
Left bitmap (reverse button).
- static [_right](#)
Right bitmap (forward button).

9.81.1 Detailed Description

Locomotive Direction widget.

This widget implements Locomotive Direction control / display. There are buttons for selecting the direction and the current direction is displayed.

Parameters

<i>path</i>	Pathname of the widget.
...	Options: <ul style="list-style-type: none">• -command Script to call when the direction is changed. The new direction is appended.

Author

Robert Heller <heller@deepsoft.com>

9.81.2 Constructor & Destructor Documentation

9.81.2.1 LocomotiveDirection()

```
CabWidgets::LocomotiveDirection::LocomotiveDirection (
    name ,
    ... )
```

Build and install all component widgets and process configuration.

Parameters

...	Argument list (option value pairs). Gets passed to the implicitly defined configurelist method.
-----	---

9.81.3 Member Function Documentation

9.81.3.1 _setdirection()

```
CabWidgets::LocomotiveDirection::_setdirection (
    dir ) [private]
```

Set the current direction.

Bound to direction buttons.

Parameters

<i>dir</i>	Localized string containing the direction.
------------	--

9.81.3.2 direction()

```
CabWidgets::LocomotiveDirection::direction ( )
```

Return the current direction.

9.81.3.3 direction_sense()

```
CabWidgets::LocomotiveDirection::direction_sense (
    dir )
```

Method to set the sensed direction.

Parameters

<i>dir</i>	The localized direction to set.
------------	---------------------------------

9.81.3.4 invoke()

```
CabWidgets::LocomotiveDirection::invoke ( )
```

Method to invoke the widget.

This calls the script (if any) defined by the -command option.

9.81.4 Member Data Documentation

9.81.4.1 _direction

```
CabWidgets::LocomotiveDirection::_direction [private]
```

The current direction.

9.81.4.2 _left

```
CabWidgets::LocomotiveDirection::_left [static], [private]
```

Left bitmap (reverse button).

9.81.4.3 _right

```
CabWidgets::LocomotiveDirection::_right [static], [private]
```

Right bitmap (forward button).

9.81.4.4 currentDirection

`CabWidgets::LocomotiveDirection::currentDirection` [private]

Current direction label component.

9.81.4.5 forward

`CabWidgets::LocomotiveDirection::forward` [private]

Forward button component.

9.81.4.6 reverse

`CabWidgets::LocomotiveDirection::reverse` [private]

Reverse button component.

9.82 xpressnet::LocomotiveInformation Class Reference

Locomotive information.

Public Member Functions

- [Address](#) ()
Return address.
- [Available](#) ()
Return available flag.
- [Direction](#) ()
Return direction.
- [SpeedStepMode](#) ()
Return speed step mode.
- [Speed](#) ()
Return speed.
- [Function](#) (f)
Return function status.
- [MTR](#) ()
Return Muti-unit address.
- [Address2](#) ()
Return the address of second unit in double header.
- [LocomotiveInformation](#) (name, a, avail=0, dir="", ssm="", s=0, f0=0, f1=0, f2=0, f3=0, f4=0, f5=0, f6=0, f7=0, f8=0, f9=0, f10=0, f11=0, f12=0, mtraddr=0, addr2=0xffff)
Constructor.

Private Attributes

- [_address](#)
Locomotive address.
- [_available](#)
Locomotive is available.
- [_direction](#)
Locomotive direction.
- [_speedstep](#)
Locomotive speed step mode.
- [_speed](#)
Locomotive speed.
- [_function0](#)
Function 0.
- [_function1](#)
Function 1.
- [_function2](#)
Function 2.
- [_function3](#)
Function 3.
- [_function4](#)
Function 4.
- [_function5](#)
Function 5.
- [_function6](#)
Function 6.
- [_function7](#)
Function 7.
- [_function8](#)
Function 8.
- [_function9](#)
Function 9.
- [_function10](#)
Function 10.
- [_function11](#)
Function 11.
- [_function12](#)
Function 12.
- [_mtraddress](#)
Multi-unit address.
- [_address2](#)
Double header address.

9.82.1 Detailed Description

Locomotive information.

Author

Robert Heller <heller@deepsoft.com>

9.82.2 Constructor & Destructor Documentation

9.82.2.1 LocomotiveInformation()

```
xpressnet::LocomotiveInformation::LocomotiveInformation (
    name ,
    a ,
    avail = 0,
    dir = "",
    ssm = "",
    s = 0,
    f0 = 0,
    f1 = 0,
    f2 = 0,
    f3 = 0,
    f4 = 0,
    f5 = 0,
    f6 = 0,
    f7 = 0,
    f8 = 0,
    f9 = 0,
    f10 = 0,
    f11 = 0,
    f12 = 0,
    mtraddr = 0,
    addr2 = 0xffff )
```

Constructor.

Parameters

<i>a</i>	Locomotive address.
<i>avail</i>	Available flag.
<i>dir</i>	Direction.
<i>ssm</i>	Speed step mode.
<i>s</i>	Locomotive speed.
<i>f0</i>	Function 0 status.
<i>f1</i>	Function 1 status.
<i>f2</i>	Function 2 status.
<i>f3</i>	Function 3 status.
<i>f4</i>	Function 4 status.
<i>f5</i>	Function 5 status.
<i>f6</i>	Function 6 status.
<i>f7</i>	Function 7 status.
<i>f8</i>	Function 8 status.
<i>f9</i>	Function 9 status.
<i>f10</i>	Function 10 status.
<i>f11</i>	Function 11 status.

Parameters

<i>f12</i>	Function 12 status.
<i>mtraddr</i>	MTR address.
<i>addr2</i>	Double header address.

9.82.3 Member Function Documentation

9.82.3.1 Address()

```
xpressnet::LocomotiveInformation::Address ( )
```

Return address.

9.82.3.2 Address2()

```
xpressnet::LocomotiveInformation::Address2 ( )
```

Return the address of second unit in double header.

9.82.3.3 Available()

```
xpressnet::LocomotiveInformation::Available ( )
```

Return available flag.

9.82.3.4 Direction()

```
xpressnet::LocomotiveInformation::Direction ( )
```

Return direction.

9.82.3.5 Function()

```
xpressnet::LocomotiveInformation::Function (
    f )
```

Return function status.

Parameters

<i>f</i>	Function whose status to return.
----------	----------------------------------

9.82.3.6 MTR()

```
xpressnet::LocomotiveInformation::MTR ( )
```

Return Multi-unit address.

9.82.3.7 Speed()

```
xpressnet::LocomotiveInformation::Speed ( )
```

Return speed.

9.82.3.8 SpeedStepMode()

```
xpressnet::LocomotiveInformation::SpeedStepMode ( )
```

Return speed step mode.

9.82.4 Member Data Documentation

9.82.4.1 _address

```
xpressnet::LocomotiveInformation::_address [private]
```

Locomotive address.

9.82.4.2 `_address2`

`xpressnet::LocomotiveInformation::_address2` [private]

Double header address.

9.82.4.3 `_available`

`xpressnet::LocomotiveInformation::_available` [private]

Locomotive is available.

9.82.4.4 `_direction`

`xpressnet::LocomotiveInformation::_direction` [private]

Locomotive direction.

9.82.4.5 `_function0`

`xpressnet::LocomotiveInformation::_function0` [private]

Function 0.

9.82.4.6 `_function1`

`xpressnet::LocomotiveInformation::_function1` [private]

Function 1.

9.82.4.7 `_function10`

`xpressnet::LocomotiveInformation::_function10` [private]

Function 10.

9.82.4.8 `_function11`

```
xpressnet::LocomotiveInformation::_function11 [private]
```

Function 11.

9.82.4.9 `_function12`

```
xpressnet::LocomotiveInformation::_function12 [private]
```

Function 12.

9.82.4.10 `_function2`

```
xpressnet::LocomotiveInformation::_function2 [private]
```

Function 2.

9.82.4.11 `_function3`

```
xpressnet::LocomotiveInformation::_function3 [private]
```

Function 3.

9.82.4.12 `_function4`

```
xpressnet::LocomotiveInformation::_function4 [private]
```

Function 4.

9.82.4.13 `_function5`

```
xpressnet::LocomotiveInformation::_function5 [private]
```

Function 5.

9.82.4.14 _function6

xpressnet::LocomotiveInformation::_function6 [private]

Function 6.

9.82.4.15 _function7

xpressnet::LocomotiveInformation::_function7 [private]

Function 7.

9.82.4.16 _function8

xpressnet::LocomotiveInformation::_function8 [private]

Function 8.

9.82.4.17 _function9

xpressnet::LocomotiveInformation::_function9 [private]

Function 9.

9.82.4.18 _mtraddress

xpressnet::LocomotiveInformation::_mtraddress [private]

Multi-unit address.

9.82.4.19 _speed

xpressnet::LocomotiveInformation::_speed [private]

Locomotive speed.

9.82.4.20 `_speedstep`

`xpressnet::LocomotiveInformation::_speedstep` [private]

Locomotive speed step mode.

9.83 CabWidgets::LocomotiveSpeed Class Reference

Locomotive Speed widget.

Public Member Functions

- [speed](#) ()
Method to return the current speed.
- [setspeed](#) ([speed](#))
Method to set the sensed speed.
- [LocomotiveSpeed](#) (name,...)
Build and install all component widgets and process configuration.
- [invoke](#) ()
Method to invoke the widget.

Private Member Functions

- [__setspeed](#) (newspeed)
Set the speed, bound to the bar -command option.
- [__stop](#) ()
Stop method, bound to the stop button.
- [__up1](#) ()
Up by one method, bound to the slow up button.
- [__up10](#) ()
Up by 10 method, bound to the fast up button.
- [__down1](#) ()
Down by one method, bound to the slow down button.
- [__down10](#) ()
Down by one method, bound to the fast down button.

Private Attributes

- [leftbuttons](#)
Left buttons component (small increments).
- [up1](#)
Up by one button.
- [down1](#)
Down by one button.
- [rightbuttons](#)
Right buttons component (larger increments).
- [up10](#)
Up by ten button.
- [down10](#)
Down by one button.
- [bar](#)
Current speed bar.
- [stop](#)
Stop button.
- [_speed](#)
The current speed.

Static Private Attributes

- static [_up](#)
Bitmap for up button.
- static [_down](#)
Bitmap for down button.
- static [_up10](#)
Bitmap for fast up button.
- static [_down10](#)
Bitmap for fast down button.
- static [_stop](#)
Bitmap for fast down button.

9.83.1 Detailed Description

Locomotive Speed widget.

This widget implements Locomotive Speed control / display. There are buttons for increasing or decreasing speed either by units of 1 or by units of 10. Plus there is a bar showing the current relative speed.

Parameters

<i>path</i>	Pathname of the widget.
...	Options: <ul style="list-style-type: none"> • -command Script to call when the speed is changed. The new speed is appended.

Author

Robert Heller <heller@deepsoft.com>

9.83.2 Constructor & Destructor Documentation

9.83.2.1 LocomotiveSpeed()

```
CabWidgets::LocomotiveSpeed::LocomotiveSpeed (
    name ,
    ... )
```

Build and install all component widgets and process configuration.

Parameters

...	Argument list (option value pairs). Gets passed to the implicitly defined configurelist method.
-----	---

9.83.3 Member Function Documentation

9.83.3.1 _down1()

```
CabWidgets::LocomotiveSpeed::_down1 ( ) [private]
```

Down by one method, bound to the slow down button.

9.83.3.2 _down10()

```
CabWidgets::LocomotiveSpeed::_down10 ( ) [private]
```

Down by one method, bound to the fast down button.

9.83.3.3 _setspeed()

```
CabWidgets::LocomotiveSpeed::_setspeed (
    newspeed ) [private]
```

Set the speed, bound to the bar -command option.

9.83.3.4 _stop()

```
CabWidgets::LocomotiveSpeed::_stop ( ) [private]
```

Stop method, bound to the stop button.

9.83.3.5 _up1()

```
CabWidgets::LocomotiveSpeed::_up1 ( ) [private]
```

Up by one method, bound to the slow up button.

9.83.3.6 _up10()

```
CabWidgets::LocomotiveSpeed::_up10 ( ) [private]
```

Up by 10 method, bound to the fast up button.

9.83.3.7 invoke()

```
CabWidgets::LocomotiveSpeed::invoke ( )
```

Method to invoke the widget.

This calls the script (if any) defined by the -command option.

9.83.3.8 `setspeed()`

```
CabWidgets::LocomotiveSpeed::setspeed (
    speed )
```

Method to set the sensed speed.

9.83.3.9 `speed()`

```
CabWidgets::LocomotiveSpeed::speed ( )
```

Method to return the current speed.

9.83.4 Member Data Documentation

9.83.4.1 `_down`

```
CabWidgets::LocomotiveSpeed::_down [static], [private]
```

Bitmap for down button.

9.83.4.2 `_down10`

```
CabWidgets::LocomotiveSpeed::_down10 [static], [private]
```

Bitmap for fast down button.

9.83.4.3 `_speed`

```
CabWidgets::LocomotiveSpeed::_speed [private]
```

The current speed.

9.83.4.4 `_stop`

`CabWidgets::LocomotiveSpeed::_stop` [static], [private]

Bitmap for fast down button.

9.83.4.5 `_up`

`CabWidgets::LocomotiveSpeed::_up` [static], [private]

Bitmap for up button.

9.83.4.6 `_up10`

`CabWidgets::LocomotiveSpeed::_up10` [static], [private]

Bitmap for fast up button.

9.83.4.7 `bar`

`CabWidgets::LocomotiveSpeed::bar` [private]

Current speed bar.

9.83.4.8 `down1`

`CabWidgets::LocomotiveSpeed::down1` [private]

Down by one button.

9.83.4.9 `down10`

`CabWidgets::LocomotiveSpeed::down10` [private]

Down by one button.

9.83.4.10 leftbuttons

```
CabWidgets::LocomotiveSpeed::leftbuttons [private]
```

Left buttons component (small increments).

9.83.4.11 rightbuttons

```
CabWidgets::LocomotiveSpeed::rightbuttons [private]
```

Right buttons component (larger increments).

9.83.4.12 stop

```
CabWidgets::LocomotiveSpeed::stop [private]
```

Stop button.

9.83.4.13 up1

```
CabWidgets::LocomotiveSpeed::up1 [private]
```

Up by one button.

9.83.4.14 up10

```
CabWidgets::LocomotiveSpeed::up10 [private]
```

Up by ten button.

9.84 FCFSupport::LogMessageCallback Class Reference

A callback to log a message.

```
#include <CallBack.h>
```

Public Types

- enum [MessageType](#) { [Infomational](#) =1 , [Warning](#) =2 , [Error](#) =3 }

The three types of messages.

Public Member Functions

- [LogMessageCallback](#) ()
Constructor.
- virtual [~LogMessageCallback](#) ()
Destructor.
- virtual void [LogMessage](#) ([MessageType](#) Type, const string Message) const
Log message callback function.

9.84.1 Detailed Description

A callback to log a message.

This callback class is used to display various sorts of messages in an application dependent way. There are three types of messages, informational messages, warning messages, and error messages. Infomational messages are just to inform the user of of important things that are happening. Warning messages are to inform the user of minor, correctable, problems. Error are to inform the user of serious problems that need to be fixed before proceeding much further.

@author Robert Heller \<heller\@deepsoft.com\>

9.84.2 Member Enumeration Documentation

9.84.2.1 MessageType

enum [FCFSupport::LogMessageCallback::MessageType](#)

The three types of messages.

Enumerator

Infomational	Random informational messages.
Warning	Warning messages.
Error	Error messages.

9.84.3 Constructor & Destructor Documentation

9.84.3.1 LogMessageCallback()

```
FCFSupport::LogMessageCallback::LogMessageCallback ( ) [inline]
```

Constructor.

The base constructor does nothing. It is presumed that a derived class might do something useful.

9.84.3.2 ~LogMessageCallback()

```
virtual FCFSupport::LogMessageCallback::~~LogMessageCallback ( ) [inline], [virtual]
```

Destructor.

The base destructor does nothing. It is presumed that a derived class might do something useful.

9.84.4 Member Function Documentation

9.84.4.1 LogMessage()

```
virtual void FCFSupport::LogMessageCallback::LogMessage (
    MessageType Type,
    const string Message ) const [inline], [virtual]
```

Log message callback function.

Display a specific type of message in an application specific way.

Parameters

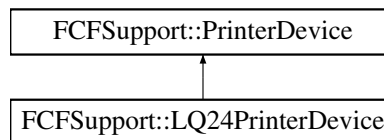
<i>Type</i>	The message type.
<i>Message</i>	The message itself.

9.85 FCFSupport::LQ24PrinterDevice Class Reference

Class for an LQ24 compatible printer.

```
#include <LQ24Printer.h>
```

Inheritance diagram for FCFSupport::LQ24PrinterDevice:



Public Member Functions

- [LQ24PrinterDevice](#) (const string filename="", const string title="", [PageSize pageSize=Letter](#), char **outmessage=NULL)
Constructor.
- virtual bool [OpenPrinter](#) (const string filename, [PageSize pageSize=Letter](#), char **outmessage=NULL)
Member function to open the printer.
- virtual bool [ClosePrinter](#) (char **outmessage)
Close the printer.
- virtual bool [SetTypeSpacing](#) ([TypeSpacing](#) spacing)
Set the the spacing.
- virtual bool [SetTypeWeight](#) ([TypeWeight](#) weight)
Set the type weight.
- virtual bool [SetTypeSlant](#) ([TypeSlant](#) slant)
Set the type slant.
- virtual bool [NewPage](#) (const string heading="")
Perform a page feed and print a heading.
- virtual bool [PutLine](#) (const string line)
Print out a string and follow it with a new line sequence.
- virtual bool [Put](#) (const string text)
Print a string of text.
- virtual bool [Tab](#) (int column)
Tab over to the specified column.
- virtual [~LQ24PrinterDevice](#) ()
Destructor.

Private Types

- enum [ChCodes](#) { [FF](#) = 12 , [SI](#) = 15 , [DC2](#) = 18 , [ESC](#) = 27 }
Special character codes.

Private Attributes

- ofstream [printerStream](#)
Output stream.
- int [currentColumn](#)
Current column.
- double [currentColumnFraction](#)
Current column fraction.
- [TypeSpacing](#) [currentSpacing](#)
Current spacing.
- [TypeWeight](#) [currentWeight](#)
Current weight.
- [TypeSlant](#) [currentSlant](#)
Current slant.
- double [oneColumnWidthFraction](#)
One column's width fraction.

Additional Inherited Members

9.85.1 Detailed Description

Class for an LQ24 compatible printer.

This is Epson's 24-bit dot matrix printers.

Author

Robert Heller <heller@deepsoft.com>

9.85.2 Member Enumeration Documentation

9.85.2.1 ChCodes

```
enum FCFSupport::LQ24PrinterDevice::ChCodes [private]
```

Special character codes.

These character codes introduce various special printer functions and modes.

Enumerator

FF	Form feed. This code causes a page feed.
SI	Shift In This character starts condensed (half width) spacing.
DC2	Device control 2. This character ends condensed (half width) spacing.
ESC	Escape. This character is used to introduce a number of escape sequences to perform a number of printer functions and/or set various printing modes.

9.85.3 Constructor & Destructor Documentation

9.85.3.1 LQ24PrinterDevice()

```
FCFSupport::LQ24PrinterDevice::LQ24PrinterDevice (
    const string filename = "",
    const string title = "",
    PageSize pageSize = Letter,
    char ** outmessage = NULL )
```

Constructor.

Create a new printer device instance from a set of parameters, all of which have default values, so this also doubles as the default base constructor.

Parameters

<i>filename</i>	Output filename.
<i>title</i>	An internal document title string.
<i>pageSize</i>	The page size to use. This parameter is not used.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.

9.85.3.2 ~LQ24PrinterDevice()

```
virtual FCFSupport::LQ24PrinterDevice::~~LQ24PrinterDevice ( ) [virtual]
```

Destructor.

Close the printer.

9.85.4 Member Function Documentation

9.85.4.1 ClosePrinter()

```
virtual bool FCFSupport::LQ24PrinterDevice::ClosePrinter (
    char ** outmessage ) [virtual]
```

Close the printer.

Parameters

<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.
-------------------	--

Reimplemented from [FCFSupport::PrinterDevice](#).

9.85.4.2 NewPage()

```
virtual bool FCFSupport::LQ24PrinterDevice::NewPage (  
    const string heading = "" ) [virtual]
```

Perform a page feed and print a heading.

Parameters

<i>heading</i>	The heading string.
----------------	---------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.85.4.3 OpenPrinter()

```
virtual bool FCFSupport::LQ24PrinterDevice::OpenPrinter (  
    const string filename,  
    PageSize pageSize = Letter,  
    char ** outmessage = NULL ) [virtual]
```

Member function to open the printer.

Parameters

<i>filename</i>	Output filename.
<i>pageSize</i>	The page size to use.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.

Reimplemented from [FCFSupport::PrinterDevice](#).

9.85.4.4 Put()

```
virtual bool FCFSupport::LQ24PrinterDevice::Put (
    const string text ) [virtual]
```

Print a string of text.

Don't include a newline.

Parameters

<i>text</i>	The string to print.
-------------	----------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.85.4.5 PutLine()

```
virtual bool FCFSupport::LQ24PrinterDevice::PutLine (
    const string line ) [virtual]
```

Print out a string and follow it with a new line sequence.

Parameters

<i>line</i>	The line to print.
-------------	--------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.85.4.6 SetTypeSlant()

```
virtual bool FCFSupport::LQ24PrinterDevice::SetTypeSlant (
    TypeSlant slant ) [virtual]
```

Set the type slant.

Parameters

<i>slant</i>	The new type slant.
--------------	---------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.85.4.7 SetTypeSpacing()

```
virtual bool FCFSupport::LQ24PrinterDevice::SetTypeSpacing (
    TypeSpacing spacing ) [virtual]
```

Set the the spacing.

Parameters

<i>spacing</i>	The new type spacing.
----------------	-----------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.85.4.8 SetTypeWeight()

```
virtual bool FCFSupport::LQ24PrinterDevice::SetTypeWeight (
    TypeWeight weight ) [virtual]
```

Set the type weight.

Parameters

<i>weight</i>	The new type weight.
---------------	----------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.85.4.9 Tab()

```
virtual bool FCFSupport::LQ24PrinterDevice::Tab (
    int column ) [virtual]
```

Tab over to the specified column.

Parameters

<i>column</i>	The desired tab column.
---------------	-------------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.85.5 Member Data Documentation

9.85.5.1 currentColumn

```
int FCFSupport::LQ24PrinterDevice::currentColumn [private]
```

Current column.

9.85.5.2 currentColumnFraction

```
double FCFSupport::LQ24PrinterDevice::currentColumnFraction [private]
```

Current column fraction.

9.85.5.3 currentSlant

```
TypeSlant FCFSupport::LQ24PrinterDevice::currentSlant [private]
```

Current slant.

9.85.5.4 currentSpacing

```
TypeSpacing FCFSupport::LQ24PrinterDevice::currentSpacing [private]
```

Current spacing.

9.85.5.5 currentWeight

```
TypeWeight FCFSupport::LQ24PrinterDevice::currentWeight [private]
```

Current weight.

9.85.5.6 oneColumnWidthFraction

```
double FCFSupport::LQ24PrinterDevice::oneColumnWidthFraction [private]
```

One column's width fraction.

9.85.5.7 printerStream

```
ofstream FCFSupport::LQ24PrinterDevice::printerStream [private]
```

Output stream.

9.86 mainWindow Class Reference

A widget that is heavily extended from the BWidget MainFrame windget.

Public Member Functions

- [buttons_add](#) (...) *Method to add a button to the button menu.*
- [buttons_delete](#) (index) *Method to delete a button from the button menu.*
- [buttons_insert](#) (index,...) *Method to insert a button to the button menu.*
- [buttons_itemconfigure](#) (index,...) *Method to configure a button in the button menu.*
- [buttons_hide](#) () *Method to hide the button menu.*
- [buttons_show](#) () *Method to show the button menu.*
- [slideout_add](#) (name) *Method to add a new slideout frame to the main window.*
- [slideout_show](#) (name) *Method to show (display) a slideout frame.*
- [slideout_hide](#) (name) *Method to hide a slideout frame.*
- [slideout_getframe](#) (name) *Method to get the frame of a slideout frame.*
- [slideout_issownp](#) (name) *Method to test to see if the named slideout is being shown.*
- [slideout_list](#) () *Method to return a list of defined slideout frames.*

- [slideout_reqwidth](#) (name)
Method to return the requested width of the named slideout frame.
- [toolbar_add](#) (name)
Method to add a toolbar to the main frame.
- [toolbar_show](#) (name)
Method to show a toolbar.
- [toolbar_hide](#) (name)
Method to hide a toolbar.
- [toolbar_setbuttonstate](#) (name, state)
Method to set the state of the buttons in a toolbar.
- [toolbar_addbutton](#) (name, bname,...)
Method to add a button to a toolbar.
- [toolbar_buttonconfigure](#) (name, bname,...)
Method to configure a button on a toolbar.
- [toolbar_buttoncget](#) (name, bname, option)
Method to get a configuration option of a button on a toolbar.
- [menu_activate](#) (menuid, index)
Method to activate a menu on the main frame.
- [menu_add](#) (menuid, entrytype,...)
Method to add a menu entry to a menu on the main frame.
- [menu_delete](#) (menuid, index,...)
Method to delete an entry from a menu.
- [menu_entrycget](#) (menuid, index, option)
Method to get an option value of a menu entry.
- [menu_entryconfigure](#) (menuid, index,...)
Method to configure options of a menu entry.
- [menu_sethelpvar](#) (menuid)
Method to set the bind the status line to the help variable of the menu.
- [menu_index](#) (menuid, index)
Method to get the index of a menu entry.
- [menu_insert](#) (menuid, index, entrytype,...)
Method to insert a menu entry to a menu on the main frame.
- [menu_invoke](#) (menuid, index)
Method to invoke a menu entry.
- [menu_type](#) (menuid, index)
Method to return the type of a menu entry.
- [showit](#) (extraX=0)
Method to show the main window.
- [setstatus](#) (statusmessage)
Method to set the status message.
- [setprogress](#) (progressvalue)
Method to set the progress bar value.
- [mainwindow](#) (name,...)
Constructor build a full featured main window.

Private Attributes

- [scrollwindow](#)
ScrollWindow component.
- [wipmessage](#)
Work-In-Progress message component.
- [buttons](#)
Right button box.
- [panewindow](#)
PaneWindow holding the main area and the right widgets (command buttons and the slideouts).
- [slideouts](#)
Slideout map.
- [toolbars](#)
Toolbar map.
- [numtoolbars](#)
The number of toolbars.
- [progress](#)
The value of the progress bar.
- [status](#)
Status value.

9.86.1 Detailed Description

A widget that is heavily extended from the BWidget MainFrame widget.

This widget starts with a MainFrame, and adds a paned window with a scrolled window and a button menu, and zero or more slide out frames. also management methods for toolbars and for menus.

Parameters

<i>path</i>	The widget path.
...	Options: <ul style="list-style-type: none"> • -menu The basic MainFrame -menu option. Defaults to the Motif standard set of menus (File, Edit, View, Options, and Help). • -extramenus Like the basic MainFrame -menu option, but can be used when the just additional menus need to be added to the standard set. • -height Widget height. Delegated to the hull (MainFrame) widget. • -width Widget width. Delegated to the hull (MainFrame) widget. • -separator Include a separator between windows on the MainFrame widget. • -dontwithdraw Boolean to suppress withdrawing the toplevel while it is being built. • -scrolling Boolean to enable the scrollwindow.

Author

Robert Heller <heller@deepsoft.com>

9.86.2 Package provided

MainWindow 1.0

9.86.3 Constructor & Destructor Documentation**9.86.3.1 mainwindow()**

```
mainwindow::mainwindow (
    name ,
    ... )
```

Constructor build a full featured main window.

Parameters

...	Option value list.
-----	--------------------

9.86.4 Member Function Documentation**9.86.4.1 buttons_add()**

```
mainwindow::buttons_add (
    ... )
```

Method to add a button to the button menu.

See the ButtonBox add method.

Parameters

...	Arguments passed to the ButtonBox add method.
-----	---

9.86.4.2 buttons_delete()

```
mainwindow::buttons_delete (
    index )
```

Method to delete a button from the button menu.

See the ButtonBox delete method.

Parameters

<i>index</i>	Passed to the ButtonBox delete method.
--------------	--

9.86.4.3 buttons_hide()

```
mainwindow::buttons_hide ( )
```

Method to hide the button menu.

9.86.4.4 buttons_insert()

```
mainwindow::buttons_insert (
    index ,
    ... )
```

Method to insert a button to the button menu.

See the ButtonBox insert method.

Parameters

...	Arguments passed to the ButtonBox insert method.
-----	--

9.86.4.5 buttons_itemconfigure()

```
mainwindow::buttons_itemconfigure (
    index ,
    ... )
```


Method to configure a button in the button menu.

See the `ButtonBox::itemconfigure` method.

Parameters

<i>index</i>	Argument passed to the ButtonBox itemconfigure method.
...	Arguments passed to the ButtonBox itemconfigure method.

9.86.4.6 buttons_show()

```
mainwindow::buttons_show ( )
```

Method to show the button menu.

9.86.4.7 menu_activate()

```
mainwindow::menu_activate (
    menuid ,
    index )
```

Method to activate a menu on the main frame.

Parameters

<i>menuid</i>	Menu id.
<i>index</i>	Menu item index.

9.86.4.8 menu_add()

```
mainwindow::menu_add (
    menuid ,
    entrytype ,
    ... )
```

Method to add a menu entry to a menu on the main frame.

Parameters

<i>menuid</i>	Menu id.
<i>entrytype</i>	The type of entry.
...	The arguments to pass to the entry creation command.

9.86.4.9 menu_delete()

```
mainwindow::menu_delete (
    menuid ,
    index ,
    ... )
```

Method to delete an entry from a menu.

Parameters

<i>menuid</i>	Menu id.
<i>index</i>	Menu item index.
...	The arguments to pass to the menu delete command.

9.86.4.10 menu_entrycget()

```
mainwindow::menu_entrycget (
    menuid ,
    index ,
    option )
```

Method to get an option value of a menu entry.

Parameters

<i>menuid</i>	Menu id.
<i>index</i>	Menu item index.
<i>option</i>	The option to fetch.

9.86.4.11 menu_entryconfigure()

```
mainwindow::menu_entryconfigure (
    menuid ,
    index ,
    ... )
```

Method to configure options of a menu entry.

Parameters

<i>menuid</i>	Menu id.
<i>index</i>	Menu item index.
...	The arguments to pass on to entryconfigure.

9.86.4.12 menu_index()

```
mainwindow::menu_index (
    menuid ,
    index )
```

Method to get the index of a menu entry.

Parameters

<i>menuid</i>	Menu id.
<i>index</i>	The index of the menu entry.

9.86.4.13 menu_insert()

```
mainwindow::menu_insert (
    menuid ,
    index ,
    entrytype ,
    ... )
```

Method to insert a menu entry to a menu on the main frame.

Parameters

<i>menuid</i>	Menu id.
<i>index</i>	The index to insert before.
<i>entrytype</i>	The type of entry.
...	The arguments to pass to the entry creation command.

9.86.4.14 menu_invoke()

```
mainwindow::menu_invoke (
```

```
    menuid ,  
    index )
```

Method to invoke a menu entry.

Parameters

<i>menuid</i>	Menu id.
<i>index</i>	The index to invoke.

9.86.4.15 menu_sethelpvar()

```
mainwindow::menu_sethelpvar (  
    menuid )
```

Method to set the bind the status line to the help variable of the menu.

Parameters

<i>menuid</i>	Menu id.
---------------	----------

9.86.4.16 menu_type()

```
mainwindow::menu_type (  
    menuid ,  
    index )
```

Method to return the type of a menu entry.

Parameters

<i>menuid</i>	Menu id.
<i>index</i>	The index to get the type of.

9.86.4.17 setprogress()

```
mainwindow::setprogress (  
    progressvalue )
```

Method to set the progress bar value.

Parameters

<i>progressvalue</i>	The amount of the progress.
----------------------	-----------------------------

9.86.4.18 setStatus()

```
mainwindow::setStatus (
    statusmessage )
```

Method to set the status message.

Parameters

<i>statusmessage</i>	The status message to display.
----------------------	--------------------------------

9.86.4.19 showit()

```
mainwindow::showit (
    extraX = 0 )
```

Method to show the main window.

Parameters

<i>extraX</i>	Extra width to add when computing the position to map the window at. Defaults to 0.
---------------	---

9.86.4.20 slideout_add()

```
mainwindow::slideout_add (
    name )
```

Method to add a new slideout frame to the main window.

A slide out frame is a frame that can be packed and unpacked as needed and is shown in the right pane of the pane window.

Parameters

<i>name</i>	The name of the slideout frame.
-------------	---------------------------------

9.86.4.21 slideout_getframe()

```
mainwindow::slideout_getframe (
    name )
```

Method to get the frame of a slideout frame.

Parameters

<i>name</i>	The name of the slideout.
-------------	---------------------------

9.86.4.22 slideout_hide()

```
mainwindow::slideout_hide (
    name )
```

Method to hide a slideout frame.

Parameters

<i>name</i>	The name of the slideout.
-------------	---------------------------

9.86.4.23 slideout_isshownp()

```
mainwindow::slideout_isshownp (
    name )
```

Method to test to see if the named slideout is being shown.

Parameters

<i>name</i>	The name of the slideout.
-------------	---------------------------

9.86.4.24 slideout_list()

```
mainwindow::slideout_list ( )
```


Method to return a list of defined slideout frames.

9.86.4.25 slideout_reqwidth()

```
mainwindow::slideout_reqwidth (
    name )
```

Method to return the requested width of the named slideout frame.

Parameters

<i>name</i>	The name of the slideout.
-------------	---------------------------

9.86.4.26 slideout_show()

```
mainwindow::slideout_show (
    name )
```

Method to show (display) a slideout frame.

Parameters

<i>name</i>	The name of the slideout.
-------------	---------------------------

9.86.4.27 toolbar_add()

```
mainwindow::toolbar_add (
    name )
```

Method to add a toolbar to the main frame.

Parameters

<i>name</i>	The name of the new toolbar.
-------------	------------------------------

9.86.4.28 toolbar_addbutton()

```
mainwindow::toolbar_addbutton (
    name ,
    bname ,
    ... )
```

Method to add a button to a toolbar.

Parameters

<i>name</i>	The name of the toolbar.
<i>bname</i>	The name of the button.
<i>...</i>	Button configuration options (passed to Button).

9.86.4.29 toolbar_buttoncget()

```
mainwindow::toolbar_buttoncget (
    name ,
    bname ,
    option )
```

Method to get a configuration option of a button on a toolbar.

Parameters

<i>name</i>	The name of the toolbar.
<i>bname</i>	The name of the button.
<i>option</i>	Button configuration option (passed to cget).

9.86.4.30 toolbar_buttonconfigure()

```
mainwindow::toolbar_buttonconfigure (
    name ,
    bname ,
    ... )
```

Method to configure a button on a toolbar.

Parameters

<i>name</i>	The name of the toolbar.
<i>bname</i>	The name of the button.
<i>...</i>	Button configuration options (passed to configure).

9.86.4.31 toolbar_hide()

```
mainwindow::toolbar_hide (
    name )
```

Method to hide a toolbar.

Parameters

<i>name</i>	The name of the toolbar.
-------------	--------------------------

9.86.4.32 toolbar_setbuttonstate()

```
mainwindow::toolbar_setbuttonstate (
    name ,
    state )
```

Method to set the state of the buttons in a toolbar.

Parameters

<i>name</i>	The name of the toolbar.
-------------	--------------------------

9.86.4.33 toolbar_show()

```
mainwindow::toolbar_show (
    name )
```

Method to show a toolbar.

Parameters

<i>name</i>	The name of the toolbar.
-------------	--------------------------

9.86.5 Member Data Documentation

9.86.5.1 buttons

`mainwindow::buttons` [private]

Right button box.

9.86.5.2 numtoolbars

`mainwindow::numtoolbars` [private]

The number of toolbars.

9.86.5.3 panewindow

`mainwindow::panewindow` [private]

PaneWindow holding the main area and the right widgets (command buttons and the slideouts).

9.86.5.4 progress

`mainwindow::progress` [private]

The value of the progreee bar.

9.86.5.5 scrollwindow

`mainwindow::scrollwindow` [private]

ScrollWindow component.

9.86.5.6 slideouts

`mainwindow::slideouts` [private]

Slideout map.

9.86.5.7 status

```
mainwindow::status [private]
```

Status value.

9.86.5.8 toolbars

```
mainwindow::toolbars [private]
```

Toolbar map.

9.86.5.9 wipmessage

```
mainwindow::wipmessage [private]
```

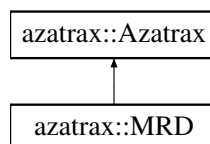
Work-In-Progress message component.

9.87 azatrax::MRD Class Reference

[MRD](#) I/O Class.

```
#include <mrd.h>
```

Inheritance diagram for azatrax::MRD:



Classes

- union [status1_union](#)
Status byte 1 union type.
- union [status2_union](#)
Status byte 2 union type.

Public Types

- enum [OperatingMode_Type](#) { [NonTurnoutSeparate](#) =0x31 , [NonTurnoutDirectionSensing](#) =0x32 , [TurnoutSolenoid](#) =0x34 , [TurnoutMotor](#) =0x37 }

Operating Mode codes.

Public Member Functions

- [~MRD](#) ()
Base destructor.
- [ErrorCode SetChan1](#) () const
Set channel 1 relays and status bits.
- [ErrorCode SetChan2](#) () const
Set channel 2 relays and status bits.
- [ErrorCode ClearExternallyChanged](#) () const
Clear 'ExternallyChanged' status bit.
- [ErrorCode DisableExternal](#) () const
Disable external changes of turnout state.
- [ErrorCode EnableExternal](#) () const
Enable external changes of turnout state.
- [ErrorCode Identify_2](#) () const
Identify 2.
- [ErrorCode Identify_1_2](#) () const
Identify 1 and 2.
- [ErrorCode ResetStopwatch](#) () const
Reset Stopwatch.
- bool [Sense_1](#) () const
Sensor one active.
- bool [Sense_2](#) () const
Sensor two active.
- bool [Latch_1](#) () const
Latch one.
- bool [Latch_2](#) () const
Latch two.
- bool [HasRelays](#) () const
Has Relays?
- bool [ResetStatus](#) () const
Reset status?
- bool [StopwatchTicking](#) () const
Stopwatch Ticking?
- bool [ExternallyChanged](#) () const
Externally changed?
- bool [AllowingExternalChanges](#) () const
Allowing External Changes?
- [OperatingMode_Type OperatingMode](#) () const
Operating mode.
- void [Stopwatch](#) (uint8_t &fract, uint8_t &seconds, uint8_t &minutes, uint8_t &hours) const
Stopwatch time.

Protected Member Functions

- [MRD](#) (const char *serialnumber, char **outmessage=NULL)
Base constructor.

Friends

- class [Azatrax](#)

Additional Inherited Members

9.87.1 Detailed Description

[MRD](#) I/O Class.

[MRD](#) interface class.

This class implements the interface logic for a MRD2-S or MRD2-U device.

The constructor opens a connection to a MRD2-S or MRD2-U device, given its serial number. Each MRD2-S or MRD2-U device has a unique, factory defined serial number, which is printed on a sticker attached to the module. This serial number is much like the MAC address of an Ethernet interface. The destructor closes the connection to the device and frees any resources allocated.

The class provides methods to send commands to the device, read back its state and interrogate the state read back. This way each class instance encapsulates each device instance.

Author

Robert Heller <heller@deepsoft.com>

9.87.2 Member Enumeration Documentation

9.87.2.1 OperatingMode_Type

enum [azatrax::MRD::OperatingMode_Type](#)

Operating Mode codes.

Enumerator

NonTurnoutSeparate	Non Turnout, separate (-U always reports this).
NonTurnoutDirectionSensing	Non Turnout, Direction Sensing.
TurnoutSolenoid	Turnout, Solenoid (momentary action)
Generated by Doxygen TurnoutMotor	Turnout, Motor (sustained action)

9.87.3 Constructor & Destructor Documentation

9.87.3.1 MRD()

```
azatrax::MRD::MRD (
    const char * serialnumber,
    char ** outmessage = NULL ) [inline], [protected]
```

Base constructor.

Parameters

<i>serialnumber</i>	The serial number of the device to open.
<i>outmessage</i>	To hold an error message, if any.

9.87.3.2 ~MRD()

```
azatrax::MRD::~~MRD ( ) [inline]
```

Base destructor.

9.87.4 Member Function Documentation

9.87.4.1 AllowingExternalChanges()

```
bool azatrax::MRD::AllowingExternalChanges ( ) const [inline]
```

Allowing External Changes?

References [azatrax::MRD::status2_union::allowExternalChanges](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2_union::allowExternalChanges](#), [azatrax::MRD::status2_union::theBits](#), and [azatrax::MRD::status2_union::theByte](#).

9.87.4.2 ClearExternallyChanged()

```
ErrorCode azatrax::MRD::ClearExternallyChanged ( ) const [inline]
```

Clear 'ExternallyChanged' status bit.

Clear 'ExternallyChanged' status bit (data packet byte 2).

References [azatrax::Azatrax::cmd_ClearExternallyChanged](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.87.4.3 DisableExternal()

```
ErrorCode azatrax::MRD::DisableExternal ( ) const [inline]
```

Disable external changes of turnout state.

Disable external changes of turnout state (-S only).

References [azatrax::Azatrax::cmd_DisableExternal](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.87.4.4 EnableExternal()

```
ErrorCode azatrax::MRD::EnableExternal ( ) const [inline]
```

Enable external changes of turnout state.

Enable external changes of turnout state (-S only).

References [azatrax::Azatrax::cmd_EnableExternal](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.87.4.5 ExternallyChanged()

```
bool azatrax::MRD::ExternallyChanged ( ) const [inline]
```

Externally changed?

References [azatrax::MRD::status2_union::externallyChanged](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::stateDataPacket](#), [azatrax::MRD::status2_union::theBits](#), and [azatrax::MRD::status2_union::theByte](#).

9.87.4.6 HasRelays()

```
bool azatrax::MRD::HasRelays ( ) const [inline]
```

Has Relays?

References [azatrax::MRD::status1_union::modtype](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::MRD::status1_union::theBits](#), and [azatrax::MRD::status1_union::theByte](#).

9.87.4.7 Identify_1_2()

```
ErrorCode azatrax::MRD::Identify_1_2 ( ) const [inline]
```

Identify 1 and 2.

Identify 1 and 2 - Flashes sensor 1 and 2 LEDs.

References [azatrax::Azatrax::cmd_Identify_1_2](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.87.4.8 Identify_2()

```
ErrorCode azatrax::MRD::Identify_2 ( ) const [inline]
```

Identify 2.

Identify 2 - Flashes sensor 2's LED.

References [azatrax::Azatrax::cmd_Identify_2](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.87.4.9 Latch_1()

```
bool azatrax::MRD::Latch_1 ( ) const [inline]
```

Latch one.

References [azatrax::MRD::status1_union::latch_1](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::MRD::status1_union::theBits](#), and [azatrax::MRD::status1_union::theByte](#).

9.87.4.10 Latch_2()

```
bool azatrax::MRD::Latch_2 ( ) const [inline]
```

Latch two.

References [azatrax::MRD::status1_union::latch_2](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::MRD::status1_union::theBits](#), and [azatrax::MRD::status1_union::theByte](#).

9.87.4.11 OperatingMode()

```
OperatingMode_Type azatrax::MRD::OperatingMode ( ) const [inline]
```

Operating mode.

Returns the operating mode.

References [azatrax::Azatrax::StateDataPacket::operatingMode](#), and [azatrax::Azatrax::stateDataPacket](#).

9.87.4.12 ResetStatus()

```
bool azatrax::MRD::ResetStatus ( ) const [inline]
```

Reset status?

References [azatrax::MRD::status2_union::resetStatus](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::MRD::status2_union::theBits](#), and [azatrax::MRD::status2_union::theByte](#).

9.87.4.13 ResetStopwatch()

```
ErrorCode azatrax::MRD::ResetStopwatch ( ) const [inline]
```

Reset Stopwatch.

ResetStopwatch - Stops the stopwatch and resets time to 0.

References [azatrax::Azatrax::cmd_ResetStopwatch](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.87.4.14 Sense_1()

```
bool azatrax::MRD::Sense_1 ( ) const [inline]
```

Sensor one active.

References [azatrax::MRD::status1_union::sense_1](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::MRD::status1_union::theBits](#), and [azatrax::MRD::status1_union::theByte](#).

9.87.4.15 Sense_2()

```
bool azatrax::MRD::Sense_2 ( ) const [inline]
```

Sensor two active.

References [azatrax::MRD::status1_union::sense_2](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::MRD::status1_union::theBits](#), and [azatrax::MRD::status1_union::theByte](#).

9.87.4.16 SetChan1()

```
ErrorCode azatrax::MRD::SetChan1 ( ) const [inline]
```

Set channel 1 relays and status bits.

Sets the relays and status bits as it a train activated channel 1 (-S, turnout mode only).

References [azatrax::Azatrax::cmd_SetChan1](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.87.4.17 SetChan2()

```
ErrorCode azatrax::MRD::SetChan2 ( ) const [inline]
```

Set channel 2 relays and status bits.

Sets the relays and status bits as it a train activated channel 2 (-S, turnout mode only).

References [azatrax::Azatrax::cmd_SetChan2](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.87.4.18 Stopwatch()

```
void azatrax::MRD::Stopwatch (
    uint8_t & fract,
    uint8_t & seconds,
    uint8_t & minutes,
    uint8_t & hours ) const [inline]
```

Stopwatch time.

Returns the current Stopwatch time.

Parameters

<i>fract</i>	1/100s of a second.
<i>seconds</i>	Whole seconds.
<i>minutes</i>	Whole minutes.
<i>hours</i>	Whole hours.

References [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::stopwatchHours](#), and [azatrax::Azatrax::StateDataPack](#)

9.87.4.19 StopwatchTicking()

```
bool azatrax::MRD::StopwatchTicking ( ) const [inline]
```

Stopwatch Ticking?

References [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::MRD::status2_union::stopwatchTicking](#), [azatrax::MRD::status2_union::theBits](#), and [azatrax::MRD::status2_union::theByte](#).

9.87.5 Friends And Related Function Documentation

9.87.5.1 Azatrax

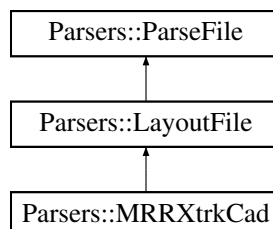
```
friend class Azatrax [friend]
```

9.88 Parsers::MRRXtrkCad Class Reference

[MRRXtrkCad](#) parser class.

```
#include <ParserClassesGroup.h>
```

Inheritance diagram for Parsers::MRRXtrkCad:



Public Types

- enum `YY_MRRXtrkCad_ENUM_TOKEN` {
`YY_MRRXtrkCad_NULL_TOKEN` =0 , `INTEGER` =258 , `FLOAT` =259 , `STRING` =260 ,
`RESTOFLINE` =261 , `MULTILINE` =262 , `EOL` =263 , `UNTERMSTRING` =264 ,
`NOTWORD` =265 , `END` =266 , `_VERSION` =267 , `TITLE` =268 ,
`MAPSCALE` =269 , `ROOMSIZE` =270 , `SCALE` =271 , `HO` =272 ,
`N` =273 , `O` =274 , `LAYERS` =275 , `CURRENT` =276 ,
`STRUCTURE` =277 , `DRAW` =278 , `CURVE` =279 , `TURNOUT` =280 ,
`TURNTABLE` =281 , `STRAIGHT` =282 , `CAR` =283 , `JOINT` =284 ,
`NOTE` =285 , `TEXT` =286 , `MAIN` =287 , `B` =288 ,
`J` =289 , `D` =290 , `L` =291 , `M` =292 ,
`F` =293 , `T` =294 , `E` =295 , `G` =296 ,
`A` =297 , `P` =298 , `S` =299 , `C` =300 ,
`X` =301 , `Y` =302 , `Q` =303 , `BLOCK` =304 ,
`TRK` =305 , `SWITCHMOTOR` =306 }

Public Member Functions

- int `yyparse` (void)
- virtual void `yyerror` (char *msg)
- virtual int `yylex` ()
- `MRRXtrkCad` (const char *filename)
The constructor function.
- virtual `~MRRXtrkCad` ()

Public Attributes

- `yy_MRRXtrkCad_stype` `yylval`
- `yytype` `yyllloc`
- int `ynerrs`
- int `yychar`
- int `yydebug`

Private Member Functions

- int `lookup_word` (const char *word) const
- void `yyerror1` (const char *message, const char *s) const

Private Attributes

- bool `scanEol`
- bool `scanToEND`
- int `fieldflag`
- double `CurrentScale`

Additional Inherited Members

9.88.1 Detailed Description

[MRRXtrkCad](#) parser class.

Include [MRRXtrkCad.tab.h](#) to get this class (the docs are wrong).

Author

Robert Heller <heller@deepsoft.com>

9.88.2 Member Enumeration Documentation

9.88.2.1 YY_MRRXtrkCad_ENUM_TOKEN

enum [Parsers::MRRXtrkCad::YY_MRRXtrkCad_ENUM_TOKEN](#)

Enumerator

YY_MRRXtrkCad_NULL_TOKEN	
INTEGER	
FLOAT	
STRING	
RESTOFLINE	
MULTILINE	
EOL	
UNTERMSTRING	
NOTWORD	
END	
_VERSION	
TITLE	
MAPSCALE	
ROOMSIZE	
SCALE	
HO	
N	
O	
LAYERS	
CURRENT	
STRUCTURE	
DRAW	
CURVE	
TURNOUT	
TURNTABLE	

Enumerator

STRAIGHT	
CAR	
JOINT	
NOTE	
TEXT	
MAIN	
B	
J	
D	
L	
M	
F	
T	
E	
G	
A	
P	
S	
C	
X	
Y	
Q	
BLOCK	
TRK	
SWITCHMOTOR	

9.88.3 Constructor & Destructor Documentation

9.88.3.1 MRRXtrkCad()

```
Parsers::MRRXtrkCad::MRRXtrkCad (
    const char * filename )
```

The constructor function.

The constructor is the only function that is directly called from user code. See [LayoutFile](#) for all other access methods.

9.88.3.2 ~MRRXtrkCad()

```
virtual Parsers::MRRXtrkCad::~~MRRXtrkCad ( ) [inline], [virtual]
```


9.88.4 Member Function Documentation

9.88.4.1 lookup_word()

```
int Parsers::MRRXtrkCad::lookup_word (
    const char * word ) const [private]
```

9.88.4.2 yyerror()

```
virtual void Parsers::MRRXtrkCad::yyerror (
    char * msg ) [virtual]
```

9.88.4.3 yyerror1()

```
void Parsers::MRRXtrkCad::yyerror1 (
    const char * message,
    const char * s ) const [private]
```

9.88.4.4 yylex()

```
virtual int Parsers::MRRXtrkCad::yylex ( ) [virtual]
```

9.88.4.5 yyparse()

```
int Parsers::MRRXtrkCad::yyparse (
    void )
```

9.88.5 Member Data Documentation

9.88.5.1 CurrentScale

```
double Parsers::MRRXtrkCad::CurrentScale [private]
```

9.88.5.2 fieldflag

```
int Parsers::MRRXtrkCad::fieldflag [private]
```

9.88.5.3 scanEol

```
bool Parsers::MRRXtrkCad::scanEol [private]
```

9.88.5.4 scanToEND

```
bool Parsers::MRRXtrkCad::scanToEND [private]
```

9.88.5.5 yychar

```
int Parsers::MRRXtrkCad::yychar
```

9.88.5.6 yydebug

```
int Parsers::MRRXtrkCad::yydebug
```

9.88.5.7 yylloc

```
yyltype Parsers::MRRXtrkCad::yylloc
```

9.88.5.8 yylval

`yy_MRRXtrkCad_stype` Parsers::MRRXtrkCad::yylval

9.88.5.9 yynerrs

`int` Parsers::MRRXtrkCad::yynerrs

9.89 Icc::MTIDetail Class Reference

MTI Header type, detailed version.

Public Member Functions

- [MTIDetail](#) (name,...)
Constructor: create a [MTIDetail](#) object.
- [getHeader](#) (CANp=1)
Get the 29-bit CAN header or 16-bit MTI.
- [setHeader](#) (header)
Decode the 29-bit header.

Private Attributes

- [mtiheader](#)
the [MTIHeader](#) component.

Static Private Attributes

- static [SPECIAL_MASK](#)
The Special bit is bit 13.
- static [STREAMDG_MASK](#)
The Stream or Datagram bit is bit 12.
- static [PRIORITY_SHIFT](#)
The priority is bits 10-11 of the MTI_CAN.
- static [PRIORITY_MASK](#)
The priority is bits 10-11 of the MTI_CAN.
- static [TYPEWITHIN_SHIFT](#)
The type within priority field is bits 5-9 of the MTI_CAN.
- static [TYPEWITHIN_MASK](#)
The type within priority field is bits 5-9 of the MTI_CAN.

- static [SIMPLE_SHIFT](#)
The simple bit is bit 4 of the MTI_CAN.
- static [SIMPLE_MASK](#)
The simple bit is bit 4 of the MTI_CAN.
- static [ADDRESSP_SHIFT](#)
The address present bit is bit 3 of the MTI_CAN.
- static [ADDRESSP_MASK](#)
The address present bit is bit 3 of the MTI_CAN.
- static [EVENTP_SHIFT](#)
The event present bit is bit 2 of the MTI_CAN.
- static [EVENTP_MASK](#)
The event present bit is bit 2 of the MTI_CAN.
- static [MODIFIER_SHIFT](#)
The modifier is bits 0-1 of the MTI_CAN.
- static [MODIFIER_MASK](#)
The modifier is bits 0-1 of the MTI_CAN.
- static [DESTID_SHIFT](#)
The destid is bits 0-11 of the MTI_CAN.
- static [DESTID_MASK](#)
The destid is bits 0-11 of the MTI_CAN.

9.89.1 Detailed Description

MTI Header type, detailed version.

Creates a 29-bit CAN header, specific to OpenLCB. The header is generated and decoded "on the fly" from/to the supplied options:

- -srcid A 12 bit source id field. Delegated to the mtiheader component.

See also

[lcc::CANHeader](#) and [lcc::MTIHeader](#).

- -special A boolean flag indicating if this is a special frame. Default is no.
- -streamordatagram A boolean flag indicating if this is a stream or datagram frame. Default is false.
- -priority A 2-bit integer specifying the frame's priority. Default is 0.
- -typewithin A 5-bit integer specifying the type withing the priority. Default is 0.
- -simple A boolean flag indicating if the frame is a simple protocol frame. Default is no.
- -addressp A boolean flag indicating if an address is present. Default is no.
- -eventp A boolean flag indicating if an event is present. Default is no.
- -modifier The 2-bit modifier field. Default is 0.
- -destid A 12-bit Desitination alias. Only used for stream and datagram frames. Default is 0.
- -datagramcontent An enumerated type defining the datagram or stream content type. Default is {} (not a datagram or stream).

9.89.2 Constructor & Destructor Documentation

9.89.2.1 MTIDetail()

```
lcc::MTIDetail::MTIDetail (
    name ,
    ... )
```

Constructor: create a [MTIDetail](#) object.

A 29-bit CAN Header specific to the OpenLCB is created, using details for a MTI frame.

Parameters

<i>name</i>	The name of the instance.
...	Options: <ul style="list-style-type: none"> • -srcid A 12 bit source id field. • -special A boolean flag indicating if this is a special frame. • -streamordatagram A boolean flag indicating if this is a stream or datagram frame. • -priority A 2-bit integer specifying the frame's priority. • -typewithin A 5-bit integer specifying the type withing the • -simple A boolean flag indicating if the frame is a simple protocol frame. • -addressp A boolean flag indicating if an address is present. • -eventp A boolean flag indicating if an event is present. • -modifier The 2-bit modifier field. • -destid A 12-bit Desitination alias. Only used for stream and datagram frames. • -datagramcontent An enumerated type defining the datagram or stream content type.

9.89.3 Member Function Documentation

9.89.3.1 `getHeader()`

```
lcc::MTIDetail::getHeader (
    CANp    = 1 )
```

Get the 29-bit CAN header or 16-bit MTI.

Most of the heavy lifting is handled in the mtiheader component.

See also

[lcc::CANHeader](#) and [lcc::MTIHeader](#).

Parameters

<i>CANp</i>	Specify whether we want a 29-bit CAN header or a 16-bit MTI.
-------------	--

Returns

The 29-bit CAN header or 16-bit MTI.

9.89.3.2 `setHeader()`

```
lcc::MTIDetail::setHeader (
    header )
```

Decode the 29-bit header.

Most of the heavy lifting is handled in the mtiheader component.

See also

[lcc::CANHeader](#) and [lcc::MTIHeader](#).

Parameters

<i>header</i>	The 29-bit header.
---------------	--------------------

9.89.4 Member Data Documentation

9.89.4.1 ADDRESSP_MASK

```
lcc::MTIDetail::ADDRESSP_MASK [static], [private]
```

The address present bit is bit 3 of the MTI_CAN.

9.89.4.2 ADDRESSP_SHIFT

```
lcc::MTIDetail::ADDRESSP_SHIFT [static], [private]
```

The address present bit is bit 3 of the MTI_CAN.

9.89.4.3 DESTID_MASK

```
lcc::MTIDetail::DESTID_MASK [static], [private]
```

The destid is bits 0-11 of the MTI_CAN.

9.89.4.4 DESTID_SHIFT

```
lcc::MTIDetail::DESTID_SHIFT [static], [private]
```

The destid is bits 0-11 of the MTI_CAN.

9.89.4.5 EVENTP_MASK

```
lcc::MTIDetail::EVENTP_MASK [static], [private]
```

The event present bit is bit 2 of the MTI_CAN.

9.89.4.6 EVENTP_SHIFT

```
lcc::MTIDetail::EVENTP_SHIFT [static], [private]
```

The event present bit is bit 2 of the MTI_CAN.

9.89.4.7 MODIFIER_MASK

```
lcc::MTIDetail::MODIFIER_MASK [static], [private]
```

The modifier is bits 0-1 of the MTI_CAN.

9.89.4.8 MODIFIER_SHIFT

```
lcc::MTIDetail::MODIFIER_SHIFT [static], [private]
```

The modifier is bits 0-1 of the MTI_CAN.

9.89.4.9 mtiheader

```
lcc::MTIDetail::mtiheader [private]
```

the [MTIHeader](#) component.

Contains a [MTIHeader](#) to perform heavy lifting.

9.89.4.10 PRIORITY_MASK

```
lcc::MTIDetail::PRIORITY_MASK [static], [private]
```

The priority is bits 10-11 of the MTI_CAN.

9.89.4.11 PRIORITY_SHIFT

```
lcc::MTIDetail::PRIORITY_SHIFT [static], [private]
```

The priority is bits 10-11 of the MTI_CAN.

9.89.4.12 SIMPLE_MASK

```
lcc::MTIDetail::SIMPLE_MASK [static], [private]
```

The simple bit is bit 4 of the MTI_CAN.

9.89.4.13 SIMPLE_SHIFT

```
lcc::MTIDetail::SIMPLE_SHIFT [static], [private]
```

The simple bit is bit 4 of the MTI_CAN.

9.89.4.14 SPECIAL_MASK

```
lcc::MTIDetail::SPECIAL_MASK [static], [private]
```

The Special bit is bit 13.

9.89.4.15 STREAMDG_MASK

```
lcc::MTIDetail::STREAMDG_MASK [static], [private]
```

The Stream or Datagram bit is bit 12.

9.89.4.16 TYPEWITHIN_MASK

```
lcc::MTIDetail::TYPEWITHIN_MASK [static], [private]
```

The type within priority field is bits 5-9 of the MTI_CAN.

9.89.4.17 TYPEWITHIN_SHIFT

```
lcc::MTIDetail::TYPEWITHIN_SHIFT [static], [private]
```

The type within priority field is bits 5-9 of the MTI_CAN.

9.90 lcc::MTIHeader Class Reference

MTI Header type.

Public Member Functions

- [MTIHeader](#) (name,...)
Constructor: create a [MTIHeader](#) A 29-bit CAN Header specific to the OpenLCB is created.
- [getHeader](#) ()
Get the 29-bit header.
- [setHeader](#) (header)
Decode the 29-bit header.

Private Attributes

- [canheader](#)
The [CANHeader](#) component.

Static Private Attributes

- static [MTI_CAN_SHIFT](#)
Bits 0-11 of the variable field are the MTI_CAN field.
- static [MTI_CAN_MASK](#)
Bits 0-11 of the variable field are the MTI_CAN field.
- static [FRAMETYPE_SHIFT](#)
Bits 12-14 of the variable field are the frame type field.
- static [FRAMETYPE_MASK](#)
Bits 12-14 of the variable field are the frame type field.

9.90.1 Detailed Description

MTI Header type.

Creates a 29-bit CAN header, specific to OpenLCB. The header is generated and decoded "on the fly" from/to the supplied options:

- -srcid A 12 bit source id field. Delegated to the canheader component.
See also
[lcc::CANHeader](#).
- -mti The 12 bit CAN_MTI field. Default is 0, type is a 12-bit integer.
- -frametype The three bit frame type field. Default is 0, type is a 3-bit integer.

9.90.2 Constructor & Destructor Documentation

9.90.2.1 MTIHeader()

```
lcc::MTIHeader::MTIHeader (
    name ,
    ... )
```

Constructor: create a [MTIHeader](#) A 29-bit CAN Header specific to the OpenLCB is created.

Parameters

<i>name</i>	The name of the instance.
...	Options: <ul style="list-style-type: none">• -srcid A 12 bit source id field.• -mti The 12 bit CAN_MTI field.• -frametype The three bit frame type field.

9.90.3 Member Function Documentation

9.90.3.1 getHeader()

```
lcc::MTIHeader::getHeader ( )
```

Get the 29-bit header.

Most of the heavy lifting is handled in the canheader component.

See also

[lcc::CANHeader](#).

Returns

The 29-bit header.

9.90.3.2 setHeader()

```
lcc::MTIHeader::setHeader (
    header )
```

Decode the 29-bit header.

Most of the heavy lifting is handled in the canheader component.

See also

[lcc::CANHeader](#).

Parameters

<i>header</i>	The 29-bit header.
---------------	--------------------

9.90.4 Member Data Documentation

9.90.4.1 canheader

```
lcc::MTIHeader::canheader [private]
```

The [CANHeader](#) component.

Handles the header at the CAN level.

9.90.4.2 FRAMETYPE_MASK

```
lcc::MTIHeader::FRAMETYPE_MASK [static], [private]
```

Bits 12-14 of the variable field are the frame type field.

9.90.4.3 FRAMETYPE_SHIFT

```
lcc::MTIHeader::FRAMETYPE_SHIFT [static], [private]
```

Bits 12-14 of the variable field are the frame type field.

9.90.4.4 MTI_CAN_MASK

```
lcc::MTIHeader::MTI_CAN_MASK [static], [private]
```

Bits 0-11 of the variable field are the MTI_CAN field.

9.90.4.5 MTI_CAN_SHIFT

```
lcc::MTIHeader::MTI_CAN_SHIFT [static], [private]
```

Bits 0-11 of the variable field are the MTI_CAN field.

9.91 nce::NCE Class Reference

Main [NCE](#) Cab Bus interface class.

Public Member Functions

- [NCE](#) (name, port="/dev/ttyS0",...)
Constructor.
- [~NCE](#) ()
The destructor restores the serial port's state and closes it.
- [NOP](#) ()
NOP, dummy instruction.
- [AssignLoco](#) (locoaddress, cabnumber)
Assign loco to cab.
- [ReturnClock](#) ()
Returns the fast clock to the RS232 port in binary mode.
- [StopClock](#) ()
Stops the scale time clock.
- [StartClock](#) ()
Starts the scale time clock.
- [SetClock](#) (hours, minutes)
Set the scale time clock.
- [SetClockFormat](#) (format)
Set clock 12/24 hours.
- [SetClockRatio](#) (ratio)
Set clock speed (ratio).
- [DequeuePacket](#) (locoaddress)
Dequeue packet by loco addr.
- [EnableMain](#) ()
Enable main trk, kill prog.
- [ReturnAuxiliaryInputUnit](#) (cabnumber)
Returns status of Auxiliary Input Unit.
- [DisableMain](#) ()
Kill main track, enable program track.
- [Dummy](#) ()
Dummy instruction returns "!" followed by CR/LF.
- [SetLocoSpeedMode](#) (locoaddress, mode)
Sets the speed mode of loco.
- [WriteToRAM](#) (address,...)

- Writes bytes to a command station RAM address.*

 - [ReadFromRAM](#) (address)

Returns 16 bytes from a RAM address.
 - [WriteLCDLine3](#) (cabnumber, textline)

Sends a message to LCD line 3 of a cab.
 - [WriteLCDLine4](#) (cabnumber, textline)

Sends a message to LCD line 4 of a cab.
 - [WriteLCDRightLine2](#) (cabnumber, textline)

Sends a message to the right side of LCD line 2 of a cab.
 - [WriteRAWPacket](#) (sendtimes,...)

Reads a raw packet to put in TEMP_Q.
 - [WriteOneByteToRAM](#) (address, byte)

Writes 1 byte to a command station RAM address.
 - [WriteTwoBytesToRAM](#) (address, byte1, byte2)

Writes 2 bytes to a command station RAM address.
 - [Write4BytesToRAM](#) (address, byte1, byte2, byte3, byte4)

Writes 4 bytes to a command station RAM address.
 - [Write8BytesToRAM](#) (address,...)

Writes 4 bytes to a command station RAM address.
 - [ReturnAuxiliaryInputUnitShortForm](#) (cabnumber)

Returns status of Auxiliary Input Unit, short form.
 - [ExecuteMacro](#) (macroNumber)

Executes a previously defined macro for route control.
 - [ReadOneByteFromRAM](#) (address)

Reads 1 byte from a command station RAM address.
 - [ProgramMode](#) ()

Enters Program track mode.
 - [NormalMode](#) ()

Returns from Program track mode.
 - [WriteCVInPagedMode](#) (address, data)

Writes a CV in paged mode.
 - [ReadCVInPagedMode](#) (address)

Reads a CV in paged mode.
 - [SetLocomotiveSpeedAndDirection](#) (locoaddress, ssm, dir, speed)

Set locomotive speed and direction.
 - [SetLocomotiveFunctionsGroup1](#) (locoaddress, f0, f1, f2, f3, f4)

Set locomotive functions, group 1.
 - [SetLocomotiveFunctionsGroup2](#) (locoaddress, f5, f6, f7, f8)

Set locomotive functions, group 2.
 - [SetLocomotiveFunctionsGroup3](#) (locoaddress, f9, f10, f11, f12)

Set locomotive functions, group 3.
 - [AddLocomotiveToMultiUnit](#) (locoaddress, mtr, samedirection)

Add locomotive to Multi-Unit.
 - [RemoveLocomotiveFromMultiUnit](#) (locoaddress, mtr)

Remove locomotive to Multi-Unit.
 - [AddLeadLocomotiveToMultiUnit](#) (locoaddress, mtr, samedirection)

Add lead locomotive to Multi-Unit.

- [AddRearLocomotiveToMultiUnit](#) (locoaddress, mtr, samedirection)
Add rear locomotive to Multi-Unit.
- [ChangeMomentumLevel](#) (locoaddress, newlevel)
Change momentum level for loco or consist.
- [WriteRAWTrackPacket](#) (...)
Reads a raw packet to put in TRK_Q.
- [WriteRegister](#) (register, data)
Writes a register.
- [ReadRegister](#) (register)
Read a register.
- [WriteCVInDirectMode](#) (address, data)
Writes a CV in direct mode.
- [ReadCVInDirectMode](#) (address)
Reads a CV in direct mode.
- [SoftwareVersion](#) ()
Read software version number.
- [SoftReset](#) ()
Soft reset of command station.
- [HardReset](#) ()
Hard reset of command station.
- [MacroCommand](#) (address, macronumber)
Assign address to macro.
- [AccessoryDecoderOperation](#) (address, activateOutput)
Accessory decoder operation request.
- [SetSignalAspect](#) (address, aspectBits)
Set signal aspect.
- [OperatingModeProgrammingByteModeWrite](#) (locoaddress, cv, data)
Operating mode programming byte mode write.
- [OperatingModeAccessoryProgrammingByteModeWrite](#) (address, cv, data)
Operating mode accessory programming byte mode write.
- [SetCabBusAddressOfUSBBoard](#) (cabaddress)
Set the cab bus address of the USB board.
- [SetBinaryCommandEchoMode](#) (mode)
Set binary command echo mode.

Public Attributes

- [ttyfd](#)
Terminal file descriptor.

Static Public Attributes

- static [NumberOfBytesReturned](#)
Array containing the number of bytes expected for each command.

Private Member Functions

- [_transmit](#) (themessage)
Transmit a message.
- [_readevent](#) ()
Read event handler, toggle timeout flag.
- [_timeoutevent](#) ()
Timeout event handler, toggle timeout flag.
- [_readbyte](#) (thebytevar, timeout=5)
Read next available byte or return false.
- [_readresponse](#) (bufferVar, expectnumberofbytes)
Read a response message.
- [_sendMessageAndReturnResponse](#) (message)
Send a message and return a response.
- [_explodechars](#) (text)
Explode text into ASCII character codes.

Private Attributes

- [_timeout](#)
Timeout or data available flag.

9.91.1 Detailed Description

Main [NCE](#) Cab Bus interface class.

This class implements the interface logic to connect to the [NCE](#) Cab Bus.

Parameters

<i>port</i>	Name of the serial port connected to the NCE Cab Bus.
...	Options: <ul style="list-style-type: none"> • -baud Data rate, readonly, defaults to 9600, can be one of 9600 or 19200.

Author

Robert Heller <heller@deepsoft.com>

9.91.2 Constructor & Destructor Documentation

9.91.2.1 NCE()

```
nce::NCE::NCE (
    name ,
    port  = "/dev/ttyS0",
    ... )
```

Constructor.

Parameters

<i>port</i>	Name of the serial port connected to the NCE Cab Bus.
...	Options: <ul style="list-style-type: none">• -baud Data rate, readonly, defaults to 9600, can be one of 9600 or 19200.

9.91.2.2 ~NCE()

```
nce::NCE::~~NCE ( )
```

The destructor restores the serial port's state and closes it.

9.91.3 Member Function Documentation

9.91.3.1 _explodechars()

```
nce::NCE::_explodechars (
    text ) [private]
```

Explode text into ASCII character codes.

9.91.3.2 _readbyte()

```
nce::NCE::_readbyte (
    thebytevar ,
    timeout  = 5 ) [private]
```

Read next available byte or return false.

Parameters

<i>thebytevar</i>	Name of a variable to receive the byte.
<i>timeout</i>	Timeout in seconds.

If there is a defined external read event handler, the timeout parameter is ignored and false is returned if there are no bytes available. The presumption is that the read is being called from event handler and that means that there is data available.

9.91.3.3 _readevent()

```
nce::NCE::_readevent ( ) [private]
```

Read event handler, toggle timeout flag.

9.91.3.4 _readresponse()

```
nce::NCE::_readresponse (
    bufferVar ,
    expectnumberofbytes ) [private]
```

Read a response message.

9.91.3.5 _sendMessageAndReturnResponse()

```
nce::NCE::_sendMessageAndReturnResponse (
    message ) [private]
```

Send a message and return a response.

9.91.3.6 _timeoutevent()

```
nce::NCE::_timeoutevent ( ) [private]
```

Timeout event handler, toggle timeout flag.

9.91.3.7 `_transmit()`

```
nce::NCE::_transmit (
    themessage ) [private]
```

Transmit a message.

9.91.3.8 `AccessoryDecoderOperation()`

```
nce::NCE::AccessoryDecoderOperation (
    address ,
    activateOutput )
```

Accessory decoder operation request.

Parameters

<i>address</i>	Accessory address (not in DCC format).
<i>activateOutput</i>	Output on or off.

Returns

The response message.

9.91.3.9 `AddLeadLocomotiveToMultiUnit()`

```
nce::NCE::AddLeadLocomotiveToMultiUnit (
    locoaddress ,
    mtr ,
    samedirection )
```

Add lead locomotive to Multi-Unit.

Parameters

<i>locoaddress</i>	Locomotive address.
<i>mtr</i>	Multi-Unit address.
<i>samedirection</i>	The locomotive direction is the same as the consist direction.

Returns

The response message.

9.91.3.10 AddLocomotiveToMultiUnit()

```
nce::NCE::AddLocomotiveToMultiUnit (
    locoaddress ,
    mtr ,
    samedirection )
```

Add locomotive to Multi-Unit.

Parameters

<i>locoaddress</i>	Locomotive address.
<i>mtr</i>	Multi-Unit address.
<i>samedirection</i>	The locomotive direction is the same as the consist direction.

Returns

The response message.

9.91.3.11 AddRearLocomotiveToMultiUnit()

```
nce::NCE::AddRearLocomotiveToMultiUnit (
    locoaddress ,
    mtr ,
    samedirection )
```

Add rear locomotive to Multi-Unit.

Parameters

<i>locoaddress</i>	Locomotive address.
<i>mtr</i>	Multi-Unit address.
<i>samedirection</i>	The locomotive direction is the same as the consist direction.

Returns

The response message.

9.91.3.12 AssignLoco()

```
nce::NCE::AssignLoco (
    locoaddress ,
    cabnumber )
```

Assign loco to cab.

From Bincmds.pdf: Loco address for this command is always 2 bytes. The first byte is zero in the case of a short address. If the address is long then bits 6,7 of first byte must be set to 1

Parameters

<i>locoaddress</i>	Loco address (0-9999).
<i>cabnumber</i>	Cab number (0-63)

Returns

The response message.

9.91.3.13 ChangeMomentumLevel()

```
nce::NCE::ChangeMomentumLevel (
    locoaddress ,
    newlevel )
```

Change momentum level for loco or consist.

Parameters

<i>locoaddress</i>	Locomotive or consist address.
<i>newlevel</i>	New momentum level (0-9).

Returns

The response message.

9.91.3.14 DequeuePacket()

```
nce::NCE::DequeuePacket (
    locoaddress )
```

Dequeue packet by loco addr.

Reads loco address from BIN_BUFF, finds the corresponding entry in TRK_Q and deletes the packet from the TRK_Q.

Parameters

<i>locoaddress</i>	Loco address (0-9999).
--------------------	------------------------

Returns

The response message.

9.91.3.15 DisableMain()

```
nce::NCE::DisableMain ( )
```

Kill main track, enable program track.

Returns

The response message.

9.91.3.16 Dummy()

```
nce::NCE::Dummy ( )
```

Dummy instruction returns "!" followed by CR/LF.

Returns

The response message.

9.91.3.17 EnableMain()

```
nce::NCE::EnableMain ( )
```

Enable main trk, kill prog.

Returns

The response message.

9.91.3.18 ExecuteMacro()

```
nce::NCE::ExecuteMacro (
    macroNumber )
```

Executes a previously defined macro for route control.

Parameters

<i>macroNumber</i>	The macro number.
--------------------	-------------------

Returns

The response message.

9.91.3.19 HardReset()

```
nce::NCE::HardReset ( )
```

Hard reset of command station.

Clears all RAM and resets command station to original fac defaults. All stored information is destroyed Note: the baud rate will be set to 9600

9.91.3.20 MacroCommand()

```
nce::NCE::MacroCommand (
    address ,
    macronumber )
```

Assign address to macro.

Parameters

<i>address</i>	Accessory address (not in DCC format).
<i>macronumber</i>	NCE macro number (0-255).

Returns

The response message.

9.91.3.21 NOP()

```
nce::NCE::NOP ( )
```

NOP, dummy instruction.

Returns

The response message.

9.91.3.22 NormalMode()

```
nce::NCE::NormalMode ( )
```

Returns from Program track mode.

Power is restored to mainline and removed from program track. The queues are reinitialized for normal operation.

Returns

The response message.

9.91.3.23 OperatingModeAccessoryProgrammingByteModeWrite()

```
nce::NCE::OperatingModeAccessoryProgrammingByteModeWrite (
    address ,
    cv ,
    data )
```

Operating mode accessory programming byte mode write.

Parameters

<i>address</i>	Accessory address.
<i>cv</i>	CV to set.
<i>data</i>	Data to set.

Returns

The response message.

9.91.3.24 OperatingModeProgrammingByteModeWrite()

```
nce::NCE::OperatingModeProgrammingByteModeWrite (
    locoaddress ,
    cv ,
    data )
```

Operating mode programming byte mode write.

Parameters

<i>locoaddress</i>	Locomotive address.
<i>cv</i>	CV to set.
<i>data</i>	Data to set.

Returns

The response message.

9.91.3.25 ProgramMode()

```
nce::NCE::ProgramMode ( )
```

Enters Program track mode.

Power is removed from mainline and applied to program track. The queues are formatted to send reset packets.

Returns

The response message.

9.91.3.26 ReadCVInDirectMode()

```
nce::NCE::ReadCVInDirectMode (
    address )
```

Reads a CV in direct mode.

Parameters

<i>address</i>	CV address.
----------------	-------------

Returns

The register value, -1 for unsupported or -2 for bad CV number.

9.91.3.27 ReadCVInPagedMode()

```
nce::NCE::ReadCVInPagedMode (
    address )
```

Reads a CV in paged mode.

Parameters

<i>address</i>	CV address.
----------------	-------------

Returns

The register value, -1 for unsupported or -2 for bad CV number.

9.91.3.28 ReadFromRAM()

```
nce::NCE::ReadFromRAM (  
    address )
```

Returns 16 bytes from a RAM address.

Parameters

<i>address</i>	Address to start reading from.
----------------	--------------------------------

Returns

The response message (16 data bytes).

9.91.3.29 ReadOneByteFromRAM()

```
nce::NCE::ReadOneByteFromRAM (  
    address )
```

Reads 1 byte from a command station RAM address.

Parameters

<i>address</i>	RAM address.
----------------	--------------

Returns

The data byte.

9.91.3.30 ReadRegister()

```
nce::NCE::ReadRegister (
    register )
```

Read a register.

Parameters

<i>register</i>	The register to read from.
-----------------	----------------------------

Returns

The register value, -1 for unsupported or -2 for bad register number.

9.91.3.31 RemoveLocomotiveFromMultiUnit()

```
nce::NCE::RemoveLocomotiveFromMultiUnit (
    locoaddress ,
    mtr )
```

Remove locomotive to Multi-Unit.

Parameters

<i>locoaddress</i>	Locomotive address.
<i>mtr</i>	Multi-Unit address (not used).

Returns

The response message.

9.91.3.32 ReturnAuxiliaryInputUnit()

```
nce::NCE::ReturnAuxiliaryInputUnit (
    cabnumber )
```

Returns status of Auxiliary Input Unit.

Returns four bytes. The first 2 bytes are a bit map of the 14 AIU inputs. The last 2 bytes are a bit map of any changes since this command was last given. If the cab is greater than 63 it will be "forced" to 0. The first time this command is given for a cab after the command station is powered up or reset the change bytes will be 0x3fff.

Parameters

<i>cabnumber</i>	Cab number (0-63)
------------------	-------------------

Returns

A list of two values, the bit map of values and the changed bitmap of values or the list {-1 -1} if the operation is unsupported.

9.91.3.33 ReturnAuxiliaryInputUnitShortForm()

```
nce::NCE::ReturnAuxiliaryInputUnitShortForm (
    cabnumber )
```

Returns status of Auxiliary Input Unit, short form.

This is a short form of CMD 0x8A. It returns only the first 2 bytes of command 0x8A. The 2 bytes are a bit map of the 14 AIU inputs. If the cab is greater than 63 it will be "forced" to 0.

Parameters

<i>cabnumber</i>	Cab number (0-63)
------------------	-------------------

Returns

The bit map of values or -1 if the operation is unsupported.

9.91.3.34 ReturnClock()

```
nce::NCE::ReturnClock ( )
```

Returns the fast clock to the RS232 port in binary mode.

Returns

The response message (hours, minutes).

9.91.3.35 SetBinaryCommandEchoMode()

```
nce::NCE::SetBinaryCommandEchoMode (
    mode )
```

Set binary command echo mode.

Parameters

<i>mode</i>	Mode to set: 0 = no echo, 1 = echo 1st byte of command, or 2 = echo entire command.
-------------	---

Returns

The response message.

9.91.3.36 SetCabBusAddressOfUSBBoard()

```
nce::NCE::SetCabBusAddressOfUSBBoard (
    cabaddress )
```

Set the cab bus address of the USB board.

Parameters

<i>cabaddress</i>	Cab address.
-------------------	--------------

Returns

The response message.

9.91.3.37 SetClock()

```
nce::NCE::SetClock (
    hours ,
    minutes )
```

Set the scale time clock.

Parameters

<i>hours</i>	Hours (0-23).
<i>minutes</i>	Minutes (0-59).

Returns

The response message.

9.91.3.38 SetClockFormat()

```
nce::NCE::SetClockFormat (
    format )
```

Set clock 12/24 hours.

Parameters

<i>format</i>	Clock format flag: true for 24 hour format, false for 12 hour format.
---------------	---

Returns

The response message.

9.91.3.39 SetClockRatio()

```
nce::NCE::SetClockRatio (
    ratio )
```

Set clock speed (ratio).

Parameters

<i>ratio</i>	Scale clock ratio, 1-25.
--------------	--------------------------

Returns

The response message.

9.91.3.40 SetLocomotiveFunctionsGroup1()

```
nce::NCE::SetLocomotiveFunctionsGroup1 (
    locoaddress ,
    f0 ,
    f1 ,
    f2 ,
    f3 ,
    f4 )
```

Set locomotive functions, group 1.

Parameters

<i>address</i>	Locomotive address.
<i>f0</i>	Function 0.
<i>f1</i>	Function 1.
<i>f2</i>	Function 2.
<i>f3</i>	Function 3.
<i>f4</i>	Function 4.

Returns

The response message.

9.91.3.41 SetLocomotiveFunctionsGroup2()

```
nce::NCE::SetLocomotiveFunctionsGroup2 (
    locoaddress ,
    f5 ,
    f6 ,
    f7 ,
    f8 )
```

Set locomotive functions, group 2.

Parameters

<i>address</i>	Locomotive address.
<i>f5</i>	Function 5.
<i>f6</i>	Function 6.
<i>f7</i>	Function 7.
<i>f8</i>	Function 7.

Returns

The response message.

9.91.3.42 SetLocomotiveFunctionsGroup3()

```
nce::NCE::SetLocomotiveFunctionsGroup3 (
    locoaddress ,
    f9 ,
```

```

    f10 ,
    f11 ,
    f12 )

```

Set locomotive functions, group 3.

Parameters

<i>address</i>	Locomotive address.
<i>f9</i>	Function 9.
<i>f10</i>	Function 10.
<i>f11</i>	Function 11.
<i>f12</i>	Function 12.

Returns

The response message.

9.91.3.43 SetLocomotiveSpeedAndDirection()

```

nce::NCE::SetLocomotiveSpeedAndDirection (
    locoaddress ,
    ssm ,
    dir ,
    speed )

```

Set locomotive speed and direction.

Parameters

<i>locoaddress</i>	Locomotive address.
<i>ssm</i>	Speed mode (either S28 or S128).
<i>dir</i>	Direction (either Forward or Reverse).
<i>speed</i>	Locomotive speed (0-28, 0-128, or 255 (means emergency stop)).

Returns

The response message.

9.91.3.44 SetLocoSpeedMode()

```

nce::NCE::SetLocoSpeedMode (
    locoaddress ,
    mode )

```


Sets the speed mode of loco.

Parameters

<i>locoaddress</i>	Loco address (0-9999).
<i>mode</i>	Speed step mode, one of S14, S28, or S128.

Returns

The response message.

9.91.3.45 SetSignalAspect()

```
nce::NCE::SetSignalAspect (
    address ,
    aspectBits )
```

Set signal aspect.

Parameters

<i>address</i>	Accessory address (not in DCC format).
<i>aspectBits</i>	Signal aspect bit mask.

Returns

The response message.

9.91.3.46 SoftReset()

```
nce::NCE::SoftReset ( )
```

Soft reset of command station.

Sets command Station to power up condition.

9.91.3.47 SoftwareVersion()

```
nce::NCE::SoftwareVersion ( )
```

Read software version number.

Returns

The software version as three bytes.

9.91.3.48 StartClock()

```
nce::NCE::StartClock ( )
```

Starts the scale time clock.

Returns

The response message.

9.91.3.49 StopClock()

```
nce::NCE::StopClock ( )
```

Stops the scale time clock.

Returns

The response message.

9.91.3.50 Write4BytesToRAM()

```
nce::NCE::Write4BytesToRAM (
    address ,
    byte1 ,
    byte2 ,
    byte3 ,
    byte4 )
```

Writes 4 bytes to a command station RAM address.

Parameters

<i>address</i>	RAM address.
<i>byte1</i>	First byte to write.
<i>byte2</i>	Second byte to write.

Returns

The response message.

9.91.3.51 Write8BytesToRAM()

```
nce::NCE::Write8BytesToRAM (
    address ,
    ... )
```

Writes 4 bytes to a command station RAM address.

Parameters

<i>address</i>	RAM address.
<i>byte1</i>	First byte to write.
<i>byte2</i>	Second byte to write.

Returns

The response message.

9.91.3.52 WriteCVInDirectMode()

```
nce::NCE::WriteCVInDirectMode (
    address ,
    data )
```

Writes a CV in direct mode.

Parameters

<i>address</i>	CV address.
<i>data</i>	Data to write.

Returns

The response message.

9.91.3.53 WriteCVInPagedMode()

```
nce::NCE::WriteCVInPagedMode (
    address ,
    data )
```

Writes a CV in paged mode.

Parameters

<i>address</i>	CV address.
<i>data</i>	Data to write.

Returns

The response message.

9.91.3.54 WriteLCDLine3()

```
nce::NCE::WriteLCDLine3 (
    cabnumber ,
    textline )
```

Sends a message to LCD line 3 of a cab.

Parameters

<i>cabnumber</i>	Cab Number (0-63).
<i>textline</i>	A string of 16 printable characters.

Returns

The response message.

9.91.3.55 WriteLCDLine4()

```
nce::NCE::WriteLCDLine4 (
    cabnumber ,
    textline )
```

Sends a message to LCD line 4 of a cab.

Parameters

<i>cabnumber</i>	Cab Number (0-63).
<i>textline</i>	A string of 16 printable characters.

Returns

The response message.

9.91.3.56 WriteLCDRightLine2()

```
nce::NCE::WriteLCDRightLine2 (
    cabnumber ,
    textline )
```

Sends a message to the right side of LCD line 2 of a cab.

Parameters

<i>cabnumber</i>	Cab Number (0-63).
<i>textline</i>	A string of 8 printable characters.

Returns

The response message.

9.91.3.57 WriteOneByteToRAM()

```
nce::NCE::WriteOneByteToRAM (
    address ,
    byte )
```

Writes 1 byte to a command station RAM address.

Parameters

<i>address</i>	RAM address.
<i>byte</i>	Byte to write.

Returns

The response message.

9.91.3.58 WriteRAWPacket()

```
nce::NCE::WriteRAWPacket (
    sendtimes ,
    ... )
```

Reads a raw packet to put in TEMP_Q.

Parameters

<i>sendtimes</i>	Number of times to send packet, 0 means don't send it. 255 is the same as 254 (system limitation).
...	Packet bytes to send, 3 to 6 bytes.

Returns

The response message.

9.91.3.59 WriteRAWTrackPacket()

```
nce::NCE::WriteRAWTrackPacket (
    ... )
```

Reads a raw packet to put in TRK_Q.

Parameters

...	Packet bytes to send, 3 to 5 bytes.
-----	-------------------------------------

Returns

The response message.

9.91.3.60 WriteRegister()

```
nce::NCE::WriteRegister (
    register ,
    data )
```

Writes a register.

Parameters

<i>register</i>	The register to write to.
<i>data</i>	The data to write.

Returns

The response message.

9.91.3.61 WriteToRAM()

```
nce::NCE::WriteToRAM (
    address ,
    ... )
```

Writes bytes to a command station RAM address.

Parameters

<i>address</i>	Address to start writing to.
<i>...</i>	Bytes to write (upto 16).

Returns

The response message.

9.91.3.62 WriteTwoBytesToRAM()

```
nce::NCE::WriteTwoBytesToRAM (
    address ,
    byte1 ,
    byte2 )
```

Writes 2 bytes to a command station RAM address.

Parameters

<i>address</i>	RAM address.
<i>byte1</i>	First byte to write.
<i>byte2</i>	Second byte to write.

Returns

The response message.

9.91.4 Member Data Documentation

9.91.4.1 `_timeout`

```
nce::NCE::_timeout [private]
```

Timeout or data available flag.

9.91.4.2 `NumberOfBytesReturned`

```
nce::NCE::NumberOfBytesReturned [static]
```

Array containing the number of bytes expected for each command.

9.91.4.3 `ttyfd`

```
nce::NCE::ttyfd
```

Terminal file descriptor.

9.92 `Icc::nid_or_null` Class Reference

Node ID regexp pattern or the empty string.

Static Public Member Functions

- static [validate](#) (value)
Validate a Node ID, but allow a null string.

9.92.1 Detailed Description

Node ID regexp pattern or the empty string.

A Node Id is six bytes as pairs of hex digits separated by colons (:).

9.92.2 Member Function Documentation

9.92.2.1 validate()

```
static lcc::nid_or_null::validate (
    value ) [static]
```

Validate a Node ID, but allow a null string.

Parameters

<i>value</i>	The value to validate, can be null.
--------------	-------------------------------------

9.93 Parsers::TrackGraph::NodeValues Struct Reference

Uncompressed graph node values.

Public Member Functions

- [NodeValues](#) (int *_id*=-1, [NodeType](#) *_type*=[Undefined](#), [TurnoutGraphic](#) **_tgr*=NULL, [TurnoutRoutelist](#) **_tpo*=NULL, float *_length*=0.0, [IntegerList](#) **_tracklist*=NULL, int *_turnoutnumber*=0, char **_name*=NULL, char **_sensescript*=NULL, char **_normalactionscript*=NULL, char **_reverseactionscript*=NULL, int *_numheads*=0, [StringPairList](#) **_aspects*=NULL, float *_origx*=0.0, float *_origy*=0.0, float *_angle*=0.0, char **_onscript*=NULL, char **_offscript*=NULL)
Default constructor.
- void [Cleanup](#) ()
Cleanup member function.

Public Attributes

- int [id](#)
Node number.
- [NodeType](#) *type*
Type of node.
- [TurnoutGraphic](#) * *tgr*
Turnout graphic (if type is turnout).
- [TurnoutRoutelist](#) * *tpo*
Turnout route list (if type is turnout).
- float [length](#)
Length of track.
- [IntegerList](#) * *tracklist*

- Track segments in block.*

 - int [turnoutnumber](#)

Number of the turnout.
- char * [name](#)

Name of block or switch motor.
- char * [sensescript](#)

Sense Script (occupation / point).
- char * [normalactionsscript](#)

Normal action script.
- char * [reverseactionsscript](#)

Reverse action script.
- int [numheads](#)

Number of heads.
- StringPairList * [aspectlist](#)

Aspect list (name, script pairs).
- float [origx](#)

X coordinate of the base of the signal.
- float [origy](#)

Y coordinate of the base of the signal.
- char * [onscript](#)

On action script.
- char * [offscript](#)

Off action script.
- float [angle](#)

Angle of the signal.

9.93.1 Detailed Description

Uncompressed graph node values.

Author

Robert Heller <heller@deepsoft.com>

9.93.2 Constructor & Destructor Documentation

9.93.2.1 NodeValues()

```
Parsers::TrackGraph::NodeValues::NodeValues (
    int _id = -1,
    NodeType _type = Undefined,
    TurnoutGraphic * _tgr = NULL,
    TurnoutRoutelist * _tpo = NULL,
    float _length = 0.0,
    IntegerList * _tracklist = NULL,
    int _turnoutnumber = 0,
    char * _name = NULL,
    char * _sensescript = NULL,
    char * _normalactionsscript = NULL,
    char * _reverseactionsscript = NULL,
    int _numheads = 0,
    StringPairList * _aspects = NULL,
    float _origx = 0.0,
    float _origy = 0.0,
    float _angle = 0.0,
    char * _onscript = NULL,
    char * _offscript = NULL ) [inline]
```

Default constructor.

References [angle](#), [aspectlist](#), [length](#), [name](#), [normalactionsscript](#), [numheads](#), [offscript](#), [onscript](#), [origx](#), [origy](#), [reverseactionsscript](#), [sensescript](#), [tgr](#), [tpo](#), [tracklist](#), [turnoutnumber](#), and [type](#).

9.93.3 Member Function Documentation

9.93.3.1 Cleanup()

```
void Parsers::TrackGraph::NodeValues::Cleanup ( ) [inline]
```

Cleanup member function.

References [Parsers::IntegerList::CleanUpIntegerList\(\)](#), [Parsers::TrackGraph::DeleteTurnoutGraphic\(\)](#), [Parsers::TrackGraph::DeleteTurnoutname](#), [normalactionsscript](#), [reverseactionsscript](#), [sensescript](#), [tgr](#), [tpo](#), and [tracklist](#).

9.93.4 Member Data Documentation

9.93.4.1 angle

```
float Parsers::TrackGraph::NodeValues::angle
```

Angle of the signal.

Referenced by [NodeValues\(\)](#).

9.93.4.2 aspectlist

```
StringPairList* Parsers::TrackGraph::NodeValues::aspectlist
```

Aspect list (name, script pairs).

Referenced by [NodeValues\(\)](#).

9.93.4.3 id

```
int Parsers::TrackGraph::NodeValues::id
```

Node number.

9.93.4.4 length

```
float Parsers::TrackGraph::NodeValues::length
```

Length of track.

Referenced by [NodeValues\(\)](#).

9.93.4.5 name

```
char* Parsers::TrackGraph::NodeValues::name
```

Name of block or switch motor.

Referenced by [Cleanup\(\)](#), and [NodeValues\(\)](#).

9.93.4.6 normalactionscript

```
char* Parsers::TrackGraph::NodeValues::normalactionscript
```

Normal action script.

Referenced by [Cleanup\(\)](#), and [NodeValues\(\)](#).

9.93.4.7 numheads

```
int Parsers::TrackGraph::NodeValues::numheads
```

Number of heads.

Referenced by [NodeValues\(\)](#).

9.93.4.8 offscript

```
char* Parsers::TrackGraph::NodeValues::offscript
```

Off action script.

Referenced by [NodeValues\(\)](#).

9.93.4.9 onscript

```
char* Parsers::TrackGraph::NodeValues::onscript
```

On action script.

Referenced by [NodeValues\(\)](#).

9.93.4.10 origx

```
float Parsers::TrackGraph::NodeValues::origx
```

X coordinate of the base of the signal.

Referenced by [NodeValues\(\)](#).

9.93.4.11 origy

```
float Parsers::TrackGraph::NodeValues::origy
```

Y coordinate of the base of the signal.

Referenced by [NodeValues\(\)](#).

9.93.4.12 reverseactionscript

```
char* Parsers::TrackGraph::NodeValues::reverseactionscript
```

Reverse action script.

Referenced by [Cleanup\(\)](#), and [NodeValues\(\)](#).

9.93.4.13 sensescript

```
char* Parsers::TrackGraph::NodeValues::sensescript
```

Sense Script (occupation / point).

Referenced by [Cleanup\(\)](#), and [NodeValues\(\)](#).

9.93.4.14 tgr

```
TurnoutGraphic* Parsers::TrackGraph::NodeValues::tgr
```

Turnout graphic (if type is turnout).

Referenced by [Cleanup\(\)](#), and [NodeValues\(\)](#).

9.93.4.15 tpo

```
TurnoutRoutelist* Parsers::TrackGraph::NodeValues::tpo
```

Turnout route list (if type is turnout).

Referenced by [Cleanup\(\)](#), and [NodeValues\(\)](#).

9.93.4.16 tracklist

`IntegerList*` `Parsers::TrackGraph::NodeValues::tracklist`

Track segments in block.

Referenced by [Cleanup\(\)](#), and [NodeValues\(\)](#).

9.93.4.17 turnoutnumber

`int` `Parsers::TrackGraph::NodeValues::turnoutnumber`

Number of the turnout.

Referenced by [NodeValues\(\)](#).

9.93.4.18 type

`NodeType` `Parsers::TrackGraph::NodeValues::type`

Type of node.

Referenced by [NodeValues\(\)](#).

9.94 TTSupport::Occupied Class Reference

This class records a train sitting on a storage track during a specified time frame.

```
#include <Station.h>
```

Public Member Functions

- [Occupied](#) (string trainnum_="", double from_=0.0, double until_=0.0, string trainnum2_="")
Constructor: record a train occupying a storage track.
- const char * [TrainNum](#) () const
Return the train that arrives.
- const char * [TrainNum2](#) () const
Return the train that departs.
- double [From](#) () const
Return the start time;.
- double [Until](#) () const
Return the end time.
- [Occupied](#) (const [Occupied](#) &other)
Copy constructor – create an instance from another [Occupied](#) instance.
- [Occupied](#) & [operator=](#) (const [Occupied](#) &other)
Assignment operator.
- ostream & [Write](#) (ostream &stream) const
Write ourselves to an output stream.
- istream & [Read](#) (istream &stream)
Read ourselves from an input stream.

Private Attributes

- string [trainnum](#)
The train that arrived.
- string [trainnum2](#)
The train that departs.
- double [from](#)
The start time of the occupation.
- double [until](#)
The end time of the occupation.

Friends

- class [TimeTableSystem](#)
We are best buddies with the [TimeTableSystem](#) class.

9.94.1 Detailed Description

This class records a train sitting on a storage track during a specified time frame.

The train number (symbol) might change when the train leaves the storage track.

Author

Robert Heller <heller@deepsoft.com>

9.94.2 Constructor & Destructor Documentation

9.94.2.1 Occupied() [1/2]

```
TTSupport::Occupied::Occupied (
    string trainnum_ = "",
    double from_ = 0.0,
    double until_ = 0.0,
    string trainnum2_ = "" ) [inline]
```

Constructor: record a train occupying a storage track.

Parameters

trainnum _	The arriving train number (symbol).
from _	The arrival time.
until _	The departure time.
trainnum2 _	The departing train number (symbol). If it is the empty string, the departing train has the same number (symbol) as the arriving train.

References [from](#), [trainnum](#), [trainnum2](#), and [until](#).

9.94.2.2 Occupied() [2/2]

```
TTSupport::Occupied::Occupied (  
    const Occupied & other ) [inline]
```

Copy constructor – create an instance from another [Occupied](#) instance.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [from](#), [trainnum](#), [trainnum2](#), and [until](#).

9.94.3 Member Function Documentation

9.94.3.1 From()

```
double TTSupport::Occupied::From ( ) const [inline]
```

Return the start time;.

References [from](#).

9.94.3.2 operator=()

```
Occupied & TTSupport::Occupied::operator= (  
    const Occupied & other ) [inline]
```

Assignment operator.

Assign an [Occupied](#) instance to another [Occupied](#) instance.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [from](#), [trainnum](#), [trainnum2](#), and [until](#).

9.94.3.3 Read()

```
istream & TTSupport::Occupied::Read (
    istream & stream )
```

Read ourselves from an input stream.

Parameters

<i>stream</i>	The stream to read from.
---------------	--------------------------

9.94.3.4 TrainNum()

```
const char * TTSupport::Occupied::TrainNum ( ) const [inline]
```

Return the train that arrives.

References [trainnum](#).

9.94.3.5 TrainNum2()

```
const char * TTSupport::Occupied::TrainNum2 ( ) const [inline]
```

Return the train that departs.

References [trainnum2](#).

9.94.3.6 Until()

```
double TTSupport::Occupied::Until ( ) const [inline]
```

Return the end time.

References [until](#).

9.94.3.7 Write()

```
ostream & TTSupport::Occupied::Write (
    ostream & stream ) const
```

Write ourselves to an output stream.

Parameters

<i>stream</i>	The stream to write to.
---------------	-------------------------

9.94.4 Friends And Related Function Documentation

9.94.4.1 TimeTableSystem

```
friend class TimeTableSystem [friend]
```

We are best buddies with the [TimeTableSystem](#) class.

9.94.5 Member Data Documentation

9.94.5.1 from

```
double TTSupport::Occupied::from [private]
```

The start time of the occupation.

Referenced by [From\(\)](#), [Occupied\(\)](#), and [operator=\(\)](#).

9.94.5.2 trainnum

```
string TTSupport::Occupied::trainnum [private]
```

The train that arrived.

Referenced by [Occupied\(\)](#), [operator=\(\)](#), and [TrainNum\(\)](#).

9.94.5.3 trainnum2

```
string TTSupport::Occupied::trainnum2 [private]
```

The train that departs.

Referenced by [Occupied\(\)](#), [operator=\(\)](#), and [TrainNum2\(\)](#).

9.94.5.4 until

```
double TTSupport::Occupied::until [private]
```

The end time of the occupation.

Referenced by [Occupied\(\)](#), [operator=\(\)](#), and [Until\(\)](#).

9.95 Icc::OpenLCBMessage Class Reference

OpenLCB Message type.

Public Member Functions

- [OpenLCBMessage](#) (name,...)
Construct a OpenLCB Message object.
- [toString](#) ()
Return the object as a printable string.

Static Public Member Functions

- static [validate](#) (object)
Validate an [OpenLCBMessage](#).

Private Member Functions

- [_configuredata](#) (option, value)
Configure method for data.
- [_cgetdata](#) (option)
Cget method for data.

9.95.1 Detailed Description

OpenLCB Message type.

Options (fields):

- -mti The MTI Header bitfield.
- -sourcenid The source Node ID.
- -destnid The destination Node ID or null if this is not an addressed message.
- -eventid The Event ID or null if there is no Event ID associated with this message.
- -data Any additional data associated with this message.

9.95.2 Constructor & Destructor Documentation

9.95.2.1 OpenLCBMessage()

```
lcc::OpenLCBMessage::OpenLCBMessage (
    name ,
    ... )
```

Construct a OpenLCB Message object.

Parameters

<i>name</i>	The name of the object
...	Options (fields): <ul style="list-style-type: none">• -mti The MTI Header bitfield.• -sourcenid The source Node ID.• -destnid The destination Node ID or null if this is not an addressed message.• -eventid The Event ID or null if there is no Event ID associated with this message.• -data Any additional data associated with this message.

9.95.3 Member Function Documentation

9.95.3.1 `_cgetdata()`

```
lcc::OpenLCBMessage::_cgetdata (
    option ) [private]
```

Cget method for data.

Parameters

<i>option</i>	Always -data.
---------------	---------------

Returns

Data vector (a list of bytes).

9.95.3.2 `_configuredata()`

```
lcc::OpenLCBMessage::_configuredata (
    option ,
    value ) [private]
```

Configure method for data.

Parameters

<i>option</i>	Always -data.
<i>value</i>	A list of bytes.

9.95.3.3 `toString()`

```
lcc::OpenLCBMessage::toString ( )
```

Return the object as a printable string.

Returns

A string representation of the object.

References [FileEntry::cget\(\)](#).

9.95.3.4 validate()

```
static lcc::OpenLCBMessage::validate (
    object ) [static]
```

Validate an [OpenLCBMessage](#).

Parameters

<i>object</i>	A possible OpenLCBMessage object.
---------------	---

9.96 lcc::OpenLCBNode Class Reference

Connect to a OpenLCB interface.

Public Member Functions

- [OpenLCBNode](#) (name,...)
Constructor: construct a [OpenLCBNode](#) object.
- [SendInitComplete](#) ()
Send an initialization complete message.
- [SendVerifyNodeID](#) (nid="")
Send a verify node id message.
- [ProtocolSupportRequest](#) (nid)
Send a Protocol Support Request to the specified node.
- [ProduceEvent](#) (eventid)
Send an event message.
- [IdentifyConsumer](#) (eventid)
Send an identify consumer message.
- [ConsumerIdentified](#) (eventid, validity)
Send a consumer identified message.
- [ConsumerRangeIdentified](#) (eventidrange)
Send a consumer range identified message.
- [IdentifyProducer](#) (eventid)
Send an identify producer message.
- [ProducerIdentified](#) (eventid, validity)

- Send a producer identified message.*
 - [ProducerRangeIdentified](#) (eventidrange)
 - Send a producer range identified message.*
 - [IdentifyEvents](#) (nid="")
 - Send an identify events message.*
 - [LearnEvent](#) (eventid)
 - Send a learn event message.*
 - [SendDatagram](#) (nid, data)
 - Send a datagram message to the specified Node ID.*
 - [DatagramReceivedOK](#) (nid, flags=0)
 - Send a datagram received ok message.*
 - [DatagramRejected](#) (nid, errorcode)
 - Send a datagram rejected message.*
 - [SendSimpleNodeInfoRequest](#) (nid)
 - Send a simple node info request message.*
 - [SendSupportedProtocolsRequest](#) (nid)
 - Send a Supported protocols request message.*
 - [SendMySupportedProtocols](#) (nid)
 - Send my supported protocols message.*
 - [ReturnMySupportedProtocols](#) ()
 - Return my protocol support bitvector (three bytes).*
 - [SendMySimpleNodeInfo](#) (nid)
 - Send my simple node info message.*
 - [ReturnMySimpleNodeInfo](#) ()
 - Return my Simple Node Info payload.*
 - [SendMyNodeVerification](#) ()
 - Send my node verification message.*

Private Member Functions

- [_messageHandler](#) (message)
 - Generic message handler.*

Static Private Member Functions

- static [nidlist](#) (nid)
 - Break a Node ID string into a list of bytes.*
- static [_buildSelectTransportConstructorDialog](#) ()
 - Build a dialog box to select the transport constructor.*
- static [_CancelSelectTransport](#) ()
 - Bound to the Cancel button.*
- static [_SelectTransport](#) ()
 - Bound to the Select button.*
- static [selectTransportConstructor](#) (...)
 - @publicsection Pop up a select transport constructor dialog box.*
- static [transportConstructors](#) ()
 - Return the list of known available transport constructors.*

Private Attributes

- [transport](#)
The logical transport layer component.
- [protocolsupport](#)
Protocol support: Simple Protocol subset and SimpleNodeInfo by default.
- [simplenodeinfo](#)
Simple node info payload.

Static Private Attributes

- static [_transportConstructors](#)
Array of transport constructors.
- static [selectTransportConstructorDialog](#)
Dialog box to select the transport constructor.
- static [constructorCombo](#)
[LabelComboBox](#) to select a transport constructor.

9.96.1 Detailed Description

Connect to a OpenLCB interface.

This class implements the high level interface to the OpenLCB network.

Options:

- -transport The transport layer constructor.
- -eventhandler This is a script prefix that is run for event processing messages. This is a script prefix that will have two or three values added: a command: one of consumerrangeidentified, consumeridentified, producer-rangeidentified, produceridentified, learnevents, report, identifyconsumer, identifyproducer, or identifyevents. An eventid. And optionally the validity of the event (if the command was one of consumerrangeidentified, consumeridentified, producer-rangeidentified, or produceridentified).
- -datagramhandler This is a script prefix that is run for datagram messages. This is a script prefix that will have two or more values added: a command datagramreceivedok, datagramrejected, or datagramcontent. followed by the sourcenid and any additional args needed.
- -generalmessagehandler This is a script prefix that is run for general messages. This is a script prefix that will have a [lcc::OpenLCBMessage](#) object added. The procedure should reference the -mti option of the message object to determine what sort of message it is.
- -logmessagehandler This is a script prefix that is run for all messages, received and sent. Presumes -promiscuousmode. This is a script prefix that will have a [lcc::OpenLCBMessage](#) object added. The procedure should log the message.

Additional options are passed to the transport layer constructor.

9.96.2 Constructor & Destructor Documentation

9.96.2.1 OpenLCBNode()

```
lcc::OpenLCBNode::OpenLCBNode (
    name ,
    ... )
```

Constructor: construct a [OpenLCBNode](#) object.

Open a connection to the OpenLCB network.

Parameters

<i>name</i>	The name of the OpenLCBNode object.
...	Options: <ul style="list-style-type: none"> • -transport The transport layer constructor. This option is required. • -promiscuousmode Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not. This option is processed by the transport component. • -eventhandler This is a script prefix that is run for event processing messages. This is a script prefix that will have two or three values added: a command: one of consumerrangeidentified, consumeridentified, producerrangeidentified, produceridentified, learnevents, report, identifyconsumer, identifyproducer, or identifyevents. An eventid. And optionally the validity of the event (if the command was one of consumerrangeidentified, consumeridentified, producerrangeidentified, or produceridentified). • -datagramhandler This is a script prefix that is run for datagram messages. This is a script prefix that will have two or more values added: a command datagramreceivedok, datagramrejected, or datagramcontent. followed by the sourcenid and any additional args needed. • -generalmessagehandler This is a script prefix that is run for general messages. This is a script prefix that will have a lcc::OpenLCBMessage object added. The procedure should reference the -mti option of the message object to determine what sort of message it is. • -logmessagehandler This is a script prefix that is run for all messages, received and sent. Presumes -promiscuousmode. This is a script prefix that will have a lcc::OpenLCBMessage object added. The procedure should log the message.

Additional options are passed to the transport layer constructor.

9.96.3 Member Function Documentation

9.96.3.1 _buildSelectTransportConstructorDialog()

```
static lcc::OpenLCBNode::_buildSelectTransportConstructorDialog ( ) [static], [private]
```

Build a dialog box to select the transport constructor.

Returns

A transport constructor selection dialog box.

9.96.3.2 _CancelSelectTransport()

```
static lcc::OpenLCBNode::_CancelSelectTransport ( ) [static], [private]
```

Bound to the `Cancel` button.

Closes the transport constructor dialog box and return the null string.

Returns

The null string.

9.96.3.3 _messageHandler()

```
lcc::OpenLCBNode::_messageHandler (
    message ) [private]
```

Generic message handler.

Parameters

<i>message</i>	The received OpenLCB message.
----------------	-------------------------------

9.96.3.4 _SelectTransport()

```
static lcc::OpenLCBNode::_SelectTransport ( ) [static], [private]
```

Bound to the `Select` button.

Closes the transport constructor dialog box and returns the selected transport constructor.

Returns

The transport constructor name.

9.96.3.5 ConsumerIdentified()

```
lcc::OpenLCBNode::ConsumerIdentified (
    eventid ,
    validity )
```

Send a consumer identified message.

Parameters

<i>eventid</i>	The event id to send.
<i>validity</i>	The validity of the eventid: one of the words valid, invalid, or unknown.

9.96.3.6 ConsumerRangeIdentified()

```
lcc::OpenLCBNode::ConsumerRangeIdentified (
    eventidrange )
```

Send a consumer range identified message.

Parameters

<i>eventidrange</i>	The event id range identified.
---------------------	--------------------------------

9.96.3.7 DatagramReceivedOK()

```
lcc::OpenLCBNode::DatagramReceivedOK (
    nid ,
    flags = 0 )
```

Send a datagram received ok message.

Parameters

<i>nid</i>	The Node ID to send the message to.
<i>flags</i>	The (optional) flags to send.

9.96.3.8 DatagramRejected()

```
lcc::OpenLCBNode::DatagramRejected (
    nid ,
    errorcode )
```

Send a datagram rejected message.

Parameters

<i>nid</i>	The Node ID to send the message to.
<i>errorcode</i>	The error code to send.

9.96.3.9 IdentifyConsumer()

```
lcc::OpenLCBNode::IdentifyConsumer (
    eventid )
```

Send an identify consumer message.

Parameters

<i>eventid</i>	The event id to send.
----------------	-----------------------

9.96.3.10 IdentifyEvents()

```
lcc::OpenLCBNode::IdentifyEvents (
    nid = "" )
```

Send an identify events message.

Parameters

<i>nid</i>	The (optional) Node ID to send the message to. If omitted, a global verify node id message is sent.
------------	---

9.96.3.11 IdentifyProducer()

```
lcc::OpenLCBNode::IdentifyProducer (
    eventid )
```

Send an identify producer message.

Parameters

<i>eventid</i>	The event id to send.
----------------	-----------------------

9.96.3.12 LearnEvent()

```
lcc::OpenLCBNode::LearnEvent (
    eventid )
```

Send a learn event message.

Parameters

<i>eventid</i>	The event id to learn.
----------------	------------------------

9.96.3.13 nidlist()

```
static lcc::OpenLCBNode::nidlist (
    nid ) [static], [private]
```

Break a Node ID string into a list of bytes.

Parameters

<i>nid</i>	The Node ID to split up.
------------	--------------------------

9.96.3.14 ProduceEvent()

```
lcc::OpenLCBNode::ProduceEvent (
    eventid )
```

Send an event message.

Parameters

<i>eventid</i>	The event id to send.
----------------	-----------------------

9.96.3.15 ProducerIdentified()

```
lcc::OpenLCBNode::ProducerIdentified (
    eventid ,
    validity )
```

Send a producer identified message.

Parameters

<i>eventid</i>	The event id to send.
<i>validity</i>	The validity of the eventid: one of the words valid, invalid, or unknown.

9.96.3.16 ProducerRangeIdentified()

```
lcc::OpenLCBNode::ProducerRangeIdentified (
    eventidrange )
```

Send a producer range identified message.

Parameters

<i>eventidrange</i>	The event id range identified.
---------------------	--------------------------------

9.96.3.17 ProtocolSupportRequest()

```
lcc::OpenLCBNode::ProtocolSupportRequest (
    nid )
```

Send a Protocol Support Request to the specified node.

Parameters

<i>nid</i>	The Node ID to send the message to.
------------	-------------------------------------

9.96.3.18 ReturnMySimpleNodeInfo()

```
lcc::OpenLCBNode::ReturnMySimpleNodeInfo ( )
```

Return my Simple Node Info payload.

Returns

A Simple Node Info payload.

9.96.3.19 ReturnMySupportedProtocols()

```
lcc::OpenLCBNode::ReturnMySupportedProtocols ( )
```

Return my protocol support bitvector (three bytes).

Returns

A protocol support bitvector (three bytes).

9.96.3.20 selectTransportConstructor()

```
static lcc::OpenLCBNode::selectTransportConstructor (
    ... ) [static], [private]
```

@publicsection Pop up a select transport constructor dialog box.

Parameters

...	Options: <ul style="list-style-type: none">• -parent The parent window for this dialog box.
-----	---

Returns

Either the null string or the transport constructor.

9.96.3.21 SendDatagram()

```
lcc::OpenLCBNode::SendDatagram (
    nid ,
    data )
```

Send a datagram message to the specified Node ID.

Parameters

<i>nid</i>	The Node ID to send the message to.
<i>data</i>	The data to send (1 to 64 bytes).

9.96.3.22 SendInitComplete()

```
lcc::OpenLCBNode::SendInitComplete ( )
```

Send an initialization complete message.

9.96.3.23 SendMyNodeVerification()

```
lcc::OpenLCBNode::SendMyNodeVerification ( )
```

Send my node verification message.

9.96.3.24 SendMySimpleNodeInfo()

```
lcc::OpenLCBNode::SendMySimpleNodeInfo (
    nid )
```

Send my simple node info message.

Parameters

<i>nid</i>	The Node ID to send the message to.
------------	-------------------------------------

9.96.3.25 SendMySupportedProtocols()

```
lcc::OpenLCBNode::SendMySupportedProtocols (
    nid )
```

Send my supported protocols message.

Parameters

<i>nid</i>	The Node ID to send the message to.
------------	-------------------------------------

9.96.3.26 SendSimpleNodeInfoRequest()

```
lcc::OpenLCBNode::SendSimpleNodeInfoRequest (
    nid )
```

Send a simple node info request message.

Parameters

<i>nid</i>	The Node ID to send the message to.
------------	-------------------------------------

9.96.3.27 SendSupportedProtocolsRequest()

```
lcc::OpenLCBNode::SendSupportedProtocolsRequest (
    nid )
```

Send a Supported protocols request message.

Parameters

<i>nid</i>	The Node ID to send the message to.
------------	-------------------------------------

9.96.3.28 SendVerifyNodeID()

```
lcc::OpenLCBNode::SendVerifyNodeID (
    nid = "" )
```

Send a verify node id message.

Parameters

<i>nid</i>	The (optional) Node ID to send the message to. If omitted, a global verify node id message is sent.
------------	---

9.96.3.29 transportConstructors()

```
static lcc::OpenLCBNode::transportConstructors ( ) [static], [private]
```

Return the list of known available transport constructors.

Returns

The list of known available transport constructors as a description name list.

9.96.4 Member Data Documentation

9.96.4.1 _transportConstructors

```
lcc::OpenLCBNode::_transportConstructors [static], [private]
```

Array of transport constructors.

9.96.4.2 constructorCombo

```
lcc::OpenLCBNode::constructorCombo [static], [private]
```

[LabelComboBox](#) to select a transport constructor.

9.96.4.3 protocolsupport

`lcc::OpenLCBNode::protocolsupport` [private]

Protocol support: Simple Protocol subset and SimpleNodeInfo by default.

9.96.4.4 selectTransportConstructorDialog

`lcc::OpenLCBNode::selectTransportConstructorDialog` [static], [private]

Dialog box to select the transport constructor.

9.96.4.5 simplenodeinfo

`lcc::OpenLCBNode::simplenodeinfo` [private]

Simple node info payload.

9.96.4.6 transport

`lcc::OpenLCBNode::transport` [private]

The logical transport layer component.

9.97 lcc::OpenLCBOverTcp Class Reference

Connect to a OpenLCB over Tcp/Ip.

Public Member Functions

- [OpenLCBOverTcp](#) (name,...)
Constructor: Connect to a Tcp/Ip OpenLCB network.
- [setMessageHandler](#) (handler)
Set the message handler.
- [setSentMessageHandler](#) (handler)
Set the sent message handler.
- [sendMessage](#) (...)
Send a message on the OpenLCB bus.

Static Public Member Functions

- static [buildPortnidandhostDialog](#) ()
Function to construct the Dialog to ask the user for a port, host, and Node ID.
- static [_CancelOpenTransport](#) ()
Function bound to the `Cancel` button.
- static [_OpenTransport](#) ()
Function bound to the `Open` button.
- static [requiredOpts](#) ()
Return the default option list.
- static [drawOptionsDialog](#) (...)
Pop up the Options Dialog box.

Static Public Attributes

- static [portnidandhostDialog](#)
Dialog to ask the user for a port, host, and Node ID.
- static [portLSpin](#)
[LabelSpinBox](#) containing possible network ports.
- static [hostLEntry](#)
[LabelEntry](#) containing the hostname.
- static [nidLEntry](#)
[LabelEntry](#) containing the Node ID.

Private Attributes

- [mtidetail](#)
[MTIDetail](#) component.
- [messagehandler](#)
Message handler.
- [sentMessageHandler](#)
Sent Message handler.
- [datagrambuffers](#)
Datagram buffers.
- [messagebuffers](#)
General message buffers (for multi frame messages)
- [sock](#)
The socket I/O channel.
- [_timeout](#)
Timeout flag.

Static Private Attributes

- static [NIDPATTERN](#)
The regexp for breaking up the Node ID into bytes.

9.97.1 Detailed Description

Connect to a OpenLCB over Tcp/Ip.

Options:

- -host The name of the host (or IP address) to connect to. The default is localhost.
- -port The Tcp/Ip port number to connect with. The default is 12000.
- -nid The Node ID that the computer will assume in the format of `hh:hh:hh:hh:hh:hh` which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:).
- -promiscuousmode Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

9.97.2 Constructor & Destructor Documentation

9.97.2.1 OpenLCBOverTcp()

```
lcc::OpenLCBOverTcp::OpenLCBOverTcp (
    name ,
    ... )
```

Constructor: Connect to a Tcp/Ip OpenLCB network.

Create a connection to a Tcp/Ip network.

Parameters

<i>name</i>	The name of the instance.
...	<p>The options:</p> <ul style="list-style-type: none"> • -host The name of the host (or IP address) to connect to. The default is localhost. • -port The Tcp/Ip port number to connect with. The default is 12000. • -nid The Node ID that the computer will assume in the format of <code>hh:hh:hh:hh:hh:hh</code> which is a 48 bit number expressed as 6 pairs of hexadecimal digits separated by colons (:). • -promiscuousmode Promiscuous mode flag. If true all messages are handled, whether they are addressed to this node or not.

9.97.3 Member Function Documentation

9.97.3.1 _CancelOpenTransport()

```
static lcc::OpenLCBOverTcp::_CancelOpenTransport ( ) [static]
```

Function bound to the `Cancel` button.

Closes the dialog box and returns the empty string.

Returns

The empty string.

9.97.3.2 _OpenTransport()

```
static lcc::OpenLCBOverTcp::_OpenTransport ( ) [static]
```

Function bound to the `Open` button.

Closes the dialog box and returns the options needed to open the transport.

Returns

An option argument list with the `-nid` and `-port` options.

9.97.3.3 buildPortnidandhostDialog()

```
static lcc::OpenLCBOverTcp::buildPortnidandhostDialog ( ) [static]
```

Function to construct the Dialog to ask the user for a port, host, and Node ID.

Returns

The Dialog box object.

9.97.3.4 drawOptionsDialog()

```
static lcc::OpenLCBOverTcp::drawOptionsDialog (
    ... ) [static]
```

Pop up the Options Dialog box.

Pops up the Options Dialog box and collects the options needed to open the [OpenLCBOverTcp](#) object.

Parameters

...	<p>Options:</p> <ul style="list-style-type: none">• -parent Set the parent for this dialog box.• -port The default Tcp/lp port number option.• -host The default Tcp/lp hostname option.• -nid The default Node ID to use for the Node ID option.
-----	--

Returns

Either the null string or an options list.

9.97.3.5 requiredOpts()

```
static lcc::OpenLCBOverTcp::requiredOpts ( ) [static]
```

Return the default option list.

Returns the default options for the options dialog.

Returns

The option value list.

9.97.3.6 sendMessage()

```
lcc::OpenLCBOverTcp::sendMessage (
    ... )
```

Send a message on the OpenLCB bus.

Parameters

...	Message options. See OpenLCBMessage for possible options.
-----	---

9.97.3.7 setMessageHandler()

```
lcc::OpenLCBOverTcp::setMessageHandler (
    handler )
```

Set the message handler.

Generally called from the upper level class to gain access to incoming messages asynchronously.

Parameters

<i>handler</i>	The new handler procedure.
----------------	----------------------------

Returns

The old handler or the empty string if there was no old handler.

9.97.3.8 setSentMessageHandler()

```
lcc::OpenLCBOverTcp::setSentMessageHandler (
    handler )
```

Set the sent message handler.

Generally called from the upper level class to gain access to outgoing messages asynchronously.

Parameters

<i>handler</i>	The new handler procedure.
----------------	----------------------------

Returns

The old handler or the empty string if there was no old handler.

9.97.4 Member Data Documentation

9.97.4.1 `_timeout`

```
lcc::OpenLCBOverTcp::_timeout [private]
```

Timeout flag.

9.97.4.2 `datagrambuffers`

```
lcc::OpenLCBOverTcp::datagrambuffers [private]
```

Datagram buffers.

9.97.4.3 `hostLEntry`

```
lcc::OpenLCBOverTcp::hostLEntry [static]
```

LabelEntry containing the hostname.

9.97.4.4 `messagebuffers`

```
lcc::OpenLCBOverTcp::messagebuffers [private]
```

General message buffers (for multi frame messages)

9.97.4.5 `messagehandler`

```
lcc::OpenLCBOverTcp::messagehandler [private]
```

Message handler.

9.97.4.6 `mtidetail`

```
lcc::OpenLCBOverTcp::mtidetail [private]
```

[MTIDetail](#) component.

This component is used to extract and pack fields from and to a MTI header at a MTI detail level.

9.97.4.7 nidLEntry

```
lcc::OpenLCBOverTcp::nidLEntry [static]
```

LabelEntry containing the Node ID.

9.97.4.8 NIDPATTERN

```
lcc::OpenLCBOverTcp::NIDPATTERN [static], [private]
```

The regexp for breaking up the Node ID into bytes.

9.97.4.9 portLSpin

```
lcc::OpenLCBOverTcp::portLSpin [static]
```

[LabelSpinBox](#) containing possible network ports.

9.97.4.10 portnidandhostDialog

```
lcc::OpenLCBOverTcp::portnidandhostDialog [static]
```

Dialog to ask the user for a port, host, and Node ID.

9.97.4.11 sentMessageHandler

```
lcc::OpenLCBOverTcp::sentMessageHandler [private]
```

Sent Message handler.

9.97.4.12 sock

```
lcc::OpenLCBOverTcp::sock [private]
```

The socket I/O channel.

9.98 lcc::OpenLCBProtocols Class Reference

Supported LCC Protocol name type.

Static Public Member Functions

- static [validate](#) (object)
Validate a protocol name.
- static [InsertProtocolBit](#) (bits, protocol)
Insert a protocol bit.
- static [GetProtocolNames](#) (report)
Return a list of protocol names.
- static [ProtocolLabelString](#) (protocolname)
Return a protocol label string.

Static Public Attributes

- static [protocolstrings](#)
Protocol display strings.
- static [bitstype](#)
Protocol payload type.

9.98.1 Detailed Description

Supported LCC Protocol name type.

9.98.2 Member Function Documentation

9.98.2.1 GetProtocolNames()

```
static lcc::OpenLCBProtocols::GetProtocolNames (
    report ) [static]
```

Return a list of protocol names.

Parameters

<i>report</i>	Protocol bit vector.
---------------	----------------------

Returns

A list of protocol names.

9.98.2.2 InsertProtocolBit()

```
static lcc::OpenLCBProtocols::InsertProtocolBit (
    bits ,
    protocol ) [static]
```

Insert a protocol bit.

Parameters

<i>bits</i>	Protocol bit vector.
<i>protocol</i>	Protocol bit to insert.

Returns

An updated protocol bit vector.

9.98.2.3 ProtocolLabelString()

```
static lcc::OpenLCBProtocols::ProtocolLabelString (
    protocolname ) [static]
```

Return a protocol label string.

Parameters

<i>protocolname</i>	The protocol name.
---------------------	--------------------

Returns

A human readable protocol label string.

9.98.2.4 validate()

```
static lcc::OpenLCBProtocols::validate (
    object ) [static]
```

Validate a protocol name.

Parameters

<i>object</i>	Protocol name to validate.
---------------	----------------------------

9.98.3 Member Data Documentation

9.98.3.1 bitstype

`lcc::OpenLCBProtocols::bitstype` [static]

Protocol payload type.

9.98.3.2 protocolstrings

`lcc::OpenLCBProtocols::protocolstrings` [static]

Protocol display strings.

9.99 OvalWidgets::OvalButton Class Reference

Oval button.

Public Member Functions

- [OvalButton](#) (name, _canvas,...)
Construct an oval button.
- [invoke](#) ()
Method for invoking the button.
- [~OvalButton](#) ()
Destructor, free up all resources.

Private Member Functions

- [_ConfigureText](#) (option, value)
Method to configure the text of the button.

Private Attributes

- [canvas](#)
Canvas the widget is on.

9.99.1 Detailed Description

Oval button.

Works just like a normal button widget.

Parameters

<code>_canvas</code>	The canvas to draw the widget on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The X coordinate (default 0). • <code>-y</code> The Y coordinate (default 0). • <code>-width</code> The width of the button (default 200). • <code>-height</code> The height of the button (default 40). • <code>-background</code> The background color (default white). • <code>-foreground</code> The foreground color (default black). • <code>-fontfamily</code> The font family (default Courier). • <code>-rightsquare</code> Should the right end be square (default no)? • <code>-leftsquare</code> Should the left end be square (default no)? • <code>-text</code> The text of the button (default {}). • <code>-command</code> The command of the button (default {}).

Author

Robert Heller <heller@deepsoft.com>

9.99.2 Constructor & Destructor Documentation

9.99.2.1 OvalButton()

```
OvalWidgets::OvalButton::OvalButton (
    name ,
    _canvas ,
    ... )
```

Construct an oval button.

Parameters

<code>_canvas</code>	The canvas to draw the button on.
<code>...</code>	The option value list.

9.99.2.2 ~OvalButton()

```
OvalWidgets::OvalButton::~~OvalButton ( )
```

Destructor, free up all resources.

9.99.3 Member Function Documentation

9.99.3.1 _ConfigureText()

```
OvalWidgets::OvalButton::_ConfigureText (
    option ,
    value ) [private]
```

Method to configure the text of the button.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value to configure it to.

9.99.3.2 invoke()

```
OvalWidgets::OvalButton::invoke ( )
```

Method for invoking the button.

9.99.4 Member Data Documentation

9.99.4.1 canvas

```
OvalWidgets::OvalButton::canvas [private]
```

Canvas the widget is on.

9.100 OvalWidgets::OvalRoundCornerRectangle Class Reference

Oval Round Corner Rectangle.

Public Member Functions

- [OvalRoundCornerRectangle](#) (name, _canvas,...)
Construct an oval round corner rectangle.
- [~OvalRoundCornerRectangle](#) ()
Destructor free up all resources.

Private Attributes

- [canvas](#)
Canvas the widget is on.

9.100.1 Detailed Description

Oval Round Corner Rectangle.

Just a rectangle with rounded corners.

Parameters

_canvas	The canvas to draw the widget on.
...	Options: <ul style="list-style-type: none">• -x The X coordinate (default 0).• -y The Y coordinate (default 0).• -width The width of the button (default 200).• -height The height of the button (default 40).• -color The color of the rectangle (default white).

Author

Robert Heller <heller@deepsoft.com>

9.100.2 Constructor & Destructor Documentation

9.100.2.1 OvalRoundCornerRectangle()

```
OvalWidgets::OvalRoundCornerRectangle::OvalRoundCornerRectangle (
    name ,
    _canvas ,
    ... )
```

Construct an oval round corner rectangle.

Parameters

<code>_canvas</code>	The canvas to draw the oval round corner rectangle on.
<code>...</code>	The option value list.

9.100.2.2 ~OvalRoundCornerRectangle()

```
OvalWidgets::OvalRoundCornerRectangle::~~OvalRoundCornerRectangle ( )
```

Destructor free up all resources.

9.100.3 Member Data Documentation

9.100.3.1 canvas

```
OvalWidgets::OvalRoundCornerRectangle::canvas [private]
```

Canvas the widget is on.

9.101 OvalWidgets::OvalScale Class Reference

An oval scale widget, much like a standard Tk scale widget.

Public Member Functions

- [OvalScale](#) (name, _canvas,...)
Constructor initialize and build an Oval Scale.
- [~OvalScale](#) ()
Destructor free up all resources.
- [set](#) (value)
Method to set the value of the scale.
- [get](#) ()
Method to get the value of the scale.

Private Member Functions

- [_ConfigureXY](#) (option, value)
Method to configure an x or y coordinate.
- [_ConfigureWL](#) (option, value)
Method to configure a width or length option.
- [_ConfigureText](#) (option, value)
Method to configure the text of the button.
- [_MoveThumb](#) (mx, my)
Method bound to button1 motion move the thumb.
- [_BaseRect](#) (mx, my)
Method bound to button 1 presses.

Private Attributes

- [canvas](#)
Canvas the widget is on.
- [_value](#)
Value of the scale.

9.101.1 Detailed Description

An oval scale widget, much like a standard Tk scale widget.

Parameters

_canvas	The canvas to draw the widget on.
-------------------------	-----------------------------------

Parameters

...	Options: <ul style="list-style-type: none"> • -x The X coordinate (default 0). • -y The Y coordinate (default 0). • -width The width of the scale (default 40). • -length The length of the scale (default 100). • -background The background color (default white). • -foreground The background color (default black). • -orientation The orientation of the scrollbar, horizontal or vertical (readonly, default vertical). • -from Start value of the scale (readonly, default 0). • -to End value of the scale (readonly, default 100). • -digits Number of digits to display (readonly, default 2). • -text Scale label (default ""). • -showvalue Flag to indicate if the value should be displayed (readonly, default yes). • -variable Variable name to hold the value (default {}). • -bigincrement Large increment value (readonly, default 0). • -command The command of the scrollbar (default {}).
-----	---

Author

Robert Heller <heller@deepsoft.com>

9.101.2 Constructor & Destructor Documentation

9.101.2.1 OvalScale()

```
OvalWidgets::OvalScale::OvalScale (
    name ,
    _canvas ,
    ... )
```

Constructor initialize and build an Oval Scale.

Parameters

<code>_canvas</code>	The canvas to draw the scrollbar on.
<code>...</code>	The option value list.

9.101.2.2 ~OvalScale()

```
OvalWidgets::OvalScale::~~OvalScale ( )
```

Destructor free up all resources.

9.101.3 Member Function Documentation

9.101.3.1 _BaseRect()

```
OvalWidgets::OvalScale::_BaseRect (
    mx ,
    my ) [private]
```

Method bound to button 1 presses.

Parameters

<i>mx</i>	Mouse X coordinate.
<i>my</i>	Mouse Y coordinate.

9.101.3.2 _ConfigureText()

```
OvalWidgets::OvalScale::_ConfigureText (
    option ,
    value ) [private]
```

Method to configure the text of the button.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value to configure it to.

9.101.3.3 _ConfigureWL()

```
OvalWidgets::OvalScale::_ConfigureWL (  
    option ,  
    value ) [private]
```

Method to configure a width or length option.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value of the option.

9.101.3.4 _ConfigureXY()

```
OvalWidgets::OvalScale::_ConfigureXY (  
    option ,  
    value ) [private]
```

Method to configure an x or y coordinate.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value of the option.

9.101.3.5 _MoveThumb()

```
OvalWidgets::OvalScale::_MoveThumb (  
    mx ,  
    my ) [private]
```

Method bound to button1 motion move the thumb.

Parameters

<i>mx</i>	Mouse X coordinate.
<i>my</i>	Mouse Y coordinate.

9.101.3.6 `get()`

```
OvalWidgets::OvalScale::get ( )
```

Method to get the value of the scale.

9.101.3.7 `set()`

```
OvalWidgets::OvalScale::set (
    value )
```

Method to set the value of the scale.

Parameters

<i>value</i>	The value to set the scale to.
--------------	--------------------------------

9.101.4 Member Data Documentation

9.101.4.1 `_value`

```
OvalWidgets::OvalScale::_value [private]
```

Value of the scale.

9.101.4.2 `canvas`

```
OvalWidgets::OvalScale::canvas [private]
```

Canvas the widget is on.

9.102 `OvalWidgets::OvalSlider` Class Reference

Oval Slider.

Public Member Functions

- [OvalSlider](#) (name, _canvas,...)
Construct an oval button.
- [set](#) (value)
Method to set the value of the slider.
- [get](#) ()
Method to get the current value.

Private Member Functions

- [_ConfigureL](#) (option, value)
Method to configure the length option.
- [_ConfigureText](#) (option, value)
Method to configure the text of the button.
- [_VerifyBitmap](#) (option, value)
Method to validate a bitmap option.
- [_MoveThumb](#) (mx, my)
Method bound to the button 1 motion on the thumb.

Private Attributes

- [canvas](#)
Canvas the widget is on.
- [_value](#)
Value of the scale.

9.102.1 Detailed Description

Oval Slider.

This is like the activation control for the Star Trek NG Transporter.

Parameters

_canvas	The canvas to draw the widget on.
-------------------------	-----------------------------------

Parameters

...	<p>Options:</p> <ul style="list-style-type: none"> • -x The X coordinate (default 0). • -y The Y coordinate (default 0). • -width The width of the slider button (default 200). • -height The height of the slider button (default 40). • -length The length of the slider (default 600). • -background The background color (default white). • -foreground The background color (default black). • -fontfamily The font family (default Courier). • -rightsquare Should the right end be square (default no)? • -leftsquare Should the left end be square (default no)? • -text The text of the button (default {}). • -command The command of the button (default {}). • -from Start value of the scale (readonly, default 0). • -to End value of the scale (readonly, default 100). • -digits Number of digits to display (readonly, default 2). • -showvalue Flag to indicate if the value should be displayed (readonly, default yes). • -variable Variable name to hold the value (default {}). • -stipple Stipple bitmap to use (readonly, default HBar).
-----	--

Author

Robert Heller <heller@deepsoft.com>

9.102.2 Constructor & Destructor Documentation

9.102.2.1 OvalSlider()

```
OvalWidgets::OvalSlider::OvalSlider (
    name ,
    _canvas ,
    ... )
```

Construct an oval button.

Parameters

<i>_canvas</i>	The canvas to draw the button on.
<i>...</i>	The option value list.

9.102.3 Member Function Documentation

9.102.3.1 `_ConfigureL()`

```
OvalWidgets::OvalSlider::_ConfigureL (  
    option ,  
    value ) [private]
```

Method to configure the length option.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value of the option.

9.102.3.2 `_ConfigureText()`

```
OvalWidgets::OvalSlider::_ConfigureText (  
    option ,  
    value ) [private]
```

Method to configure the text of the button.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value to configure it to.

9.102.3.3 `_MoveThumb()`

```
OvalWidgets::OvalSlider::_MoveThumb (  

```

```
mx ,  
my ) [private]
```

Method bound to the button 1 motion on the thumb.

Parameters

<i>mx</i>	Mouse X value.
<i>my</i>	Mouse Y value.

9.102.3.4 _VerifyBitmap()

```
OvalWidgets::OvalSlider::_VerifyBitmap (  
    option ,  
    value ) [private]
```

Method to validate a bitmap option.

Parameters

<i>option</i>	The name of the option to validate.
<i>value</i>	The value to validate.

9.102.3.5 get()

```
OvalWidgets::OvalSlider::get ( )
```

Method to get the current value.

9.102.3.6 set()

```
OvalWidgets::OvalSlider::set (  
    value )
```

Method to set the value of the slider.

Parameters

<i>value</i>	The value to set.
--------------	-------------------

9.102.4 Member Data Documentation

9.102.4.1 `_value`

OvalWidgets::OvalSlider::_value [private]

Value of the scale.

9.102.4.2 `canvas`

OvalWidgets::OvalSlider::canvas [private]

Canvas the widget is on.

9.103 OvalWidgets::OvalScrollBar Class Reference

Oval ScrollBar.

Public Member Functions

- [OvalScrollBar](#) (name, _canvas,...)
Constructor initialize and build an Oval Scrollbar.
- [~OvalScrollBar](#) ()
Destructor free up all resources.
- [resize](#) (newMin, newMax)
Resize method.
- [delta](#) (deltaX, deltaY)
Method to return a real number indicating the fractional change in the scrollbar setting that corresponds to a given change in slider position.
- [fraction](#) (x, y)
Method to return a real number between 0 and 1 indicating where the point given by x and y lies in the trough area of the scrollbar.
- [get](#) ()
Method to return the scrollbar settings in the form of a list whose elements are the arguments to the most recent set widget command.
- [identify](#) (x, y)
Method to return the name of the element under the point given by x and y (such as arrow1), or an empty string if the point does not lie in any element of the scrollbar.
- [set](#) (first, last)
This method is invoked by the scrollbar's associated widget to tell the scrollbar about the current view in the widget.

Private Member Functions

- [_ConfigureXY](#) (option, value)
Method to configure an x or y coordinate.
- [_ConfigureWL](#) (option, value)
Method to configure a width or length option.
- [_MoveThumb](#) (mx, my)
Method bound to button1 motion move the thumb.
- [_BaseRect](#) (mx, my)
Method bound to button 1 presses.
- [_Command](#) (...)
Method used to invoke the command as the thumb is moved.

Private Attributes

- [canvas](#)
Canvas the widget is on.
- [_lastSet](#)
Holds the last scrollbar settings.

9.103.1 Detailed Description

Oval ScrollBar.

Works just like a normal scrollbar widget.

Parameters

_canvas	The canvas to draw the widget on.
...	Options: <ul style="list-style-type: none"> • -x The X coordinate (default 0). • -y The Y coordinate (default 0). • -width The width of the scrollbar (default 40). • -length The length of the scrollbar (default 100). • -background The background color (default white). • -foreground The background color (default black). • -orientation The orientation of the scrollbar, horizontal or vertical (readonly, default vertical). • -command The command of the scrollbar (default {}).

Author

Robert Heller <heller@deepsoft.com>

9.103.2 Constructor & Destructor Documentation**9.103.2.1 OvalScrollBar()**

```
OvalWidgets::OvalScrollBar::OvalScrollBar (
    name ,
    _canvas ,
    ... )
```

Constructor initialize and build an Oval Scrollbar.

Parameters

<code>_canvas</code>	The canvas to draw the scrollbar on.
<code>...</code>	The option value list.

9.103.2.2 ~OvalScrollBar()

```
OvalWidgets::OvalScrollBar::~~OvalScrollBar ( )
```

Destructor free up all resources.

9.103.3 Member Function Documentation**9.103.3.1 _BaseRect()**

```
OvalWidgets::OvalScrollBar::_BaseRect (
    mx ,
    my ) [private]
```

Method bound to button 1 presses.

Parameters

<i>mx</i>	Mouse X coordinate.
<i>my</i>	Mouse Y coordinate.

9.103.3.2 _Command()

```
OvalWidgets::OvalScrollBar::_Command (  
    ... ) [private]
```

Method used to invoke the command as the thumb is moved.

Parameters

...	passed to -command option.
-----	----------------------------

9.103.3.3 _ConfigureWL()

```
OvalWidgets::OvalScrollBar::_ConfigureWL (  
    option ,  
    value ) [private]
```

Method to configure a width or length option.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value of the option.

9.103.3.4 _ConfigureXY()

```
OvalWidgets::OvalScrollBar::_ConfigureXY (  
    option ,  
    value ) [private]
```

Method to configure an x or y coordinate.

Parameters

<i>option</i>	The name of the option to configure.
<i>value</i>	The value of the option.

9.103.3.5 _MoveThumb()

```
OvalWidgets::OvalScrollBar::_MoveThumb (
    mx ,
    my ) [private]
```

Method bound to button1 motion move the thumb.

Parameters

<i>mx</i>	Mouse X coordinate.
<i>my</i>	Mouse Y coordinate.

9.103.3.6 delta()

```
OvalWidgets::OvalScrollBar::delta (
    deltaX ,
    deltaY )
```

Method to return a real number indicating the fractional change in the scrollbar setting that corresponds to a given change in slider position.

For example, if the scrollbar is horizontal, the result indicates how much the scrollbar setting must change to move the slider *deltaX* pixels to the right (*deltaY* is ignored in this case). If the scrollbar is vertical, the result indicates how much the scrollbar setting must change to move the slider *deltaY* pixels down. The arguments and the result may be zero or negative.

Parameters

<i>deltaX</i>	Amount of movement if scrollbar is horizontal.
<i>deltaY</i>	Amount of movement if scrollbar is vertical.

9.103.3.7 fraction()

```
OvalWidgets::OvalScrollBar::fraction (
```

```
x ,
y )
```

Method to return a real number between 0 and 1 indicating where the point given by x and y lies in the trough area of the scrollbar.

The value 0 corresponds to the top or left of the trough, the value 1 corresponds to the bottom or right, 0.5 corresponds to the middle, and so on. X and y must be pixel coordinates relative to the scrollbar widget. If x and y refer to a point outside the trough, the closest point in the trough is used.

Parameters

x	The X coordinate to check.
y	The Y coordinate to check.

9.103.3.8 get()

```
OvalWidgets::OvalScrollBar::get ( )
```

Method to return the scrollbar settings in the form of a list whose elements are the arguments to the most recent set widget command.

9.103.3.9 identify()

```
OvalWidgets::OvalScrollBar::identify (
    x ,
    y )
```

Method to return the name of the element under the point given by x and y (such as arrow1), or an empty string if the point does not lie in any element of the scrollbar.

X and y must be pixel coordinates relative to the scrollbar widget.

Parameters

x	The X coordinate to check.
y	The Y coordinate to check.

9.103.3.10 resize()

```
OvalWidgets::OvalScrollBar::resize (
```

```
newMin ,  
newMax )
```

Resize method.

Method update the range of the scroll region.

Parameters

<i>newMin</i>	new minimum of the scroll region.
<i>newMax</i>	new maximum of the scroll region.

9.103.3.11 set()

```
OvalWidgets::OvalScrollBar::set (  
    first ,  
    last )
```

This method is invoked by the scrollbar's associated widget to tell the scrollbar about the current view in the widget.

The command takes two arguments, each of which is a real fraction between 0 and 1. The fractions describe the range of the document that is visible in the associated widget. For example, if first is 0.2 and last is 0.4, it means that the first part of the document visible in the window is 20% of the way through the document, and the last visible part is 40% of the way through.

Parameters

<i>first</i>	First visible fraction.
<i>last</i>	Last visible fraction.

9.103.4 Member Data Documentation

9.103.4.1 _lastSet

```
OvalWidgets::OvalScrollBar::_lastSet [private]
```

Holds the last scrollbar settings.

9.103.4.2 canvas

```
OvalWidgets::OvalScrollBar::canvas [private]
```

Canvas the widget is on.

9.104 FCFSupport::Owner Class Reference

The [Owner](#) class describes a car owner.

```
#include <Owner.h>
```

Public Member Functions

- [Owner](#) ()
The default constructor initializes all fields to the empty string.
- [Owner](#) ([Owner](#) &other)
The copy constructor copies the contents of another [Owner](#) to this one.
- [Owner](#) & operator= ([Owner](#) &other)
The Assignment operator copies the contents of another [Owner](#) to this one.
- [Owner](#) (const char *i, const char *n, const char *c)
The full constructor initializes the class instance from user supplied parameters.
- ~[Owner](#) ()
The destructor does nothing special.
- const char * [Initials](#) () const
Return this owner's initials.
- const char * [Name](#) () const
Return this owner's name.
- const char * [Comment](#) () const
Return commentary about this owner.

Private Attributes

- string [initials](#)
This owner's initials.
- string [name](#)
This owner's name.
- string [comment](#)
Commentary about this owner.

9.104.1 Detailed Description

The [Owner](#) class describes a car owner.

A car owned has a set of (three letter) initials, a full name, and an (optional) comment. This information is just used for informational purposes.

Author

Robert Heller <heller@deepsoft.com>

9.104.2 Constructor & Destructor Documentation

9.104.2.1 Owner() [1/3]

```
FCFSupport::Owner::Owner ( ) [inline]
```

The default constructor initializes all fields to the empty string.

References [comment](#), [initials](#), and [name](#).

9.104.2.2 Owner() [2/3]

```
FCFSupport::Owner::Owner (
    Owner & other ) [inline]
```

The copy constructor copies the contents of another [Owner](#) to this one.

Parameters

<i>other</i>	The other Owner object.
--------------	---

References [comment](#), [initials](#), and [name](#).

9.104.2.3 Owner() [3/3]

```
FCFSupport::Owner::Owner (
    const char * i,
```

```
const char * n,  
const char * c ) [inline]
```

The full constructor initializes the class instance from user supplied parameters.

Parameters

<i>i</i>	The owner's initials.
<i>n</i>	The owner's name.
<i>c</i>	Commentary about this owner.

References [comment](#), [i](#), [initials](#), and [name](#).

9.104.2.4 ~Owner()

```
FCFSupport::Owner::~~Owner ( ) [inline]
```

The destructor does nothing special.

9.104.3 Member Function Documentation

9.104.3.1 Comment()

```
const char * FCFSupport::Owner::Comment ( ) const [inline]
```

Return commentary about this owner.

References [comment](#).

9.104.3.2 Initials()

```
const char * FCFSupport::Owner::Initials ( ) const [inline]
```

Return this owner's initials.

References [initials](#).

9.104.3.3 Name()

```
const char * FCFSupport::Owner::Name ( ) const [inline]
```

Return this owner's name.

References [name](#).

9.104.3.4 operator=()

```
Owner & FCFSupport::Owner::operator= (
    Owner & other ) [inline]
```

The Assignment operator copies the contents of another [Owner](#) to this one.

Parameters

<i>other</i>	The other Owner object.
--------------	---

References [comment](#), [initials](#), and [name](#).

9.104.4 Member Data Documentation

9.104.4.1 comment

```
string FCFSupport::Owner::comment [private]
```

Commentary about this owner.

Referenced by [Comment\(\)](#), [operator=\(\)](#), and [Owner\(\)](#).

9.104.4.2 initials

```
string FCFSupport::Owner::initials [private]
```

This owner's initials.

Referenced by [Initials\(\)](#), [operator=\(\)](#), and [Owner\(\)](#).

9.104.4.3 name

```
string FCFSupport::Owner::name [private]
```

This owner's name.

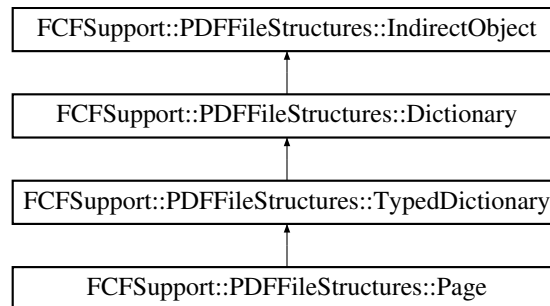
Referenced by [Name\(\)](#), [operator=\(\)](#), and [Owner\(\)](#).

9.105 FCFSupport::PDFFileStructures::Page Class Reference

Describes a single page.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::Page:



Public Member Functions

- [Page](#) ([ResourceDictionary](#) *r=NULL, [Rectangle](#) *mBox=NULL, [Rectangle](#) *cBox=NULL, unsigned long int obj↔Num=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~Page](#) ()
Destructor.
- void [AppendStream](#) ([PDFStream](#) *s)
Append a stream to the page.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const
Write an object directly.

Private Attributes

- [PageTree](#) * [parent](#)
The page's parent page tree.
- [ResourceDictionary](#) * [resources](#)
The page's resources.
- [Rectangle](#) * [mediaBox](#)
This page's media box.
- [Rectangle](#) * [cropBox](#)
This page's crop box.
- [PDFStreamVector](#) [contents](#)
This page's contents vector.

Friends

- class [PageTree](#)

9.105.1 Detailed Description

Describes a single page.

9.105.2 Constructor & Destructor Documentation

9.105.2.1 Page()

```
FCFSupport::PDFFileStructures::Page::Page (
    ResourceDictionary * r = NULL,
    Rectangle * mBox = NULL,
    Rectangle * cBox = NULL,
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a fresh [Page](#) object.

Parameters

<i>r</i>	Resource Dictionary .
<i>mBox</i>	Media box.
<i>cBox</i>	Crop box.
<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [cropBox](#), [mediaBox](#), [parent](#), and [resources](#).

9.105.2.2 ~Page()

```
FCFSupport::PDFFileStructures::Page::~~Page ( ) [inline]
```

Destructor.

9.105.3 Member Function Documentation

9.105.3.1 AppendStream()

```
void FCFSupport::PDFFileStructures::Page::AppendStream (
    PDFStream * s ) [inline]
```

Append a stream to the page.

Parameters

<i>s</i>	The stream to append.
----------	-----------------------

References [contents](#).

9.105.3.2 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::Page::WriteDictionaryElements (
    ostream & stream ) const [protected], [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::TypedDictionary](#).

9.105.4 Friends And Related Function Documentation

9.105.4.1 PageTree

```
friend class PageTree [friend]
```

9.105.5 Member Data Documentation

9.105.5.1 contents

```
PDFStreamVector FCFSupport::PDFFileStructures::Page::contents [private]
```

This page's contents vector.

Referenced by [AppendStream\(\)](#).

9.105.5.2 cropBox

```
Rectangle* FCFSupport::PDFFileStructures::Page::cropBox [private]
```

This page's crop box.

Referenced by [Page\(\)](#).

9.105.5.3 mediaBox

```
Rectangle* FCFSupport::PDFFileStructures::Page::mediaBox [private]
```

This page's media box.

Referenced by [Page\(\)](#).

9.105.5.4 parent

`PageTree* FCFSupport::PDFFileStructures::Page::parent [private]`

The page's parent page tree.

Referenced by `FCFSupport::PDFFileStructures::PageTree::AddPage()`, and `Page()`.

9.105.5.5 resources

`ResourceDictionary* FCFSupport::PDFFileStructures::Page::resources [private]`

The page's resources.

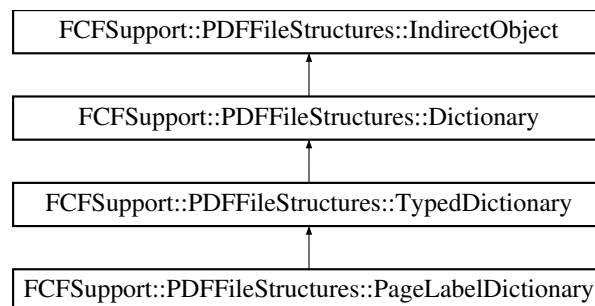
Referenced by `Page()`.

9.106 FCFSupport::PDFFileStructures::PageLabelDictionary Class Reference

`Page` label dictionary.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for `FCFSupport::PDFFileStructures::PageLabelDictionary`:



Public Types

- enum `NumberStyle` {
`None` = 0 , `Decimal` = 'D' , `UpperRoman` = 'R' , `LowerRoman` = 'r' ,
`UpperLetters` = 'A' , `LowerLetters` = 'a' }

Numbering style.

Public Member Functions

- [PageLabelDictionary](#) ([NumberStyle](#) s=[None](#), const string p="", int st=1, unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)

Constructor.

- [~PageLabelDictionary](#) ()

Destructor.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const

Write an object directly.

Private Attributes

- [NumberStyle](#) style

Page numbering style.

- string [prefix](#)

Prefix string.

- int [start](#)

Page numbering start.

9.106.1 Detailed Description

[Page](#) label dictionary.

Author

Robert Heller <heller@deepsoft.com>

9.106.2 Member Enumeration Documentation

9.106.2.1 NumberStyle

enum [FCFSupport::PDFFileStructures::PageLabelDictionary::NumberStyle](#)

Numbering style.

Enumerator

None	None.
Decimal	Decimal arabic numerals.
UpperRoman	Uppercase roman numerals.
LowerRoman	Lowercase roman numerals.
UpperLetters	Uppercase letters.
LowerLetters	Lowercase letters.

9.106.3 Constructor & Destructor Documentation

9.106.3.1 PageLabelDictionary()

```
FCFSupport::PDFFileStructures::PageLabelDictionary::PageLabelDictionary (
    NumberStyle s = None,
    const string p = "",
    int st = 1,
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a fresh Pager object.

Parameters

<i>s</i>	Numbering style.
<i>p</i>	Page label prefix string.
<i>st</i>	Page number starting value for this range.
<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [prefix](#), [start](#), and [style](#).

9.106.3.2 ~PageLabelDictionary()

```
FCFSupport::PDFFileStructures::PageLabelDictionary::~~PageLabelDictionary ( ) [inline]
```

Destructor.

9.106.4 Member Function Documentation

9.106.4.1 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::PageLabelDictionary::WriteDictionaryElements (
    ostream & stream ) const [protected], [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::TypedDictionary](#).

9.106.5 Member Data Documentation

9.106.5.1 prefix

```
string FCFSupport::PDFFileStructures::PageLabelDictionary::prefix [private]
```

Prefix string.

Referenced by [PageLabelDictionary\(\)](#).

9.106.5.2 start

```
int FCFSupport::PDFFileStructures::PageLabelDictionary::start [private]
```

[Page](#) numbering start.

Referenced by [PageLabelDictionary\(\)](#).

9.106.5.3 style

```
NumberStyle FCFSupport::PDFFileStructures::PageLabelDictionary::style [private]
```

[Page](#) numbering style.

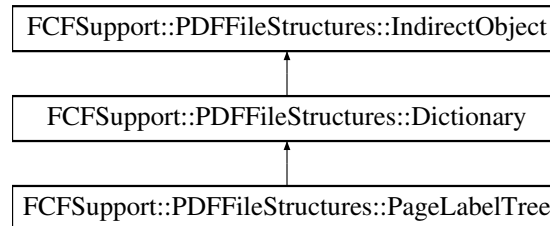
Referenced by [PageLabelDictionary\(\)](#).

9.107 FCFSupport::PDFFileStructures::PageLabelTree Class Reference

A tree of page label dictionaries.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::PageLabelTree:



Public Member Functions

- [PageLabelTree](#) (unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~PageLabelTree](#) ()
Destructor.
- void [AddPageLabelTree](#) ([PageLabelTree](#) *node)
Add a page label tree node.
- void [AddPageLabelDictionary](#) (int number, [PageLabelDictionary](#) *pld)
Add a page label dictionary.
- int [Size](#) () const
Return the number of sub-nodes in this page label tree.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const
Write an object directly.

Private Member Functions

- void [GetKidLimits](#) (int &lower, int &upper) const
Get limits of the kids vector.

Private Attributes

- bool [isRoot](#)
Root flag.
- [PageLabelTreeKidVector](#) kids
Kid nodes.
- [PageLabelDictionaryNumMap](#) nums
Num nodes.

9.107.1 Detailed Description

A tree of page label dictionaries.

Author

Robert Heller <heller@deepsoft.com>

9.107.2 Constructor & Destructor Documentation

9.107.2.1 PageLabelTree()

```
FCFSupport::PDFFileStructures::PageLabelTree::PageLabelTree (
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a new page label tree.

Parameters

<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [isRoot](#).

9.107.2.2 ~PageLabelTree()

```
FCFSupport::PDFFileStructures::PageLabelTree::~~PageLabelTree ( ) [inline]
```

Destructor.

9.107.3 Member Function Documentation

9.107.3.1 AddPageLabelDictionary()

```
void FCFSupport::PDFFileStructures::PageLabelTree::AddPageLabelDictionary (
    int number,
    PageLabelDictionary * pld ) [inline]
```

Add a page label dictionary.

Parameters

<i>number</i>	The page label dictionary start page number.
<i>pld</i>	Page label dictionary pointer.

References [nums](#).

Referenced by [FCFSupport::PDFFileStructures::CatalogDictionary::AddPageLabelDictionary\(\)](#).

9.107.3.2 AddPageLabelTree()

```
void FCFSupport::PDFFileStructures::PageLabelTree::AddPageLabelTree (
    PageLabelTree * node ) [inline]
```

Add a page label tree node.

Parameters

<i>node</i>	The page label tree node.
-------------	---------------------------

References [isRoot](#), and [kids](#).

Referenced by [FCFSupport::PDFFileStructures::CatalogDictionary::AddPageLabelTree\(\)](#).

9.107.3.3 GetKidLimits()

```
void FCFSupport::PDFFileStructures::PageLabelTree::GetKidLimits (
    int & lower,
    int & upper ) const [private]
```

Get limits of the kids vector.

Parameters

<i>lower</i>	Lower end.
<i>upper</i>	Upper end.

9.107.3.4 Size()

```
int FCFSupport::PDFFileStructures::PageLabelTree::Size ( ) const [inline]
```

Return the number of sub-nodes in this page label tree.

References [kids](#), and [nums](#).

9.107.3.5 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::PageLabelTree::WriteDictionaryElements (
    ostream & stream ) const [protected], [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::Dictionary](#).

9.107.4 Member Data Documentation

9.107.4.1 isRoot

```
bool FCFSupport::PDFFileStructures::PageLabelTree::isRoot [private]
```

Root flag.

Referenced by [AddPageLabelTree\(\)](#), and [PageLabelTree\(\)](#).

9.107.4.2 kids

```
PageLabelTreeKidVector FCFSupport::PDFFileStructures::PageLabelTree::kids [private]
```

Kid nodes.

Referenced by [AddPageLabelTree\(\)](#), and [Size\(\)](#).

9.107.4.3 nums

`PageLabelDictionaryNumMap` `FCFSupport::PDFFileStructures::PageLabelTree::nums` [private]

Num nodes.

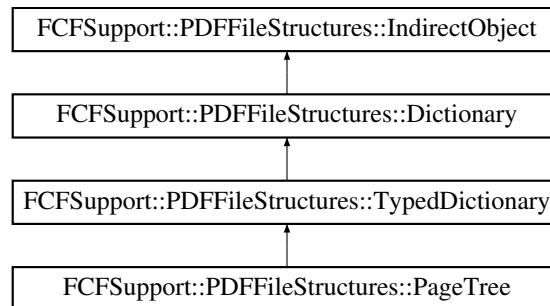
Referenced by [AddPageLabelDictionary\(\)](#), and [Size\(\)](#).

9.108 FCFSupport::PDFFileStructures::PageTree Class Reference

A tree of pages.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::PageTree:



Public Member Functions

- [PageTree](#) ([ResourceDictionary](#) *r=NULL, [Rectangle](#) *mBox=NULL, [Rectangle](#) *cBox=NULL, unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)

Constructor.

- [~PageTree](#) ()

Destructor.

- void [AddPage](#) ([Page](#) *thepage)

Add a page.

- void [AddPageTree](#) ([PageTree](#) *thepagetree)

Add a tree of pages.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const

Write an object directly.

Private Attributes

- [PageTree](#) * [parent](#)
This page tree's parent.
- [ResourceDictionary](#) * [resources](#)
Resources for this page tree.
- [Rectangle](#) * [mediaBox](#)
Media box for this page tree.
- [Rectangle](#) * [cropBox](#)
Crop box for this page tree.
- vector< [TypedDictionary](#) * > [pagenodes](#)
The children of this page tree node.

9.108.1 Detailed Description

A tree of pages.

Author

Robert Heller <heller@deepsoft.com>

9.108.2 Constructor & Destructor Documentation

9.108.2.1 PageTree()

```
FCFSupport::PDFFileStructures::PageTree::PageTree (
    ResourceDictionary * r = NULL,
    Rectangle * mBox = NULL,
    Rectangle * cBox = NULL,
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a fresh Pager object.

Parameters

<i>r</i>	Resource Dictionary .
<i>mBox</i>	Media box.
<i>cBox</i>	Crop box.
<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [cropBox](#), [mediaBox](#), [parent](#), and [resources](#).

9.108.2.2 ~PageTree()

```
FCFSupport::PDFFileStructures::PageTree::~~PageTree ( ) [inline]
```

Destructor.

9.108.3 Member Function Documentation

9.108.3.1 AddPage()

```
void FCFSupport::PDFFileStructures::PageTree::AddPage (
    Page * thepage ) [inline]
```

Add a page.

Parameters

<i>thepage</i>	The page to add.
----------------	------------------

References [pagenodes](#), and [FCFSupport::PDFFileStructures::Page::parent](#).

Referenced by [FCFSupport::PDFFileStructures::CatalogDictionary::AddPage\(\)](#).

9.108.3.2 AddPageTree()

```
void FCFSupport::PDFFileStructures::PageTree::AddPageTree (
    PageTree * thepagetree ) [inline]
```

Add a tree of pages.

Parameters

<i>thepagetree</i>	The page tree to add.
--------------------	-----------------------

References [pagenodes](#), and [parent](#).

Referenced by [FCFSupport::PDFFileStructures::CatalogDictionary::AddPageTree\(\)](#).

9.108.3.3 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::PageTree::WriteDictionaryElements (
    ostream & stream ) const [protected], [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::TypedDictionary](#).

9.108.4 Member Data Documentation

9.108.4.1 cropBox

```
Rectangle* FCFSupport::PDFFileStructures::PageTree::cropBox [private]
```

Crop box for this page tree.

Referenced by [PageTree\(\)](#).

9.108.4.2 mediaBox

```
Rectangle* FCFSupport::PDFFileStructures::PageTree::mediaBox [private]
```

Media box for this page tree.

Referenced by [PageTree\(\)](#).

9.108.4.3 pagenodes

```
vector<TypedDictionary *> FCFSupport::PDFFileStructures::PageTree::pagenodes [private]
```

The children of this page tree node.

Referenced by [AddPage\(\)](#), and [AddPageTree\(\)](#).

9.108.4.4 parent

```
PageTree* FCFSupport::PDFFileStructures::PageTree::parent [private]
```

This page tree's parent.

Referenced by [AddPageTree\(\)](#), and [PageTree\(\)](#).

9.108.4.5 resources

```
ResourceDictionary* FCFSupport::PDFFileStructures::PageTree::resources [private]
```

Resources for this page tree.

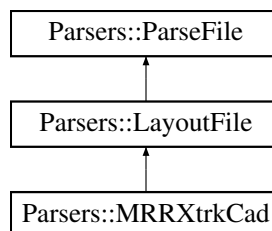
Referenced by [PageTree\(\)](#).

9.109 Parsers::ParseFile Class Reference

Virtual base class for file-based parsers.

```
#include <ParseFile.h>
```

Inheritance diagram for Parsers::ParseFile:



Public Member Functions

- const char * [SourceFile](#) () const
Return the name of the source file.
- [ParseFile](#) (const char *filename)
Constructor.
- virtual [~ParseFile](#) ()
Destructor.
- int [ProcessFile](#) (ostream &err)
open file and parse it.

Protected Member Functions

- virtual int [Parse](#) ()=0
The parser itself, supplied by derived classes.
- virtual void [ParseError](#) (const char *)=0
The parser's error handler, supplied by derived classes.

Protected Attributes

- char * [lp](#)
Input line buffer pointer.
- FILE * [fp](#)
Input file pointer.
- int [source_line](#)
Source line number.
- char [line_buffer](#) [[buffersize](#)]
Input line buffer.
- ostream * [errorstream](#)
Stream for error reporting.
- char * [source_file](#)
Name of the source file.

Static Protected Attributes

- static const int [buffersize](#) = 1024
Size of line buffer.

9.109.1 Detailed Description

Virtual base class for file-based parsers.

Contains all of the base level input and error output support members.

Author

Robert Heller <heller@deepsoft.com>

9.109.2 Constructor & Destructor Documentation

9.109.2.1 ParseFile()

```
Parsers::ParseFile::ParseFile (
    const char * filename ) [inline]
```

Constructor.

Make a local copy of the source file name, Other members are initialized.

References [fp](#), [lp](#), [source_file](#), and [source_line](#).

9.109.2.2 ~ParseFile()

```
virtual Parsers::ParseFile::~~ParseFile ( ) [inline], [virtual]
```

Destructor.

Free up memory.

References [source_file](#).

9.109.3 Member Function Documentation

9.109.3.1 Parse()

```
virtual int Parsers::ParseFile::Parse ( ) [protected], [pure virtual]
```

The parser itself, supplied by derived classes.

Implemented in [Parsers::LayoutFile](#).

9.109.3.2 ParseError()

```
virtual void Parsers::ParseFile::ParseError (
    const char * ) [protected], [pure virtual]
```

The parser's error handler, supplied by derived classes.

Implemented in [Parsers::LayoutFile](#).

9.109.3.3 ProcessFile()

```
int Parsers::ParseFile::ProcessFile (
    ostream & err )
```

open file and parse it.

Parameters

<i>err</i>	Output string to write error messages to.
------------	---

9.109.3.4 SourceFile()

```
const char * Parsers::ParseFile::SourceFile ( ) const [inline]
```

Return the name of the source file.

References [source_file](#).

9.109.4 Member Data Documentation

9.109.4.1 buffersize

```
const int Parsers::ParseFile::buffersize = 1024 [static], [protected]
```

Size of line buffer.

9.109.4.2 errorstream

```
ostream* Parsers::ParseFile::errorstream [protected]
```

Stream for error reporting.

9.109.4.3 fp

```
FILE* Parsers::ParseFile::fp [protected]
```

Input file pointer.

Referenced by [ParseFile\(\)](#).

9.109.4.4 line_buffer

```
char Parsers::ParseFile::line_buffer[buffer_size] [protected]
```

Input line buffer.

9.109.4.5 lp

```
char* Parsers::ParseFile::lp [protected]
```

Input line buffer pointer.

Referenced by [ParseFile\(\)](#).

9.109.4.6 source_file

```
char* Parsers::ParseFile::source_file [protected]
```

Name of the source file.

Referenced by [ParseFile\(\)](#), [SourceFile\(\)](#), and [~ParseFile\(\)](#).

9.109.4.7 source_line

```
int Parsers::ParseFile::source_line [protected]
```

Source line number.

Used for error reporting.

Referenced by [ParseFile\(\)](#).

9.110 ParseXML Class Reference

Class to hold an XML tree.

Public Member Functions

- [ParseXML](#) (name, xml,...)
The constructor parses the XML string and stores it as a child of the rootnode component.
- [displayTree](#) (fp="stdout")
Display the XML tree.

Static Public Member Functions

- static [validate](#) (object)
Validation typemethod.

Private Member Functions

- [_elementstart](#) (tag, attrlist,...)
Callback called at the start of of XML element.
- [_elementend](#) (tag,...)
Callback called at the end of an XML element.
- [_characterdata](#) (data)
Callback called with the text enclosed by an element.

Private Attributes

- [rootnode](#)
The (dummy) root node.
- [nodeStack](#)
Temp variable used during parsing.

9.110.1 Detailed Description

Class to hold an XML tree.

This class parses an XML string and stores the result as a DOM Element tree.

Parameters

<i>name</i>	Generally %%AUTO%% is passed.
<i>xml</i>	The XML string.
<i>—</i>	Options. None at present.

9.110.2 Constructor & Destructor Documentation

9.110.2.1 ParseXML()

```
ParseXML::ParseXML (
    name ,
    xml ,
    ... )
```

The constructor parses the XML string and stores it as a child of the rootnode component.

Parameters

<i>xml</i>	The XML string.
<i>_</i>	Options. None at present.

9.110.3 Member Function Documentation

9.110.3.1 _characterdata()

```
ParseXML::_characterdata (
    data ) [private]
```

Callback called with the text enclosed by an element.

Parameters

<i>data</i>	The text enclosed by an element. puts stderr "*** \$self _characterdata: nodeStack = \$nodeStack"
-------------	---

9.110.3.2 _elementend()

```
ParseXML::_elementend (
    tag ,
    ... ) [private]
```

Callback called at the end of an XML element.

Parameters

<i>tag</i>	The element's tag.
<i>←</i> <i>—←</i>	The element's options.

9.110.3.3 _elementstart()

```
ParseXML::_elementstart (
    tag ,
    attrlist ,
    ... ) [private]
```

Callback called at the start of of XML element.

Parameters

<i>tag</i>	The element's tag.
<i>attrlist</i>	The element's attribute list.
<i>—</i>	The element's options.

9.110.3.4 displayTree()

```
ParseXML::displayTree (
    fp = "stdout" )
```

Display the XML tree.

Parameters

<i>fp</i>	The channel to write the display to.
-----------	--------------------------------------

9.110.3.5 validate()

```
static ParseXML::validate (
    object ) [static]
```

Validation typemethod.

Raises an error if its argument is not a [ParseXML](#) object.

Parameters

<i>object</i>	The object to typecheck.
---------------	--------------------------

Returns

The object or raise an error.

9.110.4 Member Data Documentation

9.110.4.1 nodeStack

`ParseXML::nodeStack` [private]

Temp variable used during parsing.

9.110.4.2 rootnode

`ParseXML::rootnode` [private]

The (dummy) root node.

9.111 FCFSupport::PathName Class Reference

A Class that portably represents a pathname.

```
#include <PathName.h>
```

Public Member Functions

- [PathName](#) ()
Default constructor.
- [PathName](#) (const char *p)
Constructor, given a plain C string.
- [PathName](#) (string p)
Constructor, given a STL basic_string.
- [PathName](#) (const [PathName](#) &other)
Copy constructor.
- [~PathName](#) ()
Destructor.
- [PathName](#) & [operator=](#) ([PathName](#) other)
Assignment operator, from another pathname.
- [PathName](#) & [operator=](#) (string name)
Assignment operator, from a string.
- bool [operator==](#) (const [PathName](#) other) const
Equality operator.
- bool [operator<](#) (const [PathName](#) other) const
Less than operator.
- bool [operator>](#) (const [PathName](#) other) const
Greater than operator.
- bool [operator<=](#) (const [PathName](#) other) const
Less than or equal operator.
- bool [operator>=](#) (const [PathName](#) other) const
Greater than or equal operator.
- bool [SameDirectory](#) (const [PathName](#) other) const
Are the two pathnames in the same directory?
- string [Tail](#) () const
Return the last pathname component.
- string [Dirname](#) () const
Return only the directory name.
- string [Extension](#) () const
Return only the extension.
- string [FullPath](#) () const
Return the full pathname.
- [stringVector](#) [Split](#) () const
Return a list of pathname components.
- char [PathSeparator](#) () const
Return the pathname separator character.
- [PathName](#) [operator+](#) (const [PathName](#) other)
Concatenate pathnames.
- [PathName](#) [operator+](#) (string tail)
Concatenate a string to the tail of a pathname.
- [PathName](#) & [operator+=](#) (const [PathName](#) other)
Append a pathname.
- [PathName](#) & [operator+=](#) (string tail)
Append a string.

Private Attributes

- string [pathname](#)

The pathname string.

9.111.1 Detailed Description

A Class that portably represents a pathname.

This class implements a pathname object in a portable, cross platform way.

Author

Robert Heller <heller@deepsoft.com>

9.111.2 Constructor & Destructor Documentation

9.111.2.1 PathName() [1/4]

```
FCFSupport::PathName::PathName ( ) [inline]
```

Default constructor.

References [pathname](#).

9.111.2.2 PathName() [2/4]

```
FCFSupport::PathName::PathName (
    const char * p ) [inline]
```

Constructor, given a plain C string.

Parameters

<i>p</i>	The plain C string.
----------	---------------------

References [pathname](#).

9.111.2.3 PathName() [3/4]

```
FCFSupport::PathName::PathName (
    string p ) [inline]
```

Constructor, given a STL basic_string.

Parameters

<i>p</i>	The STL basic_string.
----------	-----------------------

References [pathname](#).

9.111.2.4 PathName() [4/4]

```
FCFSupport::PathName::PathName (
    const PathName & other ) [inline]
```

Copy constructor.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.111.2.5 ~PathName()

```
FCFSupport::PathName::~~PathName ( ) [inline]
```

Destructor.

9.111.3 Member Function Documentation

9.111.3.1 Dirname()

```
string FCFSupport::PathName::Dirname ( ) const
```

Return only the directory name.

Referenced by [SameDirectory\(\)](#).

9.111.3.2 Extension()

```
string FCFSupport::PathName::Extension ( ) const
```

Return only the extension.

9.111.3.3 FullPath()

```
string FCFSupport::PathName::FullPath ( ) const [inline]
```

Return the full pathname.

References [pathname](#).

Referenced by [FCFSupport::System::CarsFile\(\)](#), [FCFSupport::System::CarTypesFile\(\)](#), [FCFSupport::System::IndustriesFile\(\)](#), [FCFSupport::System::OrdersFile\(\)](#), [FCFSupport::System::OwnersFile\(\)](#), [FCFSupport::System::StatsFile\(\)](#), [FCFSupport::System::System](#) and [FCFSupport::System::TrainsFile\(\)](#).

9.111.3.4 operator+() [1/2]

```
PathName FCFSupport::PathName::operator+ (
    const PathName other )
```

Concatenate pathnames.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

9.111.3.5 operator+() [2/2]

```
PathName FCFSupport::PathName::operator+ (
    string tail )
```

Concatenate a string to the tail of a pathname.

Parameters

<i>tail</i>	The STL basic_string.
-------------	-----------------------

9.111.3.6 `operator+=()` [1/2]

```
PathName & FCFSupport::PathName::operator+= (
    const PathName other )
```

Append a pathname.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

9.111.3.7 `operator+=()` [2/2]

```
PathName & FCFSupport::PathName::operator+= (
    string tail )
```

Append a string.

Parameters

<i>tail</i>	The STL basic_string.
-------------	-----------------------

9.111.3.8 `operator<()`

```
bool FCFSupport::PathName::operator< (
    const PathName other ) const [inline]
```

Less than operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.111.3.9 operator<=()

```
bool FCFSupport::PathName::operator<= (
    const PathName other ) const [inline]
```

Less than or equal operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.111.3.10 operator=() [1/2]

```
PathName & FCFSupport::PathName::operator= (
    PathName other ) [inline]
```

Assignment operator, from another pathname.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.111.3.11 operator=() [2/2]

```
PathName & FCFSupport::PathName::operator= (
    string name ) [inline]
```

Assignment operator, from a string.

Parameters

<i>name</i>	The STL basic_string.
-------------	-----------------------

References [pathname](#).

9.111.3.12 operator==(

```
bool FCFSupport::PathName::operator== (
    const PathName other ) const [inline]
```

Equality operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.111.3.13 operator>()

```
bool FCFSupport::PathName::operator> (
    const PathName other ) const [inline]
```

Greater than operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.111.3.14 operator>=()

```
bool FCFSupport::PathName::operator>= (
    const PathName other ) const [inline]
```

Greater than or equal operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.111.3.15 PathSeparator()

```
char FCFSupport::PathName::PathSeparator ( ) const
```

Return the pathname separator character.

9.111.3.16 SameDirectory()

```
bool FCFSupport::PathName::SameDirectory (
    const PathName other ) const [inline]
```

Are the two pathnames in the same directory?

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [Dirname\(\)](#).

9.111.3.17 Split()

```
stringVector FCFSupport::PathName::Split ( ) const
```

Return a list of pathname components.

9.111.3.18 Tail()

```
string FCFSupport::PathName::Tail ( ) const
```

Return the last pathname component.

9.111.4 Member Data Documentation

9.111.4.1 pathname

```
string FCFSupport::PathName::pathname [private]
```

The pathname string.

Referenced by [FullPath\(\)](#), [operator<\(\)](#), [operator<=\(\)](#), [operator=\(\)](#), [operator==\(\)](#), [operator>\(\)](#), [operator>=\(\)](#), and [PathName\(\)](#).

9.112 TTSupport::PathName Class Reference

A Class that portably represents a pathname.

```
#include <PathName.h>
```

Public Member Functions

- [PathName](#) ()
Default constructor.
- [PathName](#) (const char *p)
Constructor, given a plain C string.
- [PathName](#) (string p)
Constructor, given a STL basic_string.
- [PathName](#) (const [PathName](#) &other)
Copy constructor.
- [~PathName](#) ()
Destructor.
- [PathName](#) & [operator=](#) ([PathName](#) other)
Assignment operator, from another pathname.
- [PathName](#) & [operator=](#) (string name)
Assignment operator, from a string.
- bool [operator==](#) (const [PathName](#) other) const
Equality operator.
- bool [operator<](#) (const [PathName](#) other) const
Less than operator.
- bool [operator>](#) (const [PathName](#) other) const
Greater than operator.
- bool [operator<=](#) (const [PathName](#) other) const
Less than or equal operator.
- bool [operator>=](#) (const [PathName](#) other) const
Greater than or equal operator.
- bool [SameDirectory](#) (const [PathName](#) other) const
Are the two pathnames in the same directory?
- string [Tail](#) () const
Return the last pathname component.

- string [Dirname](#) () const
Return only the directory name.
- string [Extension](#) () const
Return only the extension.
- string [FullPath](#) () const
Return the full pathname.
- [stringVector Split](#) () const
Return a list of pathname components.
- char [PathSeparator](#) () const
Return the pathname separator character.
- [PathName operator+](#) (const [PathName](#) other)
Concatenate pathnames.
- [PathName operator+](#) (string tail)
Concatenate a string to the tail of a pathname.
- [PathName & operator+=](#) (const [PathName](#) other)
Append a pathname.
- [PathName & operator+=](#) (string tail)
Append a string.

Private Attributes

- string [pathname](#)
The pathname string.

9.112.1 Detailed Description

A Class that portably represents a pathname.

This class implements a pathname object in a portable, cross platform way.

Author

Robert Heller <heller@deepsoft.com>

9.112.2 Constructor & Destructor Documentation

9.112.2.1 PathName() [1/4]

```
TTSupport::PathName::PathName ( ) [inline]
```

Default constructor.

References [pathname](#).

9.112.2.2 PathName() [2/4]

```
TTSupport::PathName::PathName (  
    const char * p ) [inline]
```

Constructor, given a plain C string.

Parameters

<i>p</i>	The plain C string.
----------	---------------------

References [pathname](#).

9.112.2.3 PathName() [3/4]

```
TTSupport::PathName::PathName (  
    string p ) [inline]
```

Constructor, given a STL basic_string.

Parameters

<i>p</i>	The STL basic_string.
----------	-----------------------

References [pathname](#).

9.112.2.4 PathName() [4/4]

```
TTSupport::PathName::PathName (  
    const PathName & other ) [inline]
```

Copy constructor.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.112.2.5 ~PathName()

```
TTSupport::PathName::~~PathName ( ) [inline]
```

Destructor.

9.112.3 Member Function Documentation

9.112.3.1 Dirname()

```
string TTSupport::PathName::Dirname ( ) const
```

Return only the directory name.

Referenced by [SameDirectory\(\)](#).

9.112.3.2 Extension()

```
string TTSupport::PathName::Extension ( ) const
```

Return only the extension.

9.112.3.3 FullPath()

```
string TTSupport::PathName::FullPath ( ) const [inline]
```

Return the full pathname.

References [pathname](#).

Referenced by [TTSupport::TimeTableSystem::Filename\(\)](#), and [TTSupport::TimeTableSystem::WriteOldTimeTableFile\(\)](#).

9.112.3.4 operator+() [1/2]

```
PathName TTSupport::PathName::operator+ (
    const PathName other )
```

Concatenate pathnames.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

9.112.3.5 operator+() [2/2]

```
PathName TTSupport::PathName::operator+ (
    string tail )
```

Concatenate a string to the tail of a pathname.

Parameters

<i>tail</i>	The STL basic_string.
-------------	-----------------------

9.112.3.6 operator+=() [1/2]

```
PathName & TTSupport::PathName::operator+= (
    const PathName other )
```

Append a pathname.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

9.112.3.7 operator+=() [2/2]

```
PathName & TTSupport::PathName::operator+= (
    string tail )
```

Append a string.

Parameters

<i>tail</i>	The STL basic_string.
-------------	-----------------------

9.112.3.8 operator<()

```
bool TTSupport::PathName::operator< (
```

```
const PathName other ) const [inline]
```

Less than operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.112.3.9 operator<=()

```
bool TTSupport::PathName::operator<= (
    const PathName other ) const [inline]
```

Less than or equal operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.112.3.10 operator=() [1/2]

```
PathName & TTSupport::PathName::operator= (
    PathName other ) [inline]
```

Assignment operator, from another pathname.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.112.3.11 operator=() [2/2]

```
PathName & TTSupport::PathName::operator= (
    string name ) [inline]
```


Assignment operator, from a string.

Parameters

<i>name</i>	The STL basic_string.
-------------	-----------------------

References [pathname](#).

9.112.3.12 operator==()

```
bool TTSupport::PathName::operator==(
    const PathName other ) const [inline]
```

Equality operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.112.3.13 operator>()

```
bool TTSupport::PathName::operator> (
    const PathName other ) const [inline]
```

Greater than operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.112.3.14 operator>=()

```
bool TTSupport::PathName::operator>= (
    const PathName other ) const [inline]
```

Greater than or equal operator.

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [pathname](#).

9.112.3.15 PathSeparator()

```
char TTSupport::PathName::PathSeparator ( ) const
```

Return the pathname separator character.

9.112.3.16 SameDirectory()

```
bool TTSupport::PathName::SameDirectory (
    const PathName other ) const [inline]
```

Are the two pathnames in the same directory?

Parameters

<i>other</i>	The other instance.
--------------	---------------------

References [Dirname\(\)](#).

9.112.3.17 Split()

```
stringVector TTSupport::PathName::Split ( ) const
```

Return a list of pathname components.

9.112.3.18 Tail()

```
string TTSupport::PathName::Tail ( ) const
```

Return the last pathname component.

9.112.4 Member Data Documentation

9.112.4.1 pathname

```
string TTSupport::PathName::pathname [private]
```

The pathname string.

Referenced by [FullPath\(\)](#), [operator<\(\)](#), [operator<=\(\)](#), [operator=\(\)](#), [operator==\(\)](#), [operator>\(\)](#), [operator>=\(\)](#), and [PathName\(\)](#).

9.113 FCFSupport::PauseCallback Class Reference

The Pause callback.

```
#include <CallBack.h>
```

Public Member Functions

- [PauseCallback](#) ()
The constructor.
- virtual [~PauseCallback](#) ()
The destructor.
- virtual void [Pause](#) (string message) const
Display a message and wait for a user response.

9.113.1 Detailed Description

The Pause callback.

This callback displays a message and waits for a user response. There is no partituar response sought, just an acknowledgement to continue processing. Usually there is something the user should take a momment to check or read before proceding.

```
@author Robert Heller \<heller\@deepsoft.com\>
```

9.113.2 Constructor & Destructor Documentation

9.113.2.1 PauseCallback()

```
FCFSupport::PauseCallback::PauseCallback ( ) [inline]
```

The constructor.

The base constructor does nothing. It is presumed that a derived class might do something useful.

9.113.2.2 ~PauseCallback()

```
virtual FCFSupport::PauseCallback::~~PauseCallback ( ) [inline], [virtual]
```

The destructor.

The base destructor does nothing. It is presumed that a derived class might do something useful.

9.113.3 Member Function Documentation

9.113.3.1 Pause()

```
virtual void FCFSupport::PauseCallback::Pause (
    string message ) const [inline], [virtual]
```

Display a message and wait for a user response.

This message just displays a message and waits for a user response (acknowledgement).

Parameters

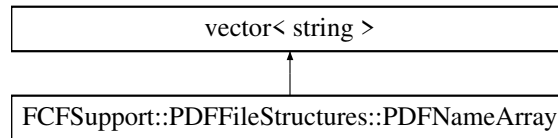
<i>message</i>	The message to display when pausing.
----------------	--------------------------------------

9.114 FCFSupport::PDFFileStructures::PDFNameArray Class Reference

PDF Name array.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::PDFNameArray:



Public Member Functions

- [PDFNameArray \(\)](#)
Constructor.
- [~PDFNameArray \(\)](#)
Destructor.

9.114.1 Detailed Description

PDF Name array.

Used with resource dictionaries.

Author

Robert Heller <heller@deepsoft.com>

9.114.2 Constructor & Destructor Documentation

9.114.2.1 PDFNameArray()

```
FCFSupport::PDFFileStructures::PDFNameArray::PDFNameArray ( ) [inline]
```

Constructor.

9.114.2.2 ~PDFNameArray()

```
FCFSupport::PDFFileStructures::PDFNameArray::~~PDFNameArray ( ) [inline]
```

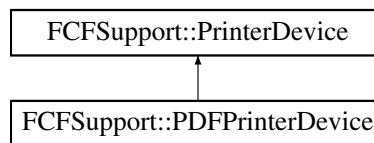
Destructor.

9.115 FCFSupport::PDFPrinterDevice Class Reference

PDF Printer device.

```
#include <PDFPrinter.h>
```

Inheritance diagram for FCFSupport::PDFPrinterDevice:



Public Member Functions

- [PDFPrinterDevice](#) (const string filename="", const string title="", [PageSize](#) pageSize=[Letter](#), char **outmessage=NULL)
Constructor.
- virtual bool [OpenPrinter](#) (const string filename, [PageSize](#) pageSize=[Letter](#), char **outmessage=NULL)
Open the printer file.
- virtual bool [ClosePrinter](#) (char **outmessage=NULL)
Close the printer.
- virtual bool [SetTypeSpacing](#) ([TypeSpacing](#) spacing)
Set the type spacing.
- virtual bool [SetTypeWeight](#) ([TypeWeight](#) weight)
Set the type weight.
- virtual bool [SetTypeSlant](#) ([TypeSlant](#) slant)
Set the type slant.
- virtual bool [NewPage](#) (const string heading="")
Generate a new page.
- virtual bool [PutLine](#) (const string line="")
Put a line of text.
- virtual bool [Put](#) (const string text)
Put a string.
- virtual bool [Tab](#) (int column)
Move to the specified tab column.
- virtual [~PDFPrinterDevice](#) ()
Destructor.

Private Member Functions

- bool [CreateNewPage](#) ()
Create a new page.
- bool [CreateNewStream](#) ()
Create new stream.

Private Attributes

- [PDFFileStructures::CrossReferenceTable](#) `crossReferenceTable`
PDF Cross reference table.
- [PDFFileStructures::CatalogDictionary](#) * `rootDictionary`
PDF Root catalog.
- [PDFFileStructures::Page](#) * `currentPage`
Current PDF Page.
- [PDFFileStructures::PDFStream](#) * `currentStream`
Current PDF Stream.
- [PDFFileStructures::PageTree](#) * `pageTreeRoot`
PDF Page Tree root.
- [PDFFileStructures::InformationDirectory](#) * `info`
Information dictionary.
- `ofstream` [printerStream](#)
Output stream.
- `string` [title](#)
Title string.
- `string` [currentFontName](#)
Current font name.
- `int` [lines](#)
Number of lines.
- `int` [horizontalScaling](#)
Current horizontal scaling.
- `int` [maxLines](#)
Maximum number of lines.
- `bool` [partline](#)
Partial line flag.
- `bool` [needPage](#)
Need page flag.
- `int` [currentColumn](#)
Current column.
- `double` [currentColumnFraction](#)
Current column fraction.

Additional Inherited Members

9.115.1 Detailed Description

PDF Printer device.

Author

Robert Heller <heller@deepsoft.com>

9.115.2 Constructor & Destructor Documentation

9.115.2.1 PDFPrinterDevice()

```
FCFSupport::PDFPrinterDevice::PDFPrinterDevice (
    const string filename = "",
    const string title_ = "",
    PageSize pageSize = Letter,
    char ** outmessage = NULL )
```

Constructor.

Create a PDF Printer device.

Parameters

<i>filename</i>	The name of the file to print to.
<i>title</i>	The document title.
<i>pageSize</i>	The document page size.
<i>outmessage</i>	Pointer to get an error message buffer pointer.

9.115.2.2 ~PDFPrinterDevice()

```
virtual FCFSupport::PDFPrinterDevice::~~PDFPrinterDevice ( ) [virtual]
```

Destructor.

9.115.3 Member Function Documentation

9.115.3.1 ClosePrinter()

```
virtual bool FCFSupport::PDFPrinterDevice::ClosePrinter (
    char ** outmessage = NULL ) [virtual]
```

Close the printer.

Parameters

<i>outmessage</i>	Pointer to get an error message buffer pointer.
-------------------	---

Reimplemented from [FCFSupport::PrinterDevice](#).

9.115.3.2 CreateNewPage()

```
bool FCFSupport::PDFPrinterDevice::CreateNewPage ( ) [private]
```

Create a new page.

9.115.3.3 CreateNewStream()

```
bool FCFSupport::PDFPrinterDevice::CreateNewStream ( ) [private]
```

Create new stream.

9.115.3.4 NewPage()

```
virtual bool FCFSupport::PDFPrinterDevice::NewPage (
    const string heading = "" ) [virtual]
```

Generate a new page.

Parameters

<i>heading</i>	The new page heading string.
----------------	------------------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.115.3.5 OpenPrinter()

```
virtual bool FCFSupport::PDFPrinterDevice::OpenPrinter (
    const string filename,
```

```
    PageSize pageSize = Letter,  
    char ** outmessage = NULL ) [virtual]
```

Open the printer file.

Parameters

<i>filename</i>	The name of the file to print to.
<i>pageSize</i>	The document page size.
<i>outmessage</i>	Pointer to get an error message buffer pointer.

Reimplemented from [FCFSupport::PrinterDevice](#).

9.115.3.6 Put()

```
virtual bool FCFSupport::PDFPrinterDevice::Put (  
    const string text ) [virtual]
```

Put a string.

Parameters

<i>text</i>	The text string to print.
-------------	---------------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.115.3.7 PutLine()

```
virtual bool FCFSupport::PDFPrinterDevice::PutLine (  
    const string line = "" ) [virtual]
```

Put a line of text.

Parameters

<i>line</i>	The line of text.
-------------	-------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.115.3.8 SetTypeSlant()

```
virtual bool FCFSupport::PDFPrinterDevice::SetTypeSlant (
    TypeSlant slant ) [virtual]
```

Set the type slant.

Parameters

<i>slant</i>	The slant value to set.
--------------	-------------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.115.3.9 SetTypeSpacing()

```
virtual bool FCFSupport::PDFPrinterDevice::SetTypeSpacing (
    TypeSpacing spacing ) [virtual]
```

Set the type spacing.

Parameters

<i>spacing</i>	The spacing value to set.
----------------	---------------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.115.3.10 SetTypeWeight()

```
virtual bool FCFSupport::PDFPrinterDevice::SetTypeWeight (
    TypeWeight weight ) [virtual]
```

Set the type weight.

Parameters

<i>weight</i>	The weight value to set.
---------------	--------------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.115.3.11 Tab()

```
virtual bool FCFSupport::PDFPrinterDevice::Tab (  
    int column ) [virtual]
```

Move to the specified tab column.

Parameters

<i>column</i>	the column to move to.
---------------	------------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.115.4 Member Data Documentation

9.115.4.1 crossReferenceTable

```
PDFFileStructures::CrossReferenceTable FCFSupport::PDFPrinterDevice::crossReferenceTable [private]
```

PDF Cross reference table.

9.115.4.2 currentColumn

```
int FCFSupport::PDFPrinterDevice::currentColumn [private]
```

Current column.

9.115.4.3 currentColumnFraction

```
double FCFSupport::PDFPrinterDevice::currentColumnFraction [private]
```

Current column fraction.

9.115.4.4 currentFontName

```
string FCFSupport::PDFPrinterDevice::currentFontName [private]
```

Current font name.

9.115.4.5 currentPage

```
PDFFileStructures::Page* FCFSupport::PDFPrinterDevice::currentPage [private]
```

Current PDF Page.

9.115.4.6 currentStream

```
PDFFileStructures::PDFStream* FCFSupport::PDFPrinterDevice::currentStream [private]
```

Current PDF Stream.

9.115.4.7 horizontalScaling

```
int FCFSupport::PDFPrinterDevice::horizontalScaling [private]
```

Current horizontal scaling.

9.115.4.8 info

```
PDFFileStructures::InformationDirectory* FCFSupport::PDFPrinterDevice::info [private]
```

Information dictionary.

9.115.4.9 lines

```
int FCFSupport::PDFPrinterDevice::lines [private]
```

Number of lines.

9.115.4.10 maxLines

```
int FCFSupport::PDFPrinterDevice::maxLines [private]
```

Maximum number of lines.

9.115.4.11 needPage

```
bool FCFSupport::PDFPrinterDevice::needPage [private]
```

Need page flag.

9.115.4.12 pageTreeRoot

```
PDFFileStructures::PageTree* FCFSupport::PDFPrinterDevice::pageTreeRoot [private]
```

PDF Page Tree root.

9.115.4.13 partline

```
bool FCFSupport::PDFPrinterDevice::partline [private]
```

Partial line flag.

9.115.4.14 printerStream

```
ofstream FCFSupport::PDFPrinterDevice::printerStream [private]
```

Output stream.

9.115.4.15 rootDictionary

```
PDFFileStructures::CatalogDictionary* FCFSupport::PDFPrinterDevice::rootDictionary [private]
```

PDF Root catalog.

9.115.4.16 title

```
string FCFSupport::PDFPrinterDevice::title [private]
```

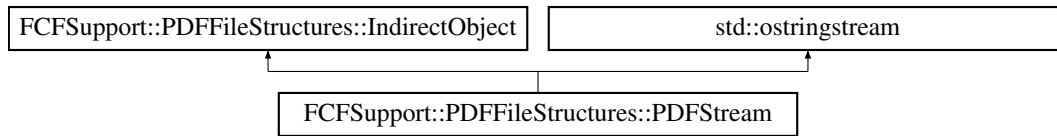
Title string.

9.116 FCFSupport::PDFFileStructures::PDFStream Class Reference

Stream object.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::PDFStream:



Public Member Functions

- [PDFStream](#) (unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~PDFStream](#) ()
Destructor.
- virtual ostream & [WriteDirect](#) (ostream &stream) const
Write an object directly.

9.116.1 Detailed Description

Stream object.

Author

Robert Heller <heller@deepsoft.com>

9.116.2 Constructor & Destructor Documentation

9.116.2.1 PDFStream()

```
FCFSupport::PDFFileStructures::PDFStream::PDFStream (
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a stream object.

Parameters

<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

9.116.2.2 ~PDFStream()

```
FCFSupport::PDFFileStructures::PDFStream::~~PDFStream ( ) [inline]
```

Destructor.

9.116.3 Member Function Documentation**9.116.3.1 WriteDirect()**

```
virtual ostream & FCFSupport::PDFFileStructures::PDFStream::WriteDirect (
    ostream & stream ) const [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Implements [FCFSupport::PDFFileStructures::IndirectObject](#).

9.117 Parsers::TrackGraph::Point Struct Reference

Position structure.

Public Attributes

- double [x](#)
X coordinate.
- double [y](#)
Y coordinate.

9.117.1 Detailed Description

Position structure.

Author

Robert Heller <heller@deepsoft.com>

9.117.2 Member Data Documentation

9.117.2.1 x

```
double Parsers::TrackGraph::Point::x
```

X coordinate.

Referenced by [Parsers::TrackGraph::CompressedNodeValues::CompressedNodeValues\(\)](#).

9.117.2.2 y

```
double Parsers::TrackGraph::Point::y
```

Y coordinate.

Referenced by [Parsers::TrackGraph::CompressedNodeValues::CompressedNodeValues\(\)](#).

9.118 Parsers::BezierBodyElt::Pos Struct Reference

Position structure.

Public Attributes

- float [x](#)
\$X\$ coordinate.
- float [y](#)
\$Y\$ coordinate.

9.118.1 Detailed Description

Position structure.

Author

Robert Heller <heller@deepsoft.com>

9.118.2 Member Data Documentation

9.118.2.1 `x`

```
float Parsers::BezierBodyElt::Pos::x
```

`X` coordinate.

Referenced by [Parsers::BezierBodyElt::GetCurveSegment\(\)](#), [Parsers::BezierBodyElt::GetStraightSegment\(\)](#), [Parsers::BezierBodyElt::MakeCurveSegment\(\)](#) and [Parsers::BezierBodyElt::MakeStraightSegment\(\)](#).

9.118.2.2 `y`

```
float Parsers::BezierBodyElt::Pos::y
```

`Y` coordinate.

Referenced by [Parsers::BezierBodyElt::GetCurveSegment\(\)](#), [Parsers::BezierBodyElt::GetStraightSegment\(\)](#), [Parsers::BezierBodyElt::MakeCurveSegment\(\)](#) and [Parsers::BezierBodyElt::MakeStraightSegment\(\)](#).

9.119 Parsers::CornuBodyElt::Pos Struct Reference

Position structure.

Public Attributes

- float `x`
`X` coordinate.
- float `y`
`Y` coordinate.

9.119.1 Detailed Description

Position structure.

Author

Robert Heller <heller@deepsoft.com>

9.119.2 Member Data Documentation

9.119.2.1 x

```
float Parsers::CornuBodyElt::Pos::x
```

\$X\$ coordinate.

Referenced by [Parsers::CornuBodyElt::GetCurveSegment\(\)](#), [Parsers::CornuBodyElt::GetStraightSegment\(\)](#), [Parsers::CornuBodyElt::MakeCurveSegment\(\)](#) and [Parsers::CornuBodyElt::MakeStraightSegment\(\)](#).

9.119.2.2 y

```
float Parsers::CornuBodyElt::Pos::y
```

\$Y\$ coordinate.

Referenced by [Parsers::CornuBodyElt::GetCurveSegment\(\)](#), [Parsers::CornuBodyElt::GetStraightSegment\(\)](#), [Parsers::CornuBodyElt::MakeCurveSegment\(\)](#) and [Parsers::CornuBodyElt::MakeStraightSegment\(\)](#).

9.120 Parsers::TurnoutBodyElt::Pos Struct Reference

Position structure.

Public Attributes

- float [x](#)
\$X\$ coordinate.
- float [y](#)
\$Y\$ coordinate.

9.120.1 Detailed Description

Position structure.

Author

Robert Heller <heller@deepsoft.com>

9.120.2 Member Data Documentation

9.120.2.1 x

```
float Parsers::TurnoutBodyElt::Pos::x
```

\$X\$ coordinate.

Referenced by [Parsers::TurnoutBodyElt::GetTurnoutCurveSegment\(\)](#), [Parsers::TurnoutBodyElt::GetTurnoutJointSegment\(\)](#), [Parsers::TurnoutBodyElt::GetTurnoutStraightSegment\(\)](#), [Parsers::TurnoutBodyElt::MakeTurnoutCurveSegment\(\)](#), [Parsers::TurnoutBodyElt::MakeTurnoutJointSegment\(\)](#), and [Parsers::TurnoutBodyElt::MakeTurnoutStraightSegment\(\)](#).

9.120.2.2 y

```
float Parsers::TurnoutBodyElt::Pos::y
```

\$Y\$ coordinate.

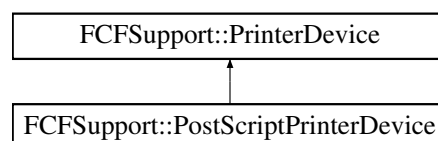
Referenced by [Parsers::TurnoutBodyElt::GetTurnoutCurveSegment\(\)](#), [Parsers::TurnoutBodyElt::GetTurnoutJointSegment\(\)](#), [Parsers::TurnoutBodyElt::GetTurnoutStraightSegment\(\)](#), [Parsers::TurnoutBodyElt::MakeTurnoutCurveSegment\(\)](#), [Parsers::TurnoutBodyElt::MakeTurnoutJointSegment\(\)](#), and [Parsers::TurnoutBodyElt::MakeTurnoutStraightSegment\(\)](#).

9.121 FCFSupport::PostScriptPrinterDevice Class Reference

Derived class for printing on Postscript printers.

```
#include <PostScriptPrinter.h>
```

Inheritance diagram for FCFSupport::PostScriptPrinterDevice:



Public Member Functions

- [PostScriptPrinterDevice](#) (const string filename="", const string title_="", [PageSize](#) pageSize=[Letter](#), char **outmessage=NULL)
Constructor.
- virtual bool [OpenPrinter](#) (const string filename, [PageSize](#) pageSize=[Letter](#), char **outmessage=NULL)
Member function to open the printer.
- virtual bool [ClosePrinter](#) (char **outmessage)
Close the printer.
- virtual bool [SetTypeSpacing](#) ([TypeSpacing](#) spacing)
Set the the spacing.
- virtual bool [SetTypeWeight](#) ([TypeWeight](#) weight)
Set the type weight.
- virtual bool [SetTypeSlant](#) ([TypeSlant](#) slant)
Set the type slant.
- virtual bool [NewPage](#) (const string heading="")
Perform a page feed and print a heading.
- virtual bool [PutLine](#) (const string line="")
Print out a string and follow it with a new line sequence.
- virtual bool [Put](#) (const string text)
Print a string of text.
- virtual bool [Tab](#) (int column)
Tab over to the specified column.
- virtual [~PostScriptPrinterDevice](#) ()
Destructor.

Private Member Functions

- bool [PutPageHeader](#) ()
Function to put the page header.
- const string [PSQuote](#) (const string s) const
Function to PostScript quote a string.

Private Attributes

- ofstream [printerStream](#)
Output stream.
- string [title](#)
The document title.
- int [pages](#)
The page count.
- int [lines](#)
The line count.
- int [maxLines](#)
The maximum number of lines per page.
- bool [partline](#)
Partial line flag.
- bool [needPageHeader](#)
Flag to let us know if we need a page header.

Additional Inherited Members

9.121.1 Detailed Description

Derived class for printing on Postscript printers.

Uses a standard 12pt Courier family of fonts and simulates an impact printer.

Author

Robert Heller <heller@deepsoft.com>

9.121.2 Constructor & Destructor Documentation

9.121.2.1 PostScriptPrinterDevice()

```
FCFSupport::PostScriptPrinterDevice::PostScriptPrinterDevice (
    const string filename = "",
    const string title_ = "",
    PageSize pageSize = Letter,
    char ** outmessage = NULL )
```

Constructor.

Create a new printer device instance from a set of parameters, all of which have default values, so this also doubles as the default base constructor.

Parameters

<i>filename</i>	Output filename.
<i>title</i>	An internal document title string.
<i>pageSize</i>	The page size to use.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.

9.121.2.2 ~PostScriptPrinterDevice()

```
virtual FCFSupport::PostScriptPrinterDevice::~~PostScriptPrinterDevice ( ) [virtual]
```

Destructor.

Close the printer.

9.121.3 Member Function Documentation

9.121.3.1 ClosePrinter()

```
virtual bool FCFSupport::PostScriptPrinterDevice::ClosePrinter (
    char ** outmessage ) [virtual]
```

Close the printer.

Parameters

<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.
-------------------	--

Reimplemented from [FCFSupport::PrinterDevice](#).

9.121.3.2 NewPage()

```
virtual bool FCFSupport::PostScriptPrinterDevice::NewPage (
    const string heading = "" ) [virtual]
```

Perform a page feed and print a heading.

Parameters

<i>heading</i>	The heading string.
----------------	---------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.121.3.3 OpenPrinter()

```
virtual bool FCFSupport::PostScriptPrinterDevice::OpenPrinter (
    const string filename,
    PageSize pageSize = Letter,
    char ** outmessage = NULL ) [virtual]
```

Member function to open the printer.

Parameters

<i>filename</i>	Output filename.
<i>pageSize</i>	The page size to use.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.

Reimplemented from [FCFSupport::PrinterDevice](#).

9.121.3.4 PSQuote()

```
const string FCFSupport::PostScriptPrinterDevice::PSQuote (
    const string s ) const [private]
```

Function to PostScript quote a string.

Parameters

<i>s</i>	The string to quote.
----------	----------------------

9.121.3.5 Put()

```
virtual bool FCFSupport::PostScriptPrinterDevice::Put (
    const string text ) [virtual]
```

Print a string of text.

Don't include a newline.

Parameters

<i>text</i>	The string to print.
-------------	----------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.121.3.6 PutLine()

```
virtual bool FCFSupport::PostScriptPrinterDevice::PutLine (
    const string line = "" ) [virtual]
```


Print out a string and follow it with a new line sequence.

Parameters

<i>line</i>	The line to print.
-------------	--------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.121.3.7 PutPageHeader()

```
bool FCFSupport::PostScriptPrinterDevice::PutPageHeader ( ) [private]
```

Function to put the page header.

9.121.3.8 SetTypeSlant()

```
virtual bool FCFSupport::PostScriptPrinterDevice::SetTypeSlant (
    TypeSlant slant ) [virtual]
```

Set the type slant.

Parameters

<i>slant</i>	The new type slant.
--------------	---------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.121.3.9 SetTypeSpacing()

```
virtual bool FCFSupport::PostScriptPrinterDevice::SetTypeSpacing (
    TypeSpacing spacing ) [virtual]
```

Set the the spacing.

Parameters

<i>spacing</i>	The new type spacing.
----------------	-----------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.121.3.10 SetTypeWeight()

```
virtual bool FCFSupport::PostScriptPrinterDevice::SetTypeWeight (
    TypeWeight weight ) [virtual]
```

Set the type weight.

Parameters

<i>weight</i>	The new type weight.
---------------	----------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.121.3.11 Tab()

```
virtual bool FCFSupport::PostScriptPrinterDevice::Tab (
    int column ) [virtual]
```

Tab over to the specified column.

Parameters

<i>column</i>	The desired tab column.
---------------	-------------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.121.4 Member Data Documentation

9.121.4.1 lines

```
int FCFSupport::PostScriptPrinterDevice::lines [private]
```

The line count.

9.121.4.2 maxLines

```
int FCFSupport::PostScriptPrinterDevice::maxLines [private]
```

The maximum number of lines per page.

9.121.4.3 needPageHeader

```
bool FCFSupport::PostScriptPrinterDevice::needPageHeader [private]
```

Flag to let us know if we need a page header,.

9.121.4.4 pages

```
int FCFSupport::PostScriptPrinterDevice::pages [private]
```

The page count.

9.121.4.5 partline

```
bool FCFSupport::PostScriptPrinterDevice::partline [private]
```

Partial line flag.

9.121.4.6 printerStream

```
ofstream FCFSupport::PostScriptPrinterDevice::printerStream [private]
```

Output stream.

9.121.4.7 title

```
string FCFSupport::PostScriptPrinterDevice::title [private]
```

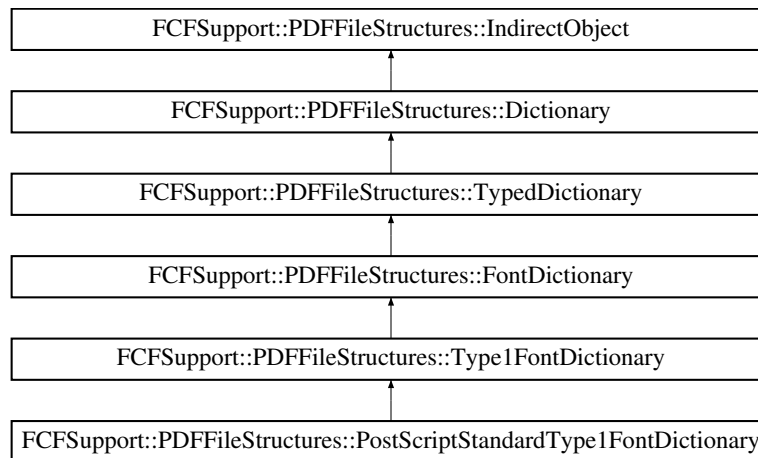
The document title.

9.122 FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary Class Reference

A standard Type1 PostScript font dictionary.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary:



Public Member Functions

- [PostScriptStandardType1FontDictionary](#) (const string name, unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)

Constructor.

- [~PostScriptStandardType1FontDictionary](#) ()

Destructor.

Additional Inherited Members

9.122.1 Detailed Description

A standard Type1 PostScript font dictionary.

Author

Robert Heller <heller@deepsoft.com>

9.122.2 Constructor & Destructor Documentation

9.122.2.1 PostScriptStandardType1FontDictionary()

```
FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary::PostScriptStandardType1FontDictionary (
    const string name,
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Construct one of the 14 standard PostScript fonts.

Parameters

<i>name</i>	The name of the PostScript font.
<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

9.122.2.2 ~PostScriptStandardType1FontDictionary()

```
FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary::~~PostScriptStandardType1FontDictionary ( ) [inline]
```

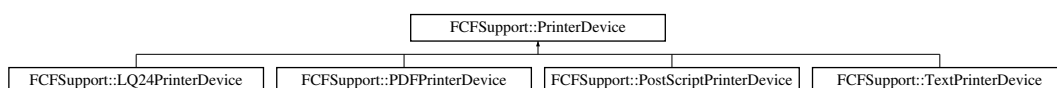
Destructor.

9.123 FCFSupport::PrinterDevice Class Reference

Base class for printer devices (hard copy output).

```
#include <Printer.h>
```

Inheritance diagram for FCFSupport::PrinterDevice:



Public Types

- enum [PageSize](#) { [Letter](#) , [A4](#) }
Page size selection, for those printers that support different page sizes.
- enum [TypeSpacing](#) { [One](#) , [Half](#) , [Double](#) }
Horizontal type spacing.
- enum [TypeWeight](#) { [Normal](#) , [Bold](#) }
Type weight.
- enum [TypeSlant](#) { [Roman](#) , [Italic](#) }
Type slant.

Public Member Functions

- [PrinterDevice](#) (const string filename="", const string title="", [PageSize](#) pageSize_[Letter](#), char **outmessage=NULL)
Constructor.
- virtual bool [OpenPrinter](#) (const string filename, [PageSize](#) pageSize_[Letter](#), char **outmessage=NULL)
Member function to open the printer.
- virtual bool [ClosePrinter](#) (char **outmessage)
Close the printer.
- bool [IsOpenP](#) () const
Is the printer open?
- [PageSize](#) [PrinterPageSize](#) () const
Return the page size.
- virtual bool [SetTypeSpacing](#) ([TypeSpacing](#) spacing)
Set the the spacing.
- virtual bool [SetTypeWeight](#) ([TypeWeight](#) weight)
Set the type weight.
- virtual bool [SetTypeSlant](#) ([TypeSlant](#) slant)
Set the type slant.
- virtual bool [NewPage](#) (const string heading="")
Perform a page feed and print a heading.
- virtual bool [PutLine](#) (const string line="")
Print out a string and follow it with a new line sequence.
- virtual bool [Put](#) (const string text)
Print a string of text.
- virtual bool [Put](#) (int number)
Print an integer.
- virtual bool [Put](#) (double number)
Print a double.
- virtual bool [Tab](#) (int column)
Tab over to the specified column.
- virtual [~PrinterDevice](#) ()
Destructor.

Protected Attributes

- bool `isOpenP`
Is open flag.
- `PageSize` `pageSize`
Document page size.

9.123.1 Detailed Description

Base class for printer devices (hard copy output).

Defines a very basic set of printing operations, including printing strings, numbers, lines, form feeds, tabbing, and changing the spacing, weight, and slant of the type used.

Author

Robert Heller <heller@deepsoft.com>

9.123.2 Member Enumeration Documentation

9.123.2.1 PageSize

enum `FCFSupport::PrinterDevice::PageSize`

Page size selection, for those printers that support different page sizes.

Enumerator

Letter	US Letter page size.
A4	European A4 page size.

9.123.2.2 TypeSlant

enum `FCFSupport::PrinterDevice::TypeSlant`

Type slant.

Enumerator

Roman	Upright.
Italic	Italic.

9.123.2.3 TypeSpacing

enum `FCFSupport::PrinterDevice::TypeSpacing`

Horizontal type spacing.

This is the character width.

Enumerator

One	Single wide characters. Normal width charactes.
Half	Half (actually 60%) wide characters. Condensed printing.
Double	Double wide characters.

9.123.2.4 TypeWeight

enum `FCFSupport::PrinterDevice::TypeWeight`

Type weight.

Enumerator

Normal	Normal weight.
Bold	Heavy (bold) weight.

9.123.3 Constructor & Destructor Documentation

9.123.3.1 PrinterDevice()

```
FCFSupport::PrinterDevice::PrinterDevice (  
    const string filename = "",  
    const string title = "",  
    PageSize pageSize_ = Letter,  
    char ** outmessage = NULL ) [inline]
```

Constructor.

Create a new printer device instance from a set of parameters, all of which have default values, so this also doubles as the default base constructor.

Parameters

<i>filename</i>	Output filename.
<i>title</i>	An internal document title string.
<i>pageSize</i> ↔ —	The page size to use.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.

References [isOpenP](#), and [pageSize](#).

9.123.3.2 ~PrinterDevice()

```
virtual FCFSupport::PrinterDevice::~~PrinterDevice ( ) [inline], [virtual]
```

Destructor.

Close the printer.

References [ClosePrinter\(\)](#).

9.123.4 Member Function Documentation

9.123.4.1 ClosePrinter()

```
virtual bool FCFSupport::PrinterDevice::ClosePrinter (
    char ** outmessage ) [inline], [virtual]
```

Close the printer.

Parameters

<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.
-------------------	--

Reimplemented in [FCFSupport::LQ24PrinterDevice](#), [FCFSupport::PostScriptPrinterDevice](#), [FCFSupport::TextPrinterDevice](#), and [FCFSupport::PDFPrinterDevice](#).

References [isOpenP](#).

Referenced by [~PrinterDevice\(\)](#).

9.123.4.2 IsOpenP()

```
bool FCFSupport::PrinterDevice::IsOpenP ( ) const [inline]
```

Is the printer open?

References [isOpenP](#).

9.123.4.3 NewPage()

```
virtual bool FCFSupport::PrinterDevice::NewPage (
    const string heading = "" ) [inline], [virtual]
```

Perform a page feed and print a heading.

Parameters

<i>heading</i>	The heading string.
----------------	---------------------

Reimplemented in [FCFSupport::LQ24PrinterDevice](#), [FCFSupport::PDFPrinterDevice](#), [FCFSupport::PostScriptPrinterDevice](#), and [FCFSupport::TextPrinterDevice](#).

9.123.4.4 OpenPrinter()

```
virtual bool FCFSupport::PrinterDevice::OpenPrinter (
    const string filename,
    PageSize pageSize_ = Letter,
    char ** outmessage = NULL ) [inline], [virtual]
```

Member function to open the printer.

Parameters

<i>filename</i>	Output filename.
<i>pageSize</i>	The page size to use.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.

Reimplemented in [FCFSupport::LQ24PrinterDevice](#), [FCFSupport::PDFPrinterDevice](#), [FCFSupport::PostScriptPrinterDevice](#), and [FCFSupport::TextPrinterDevice](#).

References [isOpenP](#), and [pageSize](#).

9.123.4.5 PrinterPageSize()

```
PageSize FCFSupport::PrinterDevice::PrinterPageSize ( ) const [inline]
```

Return the page size.

References [pageSize](#).

9.123.4.6 Put() [1/3]

```
virtual bool FCFSupport::PrinterDevice::Put (
    const string text ) [inline], [virtual]
```

Print a string of text.

Don't include a newline.

Parameters

<i>text</i>	The string to print.
-------------	----------------------

Reimplemented in [FCFSupport::LQ24PrinterDevice](#), [FCFSupport::PDFPrinterDevice](#), [FCFSupport::PostScriptPrinterDevice](#), and [FCFSupport::TextPrinterDevice](#).

Referenced by [Put\(\)](#).

9.123.4.7 Put() [2/3]

```
virtual bool FCFSupport::PrinterDevice::Put (
    double number ) [inline], [virtual]
```

Print a double.

Don't include a newline.

Parameters

<i>number</i>	The string to print.
---------------	----------------------

References [Put\(\)](#).

9.123.4.8 Put() [3/3]

```
virtual bool FCFSupport::PrinterDevice::Put (  
    int number ) [inline], [virtual]
```

Print an integer.

Don't include a newline.

Parameters

<i>number</i>	The string to print.
---------------	----------------------

References [Put\(\)](#).

9.123.4.9 PutLine()

```
virtual bool FCFSupport::PrinterDevice::PutLine (  
    const string line = "" ) [inline], [virtual]
```

Print out a string and follow it with a new line sequence.

Parameters

<i>line</i>	The line to print.
-------------	--------------------

Reimplemented in [FCFSupport::LQ24PrinterDevice](#), [FCFSupport::TextPrinterDevice](#), [FCFSupport::PDFPrinterDevice](#), and [FCFSupport::PostScriptPrinterDevice](#).

9.123.4.10 SetTypeSlant()

```
virtual bool FCFSupport::PrinterDevice::SetTypeSlant (  
    TypeSlant slant ) [inline], [virtual]
```

Set the type slant.

Parameters

<i>slant</i>	The new type slant.
--------------	---------------------

Reimplemented in [FCFSupport::LQ24PrinterDevice](#), [FCFSupport::PDFPrinterDevice](#), and [FCFSupport::PostScriptPrinterDevice](#).

9.123.4.11 SetTypeSpacing()

```
virtual bool FCFSupport::PrinterDevice::SetTypeSpacing (
    TypeSpacing spacing ) [inline], [virtual]
```

Set the the spacing.

Parameters

<i>spacing</i>	The new type spacing.
----------------	-----------------------

Reimplemented in [FCFSupport::LQ24PrinterDevice](#), [FCFSupport::PDFPrinterDevice](#), and [FCFSupport::PostScriptPrinterDevice](#).

9.123.4.12 SetTypeWeight()

```
virtual bool FCFSupport::PrinterDevice::SetTypeWeight (
    TypeWeight weight ) [inline], [virtual]
```

Set the type weight.

Parameters

<i>weight</i>	The new type weight.
---------------	----------------------

Reimplemented in [FCFSupport::LQ24PrinterDevice](#), [FCFSupport::PDFPrinterDevice](#), and [FCFSupport::PostScriptPrinterDevice](#).

9.123.4.13 Tab()

```
virtual bool FCFSupport::PrinterDevice::Tab (
    int column ) [inline], [virtual]
```

Tab over to the specified column.

Parameters

<i>column</i>	The desired tab column.
---------------	-------------------------

Reimplemented in [FCFSupport::LQ24PrinterDevice](#), [FCFSupport::PDFPrinterDevice](#), [FCFSupport::PostScriptPrinterDevice](#), and [FCFSupport::TextPrinterDevice](#).

9.123.5 Member Data Documentation

9.123.5.1 isOpenP

```
bool FCFSupport::PrinterDevice::isOpenP [protected]
```

Is open flag.

Referenced by [ClosePrinter\(\)](#), [IsOpenP\(\)](#), [OpenPrinter\(\)](#), and [PrinterDevice\(\)](#).

9.123.5.2 pageSize

```
PageSize FCFSupport::PrinterDevice::pageSize [protected]
```

Document page size.

Referenced by [OpenPrinter\(\)](#), [PrinterDevice\(\)](#), and [PrinterPageSize\(\)](#).

9.124 CTCPanel::PushButton Class Reference

Push Button object type.

Public Member Functions

- [PushButton](#) (name, _ctcpanel, _canvas,...)
Construct a [PushButton](#) object.
- [~PushButton](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value ([PushButton](#) state).
- [setv](#) (newstate)
Method to set out value ([PushButton](#) state).
- [geti](#) (ind)
Method to get the state of one of our indicators.
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the [PushButton](#).

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

9.124.1 Detailed Description

Push Button object type.

These are on the control panel and represent simple push buttons.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The control panel canvas to draw the PushButton on.
...	Options: <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this PushButton is part of (readonly, default CP1). • -color The color of the PushButton (default white). • -label The label of the PushButton (default "PushButton"). • -command The Tcl script to run when the PushButton button is pushed.

Defined coords terminals: none. Defined values (states): none. Defined indicators:

- I -color if on.

Author

Robert Heller <heller@deepsoft.com>

9.124.2 Constructor & Destructor Documentation

9.124.2.1 `PushButton()`

```
CTCPanel::PushButton::PushButton (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [PushButton](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the PushButton on.
<code>...</code>	Option list.

9.124.2.2 `~PushButton()`

```
CTCPanel::PushButton::~~PushButton ( )
```

Clean up all data objects and free up all resources.

9.124.3 Member Function Documentation

9.124.3.1 `_configureLabel()`

```
CTCPanel::PushButton::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.124.3.2 geti()

```
CTCPanel::PushButton::geti (
    ind )
```

Method to get the state of one of our indicators.

9.124.3.3 getv()

```
CTCPanel::PushButton::getv ( )
```

Method to get our value ([PushButton](#) state).

9.124.3.4 invoke()

```
CTCPanel::PushButton::invoke ( )
```

Method to invoke the [PushButton](#).

9.124.3.5 seti()

```
CTCPanel::PushButton::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.124.3.6 setv()

```
CTCPanel::PushButton::setv (
    newstate )
```

Method to set out value ([PushButton](#) state).

Parameters

<i>newstate</i>	The new PushButton state.
-----------------	---

9.124.4 Member Data Documentation

9.124.4.1 canvas

`CTCPanel::PushButton::canvas` [private]

The canvas component (parent widget component).

9.124.4.2 ctcpnl

`CTCPanel::PushButton::ctcpnl` [private]

The CTC Panel component (parent widget).

9.125 raildriver::RaildriverClient Class Reference

Raildriver Client class – connects to the Raildriver daemon.

Public Member Functions

- [RaildriverClient](#) (name,...)
Construct a [RaildriverClient](#) object.
- [~RaildriverClient](#) ()
close the connection.
- [clear](#) ()
Send a CLEAR message to the daemon.
- [mask](#) (...)
Send a MASK message to the daemon.
- [leds](#) (ledstring)
Send a LED message to the daemon.
- [speaker](#) (onoff)
Turn the speaker on or off.

Private Member Functions

- [_readevent](#) ()
Handle messages from the daemon.
- [_poller](#) ()
Polling function.

Private Attributes

- [socket](#)
The socket descriptor connected to the daemon.
- [pollid](#)
Holds the poll after id.

9.125.1 Detailed Description

Raildriver Client class – connects to the Raildriver daemon.

Polls at intervals for Raildriver input events.

Options:

- -port Port (on localhost) to connect to. The default is 41000.
- -pollinterval Interval in milliseconds (between 250 and 2000) to poll the daemon. The default is 500.
- -pollevents List of events to poll for. See [raildriver::RaildriverEvents](#) for the allowed element values. The default is the empty list.
- -eventhandler A script (at the global level) to evaluate when a message arrives from the daemon. Two elements are appended: the message status code and the text of the message. The default is no handler.

9.125.2 Constructor & Destructor Documentation

9.125.2.1 RaildriverClient()

```
raildriver::RaildriverClient::RaildriverClient (
    name ,
    ... )
```

Construct a [RaildriverClient](#) object.

9.125.2.2 ~RaildriverClient()

```
raildriver::RaildriverClient::~~RaildriverClient ( )
```

close the connection.

9.125.3 Member Function Documentation

9.125.3.1 `_poller()`

```
raildriver::RaildriverClient::_poller ( ) [private]
```

Polling function.

9.125.3.2 `_readevent()`

```
raildriver::RaildriverClient::_readevent ( ) [private]
```

Handle messages from the daemon.

9.125.3.3 `clear()`

```
raildriver::RaildriverClient::clear ( )
```

Send a CLEAR message to the daemon.

9.125.3.4 `leds()`

```
raildriver::RaildriverClient::leds (
    ledstring )
```

Send a LED message to the daemon.

Parameters

<i>ledstring</i>	Led string to display.
------------------	------------------------

9.125.3.5 `mask()`

```
raildriver::RaildriverClient::mask (
```

```
... )
```

Send a MASK message to the daemon.

Parameters

...	Mask values
-----	-------------

9.125.3.6 speaker()

```
raildriver::RaildriverClient::speaker (
    onoff )
```

Turn the speaker on or off.

Parameters

<i>onoff</i>	Boolean indicating on (true) or off (false).
--------------	--

9.125.4 Member Data Documentation

9.125.4.1 pollid

```
raildriver::RaildriverClient::pollid [private]
```

Holds the poll after id.

9.125.4.2 socket

```
raildriver::RaildriverClient::socket [private]
```

The socket descriptor connected to the daemon.

9.126 RaildriverIO Class Reference

Low-level Raildriver I/O functions.

```
#include <RaildriverIO.h>
```

Public Types

- enum [Eventmask_bits](#) {
[NONE_M](#) = 0 , [REVERSER_M](#) = 1 << 0 , [THROTTLE_M](#) = 1 << 1 , [AUTOBRAKE_M](#) = 1 << 2 ,
[INDEPENDBRK_M](#) = 1 << 3 , [BAILOFF_M](#) = 1 << 4 , [WIPER_M](#) = 1 << 5 , [HEADLIGHT_M](#) = 1 << 6 ,
[DIGITAL1_M](#) = 1 << 7 , [DIGITAL2_M](#) = 1 << 8 , [DIGITAL3_M](#) = 1 << 9 , [DIGITAL4_M](#) = 1 << 10 ,
[DIGITAL5_M](#) = 1 << 11 , [DIGITAL6_M](#) = 1 << 12 }

Event Masks.

- enum [Eventcodes](#) {
[NONE](#) = 0 , [REVERSER](#) , [THROTTLE](#) , [AUTOBRAKE](#) ,
[INDEPENDBRK](#) , [BAILOFF](#) , [WIPER](#) , [HEADLIGHT](#) ,
[DIGITAL1](#) , [DIGITAL2](#) , [DIGITAL3](#) , [DIGITAL4](#) ,
[DIGITAL5](#) , [DIGITAL6](#) }

Event Codes.

Public Member Functions

- [RaildriverIO](#) (const char *path, char **outmessage=NULL)
Constructor.
- [~RaildriverIO](#) ()
Destructor.
- void [SetLEDS](#) (const char *ledstring, char **outmessage=NULL)
Set the Speedometer LEDs.
- void [SpeakerOn](#) (char **outmessage=NULL)
Turn the speaker on.
- void [SpeakerOff](#) (char **outmessage=NULL)
Turn the speaker off.
- unsigned char [GetReverser](#) () const
Get Reverser value (0-255).
- unsigned char [GetThrottle](#) () const
Get Throttle value (0-255).
- unsigned char [GetAutoBrake](#) () const
Get Auto Brake value (0-255).
- unsigned char [GetIndependBrake](#) () const
Get Independent Brake value (0-255).
- unsigned char [GetBailOff](#) () const
Get Bail Off value (0-255).
- unsigned char [GetHeadlight](#) () const
Get Headlight value (0-255).
- unsigned char [GetWiper](#) () const
Get Wiper value (0-255).
- bool [GetBlueButton1](#) () const
Get Blue Button 1.
- bool [GetBlueButton2](#) () const
Get Blue Button 2.
- bool [GetBlueButton3](#) () const
Get Blue Button 3.
- bool [GetBlueButton4](#) () const

- Get Blue Button 4.*
- bool [GetBlueButton5](#) () const
- Get Blue Button 5.*
- bool [GetBlueButton6](#) () const
- Get Blue Button 6.*
- bool [GetBlueButton7](#) () const
- Get Blue Button 7.*
- bool [GetBlueButton8](#) () const
- Get Blue Button 8.*
- bool [GetBlueButton9](#) () const
- Get Blue Button 9.*
- bool [GetBlueButton10](#) () const
- Get Blue Button 10.*
- bool [GetBlueButton11](#) () const
- Get Blue Button 11.*
- bool [GetBlueButton12](#) () const
- Get Blue Button 12.*
- bool [GetBlueButton13](#) () const
- Get Blue Button 13.*
- bool [GetBlueButton14](#) () const
- Get Blue Button 14.*
- bool [GetBlueButton15](#) () const
- Get Blue Button 15.*
- bool [GetBlueButton16](#) () const
- Get Blue Button 16.*
- bool [GetBlueButton17](#) () const
- Get Blue Button 17.*
- bool [GetBlueButton18](#) () const
- Get Blue Button 18.*
- bool [GetBlueButton19](#) () const
- Get Blue Button 19.*
- bool [GetBlueButton20](#) () const
- Get Blue Button 20.*
- bool [GetBlueButton21](#) () const
- Get Blue Button 21.*
- bool [GetBlueButton22](#) () const
- Get Blue Button 22.*
- bool [GetBlueButton23](#) () const
- Get Blue Button 23.*
- bool [GetBlueButton24](#) () const
- Get Blue Button 24.*
- bool [GetBlueButton25](#) () const
- Get Blue Button 25.*
- bool [GetBlueButton26](#) () const
- Get Blue Button 26.*
- bool [GetBlueButton27](#) () const
- Get Blue Button 27.*

- bool [GetBlueButton28](#) () const
Get Blue Button 28.
- bool [GetZoomUp](#) () const
Get Zoom Up.
- bool [GetZoopDown](#) () const
Get Zoom Down.
- bool [GetPanUp](#) () const
Get Pan Up.
- bool [GetPanRight](#) () const
Get Pan Right.
- bool [GetPanDown](#) () const
Get Pan Down.
- bool [GetPanLeft](#) () const
Get Pan Left.
- bool [GetRangeUp](#) () const
Get Range Up.
- bool [GetRangeDown](#) () const
Get Range Down.
- bool [GetEBrakeUp](#) () const
Get Emergency Brake Up.
- bool [GetEBrakeDown](#) () const
Get Emergency Brake Down.
- bool [GetAlert](#) () const
Get Alert.
- bool [GetSand](#) () const
Get Sand.
- bool [GetPantograph](#) () const
Get Pantograph.
- bool [GetBell](#) () const
Get Bell.
- bool [GetWhistleUp](#) () const
Get Whistle Up.
- bool [GetWhistleDown](#) () const
Get Whistle Down.
- unsigned char [GetProductCodeId](#) () const
Get Product Code Id.
- bool [ReadInputs](#) ([Eventmask_bits](#) &mask, int &status)
Poll the interface.

Private Member Functions

- [RaildriverIO](#) ()
Default constructor.

Private Attributes

- `hid_device * rdriverdev`
Rail Driver Device.
- `union {`
 - `unsigned char ReportBuffer [14]`
Event Buffer.
 - `struct bytes {`
 - `unsigned char Reverser`
Reverser lever, 0-255.
 - `unsigned char Throttle`
Throttle / Dynamic Brake lever, 0-255.
 - `unsigned char AutoBrake`
Automatic Brake lever, 0-255.
 - `unsigned char IndependBrake`
Independent Brake lever, 0-255.
 - `unsigned char BailOff`
Bail Off (Independent Brake lever), 0-255.
 - `unsigned char Wiper`
Wiper switch, 0-255.
 - `unsigned char Headlight`
Headlight switch, 0-255.
 - `unsigned char Digital1`
Blue Buttons 1-8.
 - `unsigned char Digital2`
Blue Buttons 9-16.
 - `unsigned char Digital3`
Blue Buttons 17-24.
 - `unsigned char Digital4`
Blue Buttons 25-28, Zoom, Pan Buttons.
 - `unsigned char Digital5`
Pan, Cab buttons.
 - `unsigned char Digital6`
Cab Buttons, Whistle Switch.
 - `unsigned char ProductCodeId`
Product Code Id, usually 210.
 - `} theBytes`
- `} RDInput`

Event data.

Static Private Attributes

- `static const unsigned short int PIEngineering`
Rail Driver vendor code.
- `static const unsigned short int RailDriverModernDesktop`
Rail Driver product code.
- `static const int LEDCommand`
LED Command code.
- `static const int SpeakerCommand`
Speaker command code.

9.126.1 Detailed Description

Low-level Raildriver I/O functions.

This class implements the low-level Raildriver I/O functions and provides access to the two endpoints, one input (controls, switches, and buttons) and one output (LED display and speaker switch).

The Raildriver ``game'' console contains a collection of levers, buttons, and switches that simulate a locomotive control stand. There is a reverser lever, a throttle, two brake levers, switches for the lights and wipers, and buttons, switches, and levers for things like the bell, alerter, whistle (or horn), sand, pantograph, and other functions, plus a collection of general purpose buttons that can be programmed to provide any other function. The console also contains a three digit seven-segment display and there is a built in speaker.

Author

Robert Heller <heller@deepsoft.com>

9.126.2 Tcl Package Provided

Raildriverio 1.0.0

9.126.3 Library Provided

libraildriverio 1.0.0

9.126.4 Member Enumeration Documentation

9.126.4.1 Eventcodes

enum [RaildriverIO::Eventcodes](#)

Event Codes.

These are the event codes for the Rail Driver's report message. There is a code for each of the thirteen bytes in the report buffer.

Enumerator

NONE	No bits set.
REVERSER	Reverser lever. This is a value between 0 and 255 representing the position of the reverser lever.

Enumerator

THROTTLE	<p>Throttle lever.</p> <p>This is a value between 0 and 255 representing the position of the throttle / dynamic brake lever.</p>
AUTOBRAKE	<p>Automatic Brake lever.</p> <p>This is a value between 0 and 255 representing the position of the automatic brake lever.</p>
INDEPENDBRK	<p>Independent Brake lever.</p> <p>This is a value between 0 and 255 representing the position of the independent brake lever.</p>
BALLOFF	<p>Independent Brake bail off.</p> <p>This is a value between 0 and 255 representing the position of the independent brake lever bail off.</p>
WIPER	<p>Wiper switch.</p> <p>This is a value between 0 and 255 representing the position of the wiper switch.</p>
HEADLIGHT	<p>Headlight switch.</p> <p>This is a value between 0 and 255 representing the position of the headlight switch.</p>
DIGITAL1	<p>Blue Buttons 1-8.</p> <p>This is a bitfield representing 8 of the generic ``blue`` buttons.</p>
DIGITAL2	<p>Blue Buttons 9-16.</p> <p>This is a bitfield representing 8 of the generic ``blue`` buttons.</p>
DIGITAL3	<p>Blue Buttons 17-24.</p> <p>This is a bitfield representing 8 of the generic ``blue`` buttons.</p>
DIGITAL4	<p>Blue Buttons 25-28, Zoom, Pan.</p> <p>This is a bitfield representing the last 4 of the generic ``blue`` buttons, the zoom rocker, and one-half of the pan (2d) rocker.</p>
DIGITAL5	<p>Pan, Cab Buttons.</p> <p>This is a bitfield representing the second half of the pan (2d) rocker, and several of the two of the cab rocker switches.</p>

Enumerator

DIGITAL6	<p>Cab Buttons, Whistle.</p> <p>This is a bitfield representing the cab buttons and the whistle lever.</p>
----------	--

9.126.4.2 Eventmask_bits

```
enum RaildriverIO::Eventmask_bits
```

Event Masks.

These are the mask bits for the Rail Driver's report message. Each bit represents one of the thirteen bytes in the report buffer.

Enumerator

NONE_M	<p>No bits set.</p> <p>This is the empty mask.</p>
REVERSER_M	<p>Reverser lever.</p> <p>This is a value between 0 and 255 representing the position of the reverser lever.</p>
THROTTLE_M	<p>Throttle lever.</p> <p>This is a value between 0 and 255 representing the position of the throttle / dynamic brake lever.</p>
AUTOBRAKE_M	<p>Automatic Brake lever.</p> <p>This is a value between 0 and 255 representing the position of the automatic brake lever.</p>
INDEPENDBRK_M	<p>Independent Brake lever.</p> <p>This is a value between 0 and 255 representing the position of the independent brake lever.</p>
BALLOFF_M	<p>Independent Brake bail off.</p> <p>This is a value between 0 and 255 representing the position of the independent brake lever bail off.</p>
WIPER_M	<p>Wiper switch.</p> <p>This is a value between 0 and 255 representing the position of the wiper switch.</p>

Enumerator

HEADLIGHT_M	Headlight switch. This is a value between 0 and 255 representing the position of the headlight switch.
DIGITAL1_M	Blue Buttons 1-8. This is a bitfield representing 8 of the generic ``blue`` buttons.
DIGITAL2_M	Blue Buttons 9-16. This is a bitfield representing 8 of the generic ``blue`` buttons.
DIGITAL3_M	Blue Buttons 17-24. This is a bitfield representing 8 of the generic ``blue`` buttons.
DIGITAL4_M	Blue Buttons 25-28, Zoom, Pan. This is a bitfield representing the last 4 of the generic ``blue`` buttons, the zoom rocker, and one-half of the pan (2d) rocker.
DIGITAL5_M	Pan, Cab Buttons. This is a bitfield representing the second half of the pan (2d) rocker, and several of the two of the cab rocker switches.
DIGITAL6_M	Cab Buttons, whistle. This is a bitfield representing the cab buttons and the whistle lever.

9.126.5 Constructor & Destructor Documentation

9.126.5.1 RaildriverIO() [1/2]

```
RaildriverIO::RaildriverIO (
    const char * path,
    char ** outmessage = NULL )
```

Constructor.

The argument is the bus number and device number that identifies the specific device. Finds and opens the device and initializes various data objects, generally preparing for I/O to the connected rail driver console.

Parameters

<i>path</i>	The path name or the empty string or NULL.
<i>outmessage</i>	Receives error messages.

9.126.5.2 ~RaildriverIO()

```
RaildriverIO::~~RaildriverIO ( )
```

Destructor.

Closes the device and free up system resources.

9.126.5.3 RaildriverIO() [2/2]

```
RaildriverIO::RaildriverIO ( ) [inline], [private]
```

Default constructor.

This constructor is never called. It is made private to force a compiler error if an attempt is made to use it.

9.126.6 Member Function Documentation**9.126.6.1 GetAlert()**

```
bool RaildriverIO::GetAlert ( ) const [inline]
```

Get Alert.

References [RDInput](#).

9.126.6.2 GetAutoBrake()

```
unsigned char RaildriverIO::GetAutoBrake ( ) const [inline]
```

Get Auto Brake value (0-255).

References [RDInput](#).

9.126.6.3 GetBailOff()

```
unsigned char RaildriverIO::GetBailOff ( ) const [inline]
```

Get Bail Off value (0-255).

References [RDInput](#).

9.126.6.4 GetBell()

```
bool RaildriverIO::GetBell ( ) const [inline]
```

Get Bell.

References [RDInput](#).

9.126.6.5 GetBlueButton1()

```
bool RaildriverIO::GetBlueButton1 ( ) const [inline]
```

Get Blue Button 1.

References [RDInput](#).

9.126.6.6 GetBlueButton10()

```
bool RaildriverIO::GetBlueButton10 ( ) const [inline]
```

Get Blue Button 10.

References [RDInput](#).

9.126.6.7 GetBlueButton11()

```
bool RaildriverIO::GetBlueButton11 ( ) const [inline]
```

Get Blue Button 11.

References [RDInput](#).

9.126.6.8 GetBlueButton12()

```
bool RaildriverIO::GetBlueButton12 ( ) const [inline]
```

Get Blue Button 12.

References [RDInput](#).

9.126.6.9 GetBlueButton13()

```
bool RaildriverIO::GetBlueButton13 ( ) const [inline]
```

Get Blue Button 13.

References [RDInput](#).

9.126.6.10 GetBlueButton14()

```
bool RaildriverIO::GetBlueButton14 ( ) const [inline]
```

Get Blue Button 14.

References [RDInput](#).

9.126.6.11 GetBlueButton15()

```
bool RaildriverIO::GetBlueButton15 ( ) const [inline]
```

Get Blue Button 15.

References [RDInput](#).

9.126.6.12 GetBlueButton16()

```
bool RaildriverIO::GetBlueButton16 ( ) const [inline]
```

Get Blue Button 16.

References [RDInput](#).

9.126.6.13 GetBlueButton17()

```
bool RaildriverIO::GetBlueButton17 ( ) const [inline]
```

Get Blue Button 17.

References [RDInput](#).

9.126.6.14 GetBlueButton18()

```
bool RaildriverIO::GetBlueButton18 ( ) const [inline]
```

Get Blue Button 18.

References [RDInput](#).

9.126.6.15 GetBlueButton19()

```
bool RaildriverIO::GetBlueButton19 ( ) const [inline]
```

Get Blue Button 19.

References [RDInput](#).

9.126.6.16 GetBlueButton2()

```
bool RaildriverIO::GetBlueButton2 ( ) const [inline]
```

Get Blue Button 2.

References [RDInput](#).

9.126.6.17 GetBlueButton20()

```
bool RaildriverIO::GetBlueButton20 ( ) const [inline]
```

Get Blue Button 20.

References [RDInput](#).

9.126.6.18 GetBlueButton21()

```
bool RaildriverIO::GetBlueButton21 ( ) const [inline]
```

Get Blue Button 21.

References [RDInput](#).

9.126.6.19 GetBlueButton22()

```
bool RaildriverIO::GetBlueButton22 ( ) const [inline]
```

Get Blue Button 22.

References [RDInput](#).

9.126.6.20 GetBlueButton23()

```
bool RaildriverIO::GetBlueButton23 ( ) const [inline]
```

Get Blue Button 23.

References [RDInput](#).

9.126.6.21 GetBlueButton24()

```
bool RaildriverIO::GetBlueButton24 ( ) const [inline]
```

Get Blue Button 24.

References [RDInput](#).

9.126.6.22 GetBlueButton25()

```
bool RaildriverIO::GetBlueButton25 ( ) const [inline]
```

Get Blue Button 25.

References [RDInput](#).

9.126.6.23 GetBlueButton26()

```
bool RaildriverIO::GetBlueButton26 ( ) const [inline]
```

Get Blue Button 26.

References [RDInput](#).

9.126.6.24 GetBlueButton27()

```
bool RaildriverIO::GetBlueButton27 ( ) const [inline]
```

Get Blue Button 27.

References [RDInput](#).

9.126.6.25 GetBlueButton28()

```
bool RaildriverIO::GetBlueButton28 ( ) const [inline]
```

Get Blue Button 28.

References [RDInput](#).

9.126.6.26 GetBlueButton3()

```
bool RaildriverIO::GetBlueButton3 ( ) const [inline]
```

Get Blue Button 3.

References [RDInput](#).

9.126.6.27 GetBlueButton4()

```
bool RaildriverIO::GetBlueButton4 ( ) const [inline]
```

Get Blue Button 4.

References [RDInput](#).

9.126.6.28 GetBlueButton5()

```
bool RaildriverIO::GetBlueButton5 ( ) const [inline]
```

Get Blue Button 5.

References [RDInput](#).

9.126.6.29 GetBlueButton6()

```
bool RaildriverIO::GetBlueButton6 ( ) const [inline]
```

Get Blue Button 6.

References [RDInput](#).

9.126.6.30 GetBlueButton7()

```
bool RaildriverIO::GetBlueButton7 ( ) const [inline]
```

Get Blue Button 7.

References [RDInput](#).

9.126.6.31 GetBlueButton8()

```
bool RaildriverIO::GetBlueButton8 ( ) const [inline]
```

Get Blue Button 8.

References [RDInput](#).

9.126.6.32 GetBlueButton9()

```
bool RaildriverIO::GetBlueButton9 ( ) const [inline]
```

Get Blue Button 9.

References [RDInput](#).

9.126.6.33 GetEBrakeDown()

```
bool RaildriverIO::GetEBrakeDown ( ) const [inline]
```

Get Emergency Brake Down.

References [RDInput](#).

9.126.6.34 GetEBrakeUp()

```
bool RaildriverIO::GetEBrakeUp ( ) const [inline]
```

Get Emergency Brake Up.

References [RDInput](#).

9.126.6.35 GetHeadlight()

```
unsigned char RaildriverIO::GetHeadlight ( ) const [inline]
```

Get Headlight value (0-255).

References [RDInput](#).

9.126.6.36 GetIndependBrake()

```
unsigned char RaildriverIO::GetIndependBrake ( ) const [inline]
```

Get Independen Brake value (0-255).

References [RDInput](#).

9.126.6.37 GetPanDown()

```
bool RaildriverIO::GetPanDown ( ) const [inline]
```

Get Pan Down.

References [RDInput](#).

9.126.6.38 GetPanLeft()

```
bool RaildriverIO::GetPanLeft ( ) const [inline]
```

Get Pan Left.

References [RDInput](#).

9.126.6.39 GetPanRight()

```
bool RaildriverIO::GetPanRight ( ) const [inline]
```

Get Pan Right.

References [RDInput](#).

9.126.6.40 GetPantograph()

```
bool RaildriverIO::GetPantograph ( ) const [inline]
```

Get Pantograph.

References [RDInput](#).

9.126.6.41 GetPanUp()

```
bool RaildriverIO::GetPanUp ( ) const [inline]
```

Get Pan Up.

References [RDInput](#).

9.126.6.42 GetProductCodeId()

```
unsigned char RaildriverIO::GetProductCodeId ( ) const [inline]
```

Get Product Code Id.

This is a unsigned char value filled in upon reading the input report buffer from the Raildriver.

References [RDInput](#).

9.126.6.43 GetRangeDown()

```
bool RaildriverIO::GetRangeDown ( ) const [inline]
```

Get Range Down.

References [RDInput](#).

9.126.6.44 GetRangeUp()

```
bool RaildriverIO::GetRangeUp ( ) const [inline]
```

Get Range Up.

References [RDInput](#).

9.126.6.45 GetReverser()

```
unsigned char RaildriverIO::GetReverser ( ) const [inline]
```

Get Reverser value (0-255).

References [RDInput](#).

9.126.6.46 GetSand()

```
bool RaildriverIO::GetSand ( ) const [inline]
```

Get Sand.

References [RDInput](#).

9.126.6.47 GetThrottle()

```
unsigned char RaildriverIO::GetThrottle ( ) const [inline]
```

Get Throttle value (0-255).

References [RDInput](#).

9.126.6.48 GetWhistleDown()

```
bool RaildriverIO::GetWhistleDown ( ) const [inline]
```

Get Whistle Down.

References [RDInput](#).

9.126.6.49 GetWhistleUp()

```
bool RaildriverIO::GetWhistleUp ( ) const [inline]
```

Get Whistle Up.

References [RDInput](#).

9.126.6.50 GetWiper()

```
unsigned char RaildriverIO::GetWiper ( ) const [inline]
```

Get Wiper value (0-255).

References [RDInput](#).

9.126.6.51 GetZoomUp()

```
bool RaildriverIO::GetZoomUp ( ) const [inline]
```

Get Zoom Up.

References [RDInput](#).

9.126.6.52 GetZoomDown()

```
bool RaildriverIO::GetZoomDown ( ) const [inline]
```

Get Zoom Down.

References [RDInput](#).

9.126.6.53 ReadInputs()

```
bool RaildriverIO::ReadInputs (
    Eventmask_bits & mask,
    int & status )
```

Poll the interface.

Called in the event loop. Returns true if something has changed, that is if any of the bytes in the freshly read report buffer are different from the stored report buffer.

Parameters

<i>mask</i>	Mask of changed bits. This parameter is updated to reflect any changed state information.
<i>status</i>	IO Status of the read.

9.126.6.54 SetLEDS()

```
void RaildriverIO::SetLEDS (
    const char * ledstring,
    char ** outmessage = NULL )
```

Set the Speedometer LEDs.

Does a bulk write to set the speedometer LEDs on the Raid Driver unit.

9.126.6.55 SpeakerOff()

```
void RaildriverIO::SpeakerOff (
    char ** outmessage = NULL )
```

Turn the speaker off.

9.126.6.56 SpeakerOn()

```
void RaildriverIO::SpeakerOn (
    char ** outmessage = NULL )
```

Turn the speaker on.

9.126.7 Member Data Documentation**9.126.7.1 AutoBrake**

```
unsigned char RaildriverIO::AutoBrake
```

Automatic Brake lever, 0-255.

9.126.7.2 BailOff

```
unsigned char RaildriverIO::BailOff
```

Bail Off (Independent Brake lever), 0-255.

9.126.7.3 Digital1

```
unsigned char RaildriverIO::Digital1
```

Blue Buttons 1-8.

This is an 8-bit bit field.

9.126.7.4 Digital2

```
unsigned char RaildriverIO::Digital2
```

Blue Buttons 9-16.

This is an 8-bit bit field.

9.126.7.5 Digital3

```
unsigned char RaildriverIO::Digital3
```

Blue Buttons 17-24.

This is an 8-bit bit field.

9.126.7.6 Digital4

```
unsigned char RaildriverIO::Digital4
```

Blue Buttons 25-28, Zoom, Pan Buttons.

This is an 8-bit bit field.

9.126.7.7 Digital5

```
unsigned char RaildriverIO::Digital5
```

Pan, Cab buttons.

This is an 8-bit bit field.

9.126.7.8 Digital6

```
unsigned char RaildriverIO::Digital6
```

Cab Buttons, Whistle Switch.

This is an 8-bit bit field.

9.126.7.9 Headlight

```
unsigned char RaildriverIO::Headlight
```

Headlight switch, 0-255.

9.126.7.10 IndependBrake

```
unsigned char RaildriverIO::IndependBrake
```

Independent Brake lever, 0-255.

9.126.7.11 LEDCommand

```
const int RaildriverIO::LEDCommand [static], [private]
```

LED Command code.

This is the command code used to change the LED display.

9.126.7.12 PIEngineering

```
const unsigned short int RaildriverIO::PIEngineering [static], [private]
```

Rail Driver vendor code.

This is the vendor code PI Engineering was granted for their USB products.

9.126.7.13 ProductCodeId

```
unsigned char RaildriverIO::ProductCodeId
```

Product Code Id, usually 210.

9.126.7.14 RailDriverModernDesktop

```
const unsigned short int RaildriverIO::RailDriverModernDesktop [static], [private]
```

Rail Driver product code.

This is the product PI Engineering uses for their Rail Driver consoles.

9.126.7.15

```
union { ... } RaildriverIO::RDInput [private]
```

Event data.

This is the report buffer used to hold the state of all of the levers, switches, and buttons on the Rail Driver console. It is a union of a fourteen byte buffer and a struct of bytes, one for each lever or switch or bit fields representing single buttons.

Referenced by [GetAlert\(\)](#), [GetAutoBrake\(\)](#), [GetBailOff\(\)](#), [GetBell\(\)](#), [GetBlueButton1\(\)](#), [GetBlueButton10\(\)](#), [GetBlueButton11\(\)](#), [GetBlueButton12\(\)](#), [GetBlueButton13\(\)](#), [GetBlueButton14\(\)](#), [GetBlueButton15\(\)](#), [GetBlueButton16\(\)](#), [GetBlueButton17\(\)](#), [GetBlueButton18\(\)](#), [GetBlueButton19\(\)](#), [GetBlueButton2\(\)](#), [GetBlueButton20\(\)](#), [GetBlueButton21\(\)](#), [GetBlueButton22\(\)](#), [GetBlueButton23\(\)](#), [GetBlueButton24\(\)](#), [GetBlueButton25\(\)](#), [GetBlueButton26\(\)](#), [GetBlueButton27\(\)](#), [GetBlueButton28\(\)](#), [GetBlueButton3\(\)](#), [GetBlueButton4\(\)](#), [GetBlueButton5\(\)](#), [GetBlueButton6\(\)](#), [GetBlueButton7\(\)](#), [GetBlueButton8\(\)](#), [GetBlueButton9\(\)](#), [GetEBrakeDown\(\)](#), [GetEBrakeUp\(\)](#), [GetHeadlight\(\)](#), [GetIndependBrake\(\)](#), [GetPanDown\(\)](#), [GetPanLeft\(\)](#), [GetPanRight\(\)](#), [GetPantograph\(\)](#), [GetPanUp\(\)](#), [GetProductCodeId\(\)](#), [GetRangeDown\(\)](#), [GetRangeUp\(\)](#), [GetReverser\(\)](#), [GetSand\(\)](#), [GetThrottle\(\)](#), [GetWhistleDown\(\)](#), [GetWhistleUp\(\)](#), [GetWiper\(\)](#), [GetZoomUp\(\)](#), and [GetZoopDown\(\)](#).

9.126.7.16 rdriverdev

```
hid_device* RaildriverIO::rdriverdev [private]
```

Rail Driver Device.

This is the HID device structure for the device.

9.126.7.17 ReportBuffer

```
unsigned char RaildriverIO::ReportBuffer[14]
```

Event Buffer.

This is the I/O buffer used to hold the information about the state of the Rail Driver console.

9.126.7.18 Reverser

```
unsigned char RaildriverIO::Reverser
```

Reverser lever, 0-255.

9.126.7.19 SpeakerCommand

```
const int RaildriverIO::SpeakerCommand [static], [private]
```

Speaker command code.

This is the command code used to toggle the speaker state.

9.126.7.20

```
struct { ... } ::bytes RaildriverIO::theBytes
```

9.126.7.21 Throttle

```
unsigned char RaildriverIO::Throttle
```

Throttle / Dynamic Brake lever, 0-255.

9.126.7.22 Wiper

```
unsigned char RaildriverIO::Wiper
```

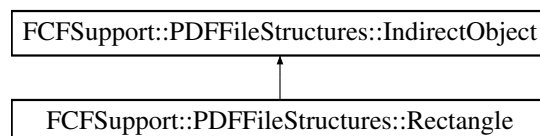
Wiper switch, 0-255.

9.127 FCFSupport::PDFFileStructures::Rectangle Class Reference

A rectangle object.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::Rectangle:



Public Member Functions

- [Rectangle](#) (double x_1, double y_1, double x_2, double y_2, unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~Rectangle](#) ()
Destructor.
- double [X1](#) () const
Return the first X coordinate.
- double [Y1](#) () const
Return the first Y coordinate.
- double [X2](#) () const
Return the second X coordinate.
- double [Y2](#) () const
Return the second Y coordinate.
- virtual ostream & [WriteDirect](#) (ostream &stream) const
Write an object directly.

Private Attributes

- double [x1](#)
First X coordinate.
- double [y1](#)
First Y coordinate.
- double [x2](#)
Second X coordinate.
- double [y2](#)
Second Y coordinate.

9.127.1 Detailed Description

A rectangle object.

Author

Robert Heller <heller@deepsoft.com>

9.127.2 Constructor & Destructor Documentation

9.127.2.1 Rectangle()

```
FCFSupport::PDFFileStructures::Rectangle::Rectangle (
    double x_1,
    double y_1,
    double x_2,
    double y_2,
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a fresh [Rectangle](#) object.

Parameters

<i>x_1</i>	First X coordinate.
<i>y_1</i>	First Y coordinate.
<i>x_2</i>	Second X coordinate.
<i>y_2</i>	Second Y coordinate.
<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [x1](#), [x2](#), [y1](#), and [y2](#).

9.127.2.2 ~Rectangle()

```
FCFSupport::PDFFileStructures::Rectangle::~~Rectangle ( ) [inline]
```

Destructor.

9.127.3 Member Function Documentation

9.127.3.1 WriteDirect()

```
virtual ostream & FCFSupport::PDFFileStructures::Rectangle::WriteDirect (
    ostream & stream ) const [inline], [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Implements [FCFSupport::PDFFileStructures::IndirectObject](#).

References [lcc::stream](#), [x1](#), [x2](#), [y1](#), and [y2](#).

9.127.3.2 X1()

```
double FCFSupport::PDFFileStructures::Rectangle::X1 ( ) const [inline]
```

Return the first X coordinate.

References [x1](#).

9.127.3.3 X2()

```
double FCFSupport::PDFFileStructures::Rectangle::X2 ( ) const [inline]
```

Return the second X coordinate.

References [x2](#).

9.127.3.4 Y1()

```
double FCFSupport::PDFFileStructures::Rectangle::Y1 ( ) const [inline]
```

Return the first Y coordinate.

References [y1](#).

9.127.3.5 Y2()

```
double FCFSupport::PDFFileStructures::Rectangle::Y2 ( ) const [inline]
```

Return the second Y coordinate.

References [y2](#).

9.127.4 Member Data Documentation

9.127.4.1 x1

```
double FCFSupport::PDFFileStructures::Rectangle::x1 [private]
```

First X coordinate.

Referenced by [Rectangle\(\)](#), [WriteDirect\(\)](#), and [X1\(\)](#).

9.127.4.2 x2

```
double FCFSupport::PDFFileStructures::Rectangle::x2 [private]
```

Second X coordinate.

Referenced by [Rectangle\(\)](#), [WriteDirect\(\)](#), and [X2\(\)](#).

9.127.4.3 y1

```
double FCFSupport::PDFFileStructures::Rectangle::y1 [private]
```

First Y coordinate.

Referenced by [Rectangle\(\)](#), [WriteDirect\(\)](#), and [Y1\(\)](#).

9.127.4.4 y2

```
double FCFSupport::PDFFileStructures::Rectangle::y2 [private]
```

Second Y coordinate.

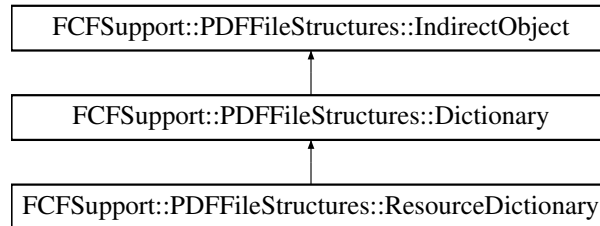
Referenced by [Rectangle\(\)](#), [WriteDirect\(\)](#), and [Y2\(\)](#).

9.128 FCFSupport::PDFFileStructures::ResourceDictionary Class Reference

Resource dictionary.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::ResourceDictionary:



Public Member Functions

- [ResourceDictionary](#) (unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~ResourceDictionary](#) ()
Destructor.
- void [AddProcSet](#) (string pname)
Add a procedure set.
- void [AddExternalGraphicsState](#) (const string name, [IndirectObject](#) *obj)
Add an External Graphics State resource.
- void [AddColorSpace](#) (const string name, [IndirectObject](#) *obj)
Add an Color Space resource.
- void [AddPattern](#) (const string name, [IndirectObject](#) *obj)
Add an Pattern resource.
- void [AddShading](#) (const string name, [IndirectObject](#) *obj)
Add an Shading resource.
- void [AddXObject](#) (const string name, [IndirectObject](#) *obj)
Add an External Object resource.
- void [AddFont](#) (const string name, [IndirectObject](#) *obj)
Add an Font resource.
- void [AddProperties](#) (const string name, [IndirectObject](#) *obj)
Add an Properties resource.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const
Write the elements of a dictionary.

Private Attributes

- [IndirectObjectDictionary extGState](#)
A dictionary that maps resource names to graphics state parameters dictionaries.
- [IndirectObjectDictionary colorSpace](#)
A dictionary that maps each resource name to either the name of a device-dependent color space or to an array describing a color space.
- [IndirectObjectDictionary pattern](#)
A *Dictionary* that maps resource names to pattern objects.
- [IndirectObjectDictionary shading](#)
A *Dictionary* that maps resource names to shading dictionaries.
- [IndirectObjectDictionary xObject](#)
A *Dictionary* that maps resource names to external objects.
- [IndirectObjectDictionary font](#)
A *Dictionary* that maps resource names to font dictionaries.
- [IndirectObjectDictionary properties](#)
A *Dictionary* that maps resource names to property list dictionaries for marked content.
- [PDFNameArray procSets](#)
An array of predefined preseture set names.

9.128.1 Detailed Description

Resource dictionary.

Holds various named resources for indirect access.

Author

Robert Heller <heller@deepsoft.com>

9.128.2 Constructor & Destructor Documentation

9.128.2.1 ResourceDictionary()

```
FCFSupport::PDFFileStructures::ResourceDictionary::ResourceDictionary (
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Create a new dictionary.

Parameters

<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

9.128.2.2 ~ResourceDictionary()

```
FCFSSupport::PDFFileStructures::ResourceDictionary::~~ResourceDictionary ( ) [inline]
```

Destructor.

9.128.3 Member Function Documentation**9.128.3.1 AddColorSpace()**

```
void FCFSSupport::PDFFileStructures::ResourceDictionary::AddColorSpace (
    const string name,
    IndirectObject * obj ) [inline]
```

Add an Color Space resource.

Parameters

<i>name</i>	The resource name.
<i>obj</i>	The indirect object.

References [FCFSSupport::PDFFileStructures::IndirectObjectDictionary::AddIndirectObject\(\)](#), and [colorSpace](#).

9.128.3.2 AddExternalGraphicsState()

```
void FCFSSupport::PDFFileStructures::ResourceDictionary::AddExternalGraphicsState (
    const string name,
    IndirectObject * obj ) [inline]
```

Add an External Graphics State resource.

Parameters

<i>name</i>	The resource name.
<i>obj</i>	The indirect object.

References [FCFSupport::PDFFileStructures::IndirectObjectDictionary::AddIndirectObject\(\)](#), and [extGState](#).

9.128.3.3 AddFont()

```
void FCFSupport::PDFFileStructures::ResourceDictionary::AddFont (
    const string name,
    IndirectObject * obj ) [inline]
```

Add an Font resource.

Parameters

<i>name</i>	The resource name.
<i>obj</i>	The indirect object.

References [FCFSupport::PDFFileStructures::IndirectObjectDictionary::AddIndirectObject\(\)](#), and [font](#).

9.128.3.4 AddPattern()

```
void FCFSupport::PDFFileStructures::ResourceDictionary::AddPattern (
    const string name,
    IndirectObject * obj ) [inline]
```

Add an Pattern resource.

Parameters

<i>name</i>	The resource name.
<i>obj</i>	The indirect object.

References [FCFSupport::PDFFileStructures::IndirectObjectDictionary::AddIndirectObject\(\)](#), and [pattern](#).

9.128.3.5 AddProcSet()

```
void FCFSupport::PDFFileStructures::ResourceDictionary::AddProcSet (
    string pname ) [inline]
```

Add a procedure set.

Parameters

<i>pname</i>	The name of the prodecure set to add.
--------------	---------------------------------------

References [procSets](#).

9.128.3.6 AddProperties()

```
void FCFSupport::PDFFileStructures::ResourceDictionary::AddProperties (
    const string name,
    IndirectObject * obj ) [inline]
```

Add an Properties resource.

Parameters

<i>name</i>	The resource name.
<i>obj</i>	The indirect object.

References [FCFSupport::PDFFileStructures::IndirectObjectDictionary::AddIndirectObject\(\)](#), and [properties](#).

9.128.3.7 AddShading()

```
void FCFSupport::PDFFileStructures::ResourceDictionary::AddShading (
    const string name,
    IndirectObject * obj ) [inline]
```

Add an Shading resource.

Parameters

<i>name</i>	The resource name.
<i>obj</i>	The indirect object.

References [FCFSupport::PDFFileStructures::IndirectObjectDictionary::AddIndirectObject\(\)](#), and [shading](#).

9.128.3.8 AddXObject()

```
void FCFSupport::PDFFileStructures::ResourceDictionary::AddXObject (
    const string name,
    IndirectObject * obj ) [inline]
```

Add an External Object resource.

Parameters

<i>name</i>	The resource name.
<i>obj</i>	The indirect object.

References [FCFSupport::PDFFileStructures::IndirectObjectDictionary::AddIndirectObject\(\)](#), and [XObject](#).

9.128.3.9 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::ResourceDictionary::WriteDictionaryElements (
    ostream & stream ) const [protected], [virtual]
```

Write the elements of a dictionary.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::Dictionary](#).

9.128.4 Member Data Documentation

9.128.4.1 colorSpace

```
IndirectObjectDictionary FCFSupport::PDFFileStructures::ResourceDictionary::colorSpace [private]
```

A dictionary that maps each resource name to either the name of a device-dependent color space or to an array describing a color space.

Referenced by [AddColorSpace\(\)](#).

9.128.4.2 extGState

`IndirectObjectDictionary` FCFSupport::PDFFileStructures::ResourceDictionary::extGState [private]

A dictionary that maps resource names to graphics state parameters dictionaries.

Referenced by [AddExternalGraphicsState\(\)](#).

9.128.4.3 font

`IndirectObjectDictionary` FCFSupport::PDFFileStructures::ResourceDictionary::font [private]

A [Dictionary](#) that maps resource names to font dictionaries.

Referenced by [AddFont\(\)](#).

9.128.4.4 pattern

`IndirectObjectDictionary` FCFSupport::PDFFileStructures::ResourceDictionary::pattern [private]

A [Dictionary](#) that maps resource names to pattern objects.

Referenced by [AddPattern\(\)](#).

9.128.4.5 procSets

`PDFNameArray` FCFSupport::PDFFileStructures::ResourceDictionary::procSets [private]

An array of predefined preseture set names.

Referenced by [AddProcSet\(\)](#).

9.128.4.6 properties

`IndirectObjectDictionary` FCFSupport::PDFFileStructures::ResourceDictionary::properties [private]

A [Dictionary](#) that maps resource names to property list dictionaries for marked content.

Referenced by [AddProperties\(\)](#).

9.128.4.7 shading

[IndirectObjectDictionary](#) FCFSupport::PDFFileStructures::ResourceDictionary::shading [private]

A [Dictionary](#) that maps resource names to shading dictionaries.

Referenced by [AddShading\(\)](#).

9.128.4.8 xObject

[IndirectObjectDictionary](#) FCFSupport::PDFFileStructures::ResourceDictionary::xObject [private]

A [Dictionary](#) that maps resource names to external objects.

Referenced by [AddXObject\(\)](#).

9.129 Parsers::RouteVec Struct Reference

Route structure.

```
#include <TrackGraph.h>
```

Public Attributes

- char * [positionName](#)
Name of route.
- [IntegerList](#) * [posList](#)
List of segments used by the route.
- float [routeLength](#)
Length of the route.

9.129.1 Detailed Description

Route structure.

Author

Robert Heller <heller@deepsoft.com>

9.129.2 Member Data Documentation

9.129.2.1 positionName

`char* Parsers::RouteVec::positionName`

Name of route.

9.129.2.2 posList

`IntegerList* Parsers::RouteVec::posList`

List of segments used by the route.

9.129.2.3 routeLength

`float Parsers::RouteVec::routeLength`

Length of the route.

9.130 Satellite Class Reference

[Satellite](#) class.

Public Member Functions

- [Satellite](#) (name, hostname,...)
Construct [Satellite](#) connection.
- [remoteeval](#) (...)
Method to run a remote command.
- [~Satellite](#) ()
Clean up all data objects and free up all resources.

Private Attributes

- [socket](#)
The connection socket.

9.130.1 Detailed Description

[Satellite](#) class.

This class implements the interface logic to connect to a [Satellite](#) daemon running on a slave computer.

Parameters

<i>hostname</i>	The name or address of the slave.
...	Options: <ul style="list-style-type: none">• -port The port to use to connect. Readonly, default is 40000.

Author

Robert Heller <heller@deepsoft.com>

9.130.2 Constructor & Destructor Documentation

9.130.2.1 Satellite()

```
Satellite::Satellite (  
    name ,  
    hostname ,  
    ... )
```

Construct [Satellite](#) connection.

Parameters

<i>hostname</i>	The name or address of the slave.
...	Options: <ul style="list-style-type: none">• -port The port to use to connect. Readonly, default is 40000.

9.130.2.2 ~Satellite()

```
Satellite::~~Satellite ( )
```

Clean up all data objects and free up all resources.

9.130.3 Member Function Documentation

9.130.3.1 remoteeval()

```
Satellite::remoteeval (
    ... )
```

Method to run a remote command.

Parameters

...	Command list.
-----	---------------

Returns

The result of the remote command.

9.130.4 Member Data Documentation

9.130.4.1 socket

```
Satellite::socket [private]
```

The connection socket.

9.131 CTCPPanel::SchLabel Class Reference

Schematic Label object type.

Public Member Functions

- [SchLabel](#) (name, _ctcpanel, _canvas,...)
Construct a Label object.
- [~SchLabel](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (none).
- [setv](#) (state)

Method to set out value (level position).

- [geti](#) (ind)

Method to get the state of one of our indicators (none).

- [seti](#) (ind, value)

Method to set an indicator's state (none).

- [invoke](#) ()

Method to invoke the label.

Private Member Functions

- [_configureColor](#) (option, value)

Method to update the color of the label.

- [_configureLabel](#) (option, value)

Method to update the label option.

Private Attributes

- [ctcpanel](#)

The CTC Panel component (parent widget).

- [canvas](#)

The canvas component (parent widget component).

9.131.1 Detailed Description

Schematic Label object type.

These are on the schematic and represent a label on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the label on.
...	Options: <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -color The color of the label (default white). • -label The label of the label (default "").

Defined coords terminals: none. Defined values (states): none. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.131.2 Constructor & Destructor Documentation

9.131.2.1 SchLabel()

```
CTCPanel::SchLabel::SchLabel (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a Label object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the SchLabel on.
<code>...</code>	Option list.

9.131.2.2 ~SchLabel()

```
CTCPanel::SchLabel::~~SchLabel ( )
```

Clean up all data objects and free up all resources.

9.131.3 Member Function Documentation

9.131.3.1 `_configureColor()`

```
CTCPanel::SchLabel::_configureColor (
    option ,
    value ) [private]
```

Method to update the color of the label.

9.131.3.2 `_configureLabel()`

```
CTCPanel::SchLabel::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.131.3.3 `geti()`

```
CTCPanel::SchLabel::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.131.3.4 `getv()`

```
CTCPanel::SchLabel::getv ( )
```

Method to get our value (none).

9.131.3.5 `invoke()`

```
CTCPanel::SchLabel::invoke ( )
```

Method to invoke the label.

9.131.3.6 seti()

```
CTCPanel::SchLabel::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.131.3.7 setv()

```
CTCPanel::SchLabel::setv (
    state )
```

Method to set out value (level position).

9.131.4 Member Data Documentation

9.131.4.1 canvas

```
CTCPanel::SchLabel::canvas [private]
```

The canvas component (parent widget component).

9.131.4.2 ctcpnl

```
CTCPanel::SchLabel::ctcpnl [private]
```

The CTC Panel component (parent widget).

9.132 CTCPanel::ScissorCrossover Class Reference

Scissor [Crossover](#) (turnout) object type.

Public Member Functions

- [ScissorCrossover](#) (name, _ctcpanel, _canvas,...)
Construct a [ScissorCrossover](#) object.
- [~ScissorCrossover](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the switch.

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).
- [state](#)
State of the points.

9.132.1 Detailed Description

Scissor [Crossover](#) (turnout) object type.

These are on the schematic and represent a Scissor [Crossover](#) on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the switch on.

Parameters

...	<p>Options:</p> <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -label The label of the switch (default "1"). • -orientation The orientation (8-way) of the switch (readonly, default 0). • -flipped Whether or not the switch is flipped (readonly, default no). • -statecommand A command to run to get the switch's state (default {}). • -occupiedcommand A command to run to find out if the switch is occupied (default {}).
-----	--

Defined coords terminals:

- Main1L Upper left mainline.
- Main2L Lower left mainline.
- Main1R Upper right mainline.
- Main2R Lower right mainline.

Defined values (states):

- Normal Points are aligned for the mainline.
- Reverse Points are aligned for the branchline.
- Unknown Point are not aligned for any route (eg points are in motion).

Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.132.2 Constructor & Destructor Documentation

9.132.2.1 ScissorCrossover()

```
CTCPanel::ScissorCrossover::ScissorCrossover (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [ScissorCrossover](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the ScissorCrossover on.
<code>...</code>	Option list.

9.132.2.2 ~ScissorCrossover()

```
CTCPanel::ScissorCrossover::~~ScissorCrossover ( )
```

Clean up all data objects and free up all resources.

9.132.3 Member Function Documentation**9.132.3.1 _configureLabel()**

```
CTCPanel::ScissorCrossover::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.132.3.2 geti()

```
CTCPanel::ScissorCrossover::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.132.3.3 getv()

```
CTCPanel::ScissorCrossover::getv ( )
```

Method to get our value (state).

9.132.3.4 `invoke()`

```
CTCPanel::ScissorCrossover::invoke ( )
```

Method to invoke the switch.

9.132.3.5 `seti()`

```
CTCPanel::ScissorCrossover::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.132.3.6 `setv()`

```
CTCPanel::ScissorCrossover::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.132.4 Member Data Documentation

9.132.4.1 `canvas`

```
CTCPanel::ScissorCrossover::canvas [private]
```

The canvas component (parent widget component).

9.132.4.2 ctcpnl

CTCPanel::ScissorCrossover::ctcpnl [private]

The CTC Panel component (parent widget).

9.132.4.3 state

CTCPanel::ScissorCrossover::state [private]

State of the points.

9.133 ScrollTabNotebook Class Reference

Tabbed Notebook with scrollable tabs.

Public Member Functions

- [ScrollTabNotebook](#) (name,...)
Constructor: create a [ScrollTabNotebook](#).
- [compute_size](#) ()
(Re-)compute the size of the widget.
- [add](#) (window,...)
Add a window to the end of the page list.
- [insert](#) (pos, window,...)
Insert a window at the specified position.
- [tab](#) (tabid,...)
Updates the tab options for tabid.
- [tabs](#) ()
Return all tabs.
- [forget](#) (tabid)
Removes the tab specified by tabid, unmaps and unmanages the associated window.
- [select](#) (tabid="")
Selects the specified tab.
- [see](#) (tabid)
Make the specified tabid visible.
- [index](#) (tabid)
Returns the numeric index of the tab specified by tabid, or the total number of tabs if tabid is the string "end".

Private Member Functions

- [_test_page](#) (page)
Test to see if page is managed.
- [_compute_width](#) ()
Recompute tab width.
- [_compute_height](#) ()
Recompute tab height.
- [_get_x_page](#) (pos)
Get X position of the page at pos.
- [_xview](#) (inc)
Shift the tabs to the left or right.
- [_highlight](#) (flag, page)
Turn highlighting on or off for the specified tab.
- [_select](#) (page)
Make the specified page the selected page.
- [_redraw](#) ()
Redraw the tabs and all.
- [_draw_page](#) (page, create)
Draw a tab for the specified page, creating a new tab if asked or moving an old one otherwise.
- [_draw_arrows](#) ()
Draw the arrow buttons if needed.
- [_resize](#) ()
Resize the widget.
- [_themeChanged](#) ()
Theme Changed method.

Static Private Member Functions

- static [_themeChanged](#) (w)
Theme Changed typemethod.
- static [_Configure](#) (widget, width, height)
Configure typemethod.
- static [get3dcolor](#) (path, bgcolor)
Compute 3D colors.

Private Attributes

- [tabrow](#)
Row containing the tabs.
- [left](#)
Left arrow button.
- [tabs](#)
Scrolling tab frame (canvas).
- [right](#)
Right arrow button.

- [select](#)
The currently selected page.
- [_clientRow](#)
Grid row for client pages (1 is bottom).
- [_tabrow](#)
Grid row for tabs (0 is top).
- [_hpage](#)
Height of tabrow.
- [_wpage](#)
Width of tabrow.
- [_textid](#)
Scratch text id.
- [realized](#)
Flag to indicate if the widget is realized.
- [pages](#)
The list of available pages.
- [pages_opts](#)
The options for the available pages.
- [base](#)
Leftmost visible tab.
- [dbg](#)
Darker tab background.
- [lbg](#)
Lighter tab background.

Static Private Attributes

- static [_tabsides](#)
Tabside type checker.
- static [_radiustype](#)
Tab radius and bevelsize type checker.
- static [_paddingtype](#)
Tab padding type checker.
- static [_warrow](#)
Width of an arrow button.
- static [_left](#)
Bitmap for the left button.
- static [_right](#)
Bitmap for the right button.

9.133.1 Detailed Description

Tabbed Notebook with scrollable tabs.

This is a Tabbed Notebook widget, with scrollable tabs. It implements left and right arrows, as needed, to shift the tab row to the left or right to allow for more tabs than will fit in the available space.

Options:

- `-style` The style to use. The default is [ScrollTabNotebook](#).
- `-width` The width in pixels.
- `-height` The height in pixels.
- `-cursor` The cursor to use.
- `-takefocus` Can the widget take focus?

9.133.2 Constructor & Destructor Documentation

9.133.2.1 ScrollTabNotebook()

```
ScrollTabNotebook::ScrollTabNotebook (
    name ,
    ... )
```

Constructor: create a [ScrollTabNotebook](#).

Parameters

<i>name</i>	Pathname of the widget.
...	Options: <ul style="list-style-type: none">• <code>-style</code> Widget style.• <code>-width</code> The width of the widget.• <code>-height</code> The height of the widget.• <code>-cursor</code> The cursor to use.• <code>-takefocus</code> Can the widget take focus?

9.133.3 Member Function Documentation

9.133.3.1 `_compute_height()`

```
ScrollTabNotebook::_compute_height ( ) [private]
```

Recompute tab height.

9.133.3.2 `_compute_width()`

```
ScrollTabNotebook::_compute_width ( ) [private]
```

Recompute tab width.

9.133.3.3 `_Configure()`

```
static ScrollTabNotebook::_Configure (
    widget ,
    width ,
    height ) [static], [private]
```

Configure typemethod.

Parameters

<i>widget</i>	The widget the Configure event happened for.
<i>width</i>	The new width.
<i>height</i>	The new height.

9.133.3.4 `_draw_arrows()`

```
ScrollTabNotebook::_draw_arrows ( ) [private]
```

Draw the arrow buttons if needed.

9.133.3.5 `_draw_page()`

```
ScrollTabNotebook::_draw_page (
    page ,
    create ) [private]
```

Draw a tab for the specified page, creating a new tab if asked or moving an old one otherwise.

Parameters

<i>page</i>	The page whose tab we will draw.
<i>create</i>	Flag indicating if the tab needs to be created.

9.133.3.6 `_get_x_page()`

```
ScrollTabNotebook::_get_x_page (
    pos ) [private]
```

Get X position of the page at pos.

Parameters

<i>pos</i>	The page position.
------------	--------------------

Returns

The x position of the tab.

9.133.3.7 `_highlight()`

```
ScrollTabNotebook::_highlight (
    flag ,
    page ) [private]
```

Turn highlighting on or off for the specified tab.

Parameters

<i>flag</i>	Flag to indicate turning highlighting on or off.
<i>page</i>	The page whose tab to turn highlighting on or off.

9.133.3.8 _redraw()

```
ScrollTabNotebook::_redraw ( ) [private]
```

Redraw the tabs and all.

9.133.3.9 _resize()

```
ScrollTabNotebook::_resize ( ) [private]
```

Resize the widget.

9.133.3.10 _select()

```
ScrollTabNotebook::_select (
    page ) [private]
```

Make the specified page the selected page.

Parameters

<i>page</i>	The page to select.
-------------	---------------------

9.133.3.11 _test_page()

```
ScrollTabNotebook::_test_page (
    page ) [private]
```

Test to see if page is managed.

Parameters

<i>page</i>	The page to test.
-------------	-------------------

Returns

The position of the page.

9.133.3.12 _themeChanged()

```
static ScrollTabNotebook::_themeChanged (
    w ) [static], [private]
```

Theme Changed typemethod.

Parameters

<i>w</i>	The widget the theme changed for.
----------	-----------------------------------

9.133.3.13 _themeChanged_()

```
ScrollTabNotebook::_themeChanged_ ( ) [private]
```

Theme Changed method.

9.133.3.14 _xview()

```
ScrollTabNotebook::_xview (
    inc ) [private]
```

Shift the tabs to the left or right.

Parameters

<i>inc</i>	The shift increment, negative to the left, positive to the right.
------------	---

9.133.3.15 add()

```
ScrollTabNotebook::add (
    window ,
    ... )
```

Add a window to the end of the page list.

Adds a new window (page) to the list of managed pages.

Parameters

<i>window</i>	The window to add.
...	<p>Tab options:</p> <ul style="list-style-type: none">• <code>-state</code> The state of the tab (NOT IMPLEMENTED - state is always normal).• <code>-sticky</code> The stickyness (as in grid configure ... <code>-sticky</code>).• <code>-padding</code> The padding (as in grid configure ... <code>-padx</code> and <code>-pady</code>).• <code>-text</code> The text of the tab.• <code>-image</code> The image of the tab.• <code>-compound</code> The compound of the tab (see the <code>-compound</code> option of labels and buttons).• <code>-underline</code> The underline of the tab label (NOT IMPLEMENTED, the <code>-underline</code> option is ignored).

9.133.3.16 compute_size()

```
ScrollTabNotebook::compute_size ( )
```

(Re-)compute the size of the widget.

9.133.3.17 forget()

```
ScrollTabNotebook::forget (
    tabid )
```

Removes the tab specified by `tabid`, unmaps and unmanages the associated window.

Parameters

<i>tabid</i>	The tab to remove.
--------------	--------------------

9.133.3.18 get3dcolor()

```
static ScrollTabNotebook::get3dcolor (
    path ,
    bgcolor ) [static], [private]
```

Compute 3D colors.

Parameters

<i>path</i>	Window path.
<i>bgcolor</i>	Background color to use as a base.

Returns

Two RGB colors, one darker, one lighter.

9.133.3.19 index()

```
ScrollTabNotebook::index (
    tabid )
```

Returns the numeric index of the tab specified by *tabid*, or the total number of tabs if *tabid* is the string "end".

Parameters

<i>tabid</i>	The <i>tabid</i> to get the index of.
--------------	---------------------------------------

Returns

The numeric index of the tab specified by *tabid*.

9.133.3.20 insert()

```
ScrollTabNotebook::insert (
    pos ,
    window ,
    ... )
```

Insert a window at the specified position.

Inserts a new window (page) to the list of managed pages at the specified position.

Parameters

<i>pos</i>	The insert position.
<i>window</i>	The window to insert.
<i>...</i>	Tab options: <ul style="list-style-type: none">• <i>-state</i> The state of the tab (NOT IMPLEMENTED - state is always normal).• <i>-sticky</i> The stickyness (as in grid configure ... <i>-sticky</i>).• <i>-padding</i> The padding (as in grid configure ... <i>-padx</i> and <i>-pady</i>).• <i>-text</i> The text of the tab.• <i>-image</i> The image of the tab.• <i>-compound</i> The compound of the tab (see the <i>-compound</i> option of labels and buttons).• <i>-underline</i> The underline of the tab label (NOT IMPLEMENTED, the <i>-underline</i> option is ignored).

9.133.3.21 see()

```
ScrollTabNotebook::see (
    tabid )
```

Make the specified tabid visible.

Parameters

<i>tabid</i>	The tabid to make visible.
--------------	----------------------------

9.133.3.22 select()

```
ScrollTabNotebook::select (
    tabid = "" )
```

Selects the specified tab.

The associated slave window will be displayed, and the previously-selected window (if different) is unmapped. If tabid is omitted, returns the widget name of the currently selected pane.

Parameters

<i>tabid</i>	The tab to select.
--------------	--------------------

Returns

If tabid is omitted, return the currently selected pane.

9.133.3.23 tab()

```
ScrollTabNotebook::tab (
    tabid ,
    ... )
```

Updates the tab options for tabid.

Parameters

<i>tabid</i>	The tab index.
...	<p>Tab options:</p> <ul style="list-style-type: none">• -state The state of the tab (NOT IMPLEMENTED - state is always normal).• -sticky The stickyness (as in grid configure ... -sticky).• -padding The padding (as in grid configure ... -padx and -pady).• -text The text of the tab.• -image The image of the tab.• -compound The compound of the tab (see the -compound option of labels and buttons).• -underline The underline of the tab label (NOT IMPLEMENTED, the -underline option is ignored).

9.133.3.24 tabs()

```
ScrollTabNotebook::tabs ( )
```

Return all tabs.

Returns

All managed windows

9.133.4 Member Data Documentation

9.133.4.1 _clientRow

```
ScrollTabNotebook::_clientRow [private]
```

Grid row for client pages (1 is bottom).

9.133.4.2 _hpage

```
ScrollTabNotebook::_hpage [private]
```

Height of tabrow.

9.133.4.3 _left

```
ScrollTabNotebook::_left [static], [private]
```

Bitmap for the left button.

9.133.4.4 _paddingtype

```
ScrollTabNotebook::_paddingtype [static], [private]
```

Tab padding type checker.

9.133.4.5 `_radiustype`

```
ScrollTabNotebook::_radiustype [static], [private]
```

Tab radius and bevelsize type checker.

9.133.4.6 `_right`

```
ScrollTabNotebook::_right [static], [private]
```

Bitmap for the right button.

9.133.4.7 `_tabrow`

```
ScrollTabNotebook::_tabrow [private]
```

Grid row for tabs (0 is top).

9.133.4.8 `_tabsides`

```
ScrollTabNotebook::_tabsides [static], [private]
```

Tabside type checker.

9.133.4.9 `_textid`

```
ScrollTabNotebook::_textid [private]
```

Scratch text id.

9.133.4.10 `_warrow`

```
ScrollTabNotebook::_warrow [static], [private]
```

Width of an arrow button.

9.133.4.11 _wpage

`ScrollTabNotebook::_wpage` [private]

Width of tabrow.

9.133.4.12 base

`ScrollTabNotebook::base` [private]

Leftmost visible tab.

9.133.4.13 dbg

`ScrollTabNotebook::dbg` [private]

Darker tab background.

9.133.4.14 lbg

`ScrollTabNotebook::lbg` [private]

Lighter tab background.

9.133.4.15 left

`ScrollTabNotebook::left` [private]

Left arrow button.

9.133.4.16 pages

`ScrollTabNotebook::pages` [private]

The list of available pages.

9.133.4.17 pages_opts

`ScrollTabNotebook::pages_opts` [private]

The options for the available pages.

9.133.4.18 realized

`ScrollTabNotebook::realized` [private]

Flag to indicate if the widget is realized.

9.133.4.19 right

`ScrollTabNotebook::right` [private]

Right arrow button.

9.133.4.20 select

`ScrollTabNotebook::select` [private]

The currently selected page.

9.133.4.21 tabrow

`ScrollTabNotebook::tabrow` [private]

Row containing the tabs.

9.133.4.22 tabs

`ScrollTabNotebook::tabs` [private]

Scrolling tab frame (canvas).

9.134 Parsers::SegPos Struct Reference

Segment position, endpoint or other coordinate.

```
#include <TrackGraph.h>
```

Public Attributes

- float `x`
\$X\$ coordinate.
- float `y`
\$Y\$ coordinate.

9.134.1 Detailed Description

Segment position, endpoint or other coordinate.

Author

Robert Heller <heller@deepsoft.com>

9.134.2 Member Data Documentation

9.134.2.1 `x`

```
float Parsers::SegPos::x
```

\$X\$ coordinate.

9.134.2.2 `y`

```
float Parsers::SegPos::y
```

\$Y\$ coordinate.

9.135 Parsers::SegVector Struct Reference

Segemnt structure.

```
#include <TrackGraph.h>
```

Public Types

- enum [GrType](#) { [S](#) , [C](#) , [J](#) }
Graphic types.

Public Attributes

- [GrType](#) [tgType](#)
Segment type.
- [SegPos](#) [gPos1](#)
First graphic position.
- [SegPos](#) [gPos2](#)
Second graphic position.
- [SegPos](#) [ePos1](#)
First end point position.
- [SegPos](#) [ePos2](#)
Second end point position.
- float [radius](#)
Radius value.
- float [ang0](#)
First angle.
- float [ang1](#)
Second angle.
- float [R](#)
\$R\$ value.
- float [L](#)
\$L\$ value.
- float [angle](#)
An angle.
- float [len0](#)
First length parameter.
- float [len1](#)
Second length parameter.
- float [length](#)
Length of segment.

9.135.1 Detailed Description

Segemnt structure.

Author

Robert Heller <heller@deepsoft.com>

9.135.2 Member Enumeration Documentation

9.135.2.1 GrType

```
enum Parsers::SegVector::GrType
```

Graphic types.

Enumerator

S	Straight segment.
C	Curved (circular) segment.
J	Curved (spiral easement) segment.

9.135.3 Member Data Documentation

9.135.3.1 ang0

```
float Parsers::SegVector::ang0
```

First angle.

9.135.3.2 ang1

```
float Parsers::SegVector::ang1
```

Second angle.

9.135.3.3 angle

```
float Parsers::SegVector::angle
```

An angle.

9.135.3.4 ePos1

`SegPos` `Parsers::SegVector::ePos1`

First end point position.

9.135.3.5 ePos2

`SegPos` `Parsers::SegVector::ePos2`

Second end point position.

9.135.3.6 gPos1

`SegPos` `Parsers::SegVector::gPos1`

First graphic position.

9.135.3.7 gPos2

`SegPos` `Parsers::SegVector::gPos2`

Second graphic position.

9.135.3.8 L

`float` `Parsers::SegVector::L`

\$L\$ value.

9.135.3.9 len0

`float` `Parsers::SegVector::len0`

First length parameter.

9.135.3.10 len1

```
float Parsers::SegVector::len1
```

Second length parameter.

9.135.3.11 length

```
float Parsers::SegVector::length
```

Length of segment.

9.135.3.12 R

```
float Parsers::SegVector::R
```

\$R\$ value.

9.135.3.13 radius

```
float Parsers::SegVector::radius
```

Radius value.

9.135.3.14 tgType

```
GrType Parsers::SegVector::tgType
```

Segment type.

9.136 CabWidgets::SelectLocomotive Class Reference

Select or enter a Locomotive address.

Public Member Functions

- [SelectLocomotive](#) (name,...)
Constructor.
- [currentLocomotive](#) ()
Method to return the current locomotive address.
- [invoke](#) ()
Method to invoke the widget.

Private Member Functions

- [_trimList](#) (option, value)
Configure method for -maxsaved.
- [_addnewloco](#) ()
Add new loco.

Private Attributes

- [lf](#)
LabelFrame component.
- [locoList](#)
Locolist Combobox component.

9.136.1 Detailed Description

Select or enter a Locomotive address.

This widget implements a Locomotive address selection widget. A Locomotive is selected from a drop down or a new address is entered. When a new address is entered, it is saved in the drop down list. The maximum number of saved addresses is configurable.

Parameters

<i>path</i>	Pathname of the widget.
...	Options: <ul style="list-style-type: none"> • -command Script to call when the address is changed. The new address is appended. • -maxsaved The maximum number of addresses to save. Default 6. • -label The label to use. • -labelwidth The width of the label. • -defaultlist The list of default loco addresses. Readonly. Default {3}.

Author

Robert Heller <heller@deepsoft.com>

9.136.2 Constructor & Destructor Documentation**9.136.2.1 SelectLocomotive()**

```
CabWidgets::SelectLocomotive::SelectLocomotive (
    name ,
    ... )
```

Constructor.

Parameters

<i>path</i>	Widget path.
...	Options.

9.136.3 Member Function Documentation**9.136.3.1 _addnewloco()**

```
CabWidgets::SelectLocomotive::_addnewloco ( ) [private]
```

Add new loco.

Bound to the locoList ComboBox entry.

9.136.3.2 _trimList()

```
CabWidgets::SelectLocomotive::_trimList (
    option ,
    value ) [private]
```

Configure method for -maxsaved.

Trim the list if needed.

Parameters

<i>option</i>	The option name.
<i>value</i>	The new value.

9.136.3.3 currentLocomotive()

```
CabWidgets::SelectLocomotive::currentLocomotive ( )
```

Method to return the current locomotive address.

9.136.3.4 invoke()

```
CabWidgets::SelectLocomotive::invoke ( )
```

Method to invoke the widget.

This calls the script (if any) defined by the -command option.

9.136.4 Member Data Documentation**9.136.4.1 lf**

```
CabWidgets::SelectLocomotive::lf [private]
```

LabelFrame component.

9.136.4.2 locoList

```
CabWidgets::SelectLocomotive::locoList [private]
```

Locolist Combobox component.

9.137 lcc::SendEvent Class Reference

Send Event Dialog – send PCRE message.

Public Member Functions

- [SendEvent](#) (name,...)
Construct a [SendEvent](#) dialog.
- [_Close](#) ()
Close the window.
- [_Send](#) ()
*Bound to the *Send* button.*

Private Attributes

- [eventid](#)
LabelEntry containing the eventId.

9.137.1 Detailed Description

Send Event Dialog – send PCRE message.

Options:

- -transport The transport to use.

9.137.2 Constructor & Destructor Documentation

9.137.2.1 SendEvent()

```
lcc::SendEvent::SendEvent (
    name ,
    ... )
```

Construct a [SendEvent](#) dialog.

Parameters

<i>name</i>	Pathname of the widget.
...	Options: <ul style="list-style-type: none">• -transport LCC Transport object.

9.137.3 Member Function Documentation**9.137.3.1 _Close()**

```
lcc::SendEvent::_Close ( )
```

Close the window.

9.137.3.2 _Send()

```
lcc::SendEvent::_Send ( )
```

Bound to the `Send` button.

Send an event.

9.137.4 Member Data Documentation**9.137.4.1 eventId**

```
lcc::SendEvent::eventId [private]
```

LabelEntry containing the eventId.

9.138 xpressnet::ServiceModeResponse Class Reference

Service mode response.

Public Member Functions

- [ServiceModeResponse](#) (name, modebits, CE, D)
Constructor.
- [ServiceMode](#) ()
Return the service mode.
- [CV](#) ()
Return the CV value.
- [Data](#) ()
Return the data value.

Private Attributes

- [_service_mode](#)
The service mode.
- [_cv](#)
The CV value.
- [_data](#)
The data value.

9.138.1 Detailed Description

Service mode response.

Author

Robert Heller <heller@deepsoft.com>

9.138.2 Constructor & Destructor Documentation

9.138.2.1 ServiceModeResponse()

```
xpressnet::ServiceModeResponse::ServiceModeResponse (
    name ,
    modebits ,
    CE ,
    D )
```

Constructor.

Parameters

<i>modebits</i>	First data byte (contains mode bit).
<i>CE</i>	Second data byte (contains C or E value).
<i>D</i>	Third data byte (contains D value).

9.138.3 Member Function Documentation

9.138.3.1 CV()

```
xpressnet::ServiceModeResponse::CV ( )
```

Return the CV value.

9.138.3.2 Data()

```
xpressnet::ServiceModeResponse::Data ( )
```

Return the data value.

9.138.3.3 ServiceMode()

```
xpressnet::ServiceModeResponse::ServiceMode ( )
```

Return the service mode.

9.138.4 Member Data Documentation

9.138.4.1 _cv

```
xpressnet::ServiceModeResponse::_cv [private]
```

The CV value.

9.138.4.2 `_data`

```
xpressnet::ServiceModeResponse::_data [private]
```

The data value.

9.138.4.3 `_service_mode`

```
xpressnet::ServiceModeResponse::_service_mode [private]
```

The service mode.

9.139 FCFSupport::ShowBannerCallback Class Reference

Display a page heading type message on the screen.

```
#include <CallBack.h>
```

Public Member Functions

- [ShowBannerCallback](#) ()
Constructor.
- virtual [~ShowBannerCallback](#) ()
Destructor.
- virtual void [ShowBanner](#) () const
Display the application supplied banner text.

9.139.1 Detailed Description

Display a page heading type message on the screen.

This callback simply has the application display its banner text identifying itself. Usually called before a series of informational messages relating to the progress of the processing.

```
@author Robert Heller \<heller\@deepsoft.com\>
```

9.139.2 Constructor & Destructor Documentation

9.139.2.1 ShowBannerCallback()

```
FCFSupport::ShowBannerCallback::ShowBannerCallback ( ) [inline]
```

Constructor.

The base constructor does nothing. It is presumed that a derived class might do something useful.

9.139.2.2 ~ShowBannerCallback()

```
virtual FCFSupport::ShowBannerCallback::~ShowBannerCallback ( ) [inline], [virtual]
```

Destructor.

The base destructor does nothing. It is presumed that a derived class might do something useful.

9.139.3 Member Function Documentation

9.139.3.1 ShowBanner()

```
virtual void FCFSupport::ShowBannerCallback::ShowBanner ( ) const [inline], [virtual]
```

Display the application supplied banner text.

9.140 CTCPPanel::Signal Class Reference

Signal object type.

Public Member Functions

- [Signal](#) (name, _ctcpanel, _canvas,...)
Construct a [Signal](#) object.
- [~Signal](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (aspect).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the [Signal](#).

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.
- [_VerifyHeads](#) (option, value)

Static Private Member Functions

- static [_SchematicDrawThinLine](#) ([canvas](#), x1, y1, x2, y2, orientation, tags)
Typemethod to draw a thin line.
- static [_SchematicDrawOval](#) ([canvas](#), x1, y1, dia, orientation, tags)
Typemethod to draw an invisible dot on the trackwork.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).
- [aspect](#)
Contains the signal's aspect.

9.140.1 Detailed Description

Signal object type.

These are on the schematic and represent a [Signal](#) on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the Signal on.
...	Options: <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -label The label of the Signal (default "1"). • -orientation The orientation (8-way) of the Signal (readonly, default 0). • -heads The number of heads (1, 2, or 3) of the Signal (readonly, default 1)

Defined coords terminals: none. Defined values: The signal's aspect. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.140.2 Constructor & Destructor Documentation

9.140.2.1 Signal()

```
CTCPanel::Signal::Signal (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [Signal](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the Signal on.
<code>...</code>	Option list.

9.140.2.2 ~Signal()

```
CTCPanel::Signal::~~Signal ( )
```

Clean up all data objects and free up all resources.

9.140.3 Member Function Documentation

9.140.3.1 _configureLabel()

```
CTCPanel::Signal::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.140.3.2 _SchematicDrawOval()

```
static CTCPanel::Signal::_SchematicDrawOval (
    canvas ,
    x1 ,
    y1 ,
    dia ,
    orientation ,
    tags ) [static], [private]
```

Typemethod to draw an invisible dot on the trackwork.

Used as anchor points to connect trackwork sections together.

Parameters

<i>x1</i>	The first X coordinate.
<i>y1</i>	The first Y coordinate.
<i>dia</i>	The diameter of the oval.
<i>orientation</i>	The orientation (8-way).
<i>tags</i>	The canvas tags to include.

9.140.3.3 _SchematicDrawThinLine()

```
static CTCPanel::Signal::_SchematicDrawThinLine (
    canvas ,
    x1 ,
    y1 ,
    x2 ,
    y2 ,
    orientation ,
    tags ) [static], [private]
```

Typemethod to draw a thin line.

Parameters

<i>canvas</i>	The canvas to draw on.
<i>x1</i>	The first X coordinate.
<i>y1</i>	The first Y coordinate.
<i>x2</i>	The second X coordinate.
<i>y2</i>	The second Y coordinate.
<i>orientation</i>	The orientation (8-way).
<i>tags</i>	The canvas tags to include.

9.140.3.4 _verifyHeads()

```
CTCPanel::Signal::_VerifyHeads (
    option ,
    value ) [private]
```

9.140.3.5 geti()

```
CTCPanel::Signal::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.140.3.6 getv()

```
CTCPanel::Signal::getv ( )
```

Method to get our value (aspect).

9.140.3.7 invoke()

```
CTCPanel::Signal::invoke ( )
```

Method to invoke the [Signal](#).

9.140.3.8 seti()

```
CTCPanel::Signal::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.140.3.9 setv()

```
CTCPanel::Signal::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.140.4 Member Data Documentation

9.140.4.1 aspect

```
CTCPanel::Signal::aspect [private]
```

Contains the signal's aspect.

9.140.4.2 canvas

```
CTCPanel::Signal::canvas [private]
```

The canvas component (parent widget component).

9.140.4.3 ctcpnl

```
CTCPanel::Signal::ctcpnl [private]
```

The CTC Panel component (parent widget).

9.141 CTCPanel::SIGPlate Class Reference

Signal plate object type.

Public Member Functions

- [SIGPlate](#) (name, _ctcpanel, _canvas,...)
Construct a [SIGPlate](#) object.
- [~SIGPlate](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (lever position).
- [setv](#) (state)
Method to set out value (level position).
- [geti](#) (ind)
Method to get the state of one of out indicators.
- [seti](#) (ind, value)
Method to set an indicator's state.
- [invoke](#) ()
Method to invoke the switch plate.

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

Static Private Attributes

- static [_PlatePolygon](#)
Polygon coordinates for the plate.

9.141.1 Detailed Description

Signal plate object type.

These are on the control panel and represent levers for controlling track signals (control point signals). They have a lever that can be in three positions, Left, Center, or Right.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the switch plate on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The x coordinate of the object (readonly, default 0). • <code>-y</code> The y coordinate of the object (readonly, default 0). • <code>-label</code> The label of the switch plate (default 1). • <code>-controlpoint</code> The name of the control point this switch is part of (readonly, default CP1). • <code>-leftcommand</code> The Tcl script to run when switch is set to left (default {}). • <code>-centercommand</code> The Tcl script to run when switch is set to center (default {}). • <code>-rightcommand</code> The Tcl script to run when switch is set to right (default {}).

Defined coords terminals:

- `xy` The base coords of the object.

Defined values (states):

- Left Left position.
- Right Right position.
- Center Center position.

Defined indicators:

- L Left indicator, green if on.
- C Center indicator, red if on.
- R Right indicator, green if on.

Author

Robert Heller <heller@deepsoft.com>

9.141.2 Constructor & Destructor Documentation

9.141.2.1 SIGPlate()

```
CTCPanel::SIGPlate::SIGPlate (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [SIGPlate](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the switch plate on.
<code>...</code>	Option list.

9.141.2.2 ~SIGPlate()

```
CTCPanel::SIGPlate::~~SIGPlate ( )
```

Clean up all data objects and free up all resources.

9.141.3 Member Function Documentation**9.141.3.1 _configureLabel()**

```
CTCPanel::SIGPlate::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.141.3.2 geti()

```
CTCPanel::SIGPlate::geti (
    ind )
```

Method to get the state of one of out indicators.

Parameters

<code>ind</code>	The indicator to fetch state information for.
------------------	---

9.141.3.3 getv()

```
CTCPanel::SIGPlate::getv ( )
```

Method to get our value (lever position).

9.141.3.4 invoke()

```
CTCPanel::SIGPlate::invoke ( )
```

Method to invoke the switch plate.

One of the command scripts is executed depending on the lever position.

9.141.3.5 seti()

```
CTCPanel::SIGPlate::seti (
    ind ,
    value )
```

Method to set an indicator's state.

Parameters

<i>ind</i>	The indicator to set.
<i>value</i>	The state to set it to.

9.141.3.6 setv()

```
CTCPanel::SIGPlate::setv (
    state )
```

Method to set out value (level position).

Parameters

<i>state</i>	The new state to set.
--------------	-----------------------

9.141.4 Member Data Documentation

9.141.4.1 `_PlatePolygon`

`CTCPanel::SIGPlate::_PlatePolygon` [static], [private]

Polygon coordinates for the plate.

9.141.4.2 `canvas`

`CTCPanel::SIGPlate::canvas` [private]

The canvas component (parent widget component).

9.141.4.3 `ctcpanel`

`CTCPanel::SIGPlate::ctcpanel` [private]

The CTC Panel component (parent widget).

9.142 SimpleDOMEElement Class Reference

A simple DOM element coded in Tcl using SNIT.

Public Member Functions

- [SimpleDOMEElement](#) (name,...)
The constructor.
- [children](#) ()
Method to return the elements children.
- [addchild](#) (childnode)
Method to add a child node.
- [length](#) ()
Method to return the number of children.
- [data](#) ()
Method to return the element's data.
- [setdata](#) (d)
Method to set the element's data.
- [display](#) (fp="stdout", indent="")
Method to display a node, along with its children, and a proper XML document.
- [attribute](#) (attrname)
Method to return a selected attribute's value.
- [setAttribute](#) (attrname, value="")
Method to set a selected attribute's value.
- [getElementsByTagName](#) (thetag,...)
Method to return all of the elements under this element with the specified tag name.
- [getElementsByld](#) (theid)
Method to return all of the elements under this element with the specified value of their id attribute.
- [isChild](#) (item)
Method to check if the item is a child of this node.
- [getParent](#) (item)
Method to get the parent of the item.
- [removeChild](#) (item)
Method to remove item from the children of this node.

Static Public Member Functions

- static [_formattrlist](#) (attrs)
@provatesection Format a attribute list for inclusion in displayed XML.
- static [_quoteXML](#) (text)
Escape text for inclusion in displayed XML.
- static [validate](#) (object)
Validation typemethod.

Private Attributes

- [_data](#)
The element's data.
- [_children](#)
The element's children.

9.142.1 Detailed Description

A simple DOM element coded in Tcl using SNIT.

This class implements a simplified DOM element, that implements the `getElementsByTagName` and `getElementsById` methods, along with accessors to get data, attributes, and children of XML elements.

Parameters

<i>name</i>	Element name. Generally <code>%%AUTO%%</code> is passed.
—	Options: <ul style="list-style-type: none"> • <code>-tag</code> The element's tag. • <code>-attributes</code> The element's attributes. • <code>-opts</code> The element's options.

Author

Robert Heller <heller@deepsoft.com>.

9.142.2 Constructor & Destructor Documentation

9.142.2.1 SimpleDOMElement()

```
SimpleDOMElement::SimpleDOMElement (
    name ,
    ... )
```

The constructor.

Just sets the options.

9.142.3 Member Function Documentation

9.142.3.1 _formattrlist()

```
static SimpleDOMElement::_formattrlist (
    attrs ) [static]
```

@privatesection Format a attribute list for inclusion in displayed XML.

Parameters

<i>attrs</i>	The attribute list as a alternating list of names and values.
--------------	---

Returns

A formatted and escaped attribute list string.

9.142.3.2 _quoteXML()

```
static SimpleDOMElement::_quoteXML (  
    text ) [static]
```

Escape text for inclusion in displayed XML.

Parameters

<i>text</i>	Unescaped string.
-------------	-------------------

Returns

A properly escaped XML string.

9.142.3.3 addchild()

```
SimpleDOMElement::addchild (  
    childnode )
```

Method to add a child node.

Parameters

<i>childnode</i>	The child node to add.
------------------	------------------------

9.142.3.4 attribute()

```
SimpleDOMElement::attribute (  
    attrname )
```

Method to return a selected attribute's value.

Parameters

<i>attrname</i>	The name of the attribute.
-----------------	----------------------------

Returns

The attribute's value or the empty string.

9.142.3.5 children()

```
SimpleDOMElement::children ( )
```

Method to return the elements children.

Returns

The children.

9.142.3.6 data()

```
SimpleDOMElement::data ( )
```

Method to return the element's data.

Returns

The data.

9.142.3.7 display()

```
SimpleDOMElement::display (
    fp    = "stdout",
    indent = " " )
```

Method to display a node, along with its children, and a proper XML document.

Parameters

<i>fp</i>	Channel to write the display to.
<i>indent</i>	The indentation to use.

9.142.3.8 getElementById()

```
SimpleDOMElement::getElementsById (
    theid )
```

Method to return all of the elements under this element with the specified value of their id attribute.

Parameters

<i>theid</i>	The id value match.
--------------	---------------------

Returns

A list of element object with the matching id value.

9.142.3.9 getElementByTagName()

```
SimpleDOMElement::getElementsByTagName (
    thetag ,
    ... )
```

Method to return all of the elements under this element with the specified tag name.

Parameters

<i>thetag</i>	The tag to match.
---------------	-------------------

Returns

A list of element object with the matching tag.

9.142.3.10 getParent()

```
SimpleDOMElement::getParent (
    item )
```

Method to get the parent of the item.

Parameters

<i>item</i>	The item to get the parent of.
-------------	--------------------------------

Returns

The parent node or {} if none found.

9.142.3.11 isChild()

```
SimpleDOMElement::isChild (
    item )
```

Method to check if the item is a child of this node.

Parameters

<i>item</i>	The possible child.
-------------	---------------------

Returns

True if item is a child, false otherwise.

9.142.3.12 length()

```
SimpleDOMElement::length ( )
```

Method to return the number of children.

Returns

The number of children.

9.142.3.13 removeChild()

```
SimpleDOMElement::removeChild (
    item )
```

Method to remove item from the children of this node.

Parameters

<i>item</i>	The item to remove.
-------------	---------------------

9.142.3.14 setAttribute()

```
SimpleDOMElement::setAttribute (
    attrname ,
    value = "" )
```

Method to set a selected attribute's value.

Parameters

<i>attrname</i>	The name of the attribute.
<i>value</i>	The value to set. Default is the empty string.

9.142.3.15 setdata()

```
SimpleDOMElement::setdata (
    d )
```

Method to set the element's data.

Parameters

<i>d</i>	The new data.
----------	---------------

9.142.3.16 validate()

```
static SimpleDOMElement::validate (
    object ) [static]
```

Validation type method.

Raises an error if its argument is not a [SimpleDOMElement](#) object.

Parameters

<i>object</i>	The object to typecheck.
---------------	--------------------------

Returns

The object or raise an error.

9.142.4 Member Data Documentation

9.142.4.1 `_children`

`SimpleDOMElement::_children` [private]

The element's children.

9.142.4.2 `_data`

`SimpleDOMElement::_data` [private]

The element's data.

9.143 CTCPanel::SingleSlip Class Reference

Single Slip (turnout) object type.

Public Member Functions

- [SingleSlip](#) (name, _ctcpanel, _canvas,...)
Construct a [SingleSlip](#) object.
- [~SingleSlip](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the switch.

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).
- [state](#)
The state of the points.

9.143.1 Detailed Description

Single Slip (turnout) object type.

These are on the schematic and represent a switch on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the switch on.
...	Options: <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -label The label of the switch (default "1"). • -orientation The orientation (8-way) of the switch (readonly, default 0). • -flipped Whether or not the switch is flipped (readonly, default no). • -statecommand A command to run to get the switch's state (default {}). • -occupiedcommand A command to run to find out if the switch is occupied (default {}).

Defined coords terminals:

- MainL Mainline left.
- MainR Mainline right.
- AltL Alternative line left.
- AltR Alternative line right.

Defined values (states):

- Normal Points are aligned for the mainline.
- Reverse Points are aligned for the branchline.
- Unknown Point are not aligned for any route (eg the points are in motion).

Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.143.2 Constructor & Destructor Documentation

9.143.2.1 SingleSlip()

```
CTCPanel::SingleSlip::SingleSlip (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [SingleSlip](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the SingleSlip on.
<code>...</code>	Option list.

9.143.2.2 ~SingleSlip()

```
CTCPanel::SingleSlip::~~SingleSlip ( )
```

Clean up all data objects and free up all resources.

9.143.3 Member Function Documentation

9.143.3.1 `_configureLabel()`

```
CTCPanel::SingleSlip::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.143.3.2 `geti()`

```
CTCPanel::SingleSlip::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.143.3.3 `getv()`

```
CTCPanel::SingleSlip::getv ( )
```

Method to get our value (state).

9.143.3.4 `invoke()`

```
CTCPanel::SingleSlip::invoke ( )
```

Method to invoke the switch.

9.143.3.5 `seti()`

```
CTCPanel::SingleSlip::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.143.3.6 `setv()`

```
CTCPanel::SingleSlip::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.143.4 Member Data Documentation

9.143.4.1 canvas

`CTCPanel::SingleSlip::canvas` [private]

The canvas component (parent widget component).

9.143.4.2 ctcpnl

`CTCPanel::SingleSlip::ctcpnl` [private]

The CTC Panel component (parent widget).

9.143.4.3 state

`CTCPanel::SingleSlip::state` [private]

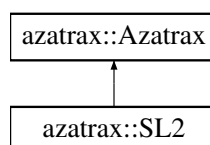
The state of the points.

9.144 azatrax::SL2 Class Reference

[SL2](#) I/O Class.

```
#include <sl2.h>
```

Inheritance diagram for azatrax::SL2:



Classes

- union [status1_union](#)
Status byte 1 union type (Output states)
- union [status2_union](#)
Status byte 2 union type (Input sense)
- union [status3_union](#)
Status byte 3 union type (Input control state)

Public Member Functions

- [~SL2](#) ()
- [ErrorCode SetQ1posQ2neg](#) () const
Sets output terminal Q1 to positive, Q2 to negative.
- [ErrorCode SetQ1negQ2pos](#) () const
Sets output terminal Q1 to negative, Q2 to positive.
- [ErrorCode SetQ1Q2open](#) () const
Outputs Q1 & Q2 both set to open circuit (disconnects switch machine #1)
- [ErrorCode SetQ3posQ4neg](#) () const
Sets output terminal Q3 to positive, Q4 to negative.
- [ErrorCode SetQ3negQ4pos](#) () const
Sets output terminal Q3 to negative, Q4 to positive.
- [ErrorCode SetQ3Q4open](#) () const
Outputs Q3 & Q4 both set to open circuit (disconnects switch machine #2)
- [ErrorCode OutputRelayInputControl](#) (bool I1, bool I2, bool I3, bool I4)
Enable/Disable discrete input lines from affecting outputs.
- bool [Sense_1](#) () const
Sense 1, return true if input line 1 was activated since last get status.
- bool [Sense_2](#) () const
Sense 2, return true if input line 2 was activated since last get status.
- bool [Sense_3](#) () const
Sense 3, return true if input line 3 was activated since last get status.
- bool [Sense_4](#) () const
Sense 4, return true if input line 4 was activated since last get status.
- bool [Motor_1_Direction](#) () const
Motor 1 direction, return true if Q1 is positive.
- bool [Motor_1_State](#) () const
Motor 1 state, return true if Q1 and Q2 are on.
- bool [Motor_2_Direction](#) () const
Motor 2 direction, return true if Q3 is positive.
- bool [Motor_2_State](#) () const
Motor 2 state, return true if Q3 and Q4 are on.
- bool [Input_1_Enabled](#) () const
Input 1 enabled? Return true if I1 can affect outputs.
- bool [Input_2_Enabled](#) () const

Input 2 enabled? Return true if I2 can affect outputs.

- bool [Input_3_Enabled](#) () const

Input 3 enabled? Return true if I3 can affect outputs.

- bool [Input_4_Enabled](#) () const

Input 4 enabled? Return true if I4 can affect outputs.

Private Member Functions

- [SL2](#) (const char *serialnumber, char **outmessage=NULL)

Base constructor.

Friends

- class [Azatrax](#)

Additional Inherited Members

9.144.1 Detailed Description

[SL2](#) I/O Class.

[SL2](#) interface class.

This class implements the interface logic for a SL2-U device.

The constructor opens a connection to a SL2-U device, given its serial number. Each SL2-U device has a unique, factory defined serial number, which is printed on a sticker attached to the module. This serial number is much like the MAC address of an Ethernet interface. The destructor closes the connection to the device and frees any resources allocated.

The class provides methods to send commands to the device, read back its state and interrogate the state read back. This way each class instance encapsulates each device instance.

Author

Robert Heller <heller@deepsoft.com>

9.144.2 Constructor & Destructor Documentation

9.144.2.1 SL2()

```
azatrax::SL2::SL2 (
    const char * serialnumber,
    char ** outmessage = NULL ) [inline], [private]
```

Base constructor.

Parameters

<i>serialnumber</i>	The serial number of the device to open.
<i>outmessage</i>	To hold an error message, if any.

9.144.2.2 ~SL2()

```
azatrax::SL2::~~SL2 ( ) [inline]
```

9.144.3 Member Function Documentation**9.144.3.1 Input_1_Enabled()**

```
bool azatrax::SL2::Input_1_Enabled ( ) const [inline]
```

Input 1 enabled? Return true if I1 can affect outputs.

References [azatrax::SL2::status3_union::input_1_enabled](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status3](#), [azatrax::SL2::status3_union::theBits](#), and [azatrax::SL2::status3_union::theByte](#).

9.144.3.2 Input_2_Enabled()

```
bool azatrax::SL2::Input_2_Enabled ( ) const [inline]
```

Input 2 enabled? Return true if I2 can affect outputs.

References [azatrax::SL2::status3_union::input_2_enabled](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status3](#), [azatrax::SL2::status3_union::theBits](#), and [azatrax::SL2::status3_union::theByte](#).

9.144.3.3 Input_3_Enabled()

```
bool azatrax::SL2::Input_3_Enabled ( ) const [inline]
```

Input 3 enabled? Return true if I3 can affect outputs.

References [azatrax::SL2::status3_union::input_3_enabled](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status3](#), [azatrax::SL2::status3_union::theBits](#), and [azatrax::SL2::status3_union::theByte](#).

9.144.3.4 Input_4_Enabled()

```
bool azatrax::SL2::Input_4_Enabled ( ) const [inline]
```

Input 4 enabled? Return true if I4 can affect outputs.

References [azatrax::SL2::status3_union::input_4_enabled](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status3](#), [azatrax::SL2::status3_union::theBits](#), and [azatrax::SL2::status3_union::theByte](#).

9.144.3.5 Motor_1_Direction()

```
bool azatrax::SL2::Motor_1_Direction ( ) const [inline]
```

Motor 1 direction, return true if Q1 is positive.

References [azatrax::SL2::status1_union::motor_1_direction](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::SL2::status1_union::theBits](#), and [azatrax::SL2::status1_union::theByte](#).

9.144.3.6 Motor_1_State()

```
bool azatrax::SL2::Motor_1_State ( ) const [inline]
```

Motor 1 state, return true if Q1 and Q2 are on.

References [azatrax::SL2::status1_union::motor_1_state](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::SL2::status1_union::theBits](#), and [azatrax::SL2::status1_union::theByte](#).

9.144.3.7 Motor_2_Direction()

```
bool azatrax::SL2::Motor_2_Direction ( ) const [inline]
```

Motor 2 direction, return true if Q3 is positive.

References [azatrax::SL2::status1_union::motor_2_direction](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::SL2::status1_union::theBits](#), and [azatrax::SL2::status1_union::theByte](#).

9.144.3.8 Motor_2_State()

```
bool azatrax::SL2::Motor_2_State ( ) const [inline]
```

Motor 2 state, return true if Q3 and Q4 are on.

References [azatrax::SL2::status1_union::motor_2_state](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::SL2::status1_union::theBits](#), and [azatrax::SL2::status1_union::theByte](#).

9.144.3.9 OutputRelayInputControl()

```
ErrorCode azatrax::SL2::OutputRelayInputControl (
    bool I1,
    bool I2,
    bool I3,
    bool I4 ) [inline]
```

Enable/Disable discrete input lines from affecting outputs.

When enabled, I1 & I2 affect Q1 & Q2 (switch 1), I3 & I4 affect Q3 & Q4 (switch 2).

Parameters

<i>I1</i>	Enable/Disable I1.
<i>I2</i>	Enable/Disable I2.
<i>I3</i>	Enable/Disable I3.
<i>I4</i>	Enable/Disable I4.

References [azatrax::Azatrax::cmd_OutputRelayInputControl](#), and [azatrax::Azatrax::send2Bytes\(\)](#).

9.144.3.10 Sense_1()

```
bool azatrax::SL2::Sense_1 ( ) const [inline]
```

Sense 1, return true if input line 1 was activated since last get status.

References [azatrax::SL2::status2_union::sense_1](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::SL2::status2_union::theBits](#), and [azatrax::SL2::status2_union::theByte](#).

9.144.3.11 Sense_2()

```
bool azatrax::SL2::Sense_2 ( ) const [inline]
```

Sense 2, return true if input line 2 was activated since last get status.

References [azatrax::SL2::status2_union::sense_2](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::SL2::status2_union::theBits](#), and [azatrax::SL2::status2_union::theByte](#).

9.144.3.12 Sense_3()

```
bool azatrax::SL2::Sense_3 ( ) const [inline]
```

Sense 3, return true if input line 3 was activated since last get status.

References [azatrax::SL2::status2_union::sense_3](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::SL2::status2_union::theBits](#), and [azatrax::SL2::status2_union::theByte](#).

9.144.3.13 Sense_4()

```
bool azatrax::SL2::Sense_4 ( ) const [inline]
```

Sense 4, return true if input line 4 was activated since last get status.

References [azatrax::SL2::status2_union::sense_4](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::SL2::status2_union::theBits](#), and [azatrax::SL2::status2_union::theByte](#).

9.144.3.14 SetQ1negQ2pos()

```
ErrorCode azatrax::SL2::SetQ1negQ2pos ( ) const [inline]
```

Sets output terminal Q1 to negative, Q2 to positive.

References [azatrax::Azatrax::cmd_Q1negQ2pos](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.144.3.15 SetQ1posQ2neg()

```
ErrorCode azatrax::SL2::SetQ1posQ2neg ( ) const [inline]
```

Sets output terminal Q1 to positive, Q2 to negative.

References [azatrax::Azatrax::cmd_Q1posQ2neg](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.144.3.16 SetQ1Q2open()

```
ErrorCode azatrax::SL2::SetQ1Q2open ( ) const [inline]
```

Outputs Q1 & Q2 both set to open circuit (disconnects switch machine #1)

References [azatrax::Azatrax::cmd_Q1Q2open](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.144.3.17 SetQ3negQ4pos()

```
ErrorCode azatrax::SL2::SetQ3negQ4pos ( ) const [inline]
```

Sets output terminal Q3 to negative, Q4 to positive.

References [azatrax::Azatrax::cmd_Q3negQ4pos](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.144.3.18 SetQ3posQ4neg()

```
ErrorCode azatrax::SL2::SetQ3posQ4neg ( ) const [inline]
```

Sets output terminal Q3 to positive, Q4 to negative.

References [azatrax::Azatrax::cmd_Q3posQ4neg](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.144.3.19 SetQ3Q4open()

```
ErrorCode azatrax::SL2::SetQ3Q4open ( ) const [inline]
```

Outputs Q3 & Q4 both set to open circuit (disconnects switch machine #2)

References [azatrax::Azatrax::cmd_Q3Q4open](#), and [azatrax::Azatrax::sendByte\(\)](#).

9.144.4 Friends And Related Function Documentation

9.144.4.1 Azatrax

```
friend class Azatrax [friend]
```

9.145 xpressnet::SoftwareVersion Class Reference

Software version.

Public Member Functions

- [SoftwareVersion](#) (name, majornibble, minornibble, cst=0xff)
Constructor.
- [Major](#) ()
Return major version number.
- [Minor](#) ()
Return minor version number.
- [CommandStationTypeCode](#) ()
Return command station type.

Private Attributes

- [_major](#)
Major version number.
- [_minor](#)
Minor version number.
- [_command_station_type](#)
Command station type.

9.145.1 Detailed Description

Software version.

Author

Robert Heller <heller@deepsoft.com>

9.145.2 Constructor & Destructor Documentation

9.145.2.1 SoftwareVersion()

```
xpressnet::SoftwareVersion::SoftwareVersion (
    name ,
    majornibble ,
    minornibble ,
    cst = 0xff )
```

Constructor.

Parameters

<i>majornibble</i>	Major version number.
<i>minornibble</i>	Minor version number.
<i>cst</i>	Command station type.

9.145.3 Member Function Documentation

9.145.3.1 CommandStationTypeCode()

```
xpressnet::SoftwareVersion::CommandStationTypeCode ( )
```

Return command station type.

9.145.3.2 Major()

```
xpressnet::SoftwareVersion::Major ( )
```

Return major version number.

9.145.3.3 Minor()

```
xpressnet::SoftwareVersion::Minor ( )
```

Return minor version number.

9.145.4 Member Data Documentation

9.145.4.1 `_command_station_type`

`xpressnet::SoftwareVersion::_command_station_type` [private]

Command station type.

9.145.4.2 `_major`

`xpressnet::SoftwareVersion::_major` [private]

Major version number.

9.145.4.3 `_minor`

`xpressnet::SoftwareVersion::_minor` [private]

Minor version number.

9.146 splash Class Reference

Widget that implements a splash window.

Public Member Functions

- [update](#) (statusMessage, percentDone)
Method to update the splash window.
- [enableClickDestroy](#) ()
Method to enable click to destroy.
- [hide](#) ()
Method to hide the splash window.
- [show](#) ()
Method to show the splash window.
- [splash](#) (name,...)
Constructor initialize a splash window.

Private Member Functions

- [CheckColor](#) (option, value)
Method to validate a color option.
- [CheckImage](#) (option, value)
Method to validate an image option.

Private Attributes

- [image](#)
Image component.
- [progressBar](#)
Progress bar component.
- [title](#)
Title component.
- [icon](#)
Icon component.
- [status](#)
Status component.
- [header](#)
Header component.
- [currentProgress](#)
The current progress.

9.146.1 Detailed Description

Widget that implements a splash window.

A splash window is a toplevel that is displayed during startup and shows a startup graphic and shows the startup / initialization progress.

Parameters

<i>path</i>	The widget path.
...	Options: <ul style="list-style-type: none"> • -style Style name, default is Splash. • -titleforeground Delegated to the title widget as -foreground. • -statusforeground Delegated to the status widget as -foreground. • -background Background color. • -progressbar Flag that enables or disables the progress bar. • -image Splash image to display in the lower part of the splash window. • -icon Icon to display next to the text in the upper part of the splash window. • -title Title text.

Author

Robert Heller <heller@deepsoft.com>

9.146.2 Package provided

Splash 1.0

9.146.3 Constructor & Destructor Documentation**9.146.3.1 splash()**

```
splash::splash (
    name ,
    ... )
```

Constructor initialize a splash window.

Parameters

...	Option list. [index] constructor!splash
-----	---

9.146.4 Member Function Documentation**9.146.4.1 CheckColor()**

```
splash::CheckColor (
    option ,
    value ) [private]
```

Method to validate a color option.

Parameters

<i>option</i>	The option being set.
<i>value</i>	The value it is being set to.

9.146.4.2 CheckImage()

```
splash::CheckImage (
    option ,
    value ) [private]
```

Method to validate an image option.

Parameters

<i>option</i>	The option being set.
<i>value</i>	The value it is being set to.

9.146.4.3 enableClickDestroy()

```
splash::enableClickDestroy ( )
```

Method to enable click to destroy.

9.146.4.4 hide()

```
splash::hide ( )
```

Method to hide the splash window.

9.146.4.5 show()

```
splash::show ( )
```

Method to show the splash window.

9.146.4.6 update()

```
splash::update (
    statusMessage ,
    percentDone )
```

Method to update the splash window.

Parameters

<i>statusMessage</i>	The new status message.
<i>percentDone</i>	The percent completed.

9.146.5 Member Data Documentation

9.146.5.1 currentProgress

`splash::currentProgress` [private]

The current progress.

9.146.5.2 header

`splash::header` [private]

Header component.

9.146.5.3 icon

`splash::icon` [private]

Icon component.

9.146.5.4 image

`splash::image` [private]

Image component.

9.146.5.5 progressBar

```
splash::progressBar [private]
```

Progress bar component.

9.146.5.6 status

```
splash::status [private]
```

Status component.

9.146.5.7 title

```
splash::title [private]
```

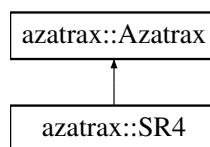
Title component.

9.147 azatrax::SR4 Class Reference

[SR4](#) I/O Class.

```
#include <sr4.h>
```

Inheritance diagram for azatrax::SR4:



Classes

- union [status1_union](#)
Status byte 1 union type (Outputs)
- union [status2_union](#)
Status byte 2 union type (Input sense)
- union [status3_union](#)
Status byte 3 union type (Input Control Status)

Public Member Functions

- [~SR4](#) ()
- [ErrorCode BlinkRelays](#) (bool Q1, bool Q2, bool Q3, bool Q4, uint8_t speed)
Blink relay contacts.
- [ErrorCode RelaysOff](#) (bool Q1, bool Q2, bool Q3, bool Q4)
Set output relay contacts off.
- [ErrorCode RelaysOn](#) (bool Q1, bool Q2, bool Q3, bool Q4)
Set output relay contacts on.
- [ErrorCode PulseRelays](#) (bool Q1, bool Q2, bool Q3, bool Q4, uint8_t duration)
Pulse output relay contacts.
- [ErrorCode OutputRelayInputControl](#) (bool I1, bool I2, bool I3, bool I4)
Enable/Disable discrete input lines from affecting outputs.
- bool [Sense_1_Latch](#) () const
Sense 1, return true if input line 1 was activated since last get status.
- bool [Sense_2_Latch](#) () const
Sense 2, return true if input line 2 was activated since last get status.
- bool [Sense_3_Latch](#) () const
Sense 3, return true if input line 3 was activated since last get status.
- bool [Sense_4_Latch](#) () const
Sense 4, return true if input line 4 was activated since last get status.
- bool [Q1_State](#) () const
Q1 state, return true if Q1 is closed.
- bool [Q2_State](#) () const
Q2 state, return true if Q2 is closed.
- bool [Q3_State](#) () const
Q3 state, return true if Q3 is closed.
- bool [Q4_State](#) () const
Q4 state, return true if Q4 is closed.
- bool [Input_1_Enabled](#) () const
Input 1 enabled? Return true if I1 can affect outputs.
- bool [Input_2_Enabled](#) () const
Input 2 enabled? Return true if I2 can affect outputs.
- bool [Input_3_Enabled](#) () const
Input 3 enabled? Return true if I3 can affect outputs.
- bool [Input_4_Enabled](#) () const
Input 4 enabled? Return true if I4 can affect outputs.
- bool [Sense_1_Live](#) () const
Sense 1, return true if input line 1 is now activated.
- bool [Sense_2_Live](#) () const
Sense 2, return true if input line 2 is now activated.
- bool [Sense_3_Live](#) () const
Sense 3, return true if input line 3 is now activated.
- bool [Sense_4_Live](#) () const
Sense 4, return true if input line 4 is now activated.

Private Member Functions

- [SR4](#) (const char *serialnumber, char **outmessage=NULL)
Base constructor.

Friends

- class [Azatrax](#)

Additional Inherited Members

9.147.1 Detailed Description

[SR4](#) I/O Class.

[SR4](#) interface class.

This class implements the interface logic for a SR4-U device.

The constructor opens a connection to a SR4-U device, given its serial number. Each SR4-U device has a unique, factory defined serial number, which is printed on a sticker attached to the module. This serial number is much like the MAC address of an Ethernet interface. The destructor closes the connection to the device and frees any resources allocated.

The class provides methods to send commands to the device, read back its state and interrogate the state read back. This way each class instance encapsulates each device instance.

Author

Robert Heller <heller@deepsoft.com>

9.147.2 Constructor & Destructor Documentation

9.147.2.1 SR4()

```
azatrax::SR4::SR4 (
    const char * serialnumber,
    char ** outmessage = NULL ) [inline], [private]
```

Base constructor.

Parameters

<i>serialnumber</i>	The serial number of the device to open.
<i>outmessage</i>	To hold an error message, if any.

9.147.2.2 ~SR4()

```
azatrax::SR4::~~SR4 ( ) [inline]
```

9.147.3 Member Function Documentation

9.147.3.1 BlinkRelays()

```
ErrorCode azatrax::SR4::BlinkRelays (
    bool Q1,
    bool Q2,
    bool Q3,
    bool Q4,
    uint8_t speed ) [inline]
```

Blink relay contacts.

Sets output relay contacts to blinking state.

Parameters

<i>Q1</i>	Blink relay Q1.
<i>Q2</i>	Blink relay Q2.
<i>Q3</i>	Blink relay Q3.
<i>Q4</i>	Blink relay Q4.
<i>speed</i>	Blink speed: 0 is 4hz, 1 is 2hz, 2 is 1hz, and 3 is .5hz.

References [azatrax::Azatrax::cmd_OutputRelayBlink](#), and [azatrax::Azatrax::send3Bytes\(\)](#).

9.147.3.2 Input_1_Enabled()

```
bool azatrax::SR4::Input_1_Enabled ( ) const [inline]
```

Input 1 enabled? Return true if I1 can affect outputs.

References [azatrax::SR4::status3_union::input_1_enabled](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status3](#), [azatrax::SR4::status3_union::theBits](#), and [azatrax::SR4::status3_union::theByte](#).

9.147.3.3 Input_2_Enabled()

```
bool azatrax::SR4::Input_2_Enabled ( ) const [inline]
```

Input 2 enabled? Return true if I2 can affect outputs.

References [azatrax::SR4::status3_union::input_2_enabled](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status3](#), [azatrax::SR4::status3_union::theBits](#), and [azatrax::SR4::status3_union::theByte](#).

9.147.3.4 Input_3_Enabled()

```
bool azatrax::SR4::Input_3_Enabled ( ) const [inline]
```

Input 3 enabled? Return true if I3 can affect outputs.

References [azatrax::SR4::status3_union::input_3_enabled](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status3](#), [azatrax::SR4::status3_union::theBits](#), and [azatrax::SR4::status3_union::theByte](#).

9.147.3.5 Input_4_Enabled()

```
bool azatrax::SR4::Input_4_Enabled ( ) const [inline]
```

Input 4 enabled? Return true if I4 can affect outputs.

References [azatrax::SR4::status3_union::input_4_enabled](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status3](#), [azatrax::SR4::status3_union::theBits](#), and [azatrax::SR4::status3_union::theByte](#).

9.147.3.6 OutputRelayInputControl()

```
ErrorCode azatrax::SR4::OutputRelayInputControl (
    bool I1,
    bool I2,
    bool I3,
    bool I4 ) [inline]
```

Enable/Disable discrete input lines from affecting outputs.

When enabled, I1 & I2 affect Q1 & Q2 (switch 1), I3 & I4 affect Q3 & Q4 (switch 2).

Parameters

<i>I1</i>	Enable/Disable I1.
<i>I2</i>	Enable/Disable I2.
<i>I3</i>	Enable/Disable I3.
<i>I4</i>	Enable/Disable I4.

References [azatrax::Azatrax::cmd_OutputRelayInputControl](#), and [azatrax::Azatrax::send2Bytes\(\)](#).

9.147.3.7 PulseRelays()

```

ErrorCode azatrax::SR4::PulseRelays (
    bool Q1,
    bool Q2,
    bool Q3,
    bool Q4,
    uint8_t duration ) [inline]

```

Pulse output relay contacts.

Parameters

<i>Q1</i>	Pulse Q1.
<i>Q2</i>	Pulse Q2.
<i>Q3</i>	Pulse Q3.
<i>Q4</i>	Pulse Q4.
<i>duration</i>	Pulse duration in 0.5 second units.

References [azatrax::Azatrax::cmd_OutputRelayPulse](#), and [azatrax::Azatrax::send3Bytes\(\)](#).

9.147.3.8 Q1_State()

```

bool azatrax::SR4::Q1_State ( ) const [inline]

```

Q1 state, return true if Q1 is closed.

References [azatrax::SR4::status1_union::Q1_state](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::SR4::status1_union::theBits](#), and [azatrax::SR4::status1_union::theByte](#).

9.147.3.9 Q2_State()

```
bool azatrax::SR4::Q2_State ( ) const [inline]
```

Q2 state, return true if Q2 is closed.

References [azatrax::SR4::status1_union::Q2_state](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::SR4::status1_union::theBits](#), and [azatrax::SR4::status1_union::theByte](#).

9.147.3.10 Q3_State()

```
bool azatrax::SR4::Q3_State ( ) const [inline]
```

Q3 state, return true if Q3 is closed.

References [azatrax::SR4::status1_union::Q3_state](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::SR4::status1_union::theBits](#), and [azatrax::SR4::status1_union::theByte](#).

9.147.3.11 Q4_State()

```
bool azatrax::SR4::Q4_State ( ) const [inline]
```

Q4 state, return true if Q4 is closed.

References [azatrax::SR4::status1_union::Q4_state](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status1](#), [azatrax::SR4::status1_union::theBits](#), and [azatrax::SR4::status1_union::theByte](#).

9.147.3.12 RelaysOff()

```
ErrorCode azatrax::SR4::RelaysOff (
    bool Q1,
    bool Q2,
    bool Q3,
    bool Q4 ) [inline]
```

Set output relay contacts off.

Parameters

<i>Q1</i>	Turn off Q1.
<i>Q2</i>	Turn off Q2.
<i>Q3</i>	Turn off Q3.
<i>Q4</i>	Turn off Q4.

References [azatrax::Azatrax::cmd_OutputRelayOff](#), and [azatrax::Azatrax::send2Bytes\(\)](#).

9.147.3.13 RelaysOn()

```
ErrorCode azatrax::SR4::RelaysOn (
    bool Q1,
    bool Q2,
    bool Q3,
    bool Q4 ) [inline]
```

Set output relay contacts on.

Parameters

<i>Q1</i>	Turn on Q1.
<i>Q2</i>	Turn on Q2.
<i>Q3</i>	Turn on Q3.
<i>Q4</i>	Turn on Q4.

References [azatrax::Azatrax::cmd_OutputRelayOn](#), and [azatrax::Azatrax::send2Bytes\(\)](#).

9.147.3.14 Sense_1_Latch()

```
bool azatrax::SR4::Sense_1_Latch ( ) const [inline]
```

Sense 1, return true if input line 1 was activated since last get status.

References [azatrax::SR4::status2_union::sense_1](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::SR4::status2_union::theBits](#), and [azatrax::SR4::status2_union::theByte](#).

9.147.3.15 Sense_1_Live()

```
bool azatrax::SR4::Sense_1_Live ( ) const [inline]
```

Sense 1, return true if input line 1 is now activated.

References [azatrax::SR4::status2_union::sense_1](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status4](#), [azatrax::SR4::status2_union::theBits](#), and [azatrax::SR4::status2_union::theByte](#).

9.147.3.16 Sense_2_Latch()

```
bool azatrax::SR4::Sense_2_Latch ( ) const [inline]
```

Sense 2, return true if input line 2 was activated since last get status.

References [azatrax::SR4::status2_union::sense_2](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::SR4::status2_union::theBits](#), and [azatrax::SR4::status2_union::theByte](#).

9.147.3.17 Sense_2_Live()

```
bool azatrax::SR4::Sense_2_Live ( ) const [inline]
```

Sense 2, return true if input line 2 is now activated.

References [azatrax::SR4::status2_union::sense_2](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status4](#), [azatrax::SR4::status2_union::theBits](#), and [azatrax::SR4::status2_union::theByte](#).

9.147.3.18 Sense_3_Latch()

```
bool azatrax::SR4::Sense_3_Latch ( ) const [inline]
```

Sense 3, return true if input line 3 was activated since last get status.

References [azatrax::SR4::status2_union::sense_3](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::SR4::status2_union::theBits](#), and [azatrax::SR4::status2_union::theByte](#).

9.147.3.19 Sense_3_Live()

```
bool azatrax::SR4::Sense_3_Live ( ) const [inline]
```

Sense 3, return true if input line 3 is now activated.

References [azatrax::SR4::status2_union::sense_3](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status4](#), [azatrax::SR4::status2_union::theBits](#), and [azatrax::SR4::status2_union::theByte](#).

9.147.3.20 Sense_4_Latch()

```
bool azatrax::SR4::Sense_4_Latch ( ) const [inline]
```

Sense 4, return true if input line 4 was activated since last get status.

References [azatrax::SR4::status2_union::sense_4](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status2](#), [azatrax::SR4::status2_union::theBits](#), and [azatrax::SR4::status2_union::theByte](#).

9.147.3.21 Sense_4_Live()

```
bool azatrax::SR4::Sense_4_Live ( ) const [inline]
```

Sense 4, return true if input line 4 is now activated.

References [azatrax::SR4::status2_union::sense_4](#), [azatrax::Azatrax::stateDataPacket](#), [azatrax::Azatrax::StateDataPacket::status4](#), [azatrax::SR4::status2_union::theBits](#), and [azatrax::SR4::status2_union::theByte](#).

9.147.4 Friends And Related Function Documentation

9.147.4.1 Azatrax

```
friend class Azatrax [friend]
```

9.148 azatrax::Azatrax::StateDataPacket Struct Reference

Raw USB Data Packet.

```
#include <Azatrax.h>
```

Public Attributes

- uint8_t [commandEcho](#)
Command Echo byte.
- uint8_t [packetCount](#)
Packet counter (All Devices)
- uint8_t [status1](#)
Status byte 1 (All Devices)
- uint8_t [status2](#)
Status byte 2 (All Devices)
- uint8_t [status3](#)
Status byte 3 (SR4-U, SL2-U) / Stopwatch 1/100ths of a second (MRD2 only)
- uint8_t [status4](#)
Status byte 4 (SR4-U, SL2-U) / Stopwatch seconds (MRD2 only)
- uint8_t [stopwatchMinutes](#)
Stopwatch minutes (MRD2 only)
- uint8_t [stopwatchHours](#)
Stopwatch hours (MRD2 only)
- uint8_t [operatingMode](#)
Operating mode (MRD2 only)
- uint8_t [reserved](#) [6]
Reserved bytes.
- uint8_t [endOfData](#)
End of data.

9.148.1 Detailed Description

Raw USB Data Packet.

This is the USB Data Packet returned in response to the GetStateData command.

9.148.2 Member Data Documentation

9.148.2.1 [commandEcho](#)

```
uint8_t azatrax::Azatrax::StateDataPacket::commandEcho
```

Command Echo byte.

(All Devices)

9.148.2.2 endOfData

```
uint8_t azatrax::Azatrax::StateDataPacket::endOfData
```

End of data.

9.148.2.3 operatingMode

```
uint8_t azatrax::Azatrax::StateDataPacket::operatingMode
```

Operating mode (MRD2 only)

Referenced by [azatrax::MRD::OperatingMode\(\)](#).

9.148.2.4 packetCount

```
uint8_t azatrax::Azatrax::StateDataPacket::packetCount
```

Packet counter (All Devices)

Referenced by [azatrax::Azatrax::PacketCount\(\)](#).

9.148.2.5 reserved

```
uint8_t azatrax::Azatrax::StateDataPacket::reserved[6]
```

Reserved bytes.

9.148.2.6 status1

```
uint8_t azatrax::Azatrax::StateDataPacket::status1
```

Status byte 1 (All Devices)

See also

[MRD](#), [SL2](#), and [SR4](#) for detailed bitfields of this byte.

Referenced by [azatrax::MRD::HasRelays\(\)](#), [azatrax::MRD::Latch_1\(\)](#), [azatrax::MRD::Latch_2\(\)](#), [azatrax::SL2::Motor_1_Direction\(\)](#), [azatrax::SL2::Motor_1_State\(\)](#), [azatrax::SL2::Motor_2_Direction\(\)](#), [azatrax::SL2::Motor_2_State\(\)](#), [azatrax::SR4::Q1_State\(\)](#), [azatrax::SR4::Q2_State\(\)](#), [azatrax::SR4::Q3_State\(\)](#), [azatrax::SR4::Q4_State\(\)](#), [azatrax::MRD::Sense_1\(\)](#), and [azatrax::MRD::Sense_2\(\)](#).

9.148.2.7 status2

```
uint8_t azatrax::Azatrax::StateDataPacket::status2
```

Status byte 2 (All Devices)

See also

[MRD](#), [SL2](#), and [SR4](#) for detailed bitfields of this byte.

Referenced by [azatrax::MRD::AllowingExternalChanges\(\)](#), [azatrax::MRD::ExternallyChanged\(\)](#), [azatrax::MRD::ResetStatus\(\)](#), [azatrax::SL2::Sense_1\(\)](#), [azatrax::SR4::Sense_1_Latch\(\)](#), [azatrax::SL2::Sense_2\(\)](#), [azatrax::SR4::Sense_2_Latch\(\)](#), [azatrax::SL2::Sense_3\(\)](#), [azatrax::SR4::Sense_3_Latch\(\)](#), [azatrax::SL2::Sense_4\(\)](#), [azatrax::SR4::Sense_4_Latch\(\)](#), and [azatrax::MRD::StopwatchTicking\(\)](#).

9.148.2.8 status3

```
uint8_t azatrax::Azatrax::StateDataPacket::status3
```

Status byte 3 (SR4-U, SL2-U) / Stopwatch 1/100ths of a second (MRD2 only)

Referenced by [azatrax::SL2::Input_1_Enabled\(\)](#), [azatrax::SR4::Input_1_Enabled\(\)](#), [azatrax::SL2::Input_2_Enabled\(\)](#), [azatrax::SR4::Input_2_Enabled\(\)](#), [azatrax::SL2::Input_3_Enabled\(\)](#), [azatrax::SR4::Input_3_Enabled\(\)](#), [azatrax::SL2::Input_4_Enabled\(\)](#), and [azatrax::SR4::Input_4_Enabled\(\)](#).

9.148.2.9 status4

```
uint8_t azatrax::Azatrax::StateDataPacket::status4
```

Status byte 4 (SR4-U, SL2-U) / Stopwatch seconds (MRD2 only)

Referenced by [azatrax::SR4::Sense_1_Live\(\)](#), [azatrax::SR4::Sense_2_Live\(\)](#), [azatrax::SR4::Sense_3_Live\(\)](#), and [azatrax::SR4::Sense_4_Live\(\)](#).

9.148.2.10 stopwatchHours

```
uint8_t azatrax::Azatrax::StateDataPacket::stopwatchHours
```

Stopwatch hours (MRD2 only)

Referenced by [azatrax::MRD::Stopwatch\(\)](#).

9.148.2.11 stopwatchMinutes

uint8_t azatrax::Azatrax::StateDataPacket::stopwatchMinutes

Stopwatch minutes (MRD2 only)

Referenced by [azatrax::MRD::Stopwatch\(\)](#).

9.149 FCFSupport::Station Class Reference

The [Station](#) class implements a single station.

```
#include <Station.h>
```

Public Member Functions

- [Station](#) ()
Default constructor.
- [Station](#) (const [Station](#) &other)
Copy constructor, copy from another station instance.
- [Station](#) & operator= ([Station](#) &other)
Assignment operator, copy from another station instance.
- [Station](#) (const char *n, [Division](#) *d, const char *c)
Full constructor.
- ~[Station](#) ()
Destructor.
- const char * [Name](#) () const
Return the station's name.
- [Division](#) * [MyDivision](#) () const
Return the station's division.
- const char * [Comment](#) () const
Return the station's comment.
- int [NumberOfIndustries](#) () const
Return the number of industries at this station.
- [FCFSupport::Industry](#) * [TheIndustry](#) (int i) const
Return the lth industry at this station.
- int [AppendIndustry](#) ([FCFSupport::Industry](#) *industry)
Append an industry to this station's list of industries.

Private Attributes

- string [name](#)
The station's name.
- string [comment](#)
The station's comment.
- [Division](#) * [division](#)
The station's division.
- vector< [Industry](#) * > [industries](#)
The list of industries at this station.

Friends

- class [System](#)

The [System](#) class is a friend.

9.149.1 Detailed Description

The [Station](#) class implements a single station.

A station exists within a division and contains a number of industries.

A [Station](#) has a name, a comment, it belongs to a division, and has a list of industries.

Author

Robert Heller <heller@deepsoft.com>

9.149.2 Constructor & Destructor Documentation

9.149.2.1 [Station\(\)](#) [1/3]

```
FCFSupport::Station::Station ( ) [inline]
```

Default constructor.

Initialize all slots to empty values.

References [comment](#), [division](#), and [name](#).

9.149.2.2 [Station\(\)](#) [2/3]

```
FCFSupport::Station::Station (
    const Station & other ) [inline]
```

Copy constructor, copy from another station instance.

Parameters

<i>other</i>	The other station instance.
--------------	-----------------------------

References [comment](#), [division](#), [industries](#), and [name](#).

9.149.2.3 Station() [3/3]

```
FCFSupport::Station::Station (
    const char * n,
    Division * d,
    const char * c ) [inline]
```

Full constructor.

Create a fresh station instance, given a name, division, and a comment. Initially, the industry list is empty.

Parameters

<i>n</i>	The new station's name.
<i>d</i>	The division the station belongs to.
<i>c</i>	A comment string.

References [comment](#), [division](#), and [name](#).

9.149.2.4 ~Station()

```
FCFSupport::Station::~~Station ( ) [inline]
```

Destructor.

9.149.3 Member Function Documentation

9.149.3.1 AppendIndustry()

```
int FCFSupport::Station::AppendIndustry (
    FCFSupport::Industry * industry ) [inline]
```

Append an industry to this station's list of industries.

Parameters

<i>industry</i>	The industry to append.
-----------------	-------------------------

References [industries](#).

9.149.3.2 Comment()

```
const char * FCFSupport::Station::Comment ( ) const [inline]
```

Return the station's comment.

References [comment](#).

9.149.3.3 MyDivision()

```
Division * FCFSupport::Station::MyDivision ( ) const [inline]
```

Return the station's division.

References [division](#).

9.149.3.4 Name()

```
const char * FCFSupport::Station::Name ( ) const [inline]
```

Return the station's name.

References [name](#).

9.149.3.5 NumberOfIndustries()

```
int FCFSupport::Station::NumberOfIndustries ( ) const [inline]
```

Return the number of industries at this station.

References [industries](#).

9.149.3.6 operator=()

```
Station & FCFSupport::Station::operator= (
    Station & other ) [inline]
```

Assignment operator, copy from another station instance.

Parameters

<i>other</i>	The other station instance.
--------------	-----------------------------

References [comment](#), [division](#), [industries](#), and [name](#).

9.149.3.7 TheIndustry()

```
FCFSupport::Industry * FCFSupport::Station::TheIndustry (  
    int i ) const [inline]
```

Return the lth industry at this station.

Parameters

<i>i</i>	The industry index.
----------	---------------------

References [i](#), and [industries](#).

9.149.4 Friends And Related Function Documentation

9.149.4.1 System

```
friend class System [friend]
```

The [System](#) class is a friend.

9.149.5 Member Data Documentation

9.149.5.1 comment

```
string FCFSupport::Station::comment [private]
```

The station's comment.

Referenced by [Comment\(\)](#), [operator=\(\)](#), and [Station\(\)](#).

9.149.5.2 division

```
Division* FCFSupport::Station::division [private]
```

The station's division.

Referenced by [MyDivision\(\)](#), [operator=\(\)](#), and [Station\(\)](#).

9.149.5.3 industries

```
vector<Industry *> FCFSupport::Station::industries [private]
```

The list of industries at this station.

Referenced by [AppendIndustry\(\)](#), [NumberOfIndustries\(\)](#), [operator=\(\)](#), [Station\(\)](#), and [TheIndustry\(\)](#).

9.149.5.4 name

```
string FCFSupport::Station::name [private]
```

The station's name.

Referenced by [Name\(\)](#), [operator=\(\)](#), and [Station\(\)](#).

9.150 TTSupport::Station Class Reference

The [Station](#) class implements a station.

```
#include <Station.h>
```

Public Member Functions

- [Station](#) (string name_="Unknown", double smile_=0)
Construct a station object, given a name and a scale mile location.
- [Station](#) (const [Station](#) &other)
Copy constructor.
- [Station](#) & [operator=](#) (const [Station](#) &other)
Assignment operator.
- [~Station](#) ()
Destructor.
- const char * [Name](#) () const
Return the name of the station.
- double [SMile](#) () const
Return the scale mile of the station.
- int [DuplicateStationIndex](#) () const
Return the duplicate station index.
- void [SetDuplicateStationIndex](#) (int index)
Set the duplication station index.
- [StorageTrack](#) * [AddStorageTrack](#) (string name_)
Add a storage track.
- [StorageTrack](#) * [FindStorageTrack](#) (string name)
Find a storage track by name.
- [StorageTrack](#) * [FindTrackTrainsStoredOn](#) (string trainNumber, double fromtime, double totime)
Find track a train is stored on.
- int [NumberOfStorageTracks](#) () const
Number of storage tracks.
- [StorageTrackMap::const_iterator](#) [FirstStorageTrack](#) () const
Return a const_iterator for the first element in the storage track map.
- [StorageTrackMap::const_iterator](#) [LastStorageTrack](#) () const
Return a const_iterator for the last element in the storage track map.
- ostream & [Write](#) (ostream &stream) const
Write object to a stream.
- istream & [Read](#) (istream &stream)
Read an object from a stream.

Private Attributes

- string [name](#)
Station name.
- [StorageTrackMap](#) [storageTracks](#)
Storage track map.
- double [smile](#)
Scale Mile.
- int [duplicateStationIndex](#)
Duplicate station index.

9.150.1 Detailed Description

The [Station](#) class implements a station.

Stations are not specifically passenger stations, but are any place where trains stop or meet or might just be important mile post locations used for time keeping checks. They also can be just sidings.

Author

Robert Heller <heller@deepsoft.com>

9.150.2 Constructor & Destructor Documentation

9.150.2.1 Station() [1/2]

```
TTSupport::Station::Station (
    string name_ = "Unknown",
    double smile_ = 0 ) [inline]
```

Construct a station object, given a name and a scale mile location.

Parameters

<i>name</i> ↔ —	The name of the station.
<i>smile</i> ↔ —	The scale mile location of the station.

References [duplicateStationIndex](#), [name](#), and [smile](#).

9.150.2.2 Station() [2/2]

```
TTSupport::Station::Station (
    const Station & other ) [inline]
```

Copy constructor.

Copy one station to another.

Parameters

<i>other</i>	The other station.
--------------	--------------------

References [duplicateStationIndex](#), [name](#), [smile](#), and [storageTracks](#).

9.150.2.3 ~Station()

```
TTSupport::Station::~~Station ( ) [inline]
```

Destructor.

9.150.3 Member Function Documentation

9.150.3.1 AddStorageTrack()

```
StorageTrack * TTSupport::Station::AddStorageTrack (
    string name_ )
```

Add a storage track.

Parameters

<i>name</i> ↔	The name of the storage track.
—	

9.150.3.2 DuplicateStationIndex()

```
int TTSupport::Station::DuplicateStationIndex ( ) const [inline]
```

Return the duplicate station index.

This is the index of another station that is the physical duplicate of this one. Only meaningful on out-and-back type layouts or other layout configurations where stations are logically duplicated due to trackage having dual meaning.

References [duplicateStationIndex](#).

9.150.3.3 FindStorageTrack()

```
StorageTrack * TTSupport::Station::FindStorageTrack (
    string name ) [inline]
```

Find a storage track by name.

Parameters

<i>name</i>	The name of the storage track.
-------------	--------------------------------

References [name](#), and [storageTracks](#).

9.150.3.4 FindTrackTrainIsStoredOn()

```
StorageTrack * TTSupport::Station::FindTrackTrainIsStoredOn (
    string trainNumber,
    double fromtime,
    double totime )
```

Find track a train is stored on.

Parameters

<i>trainNumber</i>	The train number (symbol) to search for.
<i>fromtime</i>	The from time to check.
<i>totime</i>	The to time to check.

9.150.3.5 FirstStorageTrack()

```
StorageTrackMap::const_iterator TTSupport::Station::FirstStorageTrack ( ) const [inline]
```

Return a const_iterator for the first element in the storage track map.

References [storageTracks](#).

9.150.3.6 LastStorageTrack()

```
StorageTrackMap::const_iterator TTSupport::Station::LastStorageTrack ( ) const [inline]
```

Return a const_iterator for the last element in the storage track map.

References [storageTracks](#).

9.150.3.7 Name()

```
const char * TTSupport::Station::Name ( ) const [inline]
```

Return the name of the station.

References [name](#).

9.150.3.8 NumberOfStorageTracks()

```
int TTSupport::Station::NumberOfStorageTracks ( ) const [inline]
```

Number of storage tracks.

References [storageTracks](#).

9.150.3.9 operator=()

```
Station & TTSupport::Station::operator= (
    const Station & other ) [inline]
```

Assignment operator.

Assign one station to another.

Parameters

<i>other</i>	The other station.
--------------	--------------------

References [duplicateStationIndex](#), [name](#), [smile](#), and [storageTracks](#).

9.150.3.10 Read()

```
istream & TTSupport::Station::Read (
    istream & stream )
```

Read an object from a stream.

Parameters

<i>stream</i>	Stream to read from.
---------------	----------------------

9.150.3.11 SetDuplicateStationIndex()

```
void TTSupport::Station::SetDuplicateStationIndex (  
    int index ) [inline]
```

Set the duplication station index.

Parameters

<i>index</i>	The index of the duplicate station.
--------------	-------------------------------------

References [duplicateStationIndex](#).

9.150.3.12 SMile()

```
double TTSupport::Station::SMile ( ) const [inline]
```

Return the scale mile of the station.

References [smile](#).

9.150.3.13 Write()

```
ostream & TTSupport::Station::Write (  
    ostream & stream ) const
```

Write object to a stream.

Parameters

<i>stream</i>	Stream to write to.
---------------	---------------------

9.150.4 Member Data Documentation

9.150.4.1 duplicateStationIndex

```
int TTSupport::Station::duplicateStationIndex [private]
```

Duplicate station index.

Referenced by [DuplicateStationIndex\(\)](#), [operator=\(\)](#), [SetDuplicateStationIndex\(\)](#), and [Station\(\)](#).

9.150.4.2 name

```
string TTSupport::Station::name [private]
```

[Station](#) name.

Referenced by [FindStorageTrack\(\)](#), [Name\(\)](#), [operator=\(\)](#), and [Station\(\)](#).

9.150.4.3 smile

```
double TTSupport::Station::smile [private]
```

Scale Mile.

Referenced by [operator=\(\)](#), [SMile\(\)](#), and [Station\(\)](#).

9.150.4.4 storageTracks

```
StorageTrackMap TTSupport::Station::storageTracks [private]
```

Storage track map.

Referenced by [FindStorageTrack\(\)](#), [FirstStorageTrack\(\)](#), [LastStorageTrack\(\)](#), [NumberOfStorageTracks\(\)](#), [operator=\(\)](#), and [Station\(\)](#).

9.151 FCFSupport::SwitchListElement::StationOrIndustry Union Reference

A const pointer to a train's stop, which can be either a station or an industry, depending on what kind of train it is.

```
#include <SwitchList.h>
```

Public Attributes

- const [Station](#) * [station](#)
A station stop, for Box Moves and Way Freights.
- const [Industry](#) * [industry](#)
An industry stop, for Manifest Freights.

9.151.1 Detailed Description

A const pointer to a train's stop, which can be either a station or an industry, depending on what kind of train it is.

9.151.2 Member Data Documentation

9.151.2.1 industry

```
const Industry* FCFSupport::SwitchListElement::StationOrIndustry::industry
```

An industry stop, for Manifest Freights.

Referenced by [FCFSupport::SwitchListElement::DropStopEQ\(\)](#), [FCFSupport::SwitchListElement::DropStopIndustry\(\)](#), [FCFSupport::SwitchListElement::DropStopStation\(\)](#), [FCFSupport::SwitchListElement::operator=\(\)](#), and [FCFSupport::SwitchListElement::](#)

9.151.2.2 station

```
const Station* FCFSupport::SwitchListElement::StationOrIndustry::station
```

A station stop, for Box Moves and Way Freights.

Referenced by [FCFSupport::SwitchListElement::DropStopEQ\(\)](#), [FCFSupport::SwitchListElement::DropStopStation\(\)](#), and [FCFSupport::SwitchListElement::SwitchListElement\(\)](#).

9.152 FCFSupport::Train::StationOrIndustry Union Reference

Union of stations or industries, used for stops.

```
#include <Train.h>
```

Public Attributes

- [Station](#) * [station](#)
[Station](#), for other then Manifest freights.
- [Industry](#) * [industry](#)
[Industry](#), for Manifest freights.

9.152.1 Detailed Description

Union of stations or industries, used for stops.

9.152.2 Member Data Documentation

9.152.2.1 [industry](#)

[Industry](#)* FCFSupport::Train::StationOrIndustry::industry

[Industry](#), for Manifest freights.

9.152.2.2 [station](#)

[Station](#)* FCFSupport::Train::StationOrIndustry::station

[Station](#), for other then Manifest freights.

9.153 TTSupport::StationTimes Class Reference

[Station](#) times class, used by the LaTeX generator methods.

```
#include <TimeTableSystem.h>
```

Public Member Functions

- [StationTimes](#) (double a=-1, double d=-1, [Stop::FlagType](#) f=[Stop::Transit](#))
Constructor: create an entry for a time table cell.
- [StationTimes](#) (const [StationTimes](#) &other)
Copy constructor: create an entry for a time table cell from an existing [StationTimes](#) object.
- [StationTimes](#) & [operator=](#) (const [StationTimes](#) &other)
Assignment operator: copy the fields from another [StationTimes](#) object.
- double [Arrival](#) () const
Accessor for the arrival time.
- double [Departure](#) () const
Accessor for the departure time.
- [Stop::FlagType](#) [Flag](#) () const
Accessor for the type of stop flag.

Private Attributes

- double [arrival](#)
The arrival time, in scale time units.
- double [departure](#)
The departure time, in scale time units.
- [Stop::FlagType](#) [flag](#)
The stop flag: Origin, Terminate, or Transit.

9.153.1 Detailed Description

[Station](#) times class, used by the LaTeX generator methods.

This class holds time table information used in the code that generates the LaTeX tables. Each [StationTimes](#) item contains one table element in the form of an arrival time and a departure time. The flag member indicates if only the arrival time, departure time, or both times are valid. An originating train has no arrival time and a terminating train has no departure time.

This class is actually used to hold the information for a single cell in a formatted time table. Each cell contains an arrival time and a departure time. Each row in the table contains the information for a specific station and each column contains the information for a single train.

See also

[TrainStationTimes](#) [TrainTimesAtStation](#).

Author

Robert Heller <heller@deepsoft.com>

9.153.2 Constructor & Destructor Documentation

9.153.2.1 StationTimes() [1/2]

```
TTSupport::StationTimes::StationTimes (
    double a = -1,
    double d = -1,
    Stop::FlagType f = Stop::Transit ) [inline]
```

Constructor: create an entry for a time table cell.

Parameters

<i>a</i>	The arrival time.
<i>d</i>	The departure time.
<i>f</i>	The stop flag: Origin, Terminate, or Transit.

References [arrival](#), [departure](#), and [flag](#).

9.153.2.2 StationTimes() [2/2]

```
TTSupport::StationTimes::StationTimes (
    const StationTimes & other ) [inline]
```

Copy constructor: create an entry for a time table cell from an existing [StationTimes](#) object.

Parameters

<i>other</i>	The other StationTimes object.
--------------	--

References [arrival](#), [departure](#), and [flag](#).

9.153.3 Member Function Documentation

9.153.3.1 Arrival()

```
double TTSupport::StationTimes::Arrival ( ) const [inline]
```

Accessor for the arrival time.

References [arrival](#).

9.153.3.2 Departure()

```
double TTSupport::StationTimes::Departure ( ) const [inline]
```

Accessor for the departure time.

References [departure](#).

9.153.3.3 Flag()

```
Stop::FlagType TTSupport::StationTimes::Flag ( ) const [inline]
```

Accessor for the type of stop flag.

References [flag](#).

9.153.3.4 operator=()

```
StationTimes & TTSupport::StationTimes::operator= (
    const StationTimes & other ) [inline]
```

Assignment operator: copy the fields from another [StationTimes](#) object.

Parameters

<i>other</i>	The other StationTimes object.
--------------	--

References [arrival](#), [departure](#), and [flag](#).

9.153.4 Member Data Documentation

9.153.4.1 arrival

```
double TTSupport::StationTimes::arrival [private]
```

The arrival time, in scale time units.

Only used for trains in transit and for terminating trains.

Referenced by [Arrival\(\)](#), [operator=\(\)](#), and [StationTimes\(\)](#).

9.153.4.2 departure

```
double TTSupport::StationTimes::departure [private]
```

The departure time, in scale time units.

Only used for trains in transit and for originating trains.

Referenced by [Departure\(\)](#), [operator=\(\)](#), and [StationTimes\(\)](#).

9.153.4.3 flag

```
Stop::FlagType TTSupport::StationTimes::flag [private]
```

The stop flag: Origin, Terminate, or Transit.

Referenced by [Flag\(\)](#), [operator=\(\)](#), and [StationTimes\(\)](#).

9.154 azatrax::MRD::status1_union Union Reference

Status byte 1 union type.

Public Attributes

- `uint8_t theByte`
Status byte as a byte.
- `struct {`
 - `unsigned int sense_1:1`
Sense 1.
 - `unsigned int sense_2:1`
Sense 2.
 - `unsigned int latch_1:1`
Latch 1.
 - `unsigned int latch_2:1`
Latch 2.
 - `unsigned int modtype:1`
Module type.
 - `unsigned int reserved:3`
Reserved bits.
- `} theBits`

Status byte as bit fields.

9.154.1 Detailed Description

Status byte 1 union type.

9.154.2 Member Data Documentation

9.154.2.1 latch_1

```
unsigned int azatrax::MRD::status1_union::latch_1
```

Latch 1.

Referenced by [azatrax::MRD::Latch_1\(\)](#).

9.154.2.2 latch_2

```
unsigned int azatrax::MRD::status1_union::latch_2
```

Latch 2.

Referenced by [azatrax::MRD::Latch_2\(\)](#).

9.154.2.3 modtype

```
unsigned int azatrax::MRD::status1_union::modtype
```

Module type.

Referenced by [azatrax::MRD::HasRelays\(\)](#).

9.154.2.4 reserved

```
unsigned int azatrax::MRD::status1_union::reserved
```

Reserved bits.

9.154.2.5 sense_1

```
unsigned int azatrax::MRD::status1_union::sense_1
```

Sense 1.

Referenced by [azatrax::MRD::Sense_1\(\)](#).

9.154.2.6 sense_2

```
unsigned int azatrax::MRD::status1_union::sense_2
```

Sense 2.

Referenced by [azatrax::MRD::Sense_2\(\)](#).

9.154.2.7

```
struct { ... } azatrax::MRD::status1_union::theBits
```

Status byte as bit fields.

Referenced by [azatrax::MRD::HasRelays\(\)](#), [azatrax::MRD::Latch_1\(\)](#), [azatrax::MRD::Latch_2\(\)](#), [azatrax::MRD::Sense_1\(\)](#), and [azatrax::MRD::Sense_2\(\)](#).

9.154.2.8 theByte

```
uint8_t azatrax::MRD::status1_union::theByte
```

Status byte as a byte.

Referenced by [azatrax::MRD::HasRelays\(\)](#), [azatrax::MRD::Latch_1\(\)](#), [azatrax::MRD::Latch_2\(\)](#), [azatrax::MRD::Sense_1\(\)](#), and [azatrax::MRD::Sense_2\(\)](#).

9.155 azatrax::SL2::status1_union Union Reference

Status byte 1 union type (Output states)

Public Attributes

- uint8_t [theByte](#)
Status byte as a byte.
- struct {
 - unsigned int [motor_1_direction](#):1
Motor 1 direction.
 - unsigned int [motor_1_state](#):1
Motor 1 state.
 - unsigned int [motor_2_direction](#):1
Motor 2 direction.
 - unsigned int [motor_2_state](#):1
Motor 2 state.
 - unsigned int [reserved](#):4
Reserved bits.

} [theBits](#)

Status byte as bit fields.

9.155.1 Detailed Description

Status byte 1 union type (Output states)

9.155.2 Member Data Documentation

9.155.2.1 motor_1_direction

```
unsigned int azatrax::SL2::status1_union::motor_1_direction
```

Motor 1 direction.

Referenced by [azatrax::SL2::Motor_1_Direction\(\)](#).

9.155.2.2 motor_1_state

```
unsigned int azatrax::SL2::status1_union::motor_1_state
```

Motor 1 state.

Referenced by [azatrax::SL2::Motor_1_State\(\)](#).

9.155.2.3 motor_2_direction

```
unsigned int azatrax::SL2::status1_union::motor_2_direction
```

Motor 2 direction.

Referenced by [azatrax::SL2::Motor_2_Direction\(\)](#).

9.155.2.4 motor_2_state

```
unsigned int azatrax::SL2::status1_union::motor_2_state
```

Motor 2 state.

Referenced by [azatrax::SL2::Motor_2_State\(\)](#).

9.155.2.5 reserved

```
unsigned int azatrax::SL2::status1_union::reserved
```

Reserved bits.

9.155.2.6

```
struct { ... } azatrax::SL2::status1_union::theBits
```

Status byte as bit fields.

Referenced by [azatrax::SL2::Motor_1_Direction\(\)](#), [azatrax::SL2::Motor_1_State\(\)](#), [azatrax::SL2::Motor_2_Direction\(\)](#), and [azatrax::SL2::Motor_2_State\(\)](#).

9.155.2.7 theByte

```
uint8_t azatrax::SL2::status1_union::theByte
```

Status byte as a byte.

Referenced by [azatrax::SL2::Motor_1_Direction\(\)](#), [azatrax::SL2::Motor_1_State\(\)](#), [azatrax::SL2::Motor_2_Direction\(\)](#), and [azatrax::SL2::Motor_2_State\(\)](#).

9.156 azatrax::SR4::status1_union Union Reference

Status byte 1 union type (Outputs)

Public Attributes

- `uint8_t` [theByte](#)
Status byte as a byte.
- struct {
 - `unsigned int` [Q1_state](#):1
Q1 state.
 - `unsigned int` [Q2_state](#):1
Q2 state.
 - `unsigned int` [Q3_state](#):1
Q3 state.
 - `unsigned int` [Q4_state](#):1
Q4 state.
 - `unsigned int` [reserved](#):4
reserved bits
- } [theBits](#)

Status byte as bit fields.

9.156.1 Detailed Description

Status byte 1 union type (Outputs)

9.156.2 Member Data Documentation

9.156.2.1 Q1_state

```
unsigned int azatrax::SR4::status1_union::Q1_state
```

Q1 state.

Referenced by [azatrax::SR4::Q1_State\(\)](#).

9.156.2.2 Q2_state

```
unsigned int azatrax::SR4::status1_union::Q2_state
```

Q2 state.

Referenced by [azatrax::SR4::Q2_State\(\)](#).

9.156.2.3 Q3_state

```
unsigned int azatrax::SR4::status1_union::Q3_state
```

Q3 state.

Referenced by [azatrax::SR4::Q3_State\(\)](#).

9.156.2.4 Q4_state

```
unsigned int azatrax::SR4::status1_union::Q4_state
```

Q4 state.

Referenced by [azatrax::SR4::Q4_State\(\)](#).

9.156.2.5 reserved

```
unsigned int azatrax::SR4::status1_union::reserved
```

reserved bits

9.156.2.6

```
struct { ... } azatrax::SR4::status1_union::theBits
```

Status byte as bit fields.

Referenced by [azatrax::SR4::Q1_State\(\)](#), [azatrax::SR4::Q2_State\(\)](#), [azatrax::SR4::Q3_State\(\)](#), and [azatrax::SR4::Q4_State\(\)](#).

9.156.2.7 theByte

```
uint8_t azatrax::SR4::status1_union::theByte
```

Status byte as a byte.

Referenced by [azatrax::SR4::Q1_State\(\)](#), [azatrax::SR4::Q2_State\(\)](#), [azatrax::SR4::Q3_State\(\)](#), and [azatrax::SR4::Q4_State\(\)](#).

9.157 azatrax::MRD::status2_union Union Reference

Status byte 2 union type.

Public Attributes

- `uint8_t` [theByte](#)
Status byte as a byte.
- `struct {`
 - `unsigned int` [resetStatus](#):1
Reset Status.
 - `unsigned int` [stopwatchTicking](#):1
Stopwatch Ticking.
 - `unsigned int` [externallyChanged](#):1
Externally Changed.
 - `unsigned int` [allowExternalChanges](#):1
Allow External Changes.
 - `unsigned int` [reserved](#):4
Reserved bits.
- `} theBits`

Status byte as bit fields.

9.157.1 Detailed Description

Status byte 2 union type.

9.157.2 Member Data Documentation

9.157.2.1 allowExternalChanges

```
unsigned int azatrax::MRD::status2_union::allowExternalChanges
```

Allow External Changes.

Referenced by [azatrax::MRD::AllowingExternalChanges\(\)](#).

9.157.2.2 externallyChanged

```
unsigned int azatrax::MRD::status2_union::externallyChanged
```

Externally Changed.

Referenced by [azatrax::MRD::ExternallyChanged\(\)](#).

9.157.2.3 reserved

```
unsigned int azatrax::MRD::status2_union::reserved
```

Reserved bits.

9.157.2.4 resetStatus

```
unsigned int azatrax::MRD::status2_union::resetStatus
```

Reset Status.

Referenced by [azatrax::MRD::ResetStatus\(\)](#).

9.157.2.5 stopwatchTicking

```
unsigned int azatrax::MRD::status2_union::stopwatchTicking
```

Stopwatch Ticking.

Referenced by [azatrax::MRD::StopwatchTicking\(\)](#).

9.157.2.6

```
struct { ... } azatrax::MRD::status2_union::theBits
```

Status byte as bit fields.

Referenced by [azatrax::MRD::AllowingExternalChanges\(\)](#), [azatrax::MRD::ExternallyChanged\(\)](#), [azatrax::MRD::ResetStatus\(\)](#), and [azatrax::MRD::StopwatchTicking\(\)](#).

9.157.2.7 theByte

```
uint8_t azatrax::MRD::status2_union::theByte
```

Status byte as a byte.

Referenced by [azatrax::MRD::AllowingExternalChanges\(\)](#), [azatrax::MRD::ExternallyChanged\(\)](#), [azatrax::MRD::ResetStatus\(\)](#), and [azatrax::MRD::StopwatchTicking\(\)](#).

9.158 azatrax::SL2::status2_union Union Reference

Status byte 2 union type (Input sense)

Public Attributes

- `uint8_t theByte`
Status byte as a byte.
- `struct {`
 - `unsigned int sense_1:1`
Sense 1.
 - `unsigned int sense_2:1`
Sense 2.
 - `unsigned int sense_3:1`
Sense 3.
 - `unsigned int sense_4:1`
Sense 4.
 - `unsigned int reserved:4`
Reserved bits.
- `} theBits`

Status byte as bit fields.

9.158.1 Detailed Description

Status byte 2 union type (Input sense)

9.158.2 Member Data Documentation

9.158.2.1 reserved

```
unsigned int azatrax::SL2::status2_union::reserved
```

Reserved bits.

9.158.2.2 sense_1

```
unsigned int azatrax::SL2::status2_union::sense_1
```

Sense 1.

Referenced by [azatrax::SL2::Sense_1\(\)](#).

9.158.2.3 sense_2

```
unsigned int azatrax::SL2::status2_union::sense_2
```

Sense 2.

Referenced by [azatrax::SL2::Sense_2\(\)](#).

9.158.2.4 sense_3

```
unsigned int azatrax::SL2::status2_union::sense_3
```

Sense 3.

Referenced by [azatrax::SL2::Sense_3\(\)](#).

9.158.2.5 sense_4

```
unsigned int azatrax::SL2::status2_union::sense_4
```

Sense 4.

Referenced by [azatrax::SL2::Sense_4\(\)](#).

9.158.2.6

```
struct { ... } azatrax::SL2::status2_union::theBits
```

Status byte as bit fields.

Referenced by [azatrax::SL2::Sense_1\(\)](#), [azatrax::SL2::Sense_2\(\)](#), [azatrax::SL2::Sense_3\(\)](#), and [azatrax::SL2::Sense_4\(\)](#).

9.158.2.7 theByte

```
uint8_t azatrax::SL2::status2_union::theByte
```

Status byte as a byte.

Referenced by [azatrax::SL2::Sense_1\(\)](#), [azatrax::SL2::Sense_2\(\)](#), [azatrax::SL2::Sense_3\(\)](#), and [azatrax::SL2::Sense_4\(\)](#).

9.159 azatrax::SR4::status2_union Union Reference

Status byte 2 union type (Input sense)

Public Attributes

- `uint8_t theByte`
Status byte as a byte.
- `struct {`
 - `unsigned int sense_1:1`
Sense 1.
 - `unsigned int sense_2:1`
Sense 2.
 - `unsigned int sense_3:1`
Sense 3.
 - `unsigned int sense_4:1`
Sense 4.
 - `unsigned int reserved:4`
Reserved bits.
- `} theBits`

Status byte as bit fields.

9.159.1 Detailed Description

Status byte 2 union type (Input sense)

9.159.2 Member Data Documentation

9.159.2.1 reserved

```
unsigned int azatrax::SR4::status2_union::reserved
```

Reserved bits.

9.159.2.2 sense_1

```
unsigned int azatrax::SR4::status2_union::sense_1
```

Sense 1.

Referenced by [azatrax::SR4::Sense_1_Latch\(\)](#), and [azatrax::SR4::Sense_1_Live\(\)](#).

9.159.2.3 sense_2

```
unsigned int azatrax::SR4::status2_union::sense_2
```

Sense 2.

Referenced by [azatrax::SR4::Sense_2_Latch\(\)](#), and [azatrax::SR4::Sense_2_Live\(\)](#).

9.159.2.4 sense_3

```
unsigned int azatrax::SR4::status2_union::sense_3
```

Sense 3.

Referenced by [azatrax::SR4::Sense_3_Latch\(\)](#), and [azatrax::SR4::Sense_3_Live\(\)](#).

9.159.2.5 sense_4

```
unsigned int azatrax::SR4::status2_union::sense_4
```

Sense 4.

Referenced by [azatrax::SR4::Sense_4_Latch\(\)](#), and [azatrax::SR4::Sense_4_Live\(\)](#).

9.159.2.6

```
struct { ... } azatrax::SR4::status2_union::theBits
```

Status byte as bit fields.

Referenced by [azatrax::SR4::Sense_1_Latch\(\)](#), [azatrax::SR4::Sense_1_Live\(\)](#), [azatrax::SR4::Sense_2_Latch\(\)](#), [azatrax::SR4::Sense_2_Live\(\)](#), [azatrax::SR4::Sense_3_Latch\(\)](#), [azatrax::SR4::Sense_3_Live\(\)](#), [azatrax::SR4::Sense_4_Latch\(\)](#), and [azatrax::SR4::Sense_4_Live\(\)](#).

9.159.2.7 theByte

```
uint8_t azatrax::SR4::status2_union::theByte
```

Status byte as a byte.

Referenced by [azatrax::SR4::Sense_1_Latch\(\)](#), [azatrax::SR4::Sense_1_Live\(\)](#), [azatrax::SR4::Sense_2_Latch\(\)](#), [azatrax::SR4::Sense_2_Live\(\)](#), [azatrax::SR4::Sense_3_Latch\(\)](#), [azatrax::SR4::Sense_3_Live\(\)](#), [azatrax::SR4::Sense_4_Latch\(\)](#), and [azatrax::SR4::Sense_4_Live\(\)](#).

9.160 azatrax::SL2::status3_union Union Reference

Status byte 3 union type (Input control state)

Public Attributes

- uint8_t [theByte](#)
Status byte as a byte.
- struct {
 - unsigned int [input_1_enabled](#):1
Input 1 enabled?
 - unsigned int [input_2_enabled](#):1
Input 2 enabled?
 - unsigned int [input_3_enabled](#):1
Input 3 enabled?
 - unsigned int [input_4_enabled](#):1
Input 4 enabled?
 - unsigned int [reserved](#):4
Reserved bits.

} [theBits](#)

Status byte as bit fields.

9.160.1 Detailed Description

Status byte 3 union type (Input control state)

9.160.2 Member Data Documentation

9.160.2.1 input_1_enabled

```
unsigned int azatrax::SL2::status3_union::input_1_enabled
```

Input 1 enabled?

Referenced by [azatrax::SL2::Input_1_Enabled\(\)](#).

9.160.2.2 input_2_enabled

```
unsigned int azatrax::SL2::status3_union::input_2_enabled
```

Input 2 enabled?

Referenced by [azatrax::SL2::Input_2_Enabled\(\)](#).

9.160.2.3 input_3_enabled

```
unsigned int azatrax::SL2::status3_union::input_3_enabled
```

Input 3 enabled?

Referenced by [azatrax::SL2::Input_3_Enabled\(\)](#).

9.160.2.4 input_4_enabled

```
unsigned int azatrax::SL2::status3_union::input_4_enabled
```

Input 4 enabled?

Referenced by [azatrax::SL2::Input_4_Enabled\(\)](#).

9.160.2.5 reserved

```
unsigned int azatrax::SL2::status3_union::reserved
```

Reserved bits.

9.160.2.6

```
struct { ... } azatrax::SL2::status3_union::theBits
```

Status byte as bit fields.

Referenced by [azatrax::SL2::Input_1_Enabled\(\)](#), [azatrax::SL2::Input_2_Enabled\(\)](#), [azatrax::SL2::Input_3_Enabled\(\)](#), and [azatrax::SL2::Input_4_Enabled\(\)](#).

9.160.2.7 theByte

```
uint8_t azatrax::SL2::status3_union::theByte
```

Status byte as a byte.

Referenced by [azatrax::SL2::Input_1_Enabled\(\)](#), [azatrax::SL2::Input_2_Enabled\(\)](#), [azatrax::SL2::Input_3_Enabled\(\)](#), and [azatrax::SL2::Input_4_Enabled\(\)](#).

9.161 azatrax::SR4::status3_union Union Reference

Status byte 3 union type (Input Control Status)

Public Attributes

- `uint8_t` [theByte](#)
Status byte as a byte.
- `struct` {
 - `unsigned int` [input_1_enabled](#):1
Input 1 enabled?
 - `unsigned int` [input_2_enabled](#):1
Input 2 enabled?
 - `unsigned int` [input_3_enabled](#):1
Input 3 enabled?
 - `unsigned int` [input_4_enabled](#):1
Input 4 enabled?
 - `unsigned int` [reserved](#):4
Reserved bits.
- [theBits](#)

Status byte as bit fields.

9.161.1 Detailed Description

Status byte 3 union type (Input Control Status)

9.161.2 Member Data Documentation

9.161.2.1 input_1_enabled

```
unsigned int azatrax::SR4::status3_union::input_1_enabled
```

Input 1 enabled?

Referenced by [azatrax::SR4::Input_1_Enabled\(\)](#).

9.161.2.2 input_2_enabled

```
unsigned int azatrax::SR4::status3_union::input_2_enabled
```

Input 2 enabled?

Referenced by [azatrax::SR4::Input_2_Enabled\(\)](#).

9.161.2.3 input_3_enabled

```
unsigned int azatrax::SR4::status3_union::input_3_enabled
```

Input 3 enabled?

Referenced by [azatrax::SR4::Input_3_Enabled\(\)](#).

9.161.2.4 input_4_enabled

```
unsigned int azatrax::SR4::status3_union::input_4_enabled
```

Input 4 enabled?

Referenced by [azatrax::SR4::Input_4_Enabled\(\)](#).

9.161.2.5 reserved

```
unsigned int azatrax::SR4::status3_union::reserved
```

Reserved bits.

9.161.2.6

```
struct { ... } azatrax::SR4::status3_union::theBits
```

Status byte as bit fields.

Referenced by [azatrax::SR4::Input_1_Enabled\(\)](#), [azatrax::SR4::Input_2_Enabled\(\)](#), [azatrax::SR4::Input_3_Enabled\(\)](#), and [azatrax::SR4::Input_4_Enabled\(\)](#).

9.161.2.7 theByte

```
uint8_t azatrax::SR4::status3_union::theByte
```

Status byte as a byte.

Referenced by [azatrax::SR4::Input_1_Enabled\(\)](#), [azatrax::SR4::Input_2_Enabled\(\)](#), [azatrax::SR4::Input_3_Enabled\(\)](#), and [azatrax::SR4::Input_4_Enabled\(\)](#).

9.162 TTSupport::Stop Class Reference

This class implements a stop.

```
#include <Train.h>
```

Public Types

- enum [FlagType](#) { [Origin](#) , [Terminate](#) , [Transit](#) }
- Type of stop.*

Public Member Functions

- [Stop](#) (int stationindex_=0, [FlagType](#) flag_=Origin)
Constructor: create a new stop.
- [Stop](#) (const [Stop](#) &other)
Copy constructor, create a stop from another stop.
- [Stop](#) & [operator=](#) (const [Stop](#) &other)
Assignment operator, assign one stop to another stop.
- [~Stop](#) ()
Destructor.
- double [Layover](#) () const
Return layover period.
- void [SetLayover](#) (double period)
Update layover period.
- double [Departure](#) (double arrival) const
Return departure time.
- int [StationIndex](#) () const
Return the station index.
- [Cab](#) * [TheCab](#) () const
Return the cab.
- void [SetCab](#) ([Cab](#) *newcab)
Update the cab.
- int [NumberOfNotes](#) () const
Return the number of notes.
- int [Note](#) (int i) const
Return the ith note.
- void [AddNote](#) (int note)
Add a note.
- void [RemoveNote](#) (int note)
Remove note.
- [FlagType](#) [Flag](#) () const
Return the flag.
- const char * [StorageTrackName](#) () const
Return storage track name.
- void [SetStorageTrackName](#) (string name)
Update storage track name.
- ostream & [Write](#) (ostream &stream) const
Write object to a stream.
- istream & [Read](#) (istream &stream, const [CabNameMap](#) cabs)
Read an object from a stream.

Private Attributes

- double `layover`
The layover time.
- int `stationindex`
The station index.
- `Cab * cab`
The `Cab` object.
- `vector< int > notes`
The vector of note numbers.
- `FlagType flag`
The type of stop, originating, terminating, or passing through.
- string `storageTrackName`
The storage track name.

9.162.1 Detailed Description

This class implements a stop.

This specifies the station the train goes through, even if it does not actually stop. A layover of 0 means the train does not stop and this station is a timekeeping check point.

Author

Robert Heller <heller@deepsoft.com>

9.162.2 Member Enumeration Documentation

9.162.2.1 FlagType

```
enum TTSupport::Stop::FlagType
```

Type of stop.

Origin for originating trains, Terminate for terminating trains, and Transit for trains passing through.

Enumerator

Origin	
Terminate	
Transit	

9.162.3 Constructor & Destructor Documentation

9.162.3.1 Stop() [1/2]

```
TTSupport::Stop::Stop (
    int stationindex_ = 0,
    FlagType flag_ = Origin ) [inline]
```

Constructor: create a new stop.

Parameters

<i>stationindex_</i>	The index of the station.
<i>flag_</i>	The type of stop (originating, terminating, or passing through).

References [cab](#), [flag](#), [layover](#), [stationindex](#), and [storageTrackName](#).

9.162.3.2 Stop() [2/2]

```
TTSupport::Stop::Stop (
    const Stop & other ) [inline]
```

Copy constructor, create a stop from another stop.

Parameters

<i>other</i>	The other stop.
--------------	-----------------

References [cab](#), [flag](#), [layover](#), [notes](#), [stationindex](#), and [storageTrackName](#).

9.162.3.3 ~Stop()

```
TTSupport::Stop::~Stop ( ) [inline]
```

Destructor.

9.162.4 Member Function Documentation

9.162.4.1 AddNote()

```
void TTSupport::Stop::AddNote (
    int note ) [inline]
```

Add a note.

Parameters

<i>note</i>	The note number.
-------------	------------------

References [i](#), and [notes](#).

9.162.4.2 Departure()

```
double TTSupport::Stop::Departure (
    double arrival ) const [inline]
```

Return departure time.

This is just the layover period added to the arrival time.

Parameters

<i>arrival</i>	The arrival time.
----------------	-------------------

References [layover](#).

9.162.4.3 Flag()

```
FlagType TTSupport::Stop::Flag ( ) const [inline]
```

Return the flag.

References [flag](#).

9.162.4.4 Layover()

```
double TTSupport::Stop::Layover ( ) const [inline]
```

Return layover period.

References [layover](#).

9.162.4.5 Note()

```
int TTSupport::Stop::Note (
    int i ) const [inline]
```

Return the ith note.

Returns -1 if the index is out of range.

Parameters

<i>i</i>	The index of the note.
----------	------------------------

References [i](#), and [notes](#).

9.162.4.6 NumberOfNotes()

```
int TTSupport::Stop::NumberOfNotes ( ) const [inline]
```

Return the number of notes.

References [notes](#).

9.162.4.7 operator=()

```
Stop & TTSupport::Stop::operator= (
    const Stop & other ) [inline]
```

Assignment operator, assign one stop to another stop.

Parameters

<i>other</i>	The other stop.
--------------	-----------------

References [cab](#), [flag](#), [layover](#), [notes](#), [stationindex](#), and [storageTrackName](#).

9.162.4.8 Read()

```
istream & TTSupport::Stop::Read (
    istream & stream,
    const CabNameMap cabs )
```

Read an object from a stream.

Parameters

<i>stream</i>	Stream to read from.
<i>cabs</i>	Map of cab names.

9.162.4.9 RemoveNote()

```
void TTSupport::Stop::RemoveNote (
    int note ) [inline]
```

Remove note.

Parameters

<i>note</i>	The note number to remove.
-------------	----------------------------

References [notes](#).

9.162.4.10 SetCab()

```
void TTSupport::Stop::SetCab (
    Cab * newcab ) [inline]
```

Update the cab.

Parameters

<i>newcab</i>	The new cab value.
---------------	--------------------

References [cab](#).

9.162.4.11 SetLayover()

```
void TTSupport::Stop::SetLayover (
    double period ) [inline]
```

Update layover period.

Parameters

<i>period</i>	New layover period.
---------------	---------------------

References [layover](#).

9.162.4.12 SetStorageTrackName()

```
void TTSupport::Stop::SetStorageTrackName (
    string name ) [inline]
```

Update storage track name.

Parameters

<i>name</i>	The name of the storage track.
-------------	--------------------------------

References [storageTrackName](#).

9.162.4.13 StationIndex()

```
int TTSupport::Stop::StationIndex ( ) const [inline]
```

Return the station index.

References [stationindex](#).

9.162.4.14 StorageTrackName()

```
const char * TTSupport::Stop::StorageTrackName ( ) const [inline]
```

Return storage track name.

References [storageTrackName](#).

9.162.4.15 TheCab()

```
Cab * TTSupport::Stop::TheCab ( ) const [inline]
```

Return the cab.

References [cab](#).

9.162.4.16 Write()

```
ostream & TTSupport::Stop::Write (
    ostream & stream ) const
```

Write object to a stream.

Parameters

<i>stream</i>	Stream to write to.
---------------	---------------------

9.162.5 Member Data Documentation

9.162.5.1 cab

```
Cab* TTSupport::Stop::cab [private]
```

The [Cab](#) object.

Referenced by [operator=\(\)](#), [SetCab\(\)](#), [Stop\(\)](#), and [TheCab\(\)](#).

9.162.5.2 flag

```
FlagType TTSupport::Stop::flag [private]
```

The type of stop, originating, terminating, or passing through.

Referenced by [Flag\(\)](#), [operator=\(\)](#), and [Stop\(\)](#).

9.162.5.3 layover

```
double TTSupport::Stop::layover [private]
```

The layover time.

Referenced by [Departure\(\)](#), [Layover\(\)](#), [operator=\(\)](#), [SetLayover\(\)](#), and [Stop\(\)](#).

9.162.5.4 notes

```
vector<int> TTSupport::Stop::notes [private]
```

The vector of note numbers.

Referenced by [AddNote\(\)](#), [Note\(\)](#), [NumberOfNotes\(\)](#), [operator=\(\)](#), [RemoveNote\(\)](#), and [Stop\(\)](#).

9.162.5.5 stationindex

```
int TTSupport::Stop::stationindex [private]
```

The station index.

Referenced by [operator=\(\)](#), [StationIndex\(\)](#), and [Stop\(\)](#).

9.162.5.6 storageTrackName

```
string TTSupport::Stop::storageTrackName [private]
```

The storage track name.

Referenced by [operator=\(\)](#), [SetStorageTrackName\(\)](#), [Stop\(\)](#), and [StorageTrackName\(\)](#).

9.163 TTSupport::StorageTrack Class Reference

The [StorageTrack](#) class implements a storage track.

```
#include <Station.h>
```

Public Member Functions

- [StorageTrack](#) (string name_="Track 0")
Construct a storage track.
- [~StorageTrack](#) ()
Destructor.
- const char * [Name](#) () const
Return the name of the storage track.
- void [SetName](#) (string name_)
Set the storage track's name.
- const [Occupied](#) * [IncludesTime](#) (double time) const
Return the occupation that includes the specified time;.
- const [Occupied](#) * [StoreTrain](#) (string train, double from, double to, string train2)
Insert train onto storage track for a time.
- bool [RemovedStoredTrain](#) (double from, double to)
Remove stored train.
- bool [UsedTimeRange](#) (double from, double to) const
Return true if the time range is in use.
- const [Occupied](#) * [FindOccupied](#) (double from, double to) const
Return occupation structure for a given time tange.
- const [Occupied](#) * [UpdateStoredTrain](#) (double from, double to, string train)
Replace a stored arrival train.
- const [Occupied](#) * [UpdateStoredTrain2](#) (double from, double to, string train)
Replace a stored departure train.
- const [Occupied](#) * [UpdateStoredTrainArrival](#) (double from, double to, double newArrival)
Update a train's arrival time.
- const [Occupied](#) * [UpdateStoredTrainDeparture](#) (double from, double to, double newDeparture)
Update a train's departure time.
- [StorageTrack](#) (const [StorageTrack](#) &other)
Clone a [StorageTrack](#) – copy constructor.
- [StorageTrack](#) & [operator=](#) (const [StorageTrack](#) &other)
Assign a [StorageTrack](#) to another [StorageTrack](#).
- ostream & [Write](#) (ostream &stream) const
Write method.
- istream & [Read](#) (istream &stream)
Read Method.
- OccupiedMap::const_iterator [FirstOccupied](#) () const
Return a const iterator for the first occupation.
- OccupiedMap::const_iterator [LastOccupied](#) () const
Return a const iterator for the last occupation.

Private Attributes

- string [name](#)
Name of the storage track.
- [OccupiedMap](#) [occupations](#)
Map of occupations.

9.163.1 Detailed Description

The [StorageTrack](#) class implements a storage track.

Storage tracks store trains at stations. Each storage track can only store one train at a given time. No checks are made to determining if the track is actually long enough for the train.

Each storage track has a name.

Author

Robert Heller <heller@deepsoft.com>

9.163.2 Constructor & Destructor Documentation

9.163.2.1 StorageTrack() [1/2]

```
TTSupport::StorageTrack::StorageTrack (
    string name_ = "Track 0" ) [inline]
```

Construct a storage track.

The name of the track is initialized.

Parameters

name ↔	The name of the storage track.
—	

References [name](#).

9.163.2.2 ~StorageTrack()

```
TTSupport::StorageTrack::~StorageTrack ( ) [inline]
```

Destructor.

9.163.2.3 StorageTrack() [2/2]

```
TTSupport::StorageTrack::StorageTrack (
    const StorageTrack & other ) [inline]
```

Clone a [StorageTrack](#) – copy constructor.

Parameters

<i>other</i>	The other StorageTrack .
--------------	--

References [name](#), and [occupations](#).

9.163.3 Member Function Documentation

9.163.3.1 FindOccupied()

```
const Occupied * TTSupport::StorageTrack::FindOccupied (
    double from,
    double to ) const [inline]
```

Return occupation structure for a given time tange.

Parameters

<i>from</i>	The arrival time.
<i>to</i>	The departure time.

References [occupations](#).

9.163.3.2 FirstOccupied()

```
OccupiedMap::const_iterator TTSupport::StorageTrack::FirstOccupied ( ) const [inline]
```

Return a const iterator for the first occupation.

References [occupations](#).

9.163.3.3 IncludesTime()

```
const Occupied * TTSupport::StorageTrack::IncludesTime (
    double time ) const
```

Return the occupation that includes the specified time;.

Parameters

<i>time</i>	The time to check for.
-------------	------------------------

9.163.3.4 LastOccupied()

```
OccupiedMap::const_iterator TTSupport::StorageTrack::LastOccupied ( ) const [inline]
```

Return a const iterator for the last occupation.

References [occupations](#).

9.163.3.5 Name()

```
const char * TTSupport::StorageTrack::Name ( ) const [inline]
```

Return the name of the storage track.

References [name](#).

9.163.3.6 operator=()

```
StorageTrack & TTSupport::StorageTrack::operator= (
    const StorageTrack & other ) [inline]
```

Assign a [StorageTrack](#) to another [StorageTrack](#).

Parameters

<i>other</i>	The other StorageTrack .
--------------	--

References [name](#), and [occupations](#).

9.163.3.7 Read()

```
istream & TTSupport::StorageTrack::Read (
    istream & stream )
```

Read Method.

Read object from a stream.

Parameters

<i>stream</i>	Stream to read from.
---------------	----------------------

9.163.3.8 RemovedStoredTrain()

```
bool TTSupport::StorageTrack::RemovedStoredTrain (
    double from,
    double to )
```

Remove stored train.

Parameters

<i>from</i>	The arrival time.
<i>to</i>	The departure time.

9.163.3.9 SetName()

```
void TTSupport::StorageTrack::SetName (
    string name_ ) [inline]
```

Set the storage track's name.

Parameters

<i>name</i> ↔	The new name of the storage track.
—	

References [name](#).

9.163.3.10 StoreTrain()

```
const Occupied * TTSupport::StorageTrack::StoreTrain (
    string train,
    double from,
    double to,
    string train2 )
```

Insert train onto storage track for a time.

Parameters

<i>train</i>	The arriving train.
<i>from</i>	The arrival time.
<i>to</i>	The departure time.
<i>train2</i>	The departing train.

9.163.3.11 UpdateStoredTrain()

```
const Occupied * TTSupport::StorageTrack::UpdateStoredTrain (
    double from,
    double to,
    string train )
```

Replace a stored arrival train.

Parameters

<i>from</i>	The arrival time.
<i>to</i>	The departure time.
<i>train</i>	The new arriving train.

9.163.3.12 UpdateStoredTrain2()

```
const Occupied * TTSupport::StorageTrack::UpdateStoredTrain2 (
    double from,
    double to,
    string train )
```

Replace a stored departure train.

Parameters

<i>from</i>	The arrival time.
<i>to</i>	The departure time.
<i>train</i>	The new departing train.

9.163.3.13 UpdateStoredTrainArrival()

```
const Occupied * TTSupport::StorageTrack::UpdateStoredTrainArrival (
    double from,
    double to,
    double newArrival )
```

Update a train's arrival time.

Parameters

<i>from</i>	The arrival time.
<i>to</i>	The departure time.
<i>newArrival</i>	The new arrival time.

9.163.3.14 UpdateStoredTrainDeparture()

```
const Occupied * TTSupport::StorageTrack::UpdateStoredTrainDeparture (
    double from,
    double to,
    double newDeparture )
```

Update a train's departure time.

Parameters

<i>from</i>	The arrival time.
<i>to</i>	The departure time.
<i>newDeparture</i>	The new departure time.

9.163.3.15 UsedTimeRange()

```
bool TTSupport::StorageTrack::UsedTimeRange (
```

```
double from,  
double to ) const
```

Return true if the time range is in use.

Parameters

<i>from</i>	The arrival time.
<i>to</i>	The departure time.

9.163.3.16 Write()

```
ostream & TTSupport::StorageTrack::Write (  
    ostream & stream ) const
```

Write method.

Write object to a stream.

Parameters

<i>stream</i>	Stream to write to.
---------------	---------------------

9.163.4 Member Data Documentation

9.163.4.1 name

```
string TTSupport::StorageTrack::name [private]
```

Name of the storage track.

Referenced by [Name\(\)](#), [operator=\(\)](#), [SetName\(\)](#), and [StorageTrack\(\)](#).

9.163.4.2 occupations

```
OccupiedMap TTSupport::StorageTrack::occupations [private]
```

Map of occupations.

Referenced by [FindOccupied\(\)](#), [FirstOccupied\(\)](#), [LastOccupied\(\)](#), [operator=\(\)](#), and [StorageTrack\(\)](#).

9.164 CTCPanel::StraightBlock Class Reference

Straight Block object type.

Public Member Functions

- [StraightBlock](#) (name, _ctcpanel, _canvas,...)
Construct a [StraightBlock](#) object.
- [~StraightBlock](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the [StraightBlock](#).

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

9.164.1 Detailed Description

Straight Block object type.

These are on the schematic and represent a piece of track on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the StraightBlock on.

Parameters

...	<p>Options:</p> <ul style="list-style-type: none"> • -x1 The first x coordinate of the object (readonly, default 0). • -y1 The first y coordinate of the object (readonly, default 0). • -x2 The second x coordinate of the object (readonly, default 0). • -y2 The second y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default MainLine). • -label The label of the StraightBlock (default ""). • -position The position of the label (readonly, default below). • -occupiedcommand A command to run to find out if the block is occupied (default {}).
-----	--

Defined coords terminals:

- E1 First endpoint.
- E2 Second endpoint.

Defined values (states): none. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.164.2 Constructor & Destructor Documentation

9.164.2.1 StraightBlock()

```
CTCPanel::StraightBlock::StraightBlock (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [StraightBlock](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the StraightBlock on.
<code>...</code>	Option list.

9.164.2.2 ~StraightBlock()

```
CTCPanel::StraightBlock::~~StraightBlock ( )
```

Clean up all data objects and free up all resources.

9.164.3 Member Function Documentation**9.164.3.1 _configureLabel()**

```
CTCPanel::StraightBlock::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.164.3.2 geti()

```
CTCPanel::StraightBlock::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.164.3.3 getv()

```
CTCPanel::StraightBlock::getv ( )
```

Method to get our value (state).

9.164.3.4 invoke()

```
CTCPanel::StraightBlock::invoke ( )
```

Method to invoke the [StraightBlock](#).

9.164.3.5 seti()

```
CTCPanel::StraightBlock::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.164.3.6 setv()

```
CTCPanel::StraightBlock::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.164.4 Member Data Documentation

9.164.4.1 canvas

```
CTCPanel::StraightBlock::canvas [private]
```

The canvas component (parent widget component).

9.164.4.2 ctcpnl

```
CTCPanel::StraightBlock::ctcpnl [private]
```

The CTC Panel component (parent widget).

9.165 CTCPanel::StubYard Class Reference

Stub Yard object type.

Public Member Functions

- [StubYard](#) (name, _ctcpanel, _canvas,...)
Construct a [StubYard](#) object.
- [~StubYard](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the [StubYard](#).

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

Static Private Attributes

- static [_StubYard_Poly](#)
Polygon coordinates for a stub yard.

9.165.1 Detailed Description

Stub Yard object type.

These are on the schematic and represent a piece of track on the Schematic.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the StubYard on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The x coordinate of the object (readonly, default 0). • <code>-y</code> The y coordinate of the object (readonly, default 0). • <code>-controlpoint</code> The name of the control point this label is part of (readonly, default Yard). • <code>-label</code> The label of the StubYard (default "1"). • <code>-position</code> The position of the label (readonly, default below). • <code>-orientation</code> The orientation (8-way) (readonly, default 0). • <code>-flipped</code> Whether the yard is flipped (readonly, default no). • <code>-occupiedcommand</code> A command to run to find out if the StubYard is occupied (default {}).

Defined coords terminals:

- Entry Yard throat.

Defined values (states): none. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.165.2 Constructor & Destructor Documentation

9.165.2.1 StubYard()

```
CTCPanel::StubYard::StubYard (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [StubYard](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the StubYard on.
<code>...</code>	Option list.

9.165.2.2 ~StubYard()

```
CTCPanel::StubYard::~~StubYard ( )
```

Clean up all data objects and free up all resources.

9.165.3 Member Function Documentation**9.165.3.1 _configureLabel()**

```
CTCPanel::StubYard::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.165.3.2 geti()

```
CTCPanel::StubYard::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.165.3.3 getv()

```
CTCPanel::StubYard::getv ( )
```

Method to get our value (state).

9.165.3.4 invoke()

```
CTCPanel::StubYard::invoke ( )
```

Method to invoke the [StubYard](#).

References [CTCPanel::standardMethods\(\)](#).

9.165.3.5 seti()

```
CTCPanel::StubYard::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.165.3.6 setv()

```
CTCPanel::StubYard::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.165.4 Member Data Documentation

9.165.4.1 _StubYard_Poly

```
CTCPanel::StubYard::_StubYard_Poly [static], [private]
```

Polygon coordinates for a stub yard.

9.165.4.2 canvas

CTCPanel::StubYard::canvas [private]

The canvas component (parent widget component).

9.165.4.3 ctcpnl

CTCPanel::StubYard::ctcpnl [private]

The CTC Panel component (parent widget).

9.166 CTCPanel::Switch Class Reference

Switch (turnout) object type.

Public Member Functions

- [Switch](#) (name, _ctcpnl, _canvas,...)
Construct a [Switch](#) object.
- [~Switch](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the switch.

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).
- [state](#)
The state of the points.

9.166.1 Detailed Description

Switch (turnout) object type.

These are on the schematic and represent a switch on the Schematic.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the switch on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The x coordinate of the object (readonly, default 0). • <code>-y</code> The y coordinate of the object (readonly, default 0). • <code>-controlpoint</code> The name of the control point this label is part of (readonly, default CP1). • <code>-label</code> The label of the switch (default "1"). • <code>-orientation</code> The orientation (8-way) of the switch (readonly, default 0). • <code>-flipped</code> Whether or not the switch is flipped (readonly, default no). • <code>-statecommand</code> A command to run to get the switch's state (default {}). • <code>-occupiedcommand</code> A command to run to find out if the switch is occupied (default {}).

Defined coords terminals:

- Common Common terminal (point end of switch).
- Main Mainline terminal.
- Divergence Branchline terminal.

Defined values (states):

- Normal Points are aligned for the mainline.
- Reverse Points are aligned for the branchline.
- Unknown Point are not aligned for any route (eg points are in motion).

Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.166.2 Constructor & Destructor Documentation**9.166.2.1 Switch()**

```
CTCPanel::Switch::Switch (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [Switch](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the Switch on.
<code>...</code>	Option list.

9.166.2.2 ~Switch()

```
CTCPanel::Switch::~~Switch ( )
```

Clean up all data objects and free up all resources.

9.166.3 Member Function Documentation**9.166.3.1 _configureLabel()**

```
CTCPanel::Switch::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.166.3.2 geti()

```
CTCPanel::Switch::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.166.3.3 getv()

```
CTCPanel::Switch::getv ( )
```

Method to get our value (state).

9.166.3.4 invoke()

```
CTCPanel::Switch::invoke ( )
```

Method to invoke the switch.

9.166.3.5 seti()

```
CTCPanel::Switch::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.166.3.6 setv()

```
CTCPanel::Switch::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.166.4 Member Data Documentation

9.166.4.1 canvas

```
CTCPanel::Switch::canvas [private]
```

The canvas component (parent widget component).

9.166.4.2 ctcpnl

```
CTCPanel::Switch::ctcpnl [private]
```

The CTC Panel component (parent widget).

9.166.4.3 state

```
CTCPanel::Switch::state [private]
```

The state of the points.

9.167 FCFSupport::SwitchList Class Reference

The global switch list structure.

```
#include <SwitchList.h>
```


Public Member Functions

- [SwitchList](#) ()
Constructor.
- [~SwitchList](#) ()
Destructor.
- void [ResetSwitchList](#) ()
Reset the switch list pointer.
- void [DiscardSwitchList](#) ()
Clobber the switch list.
- void [AddSwitchListElement](#) (const [Industry](#) *pickloc, const [Car](#) *pickcar, const [Train](#) *picktrain, const [Train](#) *lasttrain, const [Industry](#) *istop)
Add a switch list element for a manifest freight (industry stop).
- void [AddSwitchListElement](#) (const [Industry](#) *pickloc, const [Car](#) *pickcar, const [Train](#) *picktrain, const [Train](#) *lasttrain, const [Station](#) *sstop)
Add a switch list element for a local freight (station stop).
- [SwitchListElement](#) & [operator\[\]](#) (int ielement)
Random index access to the switch list.
- const [SwitchListElement](#) [operator\[\]](#) (int ielement) const
Random index access to the switch list, const version.
- int [NextSwitchListForCarAndIndustry](#) (const [Car](#) *car, const [Industry](#) *industry)
Return the next switch list list element for a selected car and industry.
- unsigned int [PickIndex](#) () const
Return the pick index.
- int [LimitCars](#) () const
Return the limit count.
- void [ResetLastIndex](#) ()
Reset the last index.
- bool [PickLocationEq](#) (int Gx, const [Industry](#) *lx) const
Is the selected element for the specificed industry?
- bool [PickCarEq](#) (int Gx, const [Car](#) *Cx) const
Is the selected element for the specificed car?
- bool [PickTrainEq](#) (int Gx, const [Train](#) *Tx) const
Is the selected element for the specificed train?

Private Attributes

- [SwitchListElementVector](#) theList
The switch list vector.
- unsigned int [pickIndex](#)
The pick index.
- int [limitCars](#)
The limit index.
- int [lastIndex](#)
The last index.

Friends

- ostream & [operator<<](#) (ostream &stream, const [SwitchList](#) &list)
Output stream operator for switch lists.

9.167.1 Detailed Description

The global switch list structure.

Author

Robert Heller <heller@deepsoft.com>

9.167.2 Constructor & Destructor Documentation

9.167.2.1 SwitchList()

```
FCFSupport::SwitchList::SwitchList ( )
```

Constructor.

9.167.2.2 ~SwitchList()

```
FCFSupport::SwitchList::~~SwitchList ( )
```

Destructor.

9.167.3 Member Function Documentation

9.167.3.1 AddSwitchListElement() [1/2]

```
void FCFSupport::SwitchList::AddSwitchListElement (
    const Industry * pickloc,
    const Car * pickcar,
    const Train * picktrain,
    const Train * lasttrain,
    const Industry * istop )
```

Add a switch list element for a manifest freight (industry stop).

Parameters

<i>pickloc</i>	Pickup location of car.
<i>pickcar</i>	Car being picked up by this train.
<i>picktrain</i>	Train picking this car up.
<i>lasttrain</i>	The last train this car was on.
<i>istop</i>	Where this train will drop this car.

9.167.3.2 AddSwitchListElement() [2/2]

```
void FCFSupport::SwitchList::AddSwitchListElement (
    const Industry * pickloc,
    const Car * pickcar,
    const Train * picktrain,
    const Train * lasttrain,
    const Station * sstop )
```

Add a switch list element for a local freight (station stop).

Parameters

<i>pickloc</i>	Pickup location of car.
<i>pickcar</i>	Car being picked up by this train.
<i>picktrain</i>	Train picking this car up.
<i>lasttrain</i>	The last train this car was on.
<i>sstop</i>	Where this train will drop this car.

9.167.3.3 DiscardSwitchList()

```
void FCFSupport::SwitchList::DiscardSwitchList ( )
```

Clobber the switch list.

9.167.3.4 LimitCars()

```
int FCFSupport::SwitchList::LimitCars ( ) const [inline]
```

Return the limit count.

References [limitCars](#).

9.167.3.5 NextSwitchListForCarAndIndustry()

```
int FCFSupport::SwitchList::NextSwitchListForCarAndIndustry (
    const Car * car,
    const Industry * industry )
```

Return the next switch list list element for a selected car and industry.

Parameters

<i>car</i>	The selected car.
<i>industry</i>	The selected industry.

9.167.3.6 operator[]() [1/2]

```
SwitchListElement & FCFSupport::SwitchList::operator[] (
    int ielement )
```

Random index access to the switch list.

Parameters

<i>ielement</i>	The index into the switch list.
-----------------	---------------------------------

9.167.3.7 operator[]() [2/2]

```
const SwitchListElement FCFSupport::SwitchList::operator[] (
    int ielement ) const
```

Random index access to the switch list, const version.

Parameters

<i>ielement</i>	The index into the switch list.
-----------------	---------------------------------

9.167.3.8 PickCarEq()

```
bool FCFSupport::SwitchList::PickCarEq (
    int Gx,
    const Car * Cx ) const
```

Is the selected element for the specificed car?

Parameters

<i>Gx</i>	The index to check.
<i>Cx</i>	The car to check for.

9.167.3.9 PickIndex()

```
unsigned int FCFSupport::SwitchList::PickIndex ( ) const [inline]
```

Return the pick index.

References [pickIndex](#).

9.167.3.10 PickLocationEq()

```
bool FCFSupport::SwitchList::PickLocationEq (
    int Gx,
    const Industry * Ix ) const
```

Is the selected element for the specificed industry?

Parameters

<i>Gx</i>	The index to check.
<i>Ix</i>	The industry to check for.

9.167.3.11 PickTrainEq()

```
bool FCFSupport::SwitchList::PickTrainEq (
    int Gx,
    const Train * Tx ) const
```

Is the selected element for the specificed train?

Parameters

<i>Gx</i>	The index to check.
<i>Tx</i>	The train to check for.

9.167.3.12 ResetLastIndex()

```
void FCFSupport::SwitchList::ResetLastIndex ( ) [inline]
```

Reset the last index.

References [lastIndex](#).

9.167.3.13 ResetSwitchList()

```
void FCFSupport::SwitchList::ResetSwitchList ( )
```

Reset the switch list pointer.

9.167.4 Friends And Related Function Documentation

9.167.4.1 operator<<

```
ostream & operator<< (
    ostream & stream,
    const SwitchList & list ) [friend]
```

Output stream operator for switch lists.

Parameters

<i>stream</i>	The stream to write to.
<i>list</i>	The switch list to write out.

9.167.5 Member Data Documentation

9.167.5.1 lastIndex

```
int FCFSupport::SwitchList::lastIndex [private]
```

The last index.

Referenced by [ResetLastIndex\(\)](#).

9.167.5.2 limitCars

```
int FCFSupport::SwitchList::limitCars [private]
```

The limit index.

Referenced by [LimitCars\(\)](#).

9.167.5.3 pickIndex

```
unsigned int FCFSupport::SwitchList::pickIndex [private]
```

The pick index.

Referenced by [PickIndex\(\)](#).

9.167.5.4 theList

```
SwitchListElementVector FCFSupport::SwitchList::theList [private]
```

The switch list vector.

9.168 FCFSupport::SwitchListElement Class Reference

This class implements each switch list element.

```
#include <SwitchList.h>
```

Classes

- union [StationOrIndustry](#)

A const pointer to a train's stop, which can be either a station or an industry, depending on what kind of train it is.

Public Member Functions

- [SwitchListElement](#) ()
Default constructor.
- [SwitchListElement](#) (const [SwitchListElement](#) &other)
Copy constructor.
- [SwitchListElement](#) & operator= (const [SwitchListElement](#) &other)
Assignment operator.
- [SwitchListElement](#) (const [Industry](#) *pickloc, const [Car](#) *pickcar, const [Train](#) *picktrain, const [Train](#) *lasttrain, const [Industry](#) *istop)
Constructor, given a manifest freight's stop at an industry.
- [SwitchListElement](#) (const [Industry](#) *pickloc, const [Car](#) *pickcar, const [Train](#) *picktrain, const [Train](#) *lasttrain, const [Station](#) *sstop)
Constructor, given a local freight's stop at a station.
- const [Industry](#) * [PickLocation](#) () const
Return the pickup location for this switch list element.
- const [Car](#) * [PickCar](#) () const
Return the car picked up for this switch list element.
- const [Train](#) * [PickTrain](#) () const
Return the pickup train for this switch list element.
- const [Train](#) * [LastTrain](#) () const
Return the train train for the car this switch list element is for.
- const [Industry](#) * [DropStopIndustry](#) () const
Return the industry this switch list element is dropping off at.
- const [Station](#) * [DropStopStation](#) () const
Return the station this switch list element is dropping off at.
- bool [DropStopEQ](#) (int Px) const
Is the drop stop at the stop number specified?

Private Attributes

- const [Industry](#) * [pickLoc](#)
The pickup industry.
- const [Car](#) * [pickCar](#)
The car picked up.
- const [Train](#) * [pickTrain](#)
The train picking this car up.
- const [Train](#) * [lastTrain](#)
The train that previously handled this car.
- [StationOrIndustry](#) [dropStop](#)
The station or industry where this car will be dropped off at.

Friends

- class [System](#)
The [System](#) class is a friend.

9.168.1 Detailed Description

This class implements each switch list element.

Author

Robert Heller <heller@deepsoft.com>

9.168.2 Constructor & Destructor Documentation

9.168.2.1 SwitchListElement() [1/4]

```
FCFSupport::SwitchListElement::SwitchListElement ( ) [inline]
```

Default constructor.

Initialise all slots to NULL.

References [dropStop](#), [FCFSupport::SwitchListElement::StationOrIndustry::industry](#), [lastTrain](#), [pickCar](#), [pickLoc](#), and [pickTrain](#).

9.168.2.2 SwitchListElement() [2/4]

```
FCFSupport::SwitchListElement::SwitchListElement (
    const SwitchListElement & other ) [inline]
```

Copy constructor.

Parameters

<i>other</i>	The other switch list element.
--------------	--------------------------------

References [dropStop](#), [FCFSupport::SwitchListElement::StationOrIndustry::industry](#), [lastTrain](#), [pickCar](#), [pickLoc](#), and [pickTrain](#).

9.168.2.3 SwitchListElement() [3/4]

```
FCFSupport::SwitchListElement::SwitchListElement (
    const Industry * pickloc,
```

```

const Car * pickcar,
const Train * picktrain,
const Train * lasttrain,
const Industry * istop ) [inline]

```

Constructor, given a manifest freight's stop at an industry.

Parameters

<i>pickloc</i>	Pickup location of car.
<i>pickcar</i>	Car being picked up by this train.
<i>picktrain</i>	Train picking this car up.
<i>lasttrain</i>	The last train this car was on.
<i>istop</i>	Where this train will drop this car.

References [dropStop](#), [FCFSupport::SwitchListElement::StationOrIndustry::industry](#), [lastTrain](#), [pickCar](#), [pickLoc](#), and [pickTrain](#).

9.168.2.4 SwitchListElement() [4/4]

```

FCFSupport::SwitchListElement::SwitchListElement (
    const Industry * pickloc,
    const Car * pickcar,
    const Train * picktrain,
    const Train * lasttrain,
    const Station * sstop ) [inline]

```

Constructor, given a local freight's stop at a station.

Parameters

<i>pickloc</i>	Pickup location of car.
<i>pickcar</i>	Car being picked up by this train.
<i>picktrain</i>	Train picking this car up.
<i>lasttrain</i>	The last train this car was on.
<i>sstop</i>	Where this train will drop this car.

References [dropStop](#), [lastTrain](#), [pickCar](#), [pickLoc](#), [pickTrain](#), and [FCFSupport::SwitchListElement::StationOrIndustry::station](#).

9.168.3 Member Function Documentation

9.168.3.1 DropStopEQ()

```
bool FCFSupport::SwitchListElement::DropStopEQ (
    int Px ) const [inline]
```

Is the drop stop at the stop number specified?

Parameters

<i>Px</i>	The train's stop number we are checking against.
-----------	--

References [dropStop](#), [FCFSupport::SwitchListElement::StationOrIndustry::industry](#), [FCFSupport::Train::IndustryStop\(\)](#), [FCFSupport::Train::Manifest](#), [pickTrain](#), [FCFSupport::SwitchListElement::StationOrIndustry::station](#), [FCFSupport::Train::StationStop\(\)](#), and [FCFSupport::Train::Type\(\)](#).

9.168.3.2 DropStopIndustry()

```
const Industry * FCFSupport::SwitchListElement::DropStopIndustry ( ) const [inline]
```

Return the industry this switch list element is dropping off at.

References [dropStop](#), [FCFSupport::SwitchListElement::StationOrIndustry::industry](#), [FCFSupport::Train::Manifest](#), [pickTrain](#), and [FCFSupport::Train::Type\(\)](#).

9.168.3.3 DropStopStation()

```
const Station * FCFSupport::SwitchListElement::DropStopStation ( ) const [inline]
```

Return the station this switch list element is dropping off at.

References [dropStop](#), [FCFSupport::SwitchListElement::StationOrIndustry::industry](#), [FCFSupport::Train::Manifest](#), [FCFSupport::Industry::MyStation\(\)](#), [pickTrain](#), [FCFSupport::SwitchListElement::StationOrIndustry::station](#), and [FCFSupport::Train::Type\(\)](#).

9.168.3.4 LastTrain()

```
const Train * FCFSupport::SwitchListElement::LastTrain ( ) const [inline]
```

Return the train train for the car this switch list element is for.

References [lastTrain](#).

9.168.3.5 operator=()

```
SwitchListElement & FCFSupport::SwitchListElement::operator= (
    const SwitchListElement & other ) [inline]
```

Assignment operator.

Parameters

<i>other</i>	The other switch list element.
--------------	--------------------------------

References [dropStop](#), [FCFSupport::SwitchListElement::StationOrIndustry::industry](#), [lastTrain](#), [pickCar](#), [pickLoc](#), and [pickTrain](#).

9.168.3.6 PickCar()

```
const Car * FCFSupport::SwitchListElement::PickCar ( ) const [inline]
```

Return the car picked up for this switch list element.

References [pickCar](#).

9.168.3.7 PickLocation()

```
const Industry * FCFSupport::SwitchListElement::PickLocation ( ) const [inline]
```

Return the pickup location for this switch list element.

References [pickLoc](#).

9.168.3.8 PickTrain()

```
const Train * FCFSupport::SwitchListElement::PickTrain ( ) const [inline]
```

Return the pickup train for this switch list element.

References [pickTrain](#).

9.168.4 Friends And Related Function Documentation

9.168.4.1 System

```
friend class System [friend]
```

The [System](#) class is a friend.

9.168.5 Member Data Documentation

9.168.5.1 dropStop

```
StationOrIndustry FCFSupport::SwitchListElement::dropStop [private]
```

The station or industry where this car will be dropped off at.

Referenced by [DropStopEQ\(\)](#), [DropStopIndustry\(\)](#), [DropStopStation\(\)](#), [operator=\(\)](#), and [SwitchListElement\(\)](#).

9.168.5.2 lastTrain

```
const Train* FCFSupport::SwitchListElement::lastTrain [private]
```

The train that previously handled this car.

Referenced by [LastTrain\(\)](#), [operator=\(\)](#), and [SwitchListElement\(\)](#).

9.168.5.3 pickCar

```
const Car* FCFSupport::SwitchListElement::pickCar [private]
```

The car picked up.

Referenced by [operator=\(\)](#), [PickCar\(\)](#), and [SwitchListElement\(\)](#).

9.168.5.4 pickLoc

```
const Industry* FCFSupport::SwitchListElement::pickLoc [private]
```

The pickup industry.

Referenced by [operator=\(\)](#), [PickLocation\(\)](#), and [SwitchListElement\(\)](#).

9.168.5.5 pickTrain

```
const Train* FCFSupport::SwitchListElement::pickTrain [private]
```

The train picking this car up.

Referenced by [DropStopEQ\(\)](#), [DropStopIndustry\(\)](#), [DropStopStation\(\)](#), [operator=\(\)](#), [PickTrain\(\)](#), and [SwitchListElement\(\)](#).

9.169 CTCPanel::SWPlate Class Reference

Switch plate object type.

Public Member Functions

- [SWPlate](#) (name, _ctcpanel, _canvas,...)
Construct a [SWPlate](#) object.
- [~SWPlate](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (lever position).
- [setv](#) (state)
Method to set out value (level position).
- [geti](#) (ind)
Method to get the state of one of our indicators.
- [seti](#) (ind, value)
Method to set an indicator's state.
- [invoke](#) ()
Method to invoke the switch plate.

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

Static Private Attributes

- static [_PlatePolygon](#)

Polygon coordinates for the plate.

9.169.1 Detailed Description

Switch plate object type.

These are on the control panel and represent levers for controlling track switches (aka turnouts). They have a lever that can be in two positions, normal (switch aligned for the main route) and reversed (switch aligned for the divergent route).

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the switch plate on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The x coordinate of the object (readonly, default 0). • <code>-y</code> The y coordinate of the object (readonly, default 0). • <code>-label</code> The label of the switch plate (default 1). • <code>-controlpoint</code> The name of the control point this switch is part of (readonly, default CP1). • <code>-normalcommand</code> The Tcl script to run when switch is set to normal (default {}). • <code>-reversecommand</code> The Tcl script to run when switch is set to reverse (default {}).

Defined coords terminals:

- `xy` The base coords of the object.

Defined values (states):

- `N` Normal.
- `R` Reversed.

Defined indicators:

- `N` Normal indicator (green if on).
- `R` Reversed indicator (yellow if on).

Author

Robert Heller <heller@deepsoft.com>

9.169.2 Constructor & Destructor Documentation

9.169.2.1 SWPlate()

```
CTCPanel::SWPlate::SWPlate (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [SWPlate](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the switch plate on.
<code>...</code>	Option list.

9.169.2.2 ~SWPlate()

```
CTCPanel::SWPlate::~~SWPlate ( )
```

Clean up all data objects and free up all resources.

9.169.3 Member Function Documentation**9.169.3.1 _configureLabel()**

```
CTCPanel::SWPlate::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.169.3.2 geti()

```
CTCPanel::SWPlate::geti (
    ind )
```

Method to get the state of one of our indicators.

Parameters

<code>ind</code>	The indicator to fetch state information for.
------------------	---

9.169.3.3 getv()

```
CTCPanel::SWPlate::getv ( )
```

Method to get our value (lever position).

9.169.3.4 invoke()

```
CTCPanel::SWPlate::invoke ( )
```

Method to invoke the switch plate.

One of the command scripts is executed depending on the lever position.

9.169.3.5 seti()

```
CTCPanel::SWPlate::seti (
    ind ,
    value )
```

Method to set an indicator's state.

Parameters

<i>ind</i>	The indicator to set.
<i>value</i>	The state to set it to.

9.169.3.6 setv()

```
CTCPanel::SWPlate::setv (
    state )
```

Method to set out value (level position).

Parameters

<i>state</i>	The new state to set.
--------------	-----------------------

9.169.4 Member Data Documentation

9.169.4.1 `_PlatePolygon`

`CTCPanel::SWPlate::_PlatePolygon` [static], [private]

Polygon coordinates for the plate.

9.169.4.2 `canvas`

`CTCPanel::SWPlate::canvas` [private]

The canvas component (parent widget component).

9.169.4.3 `ctcpanel`

`CTCPanel::SWPlate::ctcpanel` [private]

The CTC Panel component (parent widget).

9.170 FCFSupport::System Class Reference

This is the main Freight [Car](#) Forwarder class.

```
#include <System.h>
```

Public Types

- enum [CarTypeReport](#) { [All](#) , [Type](#) , [Summary](#) }
Types of car type reports.
- enum [CarLocationType](#) { [INDUSTRY](#) , [STATION](#) , [DIVISION](#) , [ALL](#) }
Types of location report.

Public Member Functions

- [System](#) (const char *systemfile, int seed, char **outmessage=NULL)
The constructor for the system.
- [~System](#) ()
The destructor frees all memory and generally cleans things up.
- const char * [SystemName](#) () const
Return the system name.
- const char * [SystemFile](#) () const
Return the system file's full path name.
- const char * [IndustriesFile](#) () const
Return the industry file's full path name.
- const char * [TrainsFile](#) () const
Return the trains file's full path name.
- const char * [OrdersFile](#) () const
Return the train orders file's full path name.
- const char * [OwnersFile](#) () const
Return the Owners file's full path name.
- const char * [CarTypesFile](#) () const
Return the [Car](#) Types file's full path name.
- const char * [CarsFile](#) () const
Return the Cars file's full path name.
- const char * [StatsFile](#) () const
Return the Statistics file's full path name.
- int [NumberOfDivisions](#) () const
return the number of divisions loaded.
- const [Division](#) * [FindDivisionByIndex](#) (int i) const
Find a division by its index.
- const [Division](#) * [FindDivisionBySymbol](#) (char symbol) const
Find a division by its symbol.
- [FCFSupport::Division](#) * [TheDivision](#) (int i)
[Division](#) indexing function.
- int [NumberOfStations](#) () const
The number of stations loaded.
- [FCFSupport::Station](#) * [TheStation](#) (int i)
[Station](#) indexing function.
- const [FCFSupport::Station](#) * [FindStationByName](#) (string name, string comment) const
[Station](#) indexing (by name) function.
- int [NumberOfTrains](#) () const
The number of trains loaded.
- [Train](#) * [TrainByIndex](#) (int i)
[Train](#) indexing function.
- const [Train](#) * [FindTrainByIndex](#) (int i) const
Find a train by its index.
- [Train](#) * [TrainByName](#) (const char *name)
[Train](#) indexing (by name) function.
- const [Train](#) * [FindTrainByName](#) (const char *name) const

- Find a train by its name.*

 - int [NumberOfIndustries](#) () const

Return the number of industries loaded.
- [FCFSupport::Industry](#) * [TheIndustry](#) (int i)

Industry indexing function.
- const [FCFSupport::Industry](#) * [FindIndustryByIndex](#) (int i) const

Find an industry by its index.
- const [FCFSupport::Industry](#) * [FindIndustryByName](#) (string name) const

Find an industry by its name.
- char [CarTypesOrder](#) (int i) const

Access a car type by index.
- int [CarTypesOrderIndex](#) (char type) const

Car type order index.
- [CarType](#) * [TheCarType](#) (char c)

Get a car type class instance pointer given a car type.
- [CarGroup](#) * [TheCarGroup](#) (int i) const

Get a car class instance pointer given a car group index.
- int [NumberOfCars](#) () const
- [Owner](#) * [TheOwner](#) (const char *initials)

Get a car owner class instance pointer given a car owner's initials.
- void [AddOwner](#) (const char *initials)

Create a new owner given a set of initials.
- [FCFSupport::Car](#) * [TheCar](#) (int i) const

Get a car by index.
- void [AddCar](#) ([FCFSupport::Car](#) *newcar)

Add a new car to the array of cars.
- int [SessionNumber](#) () const

Return the session number.
- int [ShiftNumber](#) () const

Return the shift number.
- int [TotalShifts](#) () const

Return the total number of shifts.
- int [NextShift](#) ()

Increment the shift number.
- int [TotalCars](#) () const

Return the total number of cars.
- int [RanAllTrains](#) () const

Ran all trains?
- void [DeleteAllExistingCars](#) ()

Delete all existing cars.
- bool [LoadCarFile](#) (char **outmessage=NULL)

(Re-)Load the car file.
- bool [LoadStatsFile](#) (char **outmessage=NULL)

Load the stats file.
- bool [SaveCars](#) (char **outmessage=NULL)

Save cars (and stats).
- const [FCFSupport::Industry](#) * [IndScrapYard](#) () const

- Return a pointer to the scrap yard.*

 - int [StatsPeriod](#) () const

Return the current stats period.
- int [TrainIndex](#) (const [FCFSupport::Train](#) *train) const

Return a train's index.
- int [IndustryIndex](#) (const [FCFSupport::Industry](#) *indus) const

Return an industry's index.
- int [CarsMoved](#) () const

Return the number of cars moved.
- int [CarsAtDest](#) () const

Return the number of cars that are at their destinations.
- int [CarsNotMoved](#) () const

Return the number of cars not moved at all.
- int [CarsMovedOnce](#) () const

Return the number of cars moved once.
- int [CarsMovedTwice](#) () const

Return the number of cars moved twice.
- int [CarsMovedThree](#) () const

Return the number of cars moved three times.
- int [CarsMovedMore](#) () const

Return the number of cars moved more than three times.
- int [CarMovements](#) () const

Return the total number of car movements.
- int [CarsInTransit](#) () const

Return the number of cars still in transit.
- int [CarsAtWorkBench](#) () const

Return the number of cars on the RIP track (the workbench).
- int [CarsAtDest_CarsInTransit](#) () const

Return the number of cars at their destinations plus the number of cars in transit.
- bool [PrintYards](#) () const

Print yard lists flag.
- void [SetPrintYards](#) (bool flag)

Set the print yard lists flag.
- bool [PrintAlpha](#) () const

Print the alphabetical listing flag.
- void [SetPrintAlpha](#) (bool flag)

Set the print alphabetical listing flag.
- bool [PrintAtwice](#) () const

Print second copy of the alphabetical listing flag.
- void [SetPrintAtwice](#) (bool flag)

Set the print second copy of the alphabetical listing flag.
- bool [PrintList](#) () const

Print the switch list order flag.
- void [SetPrintList](#) (bool flag)

Set the print switch list order flag.
- bool [PrintLtwice](#) () const

Print a second copy of the switch list order flag.

- void [SetPrintLtwice](#) (bool flag)
Set the print a second copy of the switch list order flag.
- bool [PrintDispatch](#) () const
Print dispatcher report sheet.
- void [SetPrintDispatch](#) (bool flag)
Set the print dispatcher report sheet.
- bool [Printem](#) () const
Print train enroute switch list.
- void [SetPrintem](#) (bool flag)
Set the print train enroute switch list.
- const [FCFSupport::Industry](#) * [IndRipTrack](#) ()
Return a pointer to the RIP track (workbench).
- const [FCFSupport::Industry](#) * [IndRipTrackConst](#) () const
Const version of the pointer to the RIP track (workbench).
- void [RestartLoop](#) ()
Reset loop variables.
- void [Randomize](#) (int seed)
Set the random seed.
- double [Random](#) ()
Return a random number between 0.0 and 1.0.
- void [CarAssignment](#) (const [FCFSupport::WorkInProgressCallback](#) *WIP, const [FCFSupport::LogMessageCallback](#) *log, const [FCFSupport::ShowBannerCallback](#) *banner, char **outmessage=NULL)
Car assignment procedure.
- void [RunAllTrains](#) (const [FCFSupport::WorkInProgressCallback](#) *WIP, const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::ShowBannerCallback](#) *banner, [FCFSupport::PrinterDevice](#) *printer, const [FCFSupport::TrainDisplayCallback](#) *traindisplay)
Run all trains procedure.
- void [RunBoxMoves](#) (const [FCFSupport::WorkInProgressCallback](#) *WIP, const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::ShowBannerCallback](#) *banner, [FCFSupport::PrinterDevice](#) *printer, const [FCFSupport::TrainDisplayCallback](#) *traindisplay)
Run all boxmove trains.
- void [PrintAllLists](#) (const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::ShowBannerCallback](#) *banner, [FCFSupport::PrinterDevice](#) *printer)
Print all of the various yard and switch lists.
- void [RunOneTrain](#) ([Train](#) *train, bool boxMove, const [FCFSupport::TrainDisplayCallback](#) *traindisplay, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Run one single train.
- void [ShowCarsNotMoved](#) (const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::ShowBannerCallback](#) *banner) const
Display cars not moved.
- void [ShowCarMovements](#) (bool showAll, const [FCFSupport::Industry](#) *lx, const [FCFSupport::Train](#) *Tx, const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::ShowBannerCallback](#) *banner) const
Show all car movements.
- void [ShowTrainCars](#) (const [Train](#) *Tx, const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::ShowBannerCallback](#) *banner) const
Show cars moved by a specific train.
- void [ShowCarsInDivision](#) (const [Division](#) *division, const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::ShowBannerCallback](#) *banner) const

Show cars in a specified division.

- void [ShowTrainTotals](#) (const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::ShowBannerCallback](#) *banner) const

Show train totals.

- void [ShowUnassignedCars](#) (const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::ShowBannerCallback](#) *banner) const

Show unassigned cars.

- void [ReloadCarFile](#) (char **outmessage)

Reload car file.

- void [ResetIndustryStats](#) ()

Reset industry statistics.

- void [ReportIndustries](#) (const [FCFSupport::WorkInProgressCallback](#) *WIP, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL) const

Report on all industries.

- void [ReportTrains](#) (const [FCFSupport::WorkInProgressCallback](#) *WIP, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL) const

Report on all trains.

- void [ReportCars](#) (const [FCFSupport::WorkInProgressCallback](#) *WIP, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL) const

Report on all cars.

- void [ReportCarsNotMoved](#) (const [FCFSupport::WorkInProgressCallback](#) *WIP, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL) const

Report on cars not moved.

- void [ReportCarTypes](#) ([CarTypeReport](#) rtype, char carType, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL) const

Report on car types.

- void [ReportCarLocations](#) ([CarLocationType](#) cltype, int index, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL)

Car location report.

- void [ReportAnalysis](#) (const [FCFSupport::WorkInProgressCallback](#) *WIP, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL) const

Industry analysis report.

- void [ReportCarOwners](#) (string ownerInitials, const [FCFSupport::WorkInProgressCallback](#) *WIP, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL) const

Report on a specified car owner.

- int [FindIndustryIndex](#) (const [FCFSupport::Industry](#) *industry) const

Find an industry's index.

- int [FindStationIndex](#) (const [FCFSupport::Station](#) *station) const

Find a station's index.

- int [FindDivisionIndex](#) (const [FCFSupport::Division](#) *division) const

Find a division's index.

- void [GetCarStatus](#) (const [Car](#) *car, string &status, string &carTypeDescr) const

Return car status information.

- [DivisionMap::const_iterator](#) [FirstDivision](#) () const

Iterator of the first division in the division map.

- [DivisionMap::const_iterator](#) [LastDivision](#) () const

Iterator of one past the last division in the division map.

- [StationMap::const_iterator](#) [FirstStation](#) () const

- Iterator of the first station in the station map.*
- StationMap::const_iterator [LastStation](#) () const
- Iterator of one past the last station in the station map.*
- TrainMap::const_iterator [FirstTrain](#) () const
- Iterator of the first train in the train map.*
- TrainMap::const_iterator [LastTrain](#) () const
- Iterator of one past the last train in the train map.*
- IndustryMap::const_iterator [FirstIndustry](#) () const
- Iterator of the first industry in the industry map.*
- IndustryMap::const_iterator [LastIndustry](#) () const
- Iterator of one past the last industry in the industry map.*
- CarTypeMap::const_iterator [FirstCarType](#) () const
- Iterator of the first car type in the car type map.*
- CarTypeMap::const_iterator [LastCarType](#) () const
- Iterator of one past the last car type in the car type map.*
- OwnerMap::const_iterator [FirstOwner](#) () const
- Iterator of the first owner in the owner map.*
- OwnerMap::const_iterator [LastOwner](#) () const
- Iterator of one past the last owner in the owner map.*
- vector< int > [SearchForCarIndexesByNumber](#) (string number, bool subStringP) const
- Search for cars with a specified number.*
- vector< int > [SearchForTrainPattern](#) (string trainNamePattern) const
- Search for a train by name given a glob pattern.*
- vector< int > [SearchForIndustryPattern](#) (string industryNamePattern) const
- Search for an industry by name given a glob pattern.*

Protected Member Functions

- [System](#) ()
- The default constructor.*

Private Member Functions

- string [trim](#) (string line) const
- Helper utility function to trim white space off the ends of a string.*
- vector< string > [split](#) (string s, char delimiter) const
- Helper utility to split a string into words.*
- bool [SkipCommentsGets](#) (istream &stream, string &buffer, const char *message, char **outmessage=NULL)
- Utility to get a line after skipping any intervening comments.*
- bool [ReadGroupLimit](#) (istream &stream, const char *label, int &value, const char *filename, char **outmessage=NULL)
- Utility to read a group limit.*
- bool [ReadDivisions](#) (istream &stream, map< int, int, less< int > > &homemap, char **outmessage=NULL)
- Read in the division map.*
- bool [ReadStations](#) (istream &stream, char **outmessage=NULL)
- Read in the station map.*

- bool [ReadTrains](#) (char **outmessage=NULL)
Read in the trains file.
- bool [ReadIndustries](#) (char **outmessage=NULL)
Read in the industries file.
- bool [ReadTrainOrders](#) (char **outmessage=NULL)
Read in the train orders file.
- bool [ReadCarTypes](#) (char **outmessage=NULL)
Read in the car types file.
- bool [ReadOwners](#) (char **outmessage=NULL)
Read in the owners file.
- bool [StringToInt](#) (string str, int &result, const char *message, char **outmessage=NULL) const
Convert a string to an integer.
- bool [StringToIntRange](#) (string str, int &result, int minv, int maxv, const char *message, char **outmessage=NULL) const
Convert a string to an integer and check its range.
- bool [WriteOneCarToDisk](#) ([Car](#) *car, ostream &stream)
Function to write one car to disk.
- bool [IndustryTakesCar](#) ([Industry](#) *Ix, [Car](#) *Cx)
Check if an industry takes a certain car.
- bool [FixedRouteMirrorCheck](#) ([Car](#) *Cx, [Industry](#) *Ix)
Check to see if a certain car can be mirrored on a fixed route at a certain industry.
- [CarVector::iterator](#) [FindCarInCarVector](#) ([CarVector](#) &cvect, [Car](#) *car)
Find a car in a car vector.
- [IndustryMap::iterator](#) [FindIndustry](#) ([Industry](#) *industry)
Find an industry in the industry map.
- void [GetIndustryCarCounts](#) ()
Update industry car counts.
- void [InternalRunOneTrain](#) ([Train](#) *train, bool boxMove, const [FCFSupport::TrainDisplayCallback](#) *traindisplay, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Internal function to run a single train.
- void [RunOneLocal](#) ([Train](#) *train, bool boxMove, [CarVector](#) &consist, const [FCFSupport::TrainDisplayCallback](#) *traindisplay, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
One one local train.
- void [RunOnePassenger](#) ([Train](#) *train, bool boxMove, const [FCFSupport::TrainDisplayCallback](#) *traindisplay, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
One one passenger train.
- void [RunOneManifest](#) ([Train](#) *train, bool boxMove, [CarVector](#) &consist, const [FCFSupport::TrainDisplayCallback](#) *traindisplay, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Run one manifest freight train.
- void [PrintTrainLoc](#) ([Train](#) *train, int Px, const [FCFSupport::LogMessageCallback](#) *Log, const [FCFSupport::TrainDisplayCallback](#) *traindisplay)
Print a train's current location.
- void [TrainLocalOriginate](#) ([Train](#) *train, bool boxMove, int Px, [CarVector](#) &consist, bool &didAction, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Make up a local train.
- void [LogCarPickup](#) ([Car](#) *car, [Train](#) *train, bool boxMove)
Log a car pickup in the switch list structure.

- void [TrainLocalDrops](#) ([Train](#) *train, int Px, [CarVector](#) &consist, bool &didAction, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Drop cars from a local (box move or way freight).
- void [TrainManifestDrops](#) ([Train](#) *train, int Px, [CarVector](#) &consist, bool &didAction, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Drop cars from a manifest freight.
- void [TrainDropOneCar](#) ([Car](#) *car, [Train](#) *train, [CarVector::iterator](#) Lx, [CarVector](#) &consist, bool &didAction, int Px, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Drop a single car.
- void [TrainDropAllCars](#) ([Train](#) *train, int Px, [CarVector](#) &consist, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Drop all cars from a train at the current stop (usually the last stop).
- void [TrainLocalPickups](#) ([Train](#) *train, bool boxMove, int Px, [CarVector](#) &consist, bool &didAction, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Pick up cars for a local train (box move or way freight).
- void [TrainManifestPickups](#) ([Train](#) *train, bool boxMove, int Px, [CarVector](#) &consist, bool &didAction, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Pick up cars for a manifest freight train.
- void [TrainPickupOneCar](#) ([Car](#) *car, [Train](#) *train, bool boxMove, [CarVector](#) &consist, bool &didAction, int Px, [CarVector::iterator](#) Lx, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Pick up one car.
- bool [TrainCarPickupCheck](#) ([Car](#) *car, [Train](#) *train, bool boxMove, [CarVector](#) &consist, bool &didAction, int Px, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer)
Check to see if we can really pick up this car.
- bool [OtherCarOkForTrain](#) ([Car](#) *car, [Train](#) *train)
Check to see if this other car can be picked up.
- void [TrainPrintConsistSummary](#) ([Train](#) *train, [CarVector](#) &consist, [FCFSupport::PrinterDevice](#) *printer)
Print a train's consist summary.
- void [TrainPrintFinalSummary](#) ([Train](#) *train, [FCFSupport::PrinterDevice](#) *printer)
Print a train's final summary.
- void [TrainPrintTown](#) (const [FCFSupport::Train](#) *train, const [FCFSupport::Station](#) *curStation, [FCFSupport::PrinterDevice](#) *printer)
Print the town a train is in.
- void [PrintTrainOrderHeader](#) (const [FCFSupport::Train](#) *train, [FCFSupport::PrinterDevice](#) *printer)
Print a train order header.
- void [PrintFormFeed](#) ([FCFSupport::PrinterDevice](#) *printer) const
Print a form feed.
- void [PrintSystemBanner](#) ([FCFSupport::PrinterDevice](#) *printer) const
Print a system banner.
- void [PrintDashedLine](#) ([FCFSupport::PrinterDevice](#) *printer) const
Print a dashed line.
- void [PrintDispatcher](#) (string banner, char trainType, [FCFSupport::PrinterDevice](#) *printer) const
Print dispatcher report sheets.
- const string [FormatDutyTime](#) (int dutytimeminutes) const
Format the on duty time in a human readable format.
- void [PrintTrainOrders](#) (const [Train](#) *train, [FCFSupport::PrinterDevice](#) *printer) const
Print the train orders for a selected train.
- const string [Today](#) () const

- Return today's date.*

 - const string [UpperCase](#) (const string str) const

Convert a string to all uppercase letters.
- void [PrintIndustryHeader](#) ([FCFSupport::PrinterDevice](#) *printer) const

Print the industry header.
- void [PrintOneIndustry](#) (const [Industry](#) *ix, int &lenInDiv, int &carsInDiv, int &carsToDiv, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer) const

Print one industry.
- void [PrintCarHeading](#) ([FCFSupport::PrinterDevice](#) *printer) const

Print the car heading.
- void [PrintOneCarInfo](#) (const [Car](#) *car, [FCFSupport::PrinterDevice](#) *printer) const

Print one car's information.
- void [PrintCarTypesHeader](#) ([FCFSupport::PrinterDevice](#) *printer) const

Print the car type header.
- void [PrintAllCarTypes](#) (bool totalsOnly, [FCFSupport::PrinterDevice](#) *printer) const

Print all car types.
- void [PrintOneCarType](#) (bool totalsOnly, char carType, const [CarType](#) *ct, int &OnLineShippersOfType, int &OffLineShippersOfType, int &OnLineReceiversOfType, int &OffLineReceiversOfType, int &allTotalMoves, int &allTotalAssigns, [FCFSupport::PrinterDevice](#) *printer) const

Print one car type.
- void [PrintCarTypesSummaryHeader](#) ([FCFSupport::PrinterDevice](#) *printer) const

Print car type summary header.
- void [ReportLocIndustry](#) ([IndustryMap::const_iterator](#) lx, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL)

Print a location report for one industry.
- void [ReportLocStation](#) ([StationMap::const_iterator](#) Sx, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL)

Print a location report for one station.
- void [ReportLocDivision](#) ([DivisionMap::const_iterator](#) Dx, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL)

Print a location report for one division.
- void [ReportLocAll](#) (bool printBench, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer, char **outmessage=NULL)

Print a location report for all locations.
- void [PrintLocCommon](#) ([FCFSupport::PrinterDevice](#) *printer)

Print a header for all location reports.
- void [PrintLocOneIndustry](#) (const [FCFSupport::Industry](#) *lx, const [FCFSupport::Station](#) *Sx, bool &firstOne, [FCFSupport::PrinterDevice](#) *printer) const

Print a location report for a single industry.
- void [PrintOneCarLocation](#) (const [Car](#) *car, [FCFSupport::PrinterDevice](#) *printer) const

Print one car location report.
- void [PrintOneAnalysis](#) (const [Industry](#) *lx, int &carsToDiv, const [FCFSupport::LogMessageCallback](#) *Log, [FCFSupport::PrinterDevice](#) *printer) const

Print one analysis report.
- void [PrintAnalysisHeader](#) ([FCFSupport::PrinterDevice](#) *printer) const

Print an analysis header.
- bool [GlobStringMatch](#) (const string thestring, const string pattern) const

Glob style string match function.
- bool [GlobStringMatchHelper](#) (string::const_iterator string_i, string::const_iterator string_e, string::const_iterator pattern_i, string::const_iterator pattern_e) const

Helper function for glob string matching.

Private Attributes

- [PathName systemFile](#)
Full pathname of the system file.
- [string systemName](#)
The system name.
- [PathName industriesFile](#)
Full pathname of the industries file.
- [PathName trainsFile](#)
Full pathname of the trains file.
- [PathName ordersFile](#)
Full pathname of the train orders file.
- [PathName ownersFile](#)
Full pathname of the car owners file.
- [PathName carTypesFile](#)
Full pathname of the car types file.
- [PathName carsFile](#)
Full pathname of the cars file.
- [PathName statsFile](#)
Full pathname of the stats file.
- [DivisionMap divisions](#)
Division map.
- [StationMap stations](#)
Station map.
- [TrainMap trains](#)
Train map.
- [TrainNameMap trainIndex](#)
Train name map.
- [IndustryMap industries](#)
Industries map.
- [char carTypesOrder \[CarType::MaxCarTypes\]](#)
Car type order vector.
- [CarTypeMap carTypes](#)
Car type map.
- [CarGroup * carGroups \[CarGroup::MaxCarGroup\]](#)
Car group vector.
- [OwnerMap owners](#)
Car owner map.
- [CarVector cars](#)
Car vector.
- [SwitchList switchList](#)
Switch lists.
- [int sessionNumber](#)
Current session number.
- [int shiftNumber](#)
Current shift number.
- [int totalShifts](#)

- The total number of shifts.*
- int [ranAllTrains](#)
 - The ran all trains flag.*
- int [totalPickups](#)
 - The total number of pickups.*
- int [totalLoads](#)
 - The total number of loads.*
- int [totalTons](#)
 - The total number of tons.*
- int [totalRevenueTons](#)
 - The total number of revenue tons.*
- bool [trainPrintOK](#)
 - Train print flag.*
- bool [wayFreight](#)
 - Way freight flag.*
- bool [deliver](#)
 - Deliver flag.*
- int [trainLength](#)
 - Train length.*
- int [numberCars](#)
 - The number of cars on a train.*
- int [trainTons](#)
 - The number of tons on a train.*
- int [trainLoads](#)
 - The number of loads on a train.*
- int [trainEmpties](#)
 - The number of empties on a train.*
- int [trainLongest](#)
 - The longest a train has been.*
- [Division](#) * [curDiv](#)
 - Current division.*
- [Industry](#) * [originYard](#)
 - Origin Yard.*
- [Industry](#) * [trainLastLocation](#)
 - A trains last location.*
- [Industry](#) * [carDest](#)
 - A temporary for a car's location.*
- int [statsPeriod](#)
 - The current stats period.*
- int [carsMoved](#)
 - The number of cars moved.*
- int [carsAtDest](#)
 - The number of cars at their destinations.*
- int [carsNotMoved](#)
 - The number of cars not moved.*
- int [carsMovedOnce](#)
 - The number of cars moved one time.*

- int [carsMovedTwice](#)
The number of cars moved two times.
- int [carsMovedThree](#)
The number of cars moved three times.
- int [carsMovedMore](#)
The number of cars moved more than three times.
- int [carMovements](#)
The number of cars movements.
- int [carsInTransit](#)
The number of cars in transit.
- int [carsAtWorkBench](#)
The number of cars at the workbench.
- int [carsAtDest_carsInTransit](#)
The number of cars at their destinations and still in transit.
- bool [printYards](#)
Flag for printing yard switch lists.
- bool [printAlpha](#)
Flag for printing alphabetical lists.
- bool [printAtwice](#)
Flag for printing a second copy of alphabetical lists.
- bool [printList](#)
Flag for printing train switch lists.
- bool [printLtwice](#)
Flag for printing a second copy of train switch lists.
- bool [printDispatch](#)
Flag for printing a dispatcher's report.
- bool [printem](#)
Flag for printing train movements.
- char [messageBuffer](#) [2048]
Message buffer, used for error messages mostly.
- const [FCFSupport::Industry indScrapYard](#)
The pointer to the scrapyard.

Static Private Attributes

- static const string [whitespace](#)
String of white space characters.

9.170.1 Detailed Description

This is the main Freight [Car](#) Forwarder class.

It implements all of the basic data and algorithms used in the the Freight [Car](#) Forwarder system.

This class includes code to load a model railroad "system" (divisions, stations, industries, cars, and trains) along with code to assign cars to trains, run trains, generate yard switch lists, and various reports. Basically everything you need run realistic trains on a layout.

This is my second port of Tim O'Connors Freight [Car](#) Forwarding system, originally written in QBasic for use with the North Shore Model RR Club "Chesapeake [System](#)".

Author

Robert Heller <heller@deepsoft.com>

9.170.2 Member Enumeration Documentation

9.170.2.1 CarLocationType

enum `FCFSupport::System::CarLocationType`

Types of location report.

Enumerator

INDUSTRY	Report by industry.
STATION	Report by station.
DIVISION	Report by division.
ALL	Report on all locations.

9.170.2.2 CarTypeReport

enum `FCFSupport::System::CarTypeReport`

Types of car type reports.

Enumerator

All	Report on all car types.
Type	Report on one type.
Summary	Report summary.

9.170.3 Constructor & Destructor Documentation

9.170.3.1 System() [1/2]

`FCFSupport::System::System () [inline], [protected]`

The default constructor.

This is protected to prevent the creation of an uninitialized class instance. It simply makes no sense to create a system without loading a system file.

9.170.3.2 System() [2/2]

```
FCFSupport::System::System (
    const char * systemfile,
    int seed,
    char ** outmessage = NULL )
```

The constructor for the system.

Takes the path to a system file (typically #system.dat#) and loads the complete system. The system file contains the names of the additional files, containing the remaining system data. All of the files are presumed to exist in the same directory as the system file. All of the files are loaded and a sanity check is made to insure that the data is sane.

Parameters

<i>systemfile</i>	Pathname to the system file.
<i>seed</i>	Seed value for the random number generator.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.170.3.3 ~System()

```
FCFSupport::System::~~System ( )
```

The destructor frees all memory and generally cleans things up.

9.170.4 Member Function Documentation

9.170.4.1 AddCar()

```
void FCFSupport::System::AddCar (
    FCFSupport::Car * newcar ) [inline]
```

Add a new car to the array of cars.

Parameters

<i>newcar</i>	The new car.
---------------	--------------

References [cars](#).

9.170.4.2 AddOwner()

```
void FCFSupport::System::AddOwner (
    const char * initials ) [inline]
```

Create a new owner given a set of initials.

Parameters

<i>initials</i>	The new car owner's initials.
-----------------	-------------------------------

References [owners](#).

9.170.4.3 CarAssignment()

```
void FCFSupport::System::CarAssignment (
    const FCFSupport::WorkInProgressCallback * WIP,
    const FCFSupport::LogMessageCallback * log,
    const FCFSupport::ShowBannerCallback * banner,
    char ** outmessage = NULL )
```

[Car](#) assignment procedure.

This is one of the main workhorse procedures. It goes through all of the cars, finding ones that are ready to be moved and determines where they could be moved to, based on a number of criteria, such as whether they are loaded or empty, whether they are in their home divisions or not, and so on.

Parameters

<i>WIP</i>	Work in progress callback.
<i>log</i>	Log message callback.
<i>banner</i>	Show banner callback.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.4 CarMovements()

```
int FCFSupport::System::CarMovements ( ) const [inline]
```

Return the total number of car movements.

References [carMovements](#).

9.170.4.5 CarsAtDest()

```
int FCFSupport::System::CarsAtDest ( ) const [inline]
```

Return the number of cars that are at their destinations.

References [carsAtDest](#).

9.170.4.6 CarsAtDest_CarsInTransit()

```
int FCFSupport::System::CarsAtDest_CarsInTransit ( ) const [inline]
```

Return the number of cars at their destinations plus the number of cars in transit.

References [carsAtDest_carsInTransit](#).

9.170.4.7 CarsAtWorkBench()

```
int FCFSupport::System::CarsAtWorkBench ( ) const [inline]
```

Return the number of cars on the RIP track (the workbench).

References [carsAtWorkBench](#).

9.170.4.8 CarsFile()

```
const char * FCFSupport::System::CarsFile ( ) const [inline]
```

Return the Cars file's full path name.

References [carsFile](#), and [FCFSupport::PathName::FullPath\(\)](#).

9.170.4.9 CarsInTransit()

```
int FCFSupport::System::CarsInTransit ( ) const [inline]
```

Return the number of cars still in transit.

References [carsInTransit](#).

9.170.4.10 CarsMoved()

```
int FCFSupport::System::CarsMoved ( ) const [inline]
```

Return the number of cars moved.

References [carsMoved](#).

9.170.4.11 CarsMovedMore()

```
int FCFSupport::System::CarsMovedMore ( ) const [inline]
```

Return the number of cars moved more then three times.

References [carsMovedMore](#).

9.170.4.12 CarsMovedOnce()

```
int FCFSupport::System::CarsMovedOnce ( ) const [inline]
```

Return the number of cars moved once.

References [carsMovedOnce](#).

9.170.4.13 CarsMovedThree()

```
int FCFSupport::System::CarsMovedThree ( ) const [inline]
```

Return the number of cars moved three times.

References [carsMovedThree](#).

9.170.4.14 CarsMovedTwice()

```
int FCFSupport::System::CarsMovedTwice ( ) const [inline]
```

Return the number of cars moved twice.

References [carsMovedTwice](#).

9.170.4.15 CarsNotMoved()

```
int FCFSupport::System::CarsNotMoved ( ) const [inline]
```

Return the number of cars not moved at all.

References [carsNotMoved](#).

9.170.4.16 CarTypesFile()

```
const char * FCFSupport::System::CarTypesFile ( ) const [inline]
```

Return the [Car](#) Types file's full path name.

References [carTypesFile](#), and [FCFSupport::PathName::FullPath\(\)](#).

9.170.4.17 CarTypesOrder()

```
char FCFSupport::System::CarTypesOrder (
    int i ) const [inline]
```

Access a car type by index.

Parameters

<i>i</i>	The car type index.
----------	---------------------

References [carTypesOrder](#), [i](#), and [FCFSupport::CarType::MaxCarTypes](#).

9.170.4.18 CarTypesOrderIndex()

```
int FCFSupport::System::CarTypesOrderIndex (
    char type ) const
```

[Car](#) type order index.

Get the index of a car type.

Parameters

<i>type</i>	The car type to lookup.
-------------	-------------------------

9.170.4.19 DeleteAllExistingCars()

```
void FCFSupport::System::DeleteAllExistingCars ( )
```

Delete all existing cars.

9.170.4.20 FindCarInCarVector()

```
CarVector::iterator FCFSupport::System::FindCarInCarVector (
    CarVector & cvect,
    Car * car ) [private]
```

Find a car in a car vector.

Parameters

<i>cvect</i>	The car vector to search.
<i>car</i>	The car to search for.

9.170.4.21 FindDivisionByIndex()

```
const Division * FCFSupport::System::FindDivisionByIndex (
    int i ) const [inline]
```

Find a division by its index.

Returns either a pointer to the division or NULL.

Parameters

<i>i</i>	The division index to look for.
----------	---------------------------------

References [divisions](#), and [i](#).

9.170.4.22 FindDivisionBySymbol()

```
const Division * FCFSupport::System::FindDivisionBySymbol (
    char symbol ) const
```

Find a division by its symbol.

Returns either a pointer to the division or NULL.

Parameters

<i>symbol</i>	The division symbol to look for.
---------------	----------------------------------

9.170.4.23 FindDivisionIndex()

```
int FCFSupport::System::FindDivisionIndex (
    const FCFSupport::Division * division ) const
```

Find a division's index.

Parameters

<i>division</i>	The division to look for.
-----------------	---------------------------

9.170.4.24 FindIndustry()

```
IndustryMap::iterator FCFSupport::System::FindIndustry (
    Industry * industry ) [private]
```

Find an industry in the industry map.

Parameters

<i>industry</i>	The industry to search for.
-----------------	-----------------------------

9.170.4.25 FindIndustryByIndex()

```
const FCFSupport::Industry * FCFSupport::System::FindIndustryByIndex (
    int i ) const [inline]
```

Find an industry by its index.

Returns either a pointer to the industry or NULL.

Parameters

<i>i</i>	The industry index to look for.
----------	---------------------------------

References [i](#), and [industries](#).

9.170.4.26 FindIndustryByName()

```
const FCFSupport::Industry * FCFSupport::System::FindIndustryByName (
    string name ) const
```

Find an industry by its name.

Returns either a pointer to the industry or NULL.

Parameters

<i>name</i>	Industry name to look for.
-------------	--

9.170.4.27 FindIndustryIndex()

```
int FCFSupport::System::FindIndustryIndex (
    const FCFSupport::Industry * industry ) const
```

Find an industry's index.

Parameters

<i>industry</i>	The industry to look for.
-----------------	---------------------------

9.170.4.28 FindStationByName()

```
const FCFSupport::Station * FCFSupport::System::FindStationByName (
    string name,
    string comment ) const
```

[Station](#) indexing (by name) function.

Returns NULL if the named station does not exist.

Parameters

<i>name</i>	Station name to access.
-------------	---

9.170.4.29 FindStationIndex()

```
int FCFSupport::System::FindStationIndex (
    const FCFSupport::Station * station ) const
```

Find a station's index.

Parameters

<i>station</i>	The station to look for.
----------------	--------------------------

9.170.4.30 FindTrainByIndex()

```
const Train * FCFSupport::System::FindTrainByIndex (
    int i ) const [inline]
```

Find a train by its index.

Returns either a pointer to the train or NULL.

Parameters

<i>i</i>	The train index to look for.
----------	------------------------------

References [i](#), and [trains](#).

9.170.4.31 FindTrainByName()

```
const Train * FCFSupport::System::FindTrainByName (
    const char * name ) const [inline]
```

Find a train by its name.

Returns either a pointer to the train or NULL.

Parameters

<i>name</i>	Train name to look for.
-------------	---

References [trainIndex](#).

9.170.4.32 FirstCarType()

```
CarTypeMap::const_iterator FCFSupport::System::FirstCarType ( ) const [inline]
```

Iterator of the first car type in the car type map.

References [carTypes](#).

9.170.4.33 FirstDivision()

```
DivisionMap::const_iterator FCFSupport::System::FirstDivision ( ) const [inline]
```

Iterator of the first division in the division map.

References [divisions](#).

9.170.4.34 FirstIndustry()

```
IndustryMap::const_iterator FCFSupport::System::FirstIndustry ( ) const [inline]
```

Iterator of the first industry in the industry map.

References [industries](#).

9.170.4.35 FirstOwner()

```
OwnerMap::const_iterator FCFSupport::System::FirstOwner ( ) const [inline]
```

Iterator of the first owner in the owner map.

References [owners](#).

9.170.4.36 FirstStation()

```
StationMap::const_iterator FCFSupport::System::FirstStation ( ) const [inline]
```

Iterator of the first station in the station map.

References [stations](#).

9.170.4.37 FirstTrain()

```
TrainMap::const_iterator FCFSupport::System::FirstTrain ( ) const [inline]
```

Iterator of the first train in the train map.

References [trains](#).

9.170.4.38 FixedRouteMirrorCheck()

```
bool FCFSupport::System::FixedRouteMirrorCheck (
    Car * Cx,
    Industry * Ix ) [private]
```

Check to see if a certain car can be mirrored on a fixed route at a certain industry.

Parameters

<i>Cx</i>	The car to check.
<i>Ix</i>	The industry to check.

9.170.4.39 FormatDutyTime()

```
const string FCFSupport::System::FormatDutyTime (
    int dutytimeminutes ) const [private]
```

Format the on duty time in a human readable format.

Parameters

<i>dutytimeminutes</i>	The duty time in minutes.
------------------------	---------------------------

9.170.4.40 GetCarStatus()

```
void FCFSupport::System::GetCarStatus (
    const Car * car,
    string & status,
    string & carTypeDescr ) const
```

Return car status information.

Parameters

<i>car</i>	The car to look up.
<i>status</i>	Its status (loaded or empty).
<i>carTypeDescr</i>	Its car type description.

9.170.4.41 GetIndustryCarCounts()

```
void FCFSupport::System::GetIndustryCarCounts ( ) [private]
```

Update industry car counts.

9.170.4.42 GlobStringMatch()

```
bool FCFSupport::System::GlobStringMatch (
    const string thestring,
    const string pattern ) const [private]
```

Glob style string match function.

Parameters

<i>thestring</i>	The string to match against.
<i>pattern</i>	The glob pattern.

9.170.4.43 GlobStringMatchHelper()

```
bool FCFSupport::System::GlobStringMatchHelper (
    string::const_iterator string_i,
    string::const_iterator string_e,
    string::const_iterator pattern_i,
    string::const_iterator pattern_e ) const [private]
```

Helper function for glob string matching.

Parameters

<i>string_i</i>	The current string index.
<i>string_e</i>	The end of the string.
<i>pattern↔ _i</i>	The current pattern index.
<i>pattern↔ _e</i>	The end of the pattern.

9.170.4.44 IndRipTrack()

```
const FCFSupport::Industry * FCFSupport::System::IndRipTrack ( ) [inline]
```

Return a pointer to the RIP track (workbench).

References [industries](#).

9.170.4.45 IndRipTrackConst()

```
const FCFSupport::Industry * FCFSupport::System::IndRipTrackConst ( ) const [inline]
```

Const version of the pointer to the RIP track (workbench).

References [industries](#).

9.170.4.46 IndScrapYard()

```
const FCFSupport::Industry * FCFSupport::System::IndScrapYard ( ) const [inline]
```

Return a pointer to the scrap yard.

References [indScrapYard](#).

9.170.4.47 IndustriesFile()

```
const char * FCFSupport::System::IndustriesFile ( ) const [inline]
```

Return the industry file's full path name.

References [FCFSupport::PathName::FullPath\(\)](#), and [industriesFile](#).

9.170.4.48 IndustryIndex()

```
int FCFSupport::System::IndustryIndex (
    const FCFSupport::Industry * indus ) const
```

Return an industry's index.

Parameters

<i>indus</i>	The industry to lookup.
--------------	-------------------------

9.170.4.49 IndustryTakesCar()

```
bool FCFSupport::System::IndustryTakesCar (
```

```

    Industry * Ix,
    Car * Cx ) [private]

```

Check if an industry takes a certain car.

Parameters

<i>Ix</i>	The industry to check.
<i>Cx</i>	The car to check.

9.170.4.50 InternalRunOneTrain()

```

void FCFSupport::System::InternalRunOneTrain (
    Train * train,
    bool boxMove,
    const FCFSupport::TrainDisplayCallback * traindisplay,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]

```

Internal function to run a single train.

Parameters

<i>train</i>	The train to run.
<i>boxMove</i>	Is this a box move?
<i>traindisplay</i>	Train display callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.51 LastCarType()

```

CarTypeMap::const_iterator FCFSupport::System::LastCarType ( ) const [inline]

```

Iterator of one past the last car type in the car type map.

References [carTypes](#).

9.170.4.52 LastDivision()

```
DivisionMap::const_iterator FCFSupport::System::LastDivision ( ) const [inline]
```

Iterator of one past the last division in the division map.

References [divisions](#).

9.170.4.53 LastIndustry()

```
IndustryMap::const_iterator FCFSupport::System::LastIndustry ( ) const [inline]
```

Iterator of one past the last industry in the industry map.

References [industries](#).

9.170.4.54 LastOwner()

```
OwnerMap::const_iterator FCFSupport::System::LastOwner ( ) const [inline]
```

Iterator of one past the last owner in the owner map.

References [owners](#).

9.170.4.55 LastStation()

```
StationMap::const_iterator FCFSupport::System::LastStation ( ) const [inline]
```

Iterator of one past the last station in the station map.

References [stations](#).

9.170.4.56 LastTrain()

```
TrainMap::const_iterator FCFSupport::System::LastTrain ( ) const [inline]
```

Iterator of one past the last train in the train map.

References [trains](#).

9.170.4.57 LoadCarFile()

```
bool FCFSupport::System::LoadCarFile (
    char ** outmessage = NULL )
```

(Re-)Load the car file.

Parameters

<i>outmessage</i>	Buffer pointer for error messages.
-------------------	------------------------------------

Referenced by [ReloadCarFile\(\)](#).

9.170.4.58 LoadStatsFile()

```
bool FCFSupport::System::LoadStatsFile (
    char ** outmessage = NULL )
```

Load the stats file.

Parameters

<i>outmessage</i>	Buffer pointer for error messages.
-------------------	------------------------------------

Referenced by [ReloadCarFile\(\)](#).

9.170.4.59 LogCarPickup()

```
void FCFSupport::System::LogCarPickup (
    Car * car,
    Train * train,
    bool boxMove ) [private]
```

Log a car pickup in the switch list structure.

Parameters

<i>car</i>	The car picked up.
<i>train</i>	The train that picked it up.
<i>boxMove</i>	Is this a box move?

9.170.4.60 NextShift()

```
int FCFSupport::System::NextShift ( ) [inline]
```

Increment the shift number.

References [sessionNumber](#), [shiftNumber](#), and [totalShifts](#).

9.170.4.61 NumberOfCars()

```
int FCFSupport::System::NumberOfCars ( ) const [inline]
```

References [cars](#).

9.170.4.62 NumberOfDivisions()

```
int FCFSupport::System::NumberOfDivisions ( ) const [inline]
```

return the number of divisions loaded.

References [divisions](#).

9.170.4.63 NumberOfIndustries()

```
int FCFSupport::System::NumberOfIndustries ( ) const [inline]
```

Return the number of industries loaded.

References [industries](#).

9.170.4.64 NumberOfStations()

```
int FCFSupport::System::NumberOfStations ( ) const [inline]
```

The number of stations loaded.

References [stations](#).

9.170.4.65 NumberOfTrains()

```
int FCFSupport::System::NumberOfTrains ( ) const [inline]
```

The number of trains loaded.

References [trains](#).

9.170.4.66 OrdersFile()

```
const char * FCFSupport::System::OrdersFile ( ) const [inline]
```

Return the train orders file's full path name.

References [FCFSupport::PathName::FullPath\(\)](#), and [ordersFile](#).

9.170.4.67 OtherCarOkForTrain()

```
bool FCFSupport::System::OtherCarOkForTrain (
    Car * car,
    Train * train ) [private]
```

Check to see if this other car can be picked up.

Parameters

<i>car</i>	The car to check.
<i>train</i>	The train to check.

9.170.4.68 OwnersFile()

```
const char * FCFSupport::System::OwnersFile ( ) const [inline]
```

Return the Owners file's full path name.

References [FCFSupport::PathName::FullPath\(\)](#), and [ownersFile](#).

9.170.4.69 PrintAllCarTypes()

```
void FCFSupport::System::PrintAllCarTypes (
    bool totalsOnly,
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print all car types.

Parameters

<i>totalsOnly</i>	Print only the totals?
<i>printer</i>	Printer device.

9.170.4.70 PrintAllLists()

```
void FCFSupport::System::PrintAllLists (
    const FCFSupport::LogMessageCallback * Log,
    const FCFSupport::ShowBannerCallback * banner,
    FCFSupport::PrinterDevice * printer )
```

Print all of the various yard and switch lists.

Parameters

<i>Log</i>	Log message callback.
<i>banner</i>	Show banner callback.
<i>printer</i>	Printer device.

9.170.4.71 PrintAlpha()

```
bool FCFSupport::System::PrintAlpha ( ) const [inline]
```

Print the alphabetical listing flag.

References [printAlpha](#).

9.170.4.72 PrintAnalysisHeader()

```
void FCFSupport::System::PrintAnalysisHeader (
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print an analysis header.

Parameters

<i>printer</i>	Printer device.
----------------	-----------------

9.170.4.73 PrintAtwice()

```
bool FCFSupport::System::PrintAtwice ( ) const [inline]
```

Print second copy of the alphabetical listing flag.

References [printAtwice](#).

9.170.4.74 PrintCarHeading()

```
void FCFSupport::System::PrintCarHeading (
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print the car heading.

Parameters

<i>printer</i>	Printer device.
----------------	-----------------

9.170.4.75 PrintCarTypesHeader()

```
void FCFSupport::System::PrintCarTypesHeader (
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print the car type header.

Parameters

<i>printer</i>	Printer device.
----------------	-----------------

9.170.4.76 PrintCarTypesSummaryHeader()

```
void FCFSupport::System::PrintCarTypesSummaryHeader (
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print car type summary header.

Parameters

<i>printer</i>	Printer device.
----------------	-----------------

9.170.4.77 PrintDashedLine()

```
void FCFSupport::System::PrintDashedLine (
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print a dashed line.

Parameters

<i>printer</i>	Printer device.
----------------	-----------------

9.170.4.78 PrintDispatch()

```
bool FCFSupport::System::PrintDispatch ( ) const [inline]
```

Print dispatcher report sheet.

References [printDispatch](#).

9.170.4.79 PrintDispatcher()

```
void FCFSupport::System::PrintDispatcher (
    string banner,
    char trainType,
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print dispatcher report sheets.

Parameters

<i>banner</i>	System banner.
<i>trainType</i>	Type of train.
<i>printer</i>	Printer device.

9.170.4.80 Printem()

```
bool FCFSupport::System::Printem ( ) const [inline]
```

Print train enroute switch list.

References [printem](#).

9.170.4.81 PrintFormFeed()

```
void FCFSupport::System::PrintFormFeed (  
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print a form feed.

Parameters

<i>printer</i>	Printer device.
----------------	-----------------

9.170.4.82 PrintIndustryHeader()

```
void FCFSupport::System::PrintIndustryHeader (  
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print the industry header.

Parameters

<i>printer</i>	Printer device.
----------------	-----------------

9.170.4.83 PrintList()

```
bool FCFSupport::System::PrintList ( ) const [inline]
```

Print the switch list order flag.

References [printList](#).

9.170.4.84 PrintLocCommon()

```
void FCFSupport::System::PrintLocCommon (
    FCFSupport::PrinterDevice * printer ) [private]
```

Print a header for all location reports.

Parameters

<i>printer</i>	Printer device.
----------------	-----------------

9.170.4.85 PrintLocOneIndustry()

```
void FCFSupport::System::PrintLocOneIndustry (
    const FCFSupport::Industry * Ix,
    const FCFSupport::Station * Sx,
    bool & firstOne,
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print a location report for a single industry.

Parameters

<i>Ix</i>	The industry to print a report for.
<i>Sx</i>	The station to print a report for.
<i>firstOne</i>	Is this the first one?
<i>printer</i>	Printer device.

9.170.4.86 PrintLtvice()

```
bool FCFSupport::System::PrintLtvice ( ) const [inline]
```


Print a second copy of the switch list order flag.

References [printLt看ice](#).

9.170.4.87 PrintOneAnalysis()

```
void FCFSupport::System::PrintOneAnalysis (
    const Industry * Ix,
    int & carsToDiv,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print one analysis report.

Parameters

<i>Ix</i>	The industry.
<i>carsToDiv</i>	Updated cars headed for the current division.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.88 PrintOneCarInfo()

```
void FCFSupport::System::PrintOneCarInfo (
    const Car * car,
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print one car's information.

Parameters

<i>car</i>	The car whose information to print.
<i>printer</i>	Printer device.

9.170.4.89 PrintOneCarLocation()

```
void FCFSupport::System::PrintOneCarLocation (
    const Car * car,
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print one car location report.

Parameters

<i>car</i>	The car to print location information for.
<i>printer</i>	Printer device.

9.170.4.90 PrintOneCarType()

```
void FCFSupport::System::PrintOneCarType (
    bool totalsOnly,
    char carType,
    const CarType * ct,
    int & OnLineShippersOfType,
    int & OffLineShippersOfType,
    int & OnLineReceiversOfType,
    int & OffLineReceiversOfType,
    int & allTotalMoves,
    int & allTotalAssigns,
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print one car type.

Parameters

<i>totalsOnly</i>	Print only the totals?
<i>carType</i>	The car type character.
<i>ct</i>	The car type object.
<i>OnLineShippersOfType</i>	Updated online shippers of this car type.
<i>OffLineShippersOfType</i>	Updated offline shippers of this car type.
<i>OnLineReceiversOfType</i>	Updated online receivers of this car type.
<i>OffLineReceiversOfType</i>	Updated offline receivers of this car type.
<i>allTotalMoves</i>	Update total moves.
<i>allTotalAssigns</i>	Updated total assignments.
<i>printer</i>	Printer device.

9.170.4.91 PrintOneIndustry()

```
void FCFSupport::System::PrintOneIndustry (
    const Industry * ix,
    int & lenInDiv,
    int & carsInDiv,
    int & carsToDiv,
```

```
const FCFSupport::LogMessageCallback * Log,
FCFSupport::PrinterDevice * printer ) const [private]
```

Print one industry.

Parameters

<i>ix</i>	The industry.
<i>lenInDiv</i>	The updated division length.
<i>carsInDiv</i>	The updated cars in division count.
<i>carsToDiv</i>	The updates cars headed to division count.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.92 PrintSystemBanner()

```
void FCFSupport::System::PrintSystemBanner (
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print a system banner.

Parameters

<i>printer</i>	Printer device.
----------------	-----------------

9.170.4.93 PrintTrainLoc()

```
void FCFSupport::System::PrintTrainLoc (
    Train * train,
    int Px,
    const FCFSupport::LogMessageCallback * Log,
    const FCFSupport::TrainDisplayCallback * traindisplay ) [private]
```

Print a train's current location.

Parameters

<i>train</i>	The train to print.
<i>Px</i>	The stop number that train is at.
<i>Log</i>	Log message callback.
<i>traindisplay</i>	Train display callback.

9.170.4.94 PrintTrainOrderHeader()

```
void FCFSupport::System::PrintTrainOrderHeader (
    const FCFSupport::Train * train,
    FCFSupport::PrinterDevice * printer ) [private]
```

Print a train order header.

Parameters

<i>train</i>	The train to print a train order header for.
<i>printer</i>	Printer device.

9.170.4.95 PrintTrainOrders()

```
void FCFSupport::System::PrintTrainOrders (
    const Train * train,
    FCFSupport::PrinterDevice * printer ) const [private]
```

Print the train orders for a selected train.

Parameters

<i>train</i>	The train to print trains orders for.
<i>printer</i>	Printer device.

9.170.4.96 PrintYards()

```
bool FCFSupport::System::PrintYards ( ) const [inline]
```

Print yard lists flag.

References [printYards](#).

9.170.4.97 RanAllTrains()

```
int FCFSupport::System::RanAllTrains ( ) const [inline]
```

Ran all trains?

References [ranAllTrains](#).

9.170.4.98 Random()

```
double FCFSupport::System::Random ( ) [inline]
```

Return a random number between 0.0 and 1.0.

9.170.4.99 Randomize()

```
void FCFSupport::System::Randomize (
    int seed ) [inline]
```

Set the random seed.

Parameters

<i>seed</i>	Seed value.
-------------	-------------

9.170.4.100 ReadCarTypes()

```
bool FCFSupport::System::ReadCarTypes (
    char ** outmessage = NULL ) [private]
```

Read in the car types file.

Parameters

<i>outmessage</i>	Buffer pointer for error messages.
-------------------	------------------------------------

9.170.4.101 ReadDivisions()

```
bool FCFSupport::System::ReadDivisions (
    istream & stream,
    map< int, int, less< int > > & homemap,
    char ** outmessage = NULL ) [private]
```

Read in the division map.

Parameters

<i>stream</i>	The input stream to read from.
<i>homemap</i>	The map of home yards.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.102 ReadGroupLimit()

```
bool FCFSupport::System::ReadGroupLimit (
    istream & stream,
    const char * label,
    int & value,
    const char * filename,
    char ** outmessage = NULL ) [private]
```

Utility to read a group limit.

Parameters

<i>stream</i>	The input stream to read from.
<i>label</i>	The label for the group limit.
<i>value</i>	The limit value read.
<i>filename</i>	The filename being read from.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.103 ReadIndustries()

```
bool FCFSupport::System::ReadIndustries (
    char ** outmessage = NULL ) [private]
```

Read in the industries file.

Parameters

<i>outmessage</i>	Buffer pointer for error messages.
-------------------	------------------------------------

9.170.4.104 ReadOwners()

```
bool FCFSupport::System::ReadOwners (
    char ** outmessage = NULL ) [private]
```

Read in the owners file.

Parameters

<i>outmessage</i>	Buffer pointer for error messages.
-------------------	------------------------------------

9.170.4.105 ReadStations()

```
bool FCFSupport::System::ReadStations (
    istream & stream,
    char ** outmessage = NULL ) [private]
```

Read in the station map.

Parameters

<i>stream</i>	The input stream to read from.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.106 ReadTrainOrders()

```
bool FCFSupport::System::ReadTrainOrders (
    char ** outmessage = NULL ) [private]
```

Read in the train orders file.

Parameters

<i>outmessage</i>	Buffer pointer for error messages.
-------------------	------------------------------------

9.170.4.107 ReadTrains()

```
bool FCFSupport::System::ReadTrains (
    char ** outmessage = NULL ) [private]
```

Read in the trains file.

Parameters

<i>outmessage</i>	Buffer pointer for error messages.
-------------------	------------------------------------

9.170.4.108 ReLoadCarFile()

```
void FCFSupport::System::ReLoadCarFile (
    char ** outmessage ) [inline]
```

Reload car file.

Parameters

<i>outmessage</i>	Buffer pointer for error messages.
-------------------	------------------------------------

References [LoadCarFile\(\)](#), [LoadStatsFile\(\)](#), and [RestartLoop\(\)](#).

9.170.4.109 ReportAnalysis()

```
void FCFSupport::System::ReportAnalysis (
    const FCFSupport::WorkInProgressCallback * WIP,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL ) const
```

[Industry](#) analysis report.

Parameters

<i>WIP</i>	Work in progress callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.110 ReportCarLocations()

```
void FCFSupport::System::ReportCarLocations (
    CarLocationType cltype,
    int index,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL )
```

Car location report.

Parameters

<i>cltype</i>	Type of report.
<i>index</i>	Index of thing to report by (industry, station, or division).
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.111 ReportCarOwners()

```
void FCFSupport::System::ReportCarOwners (
    string ownerInitials,
    const FCFSupport::WorkInProgressCallback * WIP,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL ) const
```

Report on a specified car owner.

Parameters

<i>ownerInitials</i>	Car owner's initials to report on.
<i>WIP</i>	Work in progress callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.112 ReportCars()

```
void FCFSupport::System::ReportCars (
    const FCFSupport::WorkInProgressCallback * WIP,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL ) const
```

Report on all cars.

Parameters

<i>WIP</i>	Work in progress callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.113 ReportCarsNotMoved()

```
void FCFSupport::System::ReportCarsNotMoved (
    const FCFSupport::WorkInProgressCallback * WIP,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL ) const
```

Report on cars not moved.

Parameters

<i>WIP</i>	Work in progress callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.114 ReportCarTypes()

```
void FCFSupport::System::ReportCarTypes (
    CarTypeReport rtype,
    char carType,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL ) const
```

Report on car types.

Parameters

<i>rtype</i>	Type of report to produce.
<i>carType</i>	Car type to report on (only used when the report type is for a single type).
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.115 ReportIndustries()

```
void FCFSupport::System::ReportIndustries (
    const FCFSupport::WorkInProgressCallback * WIP,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL ) const
```

Report on all industries.

Parameters

<i>WIP</i>	Work in progress callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.116 ReportLocAll()

```
void FCFSupport::System::ReportLocAll (
    bool printBench,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL ) [private]
```

Print a location report for all locations.

Parameters

<i>printBench</i>	Print cars at the workbench?
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.117 ReportLocDivision()

```
void FCFSupport::System::ReportLocDivision (
    DivisionMap::const_iterator Dx,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL ) [private]
```

Print a location report for one division.

Parameters

<i>Dx</i>	The division's index.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.118 ReportLocIndustry()

```
void FCFSupport::System::ReportLocIndustry (
    IndustryMap::const_iterator Ix,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer,
    char ** outmessage = NULL ) [private]
```

Print a location report for one industry.

Parameters

<i>Ix</i>	The industry's index.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.119 ReportLocStation()

```
void FCFSupport::System::ReportLocStation (
    StationMap::const_iterator Sx,
```

```
const FCFSupport::LogMessageCallback * Log,  
FCFSupport::PrinterDevice * printer,  
char ** outmessage = NULL ) [private]
```

Print a location report for one station.

Parameters

<i>Sx</i>	The station's index.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.120 ReportTrains()

```
void FCFSupport::System::ReportTrains (  
    const FCFSupport::WorkInProgressCallback * WIP,  
    const FCFSupport::LogMessageCallback * Log,  
    FCFSupport::PrinterDevice * printer,  
    char ** outmessage = NULL ) const
```

Report on all trains.

Parameters

<i>WIP</i>	Work in progress callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.121 ResetIndustryStats()

```
void FCFSupport::System::ResetIndustryStats ( )
```

Reset industry statistics.

9.170.4.122 RestartLoop()

```
void FCFSupport::System::RestartLoop ( )
```

Reset loop variables.

Referenced by [ReLoadCarFile\(\)](#).

9.170.4.123 RunAllTrains()

```
void FCFSupport::System::RunAllTrains (
    const FCFSupport::WorkInProgressCallback * WIP,
    const FCFSupport::LogMessageCallback * Log,
    const FCFSupport::ShowBannerCallback * banner,
    FCFSupport::PrinterDevice * printer,
    const FCFSupport::TrainDisplayCallback * traindisplay )
```

Run all trains procedure.

This is another workhorse procedure. This procedure runs the initial box moves, then the way freights and manifest trains. It is necessary to run the box moves again after running this procedure, unless additional sections of the way freights or manifest trains need to be run first.

Parameters

<i>WIP</i>	Work in progress callback.
<i>Log</i>	Log message callback.
<i>banner</i>	Show banner callback.
<i>printer</i>	Printer device.
<i>traindisplay</i>	Train display callback.

9.170.4.124 RunBoxMoves()

```
void FCFSupport::System::RunBoxMoves (
    const FCFSupport::WorkInProgressCallback * WIP,
    const FCFSupport::LogMessageCallback * Log,
    const FCFSupport::ShowBannerCallback * banner,
    FCFSupport::PrinterDevice * printer,
    const FCFSupport::TrainDisplayCallback * traindisplay )
```

Run all boxmove trains.

This is another workhorse procedure. This procedure runs all of the box moves.

Parameters

<i>WIP</i>	Work in progress callback.
<i>Log</i>	Log message callback.
<i>banner</i>	Show banner callback.
<i>printer</i>	Printer device.
<i>traindisplay</i>	Train display callback.

9.170.4.125 RunOneLocal()

```
void FCFSupport::System::RunOneLocal (
    Train * train,
    bool boxMove,
    CarVector & consist,
    const FCFSupport::TrainDisplayCallback * traindisplay,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

One one local train.

Parameters

<i>train</i>	The train to run.
<i>boxMove</i>	Is this a box move?
<i>consist</i>	The train's consist.
<i>traindisplay</i>	Train display callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.126 RunOneManifest()

```
void FCFSupport::System::RunOneManifest (
    Train * train,
    bool boxMove,
    CarVector & consist,
    const FCFSupport::TrainDisplayCallback * traindisplay,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

Run one manifest freight train.

Parameters

<i>train</i>	The train to run.
<i>boxMove</i>	Is this a box move?
<i>consist</i>	The train's consist.
<i>traindisplay</i>	Train display callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.127 RunOnePassenger()

```
void FCFSupport::System::RunOnePassenger (
    Train * train,
    bool boxMove,
    const FCFSupport::TrainDisplayCallback * traindisplay,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

One one passenger train.

Parameters

<i>train</i>	The train to run.
<i>boxMove</i>	Is this a box move?
<i>traindisplay</i>	Train display callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.128 RunOneTrain()

```
void FCFSupport::System::RunOneTrain (
    Train * train,
    bool boxMove,
    const FCFSupport::TrainDisplayCallback * traindisplay,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer )
```

Run one single train.

Parameters

<i>train</i>	The train to run.
<i>boxMove</i>	Is this a box move?
<i>traindisplay</i>	Train display callback.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.129 SaveCars()

```
bool FCFSupport::System::SaveCars (
    char ** outmessage = NULL )
```


Save cars (and stats).

Parameters

<i>outmessage</i>	Buffer pointer for error messages.
-------------------	------------------------------------

9.170.4.130 SearchForCarIndexesByNumber()

```
vector< int > FCFSupport::System::SearchForCarIndexesByNumber (
    string number,
    bool subStringP ) const
```

Search for cars with a specified number.

Parameters

<i>number</i>	The number string to look for.
<i>subStringP</i>	Match the whole number or only the last few digits.

9.170.4.131 SearchForIndustryPattern()

```
vector< int > FCFSupport::System::SearchForIndustryPattern (
    string industryNamePattern ) const
```

Search for an industry by name given a glob pattern.

Parameters

<i>industryNamePattern</i>	The name pattern.
----------------------------	-------------------

9.170.4.132 SearchForTrainPattern()

```
vector< int > FCFSupport::System::SearchForTrainPattern (
    string trainNamePattern ) const
```

Search for a train by name given a glob pattern.

Parameters

<i>trainNamePattern</i>	The name pattern.
-------------------------	-------------------

9.170.4.133 SessionNumber()

```
int FCFSupport::System::SessionNumber ( ) const [inline]
```

Return the session number.

References [sessionNumber](#).

9.170.4.134 SetPrintAlpha()

```
void FCFSupport::System::SetPrintAlpha (
    bool flag ) [inline]
```

Set the print alphabetical listing flag.

Parameters

<i>flag</i>	New value to set the flag to.
-------------	-------------------------------

References [printAlpha](#).

9.170.4.135 SetPrintAtwice()

```
void FCFSupport::System::SetPrintAtwice (
    bool flag ) [inline]
```

Set the print second copy of the alphabetical listing flag.

Parameters

<i>flag</i>	New value to set the flag to.
-------------	-------------------------------

References [printAtwice](#).

9.170.4.136 SetPrintDispatch()

```
void FCFSupport::System::SetPrintDispatch (
    bool flag ) [inline]
```

Set the print dispatcher report sheet.

Parameters

<i>flag</i>	New value to set the flag to.
-------------	-------------------------------

References [printDispatch](#).

9.170.4.137 SetPrintem()

```
void FCFSupport::System::SetPrintem (
    bool flag ) [inline]
```

Set the print train enroute switch list.

Parameters

<i>flag</i>	New value to set the flag to.
-------------	-------------------------------

References [printem](#).

9.170.4.138 SetPrintList()

```
void FCFSupport::System::SetPrintList (
    bool flag ) [inline]
```

Set the print switch list order flag.

Parameters

<i>flag</i>	New value to set the flag to.
-------------	-------------------------------

References [printList](#).

9.170.4.139 SetPrintLtwice()

```
void FCFSupport::System::SetPrintLtwice (
    bool flag ) [inline]
```

Set the print a second copy of the switch list order flag.

Parameters

<i>flag</i>	New value to set the flag to.
-------------	-------------------------------

References [printLtwice](#).

9.170.4.140 SetPrintYards()

```
void FCFSupport::System::SetPrintYards (
    bool flag ) [inline]
```

Set the print yard lists flag.

Parameters

<i>flag</i>	New value to set the flag to.
-------------	-------------------------------

References [printYards](#).

9.170.4.141 ShiftNumber()

```
int FCFSupport::System::ShiftNumber ( ) const [inline]
```

Return the shift number.

References [shiftNumber](#).

9.170.4.142 ShowCarMovements()

```
void FCFSupport::System::ShowCarMovements (
    bool showAll,
    const FCFSupport::Industry * Ix,
    const FCFSupport::Train * Tx,
    const FCFSupport::LogMessageCallback * Log,
    const FCFSupport::ShowBannerCallback * banner ) const
```

Show all car movements.

Parameters

<i>showAll</i>	Show all movements?
<i>Ix</i>	Show movements by industry.
<i>Tx</i>	Show movements by train.
<i>Log</i>	Log message callback.
<i>banner</i>	Show banner callback.

9.170.4.143 ShowCarsInDivision()

```
void FCFSupport::System::ShowCarsInDivision (
    const Division * division,
    const FCFSupport::LogMessageCallback * Log,
    const FCFSupport::ShowBannerCallback * banner ) const
```

Show cars in a specified division.

Parameters

<i>division</i>	The specific division.
<i>Log</i>	Log message callback.
<i>banner</i>	Show banner callback.

9.170.4.144 ShowCarsNotMoved()

```
void FCFSupport::System::ShowCarsNotMoved (
    const FCFSupport::LogMessageCallback * Log,
    const FCFSupport::ShowBannerCallback * banner ) const
```

Display cars not moved.

Parameters

<i>Log</i>	Log message callback.
<i>banner</i>	Show banner callback.

9.170.4.145 ShowTrainCars()

```
void FCFSupport::System::ShowTrainCars (
```

```
const Train * Tx,  
const FCFSupport::LogMessageCallback * Log,  
const FCFSupport::ShowBannerCallback * banner ) const
```

Show cars moved by a specific train.

Parameters

<i>Tx</i>	The specific train.
<i>Log</i>	Log message callback.
<i>banner</i>	Show banner callback.

9.170.4.146 ShowTrainTotals()

```
void FCFSupport::System::ShowTrainTotals (  
    const FCFSupport::LogMessageCallback * Log,  
    const FCFSupport::ShowBannerCallback * banner ) const
```

Show train totals.

Parameters

<i>Log</i>	Log message callback.
<i>banner</i>	Show banner callback.

9.170.4.147 ShowUnassignedCars()

```
void FCFSupport::System::ShowUnassignedCars (  
    const FCFSupport::LogMessageCallback * Log,  
    const FCFSupport::ShowBannerCallback * banner ) const
```

Show unassigned cars.

Parameters

<i>Log</i>	Log message callback.
<i>banner</i>	Show banner callback.

9.170.4.148 SkipCommentsGets()

```
bool FCFSupport::System::SkipCommentsGets (
    istream & stream,
    string & buffer,
    const char * message,
    char ** outmessage = NULL ) [private]
```

Utility to get a line after skipping any intervening comments.

Parameters

<i>stream</i>	The input stream to read from.
<i>buffer</i>	The result buffer.
<i>message</i>	Error message to use if an error occurs.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.149 split()

```
vector< string > FCFSupport::System::split (
    string s,
    char delimiter ) const [private]
```

Helper utility to split a string into words.

Parameters

<i>s</i>	The string to split.
<i>delimiter</i>	The delimiter character to split the string on.

9.170.4.150 StatsFile()

```
const char * FCFSupport::System::StatsFile ( ) const [inline]
```

Return the Statistics file's full path name.

References [FCFSupport::PathName::FullPath\(\)](#), and [statsFile](#).

9.170.4.151 StatsPeriod()

```
int FCFSupport::System::StatsPeriod ( ) const [inline]
```

Return the current stats period.

References [statsPeriod](#).

9.170.4.152 StringToInt()

```
bool FCFSupport::System::StringToInt (
    string str,
    int & result,
    const char * message,
    char ** outmessage = NULL ) const [private]
```

Convert a string to an integer.

Parameters

<i>str</i>	The string to convert.
<i>result</i>	The converted integer result buffer.
<i>message</i>	The message to use in case there is an error.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.153 StringToIntRange()

```
bool FCFSupport::System::StringToIntRange (
    string str,
    int & result,
    int minv,
    int maxv,
    const char * message,
    char ** outmessage = NULL ) const [private]
```

Convert a string to an integer and check its range.

Parameters

<i>str</i>	The string to convert.
<i>result</i>	The converted integer result buffer.
<i>minv</i>	The permitted minimum value.
<i>maxv</i>	The permitted maximum value.
<i>message</i>	The message to use in case there is an error.
<i>outmessage</i>	Buffer pointer for error messages.

9.170.4.154 SystemFile()

```
const char * FCFSupport::System::SystemFile ( ) const [inline]
```

Return the system file's full path name.

References [FCFSupport::PathName::FullPath\(\)](#), and [systemFile](#).

9.170.4.155 SystemName()

```
const char * FCFSupport::System::SystemName ( ) const [inline]
```

Return the system name.

This is read from the system file.

References [systemName](#).

9.170.4.156 TheCar()

```
FCFSupport::Car * FCFSupport::System::TheCar (
    int i ) const [inline]
```

Get a car by index.

Parameters

<i>i</i>	The car's index.
----------	------------------

References [cars](#), and [i](#).

9.170.4.157 TheCarGroup()

```
CarGroup * FCFSupport::System::TheCarGroup (
    int i ) const [inline]
```

Get a car class instance pointer given a car group index.

Parameters

<i>i</i>	The car group index.
----------	----------------------

References [carGroups](#), [i](#), and [FCFSupport::CarGroup::MaxCarGroup](#).

9.170.4.158 TheCarType()

```
CarType * FCFSupport::System::TheCarType (
    char c ) [inline]
```

Get a car type class instance pointer given a car type.

Parameters

<i>c</i>	The car type to lookup.
----------	-------------------------

References [carTypes](#).

9.170.4.159 TheDivision()

```
FCFSupport::Division * FCFSupport::System::TheDivision (
    int i ) [inline]
```

[Division](#) indexing function.

Warning: if the division at the specified index does not already exist, a new element is allocated with a NULL pointer.

Parameters

<i>i</i>	The division index to access.
----------	-------------------------------

References [divisions](#), and [i](#).

9.170.4.160 TheIndustry()

```
FCFSupport::Industry * FCFSupport::System::TheIndustry (
    int i ) [inline]
```

[Industry](#) indexing function.

Warning: if the industry at the specified index does not already exist, a new element is allocated with a NULL pointer.

Parameters

<i>i</i>	The industry index to access.
----------	-------------------------------

References [i](#), and [industries](#).

9.170.4.161 TheOwner()

```
Owner * FCFSupport::System::TheOwner (
    const char * initials ) [inline]
```

Get a car owner class instance pointer given a car owner's initials.

Parameters

<i>initials</i>	The car owner's initials.
-----------------	---------------------------

References [owners](#).

9.170.4.162 TheStation()

```
FCFSupport::Station * FCFSupport::System::TheStation (
    int i ) [inline]
```

[Station](#) indexing function.

Warning: if the station at the specified index does not already exist, a new element is allocated with a NULL pointer.

Parameters

<i>i</i>	The station index to access.
----------	------------------------------

References [i](#), and [stations](#).

9.170.4.163 Today()

```
const string FCFSupport::System::Today ( ) const [private]
```

Return today's date.

9.170.4.164 TotalCars()

```
int FCFSupport::System::TotalCars ( ) const [inline]
```

Return the total number of cars.

References [cars](#).

9.170.4.165 TotalShifts()

```
int FCFSupport::System::TotalShifts ( ) const [inline]
```

Return the total number of shifts.

References [totalShifts](#).

9.170.4.166 TrainByIndex()

```
Train * FCFSupport::System::TrainByIndex (
    int i ) [inline]
```

[Train](#) indexing function.

Warning: if the train at the specified index does not already exist, a new element is allocated with a NULL pointer.

Parameters

<i>i</i>	The train index to access.
----------	----------------------------

References [i](#), and [trains](#).

9.170.4.167 TrainByName()

```
Train * FCFSupport::System::TrainByName (
    const char * name ) [inline]
```

[Train](#) indexing (by name) function.

Warning: if the train at the specified index (name) does not already exist, a new element is allocated with a NULL pointer.

Parameters

<i>name</i>	Train name to access.
-------------	---------------------------------------

References [trainIndex](#).

9.170.4.168 TrainCarPickupCheck()

```
bool FCFSupport::System::TrainCarPickupCheck (
    Car * car,
    Train * train,
    bool boxMove,
    CarVector & consist,
    bool & didAction,
    int Px,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

Check to see if we can really pick up this car.

Parameters

<i>car</i>	The car to check.
<i>train</i>	The train to pick up the car for.
<i>boxMove</i>	Is this a box move?
<i>consist</i>	The train's consist.
<i>didAction</i>	Flag to set if something was done.
<i>Px</i>	The stop number that train is at.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.169 TrainDropAllCars()

```
void FCFSupport::System::TrainDropAllCars (
    Train * train,
    int Px,
    CarVector & consist,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

Drop all cars from a train at the current stop (usually the last stop).

Parameters

<i>train</i>	The train to drop cars from.
<i>Px</i>	The stop number that train is at.
<i>consist</i>	The train's consist.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.170 TrainDropOneCar()

```
void FCFSupport::System::TrainDropOneCar (
    Car * car,
    Train * train,
    CarVector::iterator Lx,
    CarVector & consist,
    bool & didAction,
    int Px,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

Drop a single car.

Parameters

<i>car</i>	The car to drop.
<i>train</i>	The train to drop the car from.
<i>Lx</i>	The index of the car to drop.
<i>consist</i>	The train's consist.
<i>didAction</i>	Flag to set if something was done.
<i>Px</i>	The stop number that train is at.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.171 TrainIndex()

```
int FCFSupport::System::TrainIndex (
    const FCFSupport::Train * train ) const
```

Return a train's index.

Parameters

<i>train</i>	The train to lookup.
--------------	----------------------

9.170.4.172 TrainLocalDrops()

```
void FCFSupport::System::TrainLocalDrops (
    Train * train,
    int Px,
    CarVector & consist,
    bool & didAction,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

Drop cars from a local (box move or way freight).

Parameters

<i>train</i>	The train to drop cars from.
<i>Px</i>	The stop number that train is at.
<i>consist</i>	The train's consist.
<i>didAction</i>	Flag to set if something was done.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.173 TrainLocalOriginate()

```
void FCFSupport::System::TrainLocalOriginate (
    Train * train,
    bool boxMove,
    int Px,
    CarVector & consist,
    bool & didAction,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

Make up a local train.

Parameters

<i>train</i>	The train to make up.
<i>boxMove</i>	Is this a box move?

Parameters

<i>Px</i>	The stop number that train is at.
<i>consist</i>	The train's consist.
<i>didAction</i>	Flag to set if something was done.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.174 TrainLocalPickups()

```
void FCFSupport::System::TrainLocalPickups (
    Train * train,
    bool boxMove,
    int Px,
    CarVector & consist,
    bool & didAction,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

Pick up cars for a local train (box move or way freight).

Parameters

<i>train</i>	The train to pick up cars for.
<i>boxMove</i>	Is this a box move?
<i>Px</i>	The stop number that train is at.
<i>consist</i>	The train's consist.
<i>didAction</i>	Flag to set if something was done.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.175 TrainManifestDrops()

```
void FCFSupport::System::TrainManifestDrops (
    Train * train,
    int Px,
    CarVector & consist,
    bool & didAction,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

Drop cars from a manifest freight.

Parameters

<i>train</i>	The train to drop cars from.
<i>Px</i>	The stop number that train is at.
<i>consist</i>	The train's consist.
<i>didAction</i>	Flag to set if something was done.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.176 TrainManifestPickups()

```
void FCFSupport::System::TrainManifestPickups (
    Train * train,
    bool boxMove,
    int Px,
    CarVector & consist,
    bool & didAction,
    const FCFSupport::LogMessageCallback * Log,
    FCFSupport::PrinterDevice * printer ) [private]
```

Pick up cars for a manifest freight train.

Parameters

<i>train</i>	The train to pick up cars for.
<i>boxMove</i>	Is this a box move?
<i>Px</i>	The stop number that train is at.
<i>consist</i>	The train's consist.
<i>didAction</i>	Flag to set if something was done.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.177 TrainPickupOneCar()

```
void FCFSupport::System::TrainPickupOneCar (
    Car * car,
    Train * train,
    bool boxMove,
    CarVector & consist,
    bool & didAction,
    int Px,
    CarVector::iterator Lx,
```

```
const FCFSupport::LogMessageCallback * Log,  
FCFSupport::PrinterDevice * printer ) [private]
```

Pick up one car.

Parameters

<i>car</i>	The car to possibly pick up.
<i>train</i>	The train to pick up the car for.
<i>boxMove</i>	Is this a box move?
<i>consist</i>	The train's consist.
<i>didAction</i>	Flag to set if something was done.
<i>Px</i>	The stop number that train is at.
<i>Lx</i>	Place in the train to put the car if it is picked up.
<i>Log</i>	Log message callback.
<i>printer</i>	Printer device.

9.170.4.178 TrainPrintConsistSummary()

```
void FCFSupport::System::TrainPrintConsistSummary (  
    Train * train,  
    CarVector & consist,  
    FCFSupport::PrinterDevice * printer ) [private]
```

Print a train's consist summary.

Parameters

<i>train</i>	The train to print a summary for.
<i>consist</i>	The train's consist.
<i>printer</i>	Printer device.

9.170.4.179 TrainPrintFinalSummary()

```
void FCFSupport::System::TrainPrintFinalSummary (  
    Train * train,  
    FCFSupport::PrinterDevice * printer ) [private]
```

Print a train's final summary.

Parameters

<i>train</i>	The train to print the final summary for.
<i>printer</i>	Printer device.

9.170.4.180 TrainPrintTown()

```
void FCFSupport::System::TrainPrintTown (
    const FCFSupport::Train * train,
    const FCFSupport::Station * curStation,
    FCFSupport::PrinterDevice * printer ) [private]
```

Print the town a train is in.

Parameters

<i>train</i>	The train to print the town for.
<i>curStation</i>	The current station.
<i>printer</i>	Printer device.

9.170.4.181 TrainsFile()

```
const char * FCFSupport::System::TrainsFile ( ) const [inline]
```

Return the trains file's full path name.

References [FCFSupport::PathName::FullPath\(\)](#), and [trainsFile](#).

9.170.4.182 trim()

```
string FCFSupport::System::trim (
    string line ) const [private]
```

Helper utility function to trim white space off the ends of a string.

Parameters

<i>line</i>	The string to trim.
-------------	---------------------

9.170.4.183 UpperCase()

```
const string FCFSupport::System::UpperCase (
    const string str ) const [private]
```

Convert a string to all uppercase letters.

Parameters

<i>str</i>	The string to convert.
------------	------------------------

9.170.4.184 WriteOneCarToDisk()

```
bool FCFSupport::System::WriteOneCarToDisk (
    Car * car,
    ostream & stream ) [private]
```

Function to write one car to disk.

Parameters

<i>car</i>	The car to write.
<i>stream</i>	The output stream to write to.

9.170.5 Member Data Documentation

9.170.5.1 carDest

```
Industry* FCFSupport::System::carDest [private]
```

A temporary for a car's location.

9.170.5.2 carGroups

`CarGroup*` FCFSupport::System::carGroups[`CarGroup::MaxCarGroup`] [private]

`Car` group vector.

Referenced by `TheCarGroup()`.

9.170.5.3 carMovements

`int` FCFSupport::System::carMovements [private]

The number of cars movements.

Referenced by `CarMovements()`.

9.170.5.4 cars

`CarVector` FCFSupport::System::cars [private]

`Car` vector.

Referenced by `AddCar()`, `NumberOfCars()`, `TheCar()`, and `TotalCars()`.

9.170.5.5 carsAtDest

`int` FCFSupport::System::carsAtDest [private]

The number of cars at their destinations.

Referenced by `CarsAtDest()`.

9.170.5.6 carsAtDest_carsInTransit

`int` FCFSupport::System::carsAtDest_carsInTransit [private]

The number of cars at their destinations and still in transit.

Referenced by `CarsAtDest_CarsInTransit()`.

9.170.5.7 carsAtWorkBench

```
int FCFSupport::System::carsAtWorkBench [private]
```

The number of cars at the workbench.

Referenced by [CarsAtWorkBench\(\)](#).

9.170.5.8 carsFile

```
PathName FCFSupport::System::carsFile [private]
```

Full pathname of the cars file.

Referenced by [CarsFile\(\)](#).

9.170.5.9 carsInTransit

```
int FCFSupport::System::carsInTransit [private]
```

The number of cars in transit.

Referenced by [CarsInTransit\(\)](#).

9.170.5.10 carsMoved

```
int FCFSupport::System::carsMoved [private]
```

The number of cars moved.

Referenced by [CarsMoved\(\)](#).

9.170.5.11 carsMovedMore

```
int FCFSupport::System::carsMovedMore [private]
```

The number of cars moved more then three times.

Referenced by [CarsMovedMore\(\)](#).

9.170.5.12 carsMovedOnce

```
int FCFSupport::System::carsMovedOnce [private]
```

The number of cars moved one time.

Referenced by [CarsMovedOnce\(\)](#).

9.170.5.13 carsMovedThree

```
int FCFSupport::System::carsMovedThree [private]
```

The number of cars moved three times.

Referenced by [CarsMovedThree\(\)](#).

9.170.5.14 carsMovedTwice

```
int FCFSupport::System::carsMovedTwice [private]
```

The number of cars moved two times.

Referenced by [CarsMovedTwice\(\)](#).

9.170.5.15 carsNotMoved

```
int FCFSupport::System::carsNotMoved [private]
```

The number of cars not moved.

Referenced by [CarsNotMoved\(\)](#).

9.170.5.16 carTypes

```
CarTypeMap FCFSupport::System::carTypes [private]
```

[Car](#) type map.

Referenced by [FirstCarType\(\)](#), [LastCarType\(\)](#), and [TheCarType\(\)](#).

9.170.5.17 carTypesFile

`PathName FCFSupport::System::carTypesFile [private]`

Full pathname of the car types file.

Referenced by [CarTypesFile\(\)](#).

9.170.5.18 carTypesOrder

`char FCFSupport::System::carTypesOrder[CarType::MaxCarTypes] [private]`

[Car](#) type order vector.

Referenced by [CarTypesOrder\(\)](#).

9.170.5.19 curDiv

`Division* FCFSupport::System::curDiv [private]`

Current division.

9.170.5.20 deliver

`bool FCFSupport::System::deliver [private]`

Deliver flag.

9.170.5.21 divisions

`DivisionMap FCFSupport::System::divisions [private]`

[Division](#) map.

Referenced by [FindDivisionByIndex\(\)](#), [FirstDivision\(\)](#), [LastDivision\(\)](#), [NumberOfDivisions\(\)](#), and [TheDivision\(\)](#).

9.170.5.22 indScrapYard

```
const FCFSupport::Industry FCFSupport::System::indScrapYard [private]
```

The pointer to the scrapyard.

Referenced by [IndScrapYard\(\)](#).

9.170.5.23 industries

```
IndustryMap FCFSupport::System::industries [private]
```

Industries map.

Referenced by [FindIndustryByIndex\(\)](#), [FirstIndustry\(\)](#), [IndRipTrack\(\)](#), [IndRipTrackConst\(\)](#), [LastIndustry\(\)](#), [NumberOfIndustries\(\)](#), and [TheIndustry\(\)](#).

9.170.5.24 industriesFile

```
PathName FCFSupport::System::industriesFile [private]
```

Full pathname of the industries file.

Referenced by [IndustriesFile\(\)](#).

9.170.5.25 messageBuffer

```
char FCFSupport::System::messageBuffer[2048] [private]
```

Message buffer, used for error messages mostly.

9.170.5.26 numberCars

```
int FCFSupport::System::numberCars [private]
```

The number of cars on a train.

9.170.5.27 ordersFile

`PathName` FCFSupport::System::ordersFile [private]

Full pathname of the train orders file.

Referenced by [OrdersFile\(\)](#).

9.170.5.28 originYard

`Industry*` FCFSupport::System::originYard [private]

Origin Yard.

9.170.5.29 owners

`OwnerMap` FCFSupport::System::owners [private]

[Car](#) owner map.

Referenced by [AddOwner\(\)](#), [FirstOwner\(\)](#), [LastOwner\(\)](#), and [TheOwner\(\)](#).

9.170.5.30 ownersFile

`PathName` FCFSupport::System::ownersFile [private]

Full pathname of the car owners file.

Referenced by [OwnersFile\(\)](#).

9.170.5.31 printAlpha

`bool` FCFSupport::System::printAlpha [private]

Flag for printing alphabetical lists.

Referenced by [PrintAlpha\(\)](#), and [SetPrintAlpha\(\)](#).

9.170.5.32 printAtwice

```
bool FCFSupport::System::printAtwice [private]
```

Flag for printing a second copy of alphabetical lists.

Referenced by [PrintAtwice\(\)](#), and [SetPrintAtwice\(\)](#).

9.170.5.33 printDispatch

```
bool FCFSupport::System::printDispatch [private]
```

Flag for printing a dispatcher's report.

Referenced by [PrintDispatch\(\)](#), and [SetPrintDispatch\(\)](#).

9.170.5.34 printem

```
bool FCFSupport::System::printem [private]
```

Flag for printing train movements.

Referenced by [Printem\(\)](#), and [SetPrintem\(\)](#).

9.170.5.35 printList

```
bool FCFSupport::System::printList [private]
```

Flag for printing train switch lists.

Referenced by [PrintList\(\)](#), and [SetPrintList\(\)](#).

9.170.5.36 printLtwice

```
bool FCFSupport::System::printLtwice [private]
```

Flag for printing a second copy of train switch lists.

Referenced by [PrintLtwice\(\)](#), and [SetPrintLtwice\(\)](#).

9.170.5.37 printYards

```
bool FCFSupport::System::printYards [private]
```

Flag for printing yard switch lists.

Referenced by [PrintYards\(\)](#), and [SetPrintYards\(\)](#).

9.170.5.38 ranAllTrains

```
int FCFSupport::System::ranAllTrains [private]
```

The ran all trains flag.

Referenced by [RanAllTrains\(\)](#).

9.170.5.39 sessionNumber

```
int FCFSupport::System::sessionNumber [private]
```

Current session number.

Referenced by [NextShift\(\)](#), and [SessionNumber\(\)](#).

9.170.5.40 shiftNumber

```
int FCFSupport::System::shiftNumber [private]
```

Current shift number.

Referenced by [NextShift\(\)](#), and [ShiftNumber\(\)](#).

9.170.5.41 stations

```
StationMap FCFSupport::System::stations [private]
```

[Station](#) map.

Referenced by [FirstStation\(\)](#), [LastStation\(\)](#), [NumberOfStations\(\)](#), and [TheStation\(\)](#).

9.170.5.42 statsFile

`PathName FCFSupport::System::statsFile [private]`

Full pathname of the stats file.

Referenced by [StatsFile\(\)](#).

9.170.5.43 statsPeriod

`int FCFSupport::System::statsPeriod [private]`

The current stats period.

Referenced by [StatsPeriod\(\)](#).

9.170.5.44 switchList

`SwitchList FCFSupport::System::switchList [private]`

Switch lists.

9.170.5.45 systemFile

`PathName FCFSupport::System::systemFile [private]`

Full pathname of the system file.

Referenced by [SystemFile\(\)](#).

9.170.5.46 systemName

`string FCFSupport::System::systemName [private]`

The system name.

Referenced by [SystemName\(\)](#).

9.170.5.47 totalLoads

```
int FCFSupport::System::totalLoads [private]
```

The total number of loads.

9.170.5.48 totalPickups

```
int FCFSupport::System::totalPickups [private]
```

The total number of pickups.

9.170.5.49 totalRevenueTons

```
int FCFSupport::System::totalRevenueTons [private]
```

The total number of revenue tons.

9.170.5.50 totalShifts

```
int FCFSupport::System::totalShifts [private]
```

The total number of shifts.

Referenced by [NextShift\(\)](#), and [TotalShifts\(\)](#).

9.170.5.51 totalTons

```
int FCFSupport::System::totalTons [private]
```

The total number of tons.

9.170.5.52 trainEmpties

```
int FCFSupport::System::trainEmpties [private]
```

The number of empties on a train.

9.170.5.53 trainIndex

```
TrainNameMap FCFSupport::System::trainIndex [private]
```

[Train](#) name map.

Referenced by [FindTrainByName\(\)](#), and [TrainByName\(\)](#).

9.170.5.54 trainLastLocation

```
Industry* FCFSupport::System::trainLastLocation [private]
```

A trains last location.

9.170.5.55 trainLength

```
int FCFSupport::System::trainLength [private]
```

[Train](#) length.

9.170.5.56 trainLoads

```
int FCFSupport::System::trainLoads [private]
```

The number of loads on a train.

9.170.5.57 trainLongest

```
int FCFSupport::System::trainLongest [private]
```

The longest a train has been.

9.170.5.58 trainPrintOK

```
bool FCFSupport::System::trainPrintOK [private]
```

[Train](#) print flag.

9.170.5.59 trains

```
TrainMap FCFSupport::System::trains [private]
```

[Train](#) map.

Referenced by [FindTrainByIndex\(\)](#), [FirstTrain\(\)](#), [LastTrain\(\)](#), [NumberOfTrains\(\)](#), and [TrainByIndex\(\)](#).

9.170.5.60 trainsFile

```
PathName FCFSupport::System::trainsFile [private]
```

Full pathname of the trains file.

Referenced by [TrainsFile\(\)](#).

9.170.5.61 trainTons

```
int FCFSupport::System::trainTons [private]
```

The number of tons on a train.

9.170.5.62 wayFreight

```
bool FCFSupport::System::wayFreight [private]
```

Way freight flag.

9.170.5.63 whitespace

```
const string FCFSupport::System::whitespace [static], [private]
```

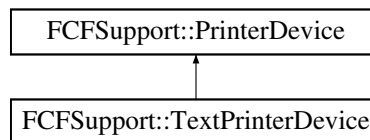
String of white space characters.

9.171 FCFSupport::TextPrinterDevice Class Reference

Derived class for printing on generic plain text printers.

```
#include <TextPrinter.h>
```

Inheritance diagram for FCFSupport::TextPrinterDevice:



Public Member Functions

- [TextPrinterDevice](#) (const string filename="", const string title="", [PageSize](#) pageSize=[Letter](#), char **outmessage=NULL)
Constructor.
- virtual bool [OpenPrinter](#) (const string filename, [PageSize](#) pageSize=[Letter](#), char **outmessage=NULL)
Member function to open the printer.
- virtual bool [ClosePrinter](#) (char **outmessage)
Close the printer.
- virtual bool [NewPage](#) (const string heading="")
Perform a page feed and print a heading.
- virtual bool [PutLine](#) (const string line)
Print out a string and follow it with a new line sequence.
- virtual bool [Put](#) (const string text)
Print a string of text.
- virtual bool [Tab](#) (int column)
Tab over to the specified column.
- virtual [~TextPrinterDevice](#) ()
Destructor.

Private Attributes

- ofstream `printerStream`
Output stream.
- int `currentColumn`
Current column.

Additional Inherited Members

9.171.1 Detailed Description

Derived class for printing on generic plain text printers.

Only the tab columns and pagination (every 60 lines or no) is implemented, that is, a very basic plain text output device.

Author

Robert Heller <heller@deepsoft.com>

9.171.2 Constructor & Destructor Documentation

9.171.2.1 TextPrinterDevice()

```
FCFSupport::TextPrinterDevice::TextPrinterDevice (
    const string filename = "",
    const string title = "",
    PageSize pageSize = Letter,
    char ** outmessage = NULL )
```

Constructor.

Create a new printer device instance from a set of parameters, all of which have default values, so this also doubles as the default base constructor.

Parameters

<i>filename</i>	Output filename.
<i>title</i>	An internal document title string.
<i>pageSize</i>	The page size to use.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.

9.171.2.2 ~TextPrinterDevice()

```
virtual FCFSupport::TextPrinterDevice::~~TextPrinterDevice ( ) [virtual]
```

Destructor.

Close the printer.

9.171.3 Member Function Documentation

9.171.3.1 ClosePrinter()

```
virtual bool FCFSupport::TextPrinterDevice::ClosePrinter (
    char ** outmessage ) [virtual]
```

Close the printer.

Parameters

<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.
-------------------	--

Reimplemented from [FCFSupport::PrinterDevice](#).

9.171.3.2 NewPage()

```
virtual bool FCFSupport::TextPrinterDevice::NewPage (
    const string heading = "" ) [virtual]
```

Perform a page feed and print a heading.

Parameters

<i>heading</i>	The heading string.
----------------	---------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.171.3.3 OpenPrinter()

```
virtual bool FCFSupport::TextPrinterDevice::OpenPrinter (
    const string filename,
    PageSize pageSize = Letter,
    char ** outmessage = NULL ) [virtual]
```

Member function to open the printer.

Parameters

<i>filename</i>	Output filename.
<i>pageSize</i>	The page size to use.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur. This parameter is hidden from the Tcl interface.

Reimplemented from [FCFSupport::PrinterDevice](#).

9.171.3.4 Put()

```
virtual bool FCFSupport::TextPrinterDevice::Put (
    const string text ) [virtual]
```

Print a string of text.

Don't include a newline.

Parameters

<i>text</i>	The string to print.
-------------	----------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.171.3.5 PutLine()

```
virtual bool FCFSupport::TextPrinterDevice::PutLine (
    const string line ) [virtual]
```

Print out a string and follow it with a new line sequence.

Parameters

<i>line</i>	The line to print.
-------------	--------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.171.3.6 Tab()

```
virtual bool FCFSupport::TextPrinterDevice::Tab (  
    int column ) [virtual]
```

Tab over to the specified column.

Parameters

<i>column</i>	The desired tab column.
---------------	-------------------------

Reimplemented from [FCFSupport::PrinterDevice](#).

9.171.4 Member Data Documentation

9.171.4.1 currentColumn

```
int FCFSupport::TextPrinterDevice::currentColumn [private]
```

Current column.

9.171.4.2 printerStream

```
ofstream FCFSupport::TextPrinterDevice::printerStream [private]
```

Output stream.

9.172 CTCPanel::ThreeWaySW Class Reference

Three Way Switch (turnout) object type.

Public Member Functions

- [ThreeWaySW](#) (name, _ctcpanel, _canvas,...)
Construct a [ThreeWaySW](#) object.
- [~ThreeWaySW](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (state).
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the switch.

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).
- [state](#)
The state of the points.

9.172.1 Detailed Description

Three Way Switch (turnout) object type.

These are on the schematic and represent a switch on the Schematic.

Parameters

_ctcpanel	The CTCPanel megawidget.
_canvas	The schematic canvas to draw the switch on.

Parameters

...	<p>Options:</p> <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default CP1). • -label The label of the switch (default "1"). • -orientation The orientation (8-way) of the switch (readonly, default 0). • -flipped Whether or not the switch is flipped (readonly, default no). • -statecommand A command to run to get the switch's state (default {}). • -occupiedcommand A command to run to find out if the switch is occupied (default {}).
-----	--

Defined coords terminals:

- Common Points.
- Main Mainline.
- L Divergence Left branch.
- R Divergence Right branch.

Defined values (states):

- Normal Points are aligned for the mainline.
- Right Points are aligned for the Right branch.
- Left Points are aligned for the Left branch.
- Unknown Point are not aligned for any route (eg the points are in motion).

Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.172.2 Constructor & Destructor Documentation

9.172.2.1 ThreeWaySW()

```
CTCPanel::ThreeWaySW::ThreeWaySW (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [ThreeWaySW](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the ThreeWaySW on.
<code>...</code>	Option list.

9.172.2.2 ~ThreeWaySW()

```
CTCPanel::ThreeWaySW::~~ThreeWaySW ( )
```

Clean up all data objects and free up all resources.

9.172.3 Member Function Documentation**9.172.3.1 _configureLabel()**

```
CTCPanel::ThreeWaySW::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.172.3.2 geti()

```
CTCPanel::ThreeWaySW::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.172.3.3 getv()

```
CTCPanel::ThreeWaySW::getv ( )
```

Method to get our value (state).

9.172.3.4 `invoke()`

```
CTCPanel::ThreeWaySW::invoke ( )
```

Method to invoke the switch.

9.172.3.5 `seti()`

```
CTCPanel::ThreeWaySW::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.172.3.6 `setv()`

```
CTCPanel::ThreeWaySW::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.172.4 Member Data Documentation

9.172.4.1 `canvas`

```
CTCPanel::ThreeWaySW::canvas [private]
```

The canvas component (parent widget component).

9.172.4.2 ctcp panel

```
CTCPanel::ThreeWaySW::ctcp panel [private]
```

The CTC Panel component (parent widget).

9.172.4.3 state

```
CTCPanel::ThreeWaySW::state [private]
```

The state of the points.

9.173 CTCPanel::ThroughYard Class Reference

Through Yard object type.

Public Member Functions

- [ThroughYard](#) (name, _ctcp panel, _canvas,...)
Construct a [ThroughYard](#) object.
- [~ThroughYard](#) ()
Clean up all data objects and free up all resources.
- [setv](#) (value)
Method to set out value (state).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the [ThroughYard](#).

Private Member Functions

- [_configureLabel](#) (option, value)
Method to update the label option.

Private Attributes

- [ctcp panel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).

Static Private Attributes

- static [_ThroughYard_Poly](#)

Polygon coordinates for a through yard.

9.173.1 Detailed Description

Through Yard object type.

These are on the schematic and represent a piece of track on the Schematic.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the ThroughYard on.
...	Options: <ul style="list-style-type: none"> • -x The x coordinate of the object (readonly, default 0). • -y The y coordinate of the object (readonly, default 0). • -controlpoint The name of the control point this label is part of (readonly, default Yard). • -label The label of the ThroughYard (default "1"). • -position The position of the label (readonly, default below). • -orientation The orientation (8-way) (readonly, default 0). • -flipped Whether the yard is flipped (readonly, default no). • -occupiedcommand A command to run to find out if the ThroughYard is occupied (default {}).

Defined coords terminals:

- EntryL Left yard throat.
- EntryR Right yard throat.

Defined values (states): none. Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.173.2 Constructor & Destructor Documentation

9.173.2.1 ThroughYard()

```
CTCPanel::ThroughYard::ThroughYard (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a [ThroughYard](#) object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The schematic canvas to draw the ThroughYard on.
<code>...</code>	Option list.

9.173.2.2 ~ThroughYard()

```
CTCPanel::ThroughYard::~~ThroughYard ( )
```

Clean up all data objects and free up all resources.

9.173.3 Member Function Documentation

9.173.3.1 _configureLabel()

```
CTCPanel::ThroughYard::_configureLabel (
    option ,
    value ) [private]
```

Method to update the label option.

9.173.3.2 geti()

```
CTCPanel::ThroughYard::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.173.3.3 `invoke()`

```
CTCPanel::ThroughYard::invoke ( )
```

Method to invoke the [ThroughYard](#).

9.173.3.4 `seti()`

```
CTCPanel::ThroughYard::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.173.3.5 `setv()`

```
CTCPanel::ThroughYard::setv (
    value )
```

Method to set out value (state).

Parameters

<i>value</i>	The new state to set.
--------------	-----------------------

9.173.4 Member Data Documentation

9.173.4.1 `_ThroughYard_Poly`

```
CTCPanel::ThroughYard::_ThroughYard_Poly [static], [private]
```

Polygon coordinates for a through yard.

9.173.4.2 canvas

CTCPanel::ThroughYard::canvas [private]

The canvas component (parent widget component).

9.173.4.3 ctcpnl

CTCPanel::ThroughYard::ctcpnl [private]

The CTC Panel component (parent widget).

9.174 TTSupport::TimeRange Class Reference

The [TimeRange](#) class implements a range of times.

```
#include <Station.h>
```

Public Member Functions

- [TimeRange](#) (double from_=0.0, double to_=0.0)
Construct a time range, from a start and end time.
- double [From](#) () const
Return the low end of the range.
- double [To](#) () const
Return the high end of the range.
- bool [ContainsTime](#) (double time) const
Does this interval contain the specified time?
- bool [operator<](#) (const [TimeRange](#) &other) const
Less than operator.
- bool [operator>](#) (const [TimeRange](#) &other) const
Greater than operator.
- bool [operator==](#) (const [TimeRange](#) &other) const
Equality to operator.
- bool [operator<=](#) (const [TimeRange](#) &other) const
Less than or equal operator.
- bool [operator>=](#) (const [TimeRange](#) &other) const
Greater than or equal operator.
- [TimeRange](#) (const [TimeRange](#) &other)
Copy constructor: create a clone of a [TimeRange](#).
- [TimeRange](#) & [operator=](#) (const [TimeRange](#) &other)
Assign a [TimeRange](#) to another [TimeRange](#).
- ostream & [Write](#) (ostream &stream) const
Write ourselves to an output stream.
- istream & [Read](#) (istream &stream)
Read ourselves from an input stream.

Private Attributes

- double [from](#)
Start time.
- double [to](#)
End time.

9.174.1 Detailed Description

The [TimeRange](#) class implements a range of times.

Author

Robert Heller <heller@deepsoft.com>

9.174.2 Constructor & Destructor Documentation

9.174.2.1 TimeRange() [1/2]

```
TTSupport::TimeRange::TimeRange (
    double from_ = 0.0,
    double to_ = 0.0 ) [inline]
```

Construct a time range, from a start and end time.

Parameters

<i>from_</i>	The start time.
<i>to_</i>	The end time.

References [from](#), and [to](#).

9.174.2.2 TimeRange() [2/2]

```
TTSupport::TimeRange::TimeRange (
    const TimeRange & other ) [inline]
```

Copy constructor: create a clone of a [TimeRange](#).

Parameters

<i>other</i>	The other TimeRange object.
--------------	---

References [from](#), and [to](#).

9.174.3 Member Function Documentation

9.174.3.1 ContainsTime()

```
bool TTSupport::TimeRange::ContainsTime (
    double time ) const [inline]
```

Does this interval contain the specified time?

Parameters

<i>time</i>	The time to check for.
-------------	------------------------

References [from](#), and [to](#).

9.174.3.2 From()

```
double TTSupport::TimeRange::From ( ) const [inline]
```

Return the low end of the range.

References [from](#).

9.174.3.3 operator<()

```
bool TTSupport::TimeRange::operator< (
    const TimeRange & other ) const [inline]
```

Less than operator.

Parameters

<i>other</i>	The time range to compare to.
--------------	-------------------------------

References [from](#), and [to](#).

9.174.3.4 operator<=()

```
bool TTSupport::TimeRange::operator<= (
    const TimeRange & other ) const [inline]
```

Less than or equal operator.

Parameters

<i>other</i>	The time range to compare to.
--------------	-------------------------------

9.174.3.5 operator=()

```
TimeRange & TTSupport::TimeRange::operator= (
    const TimeRange & other ) [inline]
```

Assign a [TimeRange](#) to another [TimeRange](#).

Parameters

<i>other</i>	The other TimeRange object.
--------------	---

References [from](#), and [to](#).

9.174.3.6 operator==()

```
bool TTSupport::TimeRange::operator==(
    const TimeRange & other ) const [inline]
```

Equality to operator.

Parameters

<i>other</i>	The time range to compare to.
--------------	-------------------------------

References [from](#), and [to](#).

9.174.3.7 operator>()

```
bool TTSupport::TimeRange::operator> (
    const TimeRange & other ) const [inline]
```

Greater than operator.

Parameters

<i>other</i>	The time range to compare to.
--------------	-------------------------------

References [from](#), and [to](#).

9.174.3.8 operator>=()

```
bool TTSupport::TimeRange::operator>= (
    const TimeRange & other ) const [inline]
```

Greater than or equal operator.

Parameters

<i>other</i>	The time range to compare to.
--------------	-------------------------------

9.174.3.9 Read()

```
istream & TTSupport::TimeRange::Read (
    istream & stream )
```

Read ourselves from an input stream.

Parameters

<i>stream</i>	The stream to read from.
---------------	--------------------------

9.174.3.10 To()

```
double TTSupport::TimeRange::To ( ) const [inline]
```

Return the high end of the range.

References [to](#).

9.174.3.11 Write()

```
ostream & TTSupport::TimeRange::Write (
    ostream & stream ) const
```

Write ourselves to an output stream.

Parameters

<i>stream</i>	The stream to write to.
---------------	-------------------------

9.174.4 Member Data Documentation**9.174.4.1 from**

```
double TTSupport::TimeRange::from [private]
```

Start time.

Referenced by [ContainsTime\(\)](#), [From\(\)](#), [operator<\(\)](#), [operator=\(\)](#), [operator==\(\)](#), [operator>\(\)](#), and [TimeRange\(\)](#).

9.174.4.2 to

```
double TTSupport::TimeRange::to [private]
```

End time.

Referenced by [ContainsTime\(\)](#), [operator<\(\)](#), [operator=\(\)](#), [operator==\(\)](#), [operator>\(\)](#), [TimeRange\(\)](#), and [To\(\)](#).

9.175 TTSupport::TimeTableSystem Class Reference

This is the main Time Table Class.

```
#include <TimeTableSystem.h>
```

Public Member Functions

- [TimeTableSystem](#) (const string filename, char **outmessage=NULL)
The constructor that creates a time table system from an existing file.
- [TimeTableSystem](#) (const string name, int timescale, int timeinterval)
The constructor that creates a new, empty time table system from scratch, given a set of esential parameters.
- [~TimeTableSystem](#) ()
Destructor.
- int [AddStation](#) (string name, double smile)
Add a new station to the system.
- int [FindStationByName](#) (string name)
Find a station by name.
- int [NumberOfStations](#) () const
Number of stations.
- [TTSupport::Station * lthStation](#) (int i)
Return lth station object.
- const char * [StationName](#) (int i) const
Return the lth station name.
- double [SMile](#) (int i) const
Return the lth station's scale mile location.
- double [TotalLength](#) () const
The total length of the route in scale miles.
- int [DuplicateStationIndex](#) (int i) const
The duplicate station index for a given station.
- void [SetDuplicateStationIndex](#) (int i, int dup)
Set the duplicate station index for a given station.
- [StorageTrack * AddStorageTrack](#) (int i, string name)
Add a storage track to a station.
- [StorageTrack * FindStorageTrack](#) (int i, string name)
Find a storage track at a station.
- [Cab * AddCab](#) (string name, string color)

- Add a new cab to the system.*

 - int [NumberOfCabs](#) () const

The number of cabs.
- [Train](#) * [AddTrain](#) (string [name](#), string number, int speed, int classnumber, int departure, int start=0, int end=-1)

Add a train to the system, short version.
- [Train](#) * [AddTrainLongVersion](#) (string [name](#), string number, int speed, int classnumber, int departure, int start, int end, const [doubleVector](#) *layoverVector, const [stringVector](#) *cabnameVector, const [stringVector](#) *storageTrack←
Vector, char **outmessage=NULL)

Add a train to the system, long version (includes storage track checking).
- bool [DeleteTrain](#) (string number, char **outmessage=NULL)

Delete a train.
- [Cab](#) * [FindCab](#) (string [name](#)) const

Find a cab (by name).
- [Train](#) * [FindTrainByName](#) (string [name](#)) const

Find a train by name.
- [Train](#) * [FindTrainByNumber](#) (string number) const

Find a train by number (or symbol).
- int [NumberOfTrains](#) () const

Return the number of trains.
- int [NumberOfNotes](#) () const

Return the number of notes.
- const char * [Note](#) (int i)

Return the ith note (1-based!) as a string.
- int [AddNote](#) (string newnote)

Add a note to the notes vector.
- bool [SetNote](#) (int i, string note)

Set the ith note (1-based!).
- const char * [GetPrintOption](#) (const char *key) const

Fetch a print option.
- void [SetPrintOption](#) (const char *key, string value)

Set a print option.
- bool [WriteNewTimeTableFile](#) (string filename="TimeTableFile.tt", bool setfilename=false, char **outmessage=NULL)

Write out a Time Table System to a new file.
- bool [WriteOldTimeTableFile](#) (char **outmessage=NULL)

Write an old time table file.
- int [TimeScale](#) () const

Return time scale.
- int [TimeInterval](#) () const

Return time interval.
- const char * [Name](#) () const

Return the name of the system.
- const char * [Filename](#) () const

Return file pathname.
- bool [CreateLaTeXTimetable](#) (string filename, char **outmessage=NULL)

Create a LaTeX file for generating a (hard copy) Employee Timetable.
- CabNameMap::const_iterator [FirstCab](#) () const

First cab.

- CabNameMap::const_iterator [LastCab](#) () const
Last cab.
- TrainNumberMap::const_iterator [FirstTrain](#) () const
First train.
- TrainNumberMap::const_iterator [LastTrain](#) () const
Last train.
- OptionHashMap::const_iterator [FirstPrintOption](#) () const
First Print option.
- OptionHashMap::const_iterator [LastPrintOption](#) () const
Last Print option.

Protected Member Functions

- [TimeTableSystem](#) ()
The default constructor.

Private Member Functions

- string [ReadNote](#) (istream &in) const
Read in a note.
- ostream & [WriteNote](#) (ostream &out, string note) const
Write out a note.
- bool [MakeTimeTableGroupByClass](#) (ostream &out, [TrainList](#) &allTrains, [TrainList](#) &forwardTrains, [TrainList](#) &backwardTrains, char **outmessage=NULL)
Make a time table grouped by class.
- bool [MakeTimeTableGroupManually](#) (ostream &out, int maxTrains, [TrainList](#) &allTrains, [TrainList](#) &forwardTrains, [TrainList](#) &backwardTrains, char **outmessage=NULL)
Make a time table grouped manually.
- bool [MakeTimeTableOneTable](#) (ostream &out, [TrainList](#) &allTrains, [TrainList](#) &forwardTrains, [TrainList](#) &backwardTrains, string header, string sectionTOP, char **outmessage=NULL)
Make a time table as a single table.
- bool [MakeTimeTableOneTableStationsLeft](#) (ostream &out, [TrainList](#) &trains, string header, string sectionTOP, char **outmessage=NULL)
Make a time table as a single table, with the stations on the left (single direction trains).
- bool [MakeTimeTableOneTableStationsCenter](#) (ostream &out, [TrainList](#) &forwardTrains, [TrainList](#) &backwardTrains, string header, string sectionTOP, char **outmessage=NULL)
Make a time table as a single table, with the stations in the center (bi-directional trains).
- void [ComputeTimes](#) ([TrainTimesAtStation](#) ×AtStations, [TrainList](#) &trains)
Precompute station times, given a list of trains.

Private Attributes

- string [name](#)
The name of the time table system.
- [PathName](#) [filepath](#)
The pathname of the file the system was loaded from.
- int [timescale](#)
Time scale.
- int [timeinterval](#)
Time interval.
- [StationVector](#) [stations](#)
Station stop vector.
- [CabNameMap](#) [cabs](#)
Cap name map.
- [TrainNumberMap](#) [trains](#)
Train number/symbol map.
- vector< string > [notes](#)
Notes.
- [OptionHashMap](#) [printOptions](#)
Print option hash table.
- bool [TOCP](#)
Table Of Contents?
- string [DirectionName](#)
Direction Name.

9.175.1 Detailed Description

This is the main Time Table Class.

It implements all of the basic data and algorithms used in the Time Table program.

This class includes code to load a set of stations and the trains that run between these stations, along with code to read and write a time table file and code to create a formatted time table, suitable for printing (by way of LaTeX).

Author

Robert Heller <heller@deepsoft.com>

9.175.2 Constructor & Destructor Documentation

9.175.2.1 TimeTableSystem() [1/3]

```
TTSupport::TimeTableSystem::TimeTableSystem ( ) [inline], [protected]
```

The default constructor.

This is protected to prevent the creation of an uninitialized class instance, which would be an error. Making the default constructor a protected method will cause a compiler error when application code attempts to create a [TimeTableSystem](#) instance without using one of the parameterized constructor. There is no meaningful way to create a proper [TimeTableSystem](#) without supplying some parameters.

9.175.2.2 TimeTableSystem() [2/3]

```
TTSupport::TimeTableSystem::TimeTableSystem (
    const string filename,
    char ** outmessage = NULL )
```

The constructor that creates a time table system from an existing file.

The file is read in and the class is properly initialized from the data in the file.

Parameters

<i>filename</i>	The name of the file to load.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.175.2.3 TimeTableSystem() [3/3]

```
TTSupport::TimeTableSystem::TimeTableSystem (
    const string name,
    int timescale,
    int timeinterval )
```

The constructor that creates a new, empty time table system from scratch, given a set of esential parameters.

Parameters

<i>name</i>	The name of the time table system.
<i>timescale</i>	Number of time units per 24 hours. There are 1440 minutes in 24 hours.
<i>timeinterval</i>	The tick frequency in time units.

9.175.2.4 ~TimeTableSystem()

```
TTSupport::TimeTableSystem::~~TimeTableSystem ( )
```

Destructor.

Properly clean up and free up all used space.

9.175.3 Member Function Documentation

9.175.3.1 AddCab()

```
Cab * TTSupport::TimeTableSystem::AddCab (
    string name,
    string color )
```

Add a new cab to the system.

With DC systems this would be an actual cab. With DCC systems, this can be used to define a logical operator for the train. The color is used for visual distinction. A pointer to the new cab object is returned.

Parameters

<i>name</i>	The name of the cab.
<i>color</i>	The color of the cab.

9.175.3.2 AddNote()

```
int TTSupport::TimeTableSystem::AddNote (
    string newnote ) [inline]
```

Add a note to the notes vector.

Parameters

<i>newnote</i>	The text of the new note.
----------------	---------------------------

References [notes](#).

9.175.3.3 AddStation()

```
int TTSupport::TimeTableSystem::AddStation (
    string name,
    double smile )
```

Add a new station to the system.

Creates a new [Station](#) class instance and adds it to the station vector. Stations must be added in order of their scale mile location. If the new station is out of order, -1 is returned and the station is not added!

Parameters

<i>name</i>	The name of the station.
<i>smile</i>	The scale mile along the route where the station is located.

9.175.3.4 AddStorageTrack()

```
StorageTrack * TTSupport::TimeTableSystem::AddStorageTrack (
    int i,
    string name ) [inline]
```

Add a storage track to a station.

Sometimes stations, especially major terminals, have extra tracks for storing terminating and originating trains. Returns the NULL pointer if the index is out of range. Otherwise returns the pointer to the new [StorageTrack](#) object.

Parameters

<i>i</i>	The index of the station to be updated.
<i>name</i>	The name for the new storage track.

References [i](#), [name](#), and [stations](#).

9.175.3.5 AddTrain()

```
Train * TTSupport::TimeTableSystem::AddTrain (
    string name,
    string number,
```

```

    int speed,
    int classnumber,
    int departure,
    int start = 0,
    int end = -1 )

```

Add a train to the system, short version.

Creates a new [Train](#) object and adds it to the train map. The short version assumes that the train does not layover at any of the stops. Layover times can be added later. Returns a pointer to the new [Train](#) object.

Parameters

<i>name</i>	The name of the train.
<i>number</i>	The number (or symbol) of the train.
<i>speed</i>	The trains maximum speed.
<i>classnumber</i>	The class (inverse priority) of the train.
<i>departure</i>	The train's departure time.
<i>start</i>	The train's origin station index. Defaults to the first station.
<i>end</i>	The train's destination station index. Defaults to the last station.

9.175.3.6 AddTrainLongVersion()

```

Train * TTSupport::TimeTableSystem::AddTrainLongVersion (
    string name,
    string number,
    int speed,
    int classnumber,
    int departure,
    int start,
    int end,
    const doubleVector * layoverVector,
    const stringVector * cabnameVector,
    const stringVector * storageTrackVector,
    char ** outmessage = NULL )

```

Add a train to the system, long version (includes storage track checking).

This version includes layover times, cabnames, and storage track assignments. Returns a pointer to the new [Train](#) object or the NULL pointer if there was an error, in which case the error message will be stored in the pointer provided.

Parameters

<i>name</i>	The name of the train.
<i>number</i>	The number (or symbol) of the train.
<i>speed</i>	The trains maximum speed.
<i>classnumber</i>	The class (inverse priority) of the train.
<i>departure</i>	The train's departure time.
<i>start</i>	The train's origin station index.
<i>end</i>	The train's destination station index.
<i>layoverVector</i>	The train's layover vector.
<i>cabnameVector</i>	The train's departure cab name vector.
<i>storageTrackVector</i>	The train's storage track name vector.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.175.3.7 ComputeTimes()

```
void TTSupport::TimeTableSystem::ComputeTimes (
    TrainTimesAtStation & timesAtStations,
    TrainList & trains ) [private]
```

Precompute station times, given a list of trains.

This helper function creates the table cell information for a time table.

Parameters

<i>timesAtStations</i>	The time table matrix to be filled in.
<i>trains</i>	A list of trains to process.

9.175.3.8 CreateLaTeXTimetable()

```
bool TTSupport::TimeTableSystem::CreateLaTeXTimetable (
    string filename,
    char ** outmessage = NULL )
```

Create a LaTeX file for generating a (hard copy) Employee Timetable.

This method create a LaTeX source file from the information in the time table structure. It access various print options to control how the LaTeX file is generated.

Parameters

<i>filename</i>	The name of the LaTeX file to create.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.175.3.9 DeleteTrain()

```
bool TTSupport::TimeTableSystem::DeleteTrain (
    string number,
    char ** outmessage = NULL )
```

Delete a train.

Returns true if the train was successfully deleted and false if not. If the train was not deleted, an error message will be provided in the pointer provided.

Parameters

<i>number</i>	The train number or symbol.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.175.3.10 DuplicateStationIndex()

```
int TTSupport::TimeTableSystem::DuplicateStationIndex (
    int i ) const [inline]
```

The duplicate station index for a given station.

Only meaningful for out and back type layouts or layouts that have shared trackage. This would be stations along shared trackage. Returns -1 if the index is out of range or if there is not a duplicate station for the *i*th station.

Parameters

<i>i</i>	The index of the station.
----------	---------------------------

References [i](#), and [stations](#).

9.175.3.11 Filename()

```
const char * TTSupport::TimeTableSystem::Filename ( ) const [inline]
```

Return file pathname.

References [filepath](#), and [TTSupport::PathName::FullPath\(\)](#).

9.175.3.12 FindCab()

```
Cab * TTSupport::TimeTableSystem::FindCab (
    string name ) const
```

Find a cab (by name).

Returns the pointer to the named cab or NULL if the cab was not found.

Parameters

<i>name</i>	The cab name to look for.
-------------	---------------------------

9.175.3.13 FindStationByName()

```
int TTSupport::TimeTableSystem::FindStationByName (
    string name )
```

Find a station by name.

Returns the index of the station or -1 if the station cannot be found.

Parameters

<i>name</i>	The name of the station.
-------------	--------------------------

9.175.3.14 FindStorageTrack()

```
StorageTrack * TTSupport::TimeTableSystem::FindStorageTrack (
    int i,
    string name ) [inline]
```

Find a storage track at a station.

Sometimes stations, especially major terminals, have extra tracks for storing terminating and originating trains. Returns the NULL pointer if the index is out of range or if there is no storage track with the specified name. Otherwise the [StorageTrack](#) object pointer is returned.

Parameters

<i>i</i>	The index of the station to be updated.
<i>name</i>	The name of the storage track.

References [i](#), [name](#), and [stations](#).

9.175.3.15 FindTrainByName()

```
Train * TTSupport::TimeTableSystem::FindTrainByName (
    string name ) const
```

Find a train by name.

Returns the pointer to the named train or NULL if the train was not found.

Parameters

<i>name</i>	The train name to look for.
-------------	-----------------------------

9.175.3.16 FindTrainByNumber()

```
Train * TTSupport::TimeTableSystem::FindTrainByNumber (
    string number ) const
```

Find a train by number (or symbol).

Returns the pointer to the train or NULL if the train was not found.

Parameters

<i>number</i>	The train number (or symbol) to look for.
---------------	---

9.175.3.17 FirstCab()

```
CabNameMap::const_iterator TTSupport::TimeTableSystem::FirstCab ( ) const [inline]
```

First cab.

Return a const iterator for the first cab.

References [cabs](#).

9.175.3.18 FirstPrintOption()

```
OptionHashMap::const_iterator TTSupport::TimeTableSystem::FirstPrintOption ( ) const [inline]
```

First Print option.

Return a const iterator for the first print option.

References [printOptions](#).

9.175.3.19 FirstTrain()

```
TrainNumberMap::const_iterator TTSupport::TimeTableSystem::FirstTrain ( ) const [inline]
```

First train.

Return a const iterator for the first train.

References [trains](#).

9.175.3.20 GetPrintOption()

```
const char * TTSupport::TimeTableSystem::GetPrintOption (
    const char * key ) const [inline]
```

Fetch a print option.

Returns the value of a specified print option or the empty string if the print option was not found.

Parameters

<i>key</i>	The name of the print option.
------------	-------------------------------

References [printOptions](#).

9.175.3.21 IthStation()

```
TTSupport::Station * TTSupport::TimeTableSystem::IthStation (
    int i ) [inline]
```

Return Ith station object.

Returns the NULL pointer if the index is out of range.

Parameters

<i>i</i>	The index of the station.
----------	---------------------------

References [i](#), and [stations](#).

9.175.3.22 LastCab()

```
CabNameMap::const_iterator TTSupport::TimeTableSystem::LastCab ( ) const [inline]
```

Last cab.

Return a const iterator for the last cab.

References [cabs](#).

9.175.3.23 LastPrintOption()

```
OptionHashMap::const_iterator TTSupport::TimeTableSystem::LastPrintOption ( ) const [inline]
```

Last Print option.

Return a const iterator for the last print option.

References [printOptions](#).

9.175.3.24 LastTrain()

```
TrainNumberMap::const_iterator TTSupport::TimeTableSystem::LastTrain ( ) const [inline]
```

Last train.

Return a const iterator for the last train.

References [trains](#).

9.175.3.25 MakeTimeTableGroupByClass()

```
bool TTSupport::TimeTableSystem::MakeTimeTableGroupByClass (
    ostream & out,
    TrainList & allTrains,
    TrainList & forwardTrains,
    TrainList & backwardTrains,
    char ** outmessage = NULL ) [private]
```

Make a time table grouped by class.

Writes a time table LaTeX file grouped by train class. Each class will have its own table in its own section. Returns true if successfull and false if there were problems (errors).

Parameters

<i>out</i>	The LaTeX output stream.
<i>allTrains</i>	A list of all of the trains.
<i>forwardTrains</i>	A list of all forward moving trains.
<i>backwardTrains</i>	A list of all backward moving trains.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.175.3.26 MakeTimeTableGroupManually()

```
bool TTSupport::TimeTableSystem::MakeTimeTableGroupManually (
    ostream & out,
    int maxTrains,
    TrainList & allTrains,
    TrainList & forwardTrains,
    TrainList & backwardTrains,
    char ** outmessage = NULL ) [private]
```

Make a time table grouped manually.

Writes a time table LaTeX file grouped manually. Returns true if successfull and false if there were problems (errors).

Parameters

<i>out</i>	The LaTeX output stream.
<i>maxTrains</i>	The maximum number of trains per table.
<i>allTrains</i>	A list of all of the trains.
<i>forwardTrains</i>	A list of all forward moving trains.
<i>backwardTrains</i>	A list of all backward moving trains.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.175.3.27 MakeTimeTableOneTable()

```
bool TTSupport::TimeTableSystem::MakeTimeTableOneTable (
    ostream & out,
    TrainList & allTrains,
    TrainList & forwardTrains,
    TrainList & backwardTrains,
    string header,
    string sectionTOP,
    char ** outmessage = NULL ) [private]
```

Make a time table as a single table.

Writes a time table LaTeX file with all trains in a single table. This only makes sense if the total number of trains is small.

Parameters

<i>out</i>	The LaTeX output stream.
<i>allTrains</i>	A list of all of the trains.
<i>forwardTrains</i>	A list of all forward moving trains.
<i>backwardTrains</i>	A list of all backward moving trains.
<i>header</i>	String (LaTeX code) to use for the time table header.
<i>sectionTOP</i>	String (LaTeX code) to use for the section start.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.175.3.28 MakeTimeTableOneTableStationsCenter()

```
bool TTSupport::TimeTableSystem::MakeTimeTableOneTableStationsCenter (
    ostream & out,
    TrainList & forwardTrains,
    TrainList & backwardTrains,
    string header,
```

```
string sectionTOP,
char ** outmessage = NULL ) [private]
```

Make a time table as a single table, with the stations in the center (bi-directional trains).

Parameters

<i>out</i>	The LaTeX output stream.
<i>forwardTrains</i>	A list of all forward moving trains.
<i>backwardTrains</i>	A list of all backward moving trains.
<i>header</i>	String (LaTeX code) to use for the time table header.
<i>sectionTOP</i>	String (LaTeX code) to use for the section start.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.175.3.29 MakeTimeTableOneTableStationsLeft()

```
bool TTSupport::TimeTableSystem::MakeTimeTableOneTableStationsLeft (
    ostream & out,
    TrainList & trains,
    string header,
    string sectionTOP,
    char ** outmessage = NULL ) [private]
```

Make a time table as a single table, with the stations on the left (single direction trains).

Parameters

<i>out</i>	The LaTeX output stream.
<i>trains</i>	A list of the trains.
<i>header</i>	String (LaTeX code) to use for the time table header.
<i>sectionTOP</i>	String (LaTeX code) to use for the section start.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

9.175.3.30 Name()

```
const char * TTSupport::TimeTableSystem::Name ( ) const [inline]
```

Return the name of the system.

References [name](#).

9.175.3.31 Note()

```
const char * TTSupport::TimeTableSystem::Note (
    int i ) [inline]
```

Return the ith note (1-based!) as a string.

Returns the NULL pointer if the index is out of range.

Parameters

<i>i</i>	The note index. The first note is at index 1, not 0!.
----------	---

References [i](#), and [notes](#).

9.175.3.32 NumberOfCabs()

```
int TTSupport::TimeTableSystem::NumberOfCabs ( ) const [inline]
```

The nymber of cabs.

References [cabs](#).

9.175.3.33 NumberOfNotes()

```
int TTSupport::TimeTableSystem::NumberOfNotes ( ) const [inline]
```

Return the number of notes.

References [notes](#).

9.175.3.34 NumberOfStations()

```
int TTSupport::TimeTableSystem::NumberOfStations ( ) const [inline]
```

Number of stations.

Returns the number of stations in the system.

References [stations](#).

9.175.3.35 NumberOfTrains()

```
int TTSupport::TimeTableSystem::NumberOfTrains ( ) const [inline]
```

Return the number of trains.

References [trains](#).

9.175.3.36 ReadNote()

```
string TTSupport::TimeTableSystem::ReadNote (
    istream & in ) const [private]
```

Read in a note.

Reads a note from a stream. Returns the note text.

Parameters

<i>in</i>	Stream to read from.
-----------	----------------------

9.175.3.37 SetDuplicateStationIndex()

```
void TTSupport::TimeTableSystem::SetDuplicateStationIndex (
    int i,
    int dup ) [inline]
```

Set the duplicate station index for a given station.

Only meaningful for out and back type layouts or layouts that have shared trackage. This would be stations along shared trackage. setting the duplicate station index indicates there is no duplicate station

Parameters

<i>i</i>	The index of the station to be updated.
<i>dup</i>	The other station index sharing this station location.

References [i](#), and [stations](#).

9.175.3.38 SetNote()

```
bool TTSupport::TimeTableSystem::SetNote (
    int i,
    string note ) [inline]
```

Set the *i*th note (1-based!).

Updates the text of the specified note. Returns true if the note was updated or false if the index was out of range.

Parameters

<i>i</i>	The note index. The first note is at index 1, not 0!.
<i>note</i>	The new text for the note.

References [i](#), and [notes](#).

9.175.3.39 SetPrintOption()

```
void TTSupport::TimeTableSystem::SetPrintOption (
    const char * key,
    string value ) [inline]
```

Set a print option.

Sets the value of a print option. Creates a new hash table element if the specified print option does not already exist.

Parameters

<i>key</i>	The name of the print option to be set.
<i>value</i>	The value to set the print option to.

References [printOptions](#).

9.175.3.40 SMile()

```
double TTSupport::TimeTableSystem::SMile (
    int i ) const [inline]
```

Return the *l*th station's scale mile location.

Returns -1.0 if the index is out of range.

Parameters

<i>i</i>	The index of the station.
----------	---------------------------

References [i](#), and [stations](#).

9.175.3.41 StationName()

```
const char * TTSupport::TimeTableSystem::StationName (  
    int i ) const [inline]
```

Return the *l*th station name.

Returns the NULL pointer if the index is out of range.

Parameters

<i>i</i>	The index of the station.
----------	---------------------------

References [i](#), and [stations](#).

9.175.3.42 TimeInterval()

```
int TTSupport::TimeTableSystem::TimeInterval ( ) const [inline]
```

Return time interval.

References [timeinterval](#).

9.175.3.43 TimeScale()

```
int TTSupport::TimeTableSystem::TimeScale ( ) const [inline]
```

Return time scale.

References [timescale](#).

9.175.3.44 TotalLength()

```
double TTSupport::TimeTableSystem::TotalLength ( ) const [inline]
```

The total length of the route in scale miles.

This is just the scale mile location of the last station along the route.

References [stations](#).

9.175.3.45 WriteNewTimeTableFile()

```
bool TTSupport::TimeTableSystem::WriteNewTimeTableFile (
    string filename = "TimeTableFile.tt",
    bool setfilename = false,
    char ** outmessage = NULL )
```

Write out a Time Table System to a new file.

The current contents of the time table is written to a new time table file. Returns true if successful and false if not.

Parameters

<i>filename</i>	The name of the file to write (if empty, use existing name, if available).
<i>setfilename</i>	Change the filename if true.
<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.

Referenced by [WriteOldTimeTableFile\(\)](#).

9.175.3.46 WriteNote()

```
ostream & TTSupport::TimeTableSystem::WriteNote (
    ostream & out,
    string note ) const [private]
```

Write out a note.

Writes the note text to a stream. Returns the stream.

Parameters

<i>out</i>	Stream to write to.
<i>note</i>	The note text.

9.175.3.47 WriteOldTimeTableFile()

```
bool TTSupport::TimeTableSystem::WriteOldTimeTableFile (  
    char ** outmessage = NULL ) [inline]
```

Write an old time table file.

The current contents of the time table is written to the file name stored in the time table object. This method just calls the WriteNewTimeTableFile method with the old file name. Returns true if successful and false if not.

Parameters

<i>outmessage</i>	Pointer to a pointer to receive any error messages for any errors that might occur.
-------------------	---

References [filepath](#), [TTSupport::PathName::FullPath\(\)](#), and [WriteNewTimeTableFile\(\)](#).

9.175.4 Member Data Documentation**9.175.4.1 cabs**

```
CabNameMap TTSupport::TimeTableSystem::cabs [private]
```

Cap name map.

Referenced by [FirstCab\(\)](#), [LastCab\(\)](#), and [NumberOfCabs\(\)](#).

9.175.4.2 DirectionName

```
string TTSupport::TimeTableSystem::DirectionName [private]
```

Direction Name.

Used by print functions.

9.175.4.3 filepath

`PathName` TTSupport::TimeTableSystem::filepath [private]

The pathname of the file the system was loaded from.

Referenced by [Filename\(\)](#), and [WriteOldTimeTableFile\(\)](#).

9.175.4.4 name

`string` TTSupport::TimeTableSystem::name [private]

The name of the time table system.

Referenced by [AddStorageTrack\(\)](#), [FindStorageTrack\(\)](#), and [Name\(\)](#).

9.175.4.5 notes

`vector<string>` TTSupport::TimeTableSystem::notes [private]

Notes.

Referenced by [AddNote\(\)](#), [Note\(\)](#), [NumberOfNotes\(\)](#), and [SetNote\(\)](#).

9.175.4.6 printOptions

`OptionHashMap` TTSupport::TimeTableSystem::printOptions [private]

Print option hash table.

Referenced by [FirstPrintOption\(\)](#), [GetPrintOption\(\)](#), [LastPrintOption\(\)](#), and [SetPrintOption\(\)](#).

9.175.4.7 stations

`StationVector` TTSupport::TimeTableSystem::stations [private]

[Station](#) stop vector.

Referenced by [AddStorageTrack\(\)](#), [DuplicateStationIndex\(\)](#), [FindStorageTrack\(\)](#), [IthStation\(\)](#), [NumberOfStations\(\)](#), [SetDuplicateStationIndex\(\)](#), [SMile\(\)](#), [StationName\(\)](#), and [TotalLength\(\)](#).

9.175.4.8 timeinterval

```
int TTSupport::TimeTableSystem::timeinterval [private]
```

Time interval.

Referenced by [TimeInterval\(\)](#).

9.175.4.9 timescale

```
int TTSupport::TimeTableSystem::timescale [private]
```

Time scale.

Referenced by [TimeScale\(\)](#).

9.175.4.10 TOCP

```
bool TTSupport::TimeTableSystem::TOCP [private]
```

Table Of Contents?

Used by print functions.

9.175.4.11 trains

```
TrainNumberMap TTSupport::TimeTableSystem::trains [private]
```

[Train](#) number/symbol map.

Referenced by [FirstTrain\(\)](#), [LastTrain\(\)](#), and [NumberOfTrains\(\)](#).

9.176 CTCPanel::Toggle Class Reference

Toggle switch object type.

Public Member Functions

- [Toggle](#) (name, _ctcpanel, _canvas,...)
Construct a toggle switch object.
- [~Toggle](#) ()
Clean up all data objects and free up all resources.
- [getv](#) ()
Method to get our value (lever position).
- [setv](#) (state)
Method to set out value (level position).
- [geti](#) (ind)
Method to get the state of one of our indicators (none).
- [seti](#) (ind, value)
Method to set an indicator's state (none).
- [invoke](#) ()
Method to invoke the toggle switch.

Private Member Functions

- [_VerifyOrientationHV](#) (option, value)
Method to validate an orientation option of horizontal or vertical.
- [_configureLeftLabel](#) (option, value)
Method to update the leftlabel option.
- [_configureRightLabel](#) (option, value)
Method to update the rightlabel option.
- [_configureCenterLabel](#) (option, value)
Method to update the centerlabel option.
- [_AddTLever](#) (pos)
Method to add (draw) a toggle switch lever.
- [_MoveTLever](#) (mx, my)
Method to move an object's lever.

Private Attributes

- [ctcpanel](#)
The CTC Panel component (parent widget).
- [canvas](#)
The canvas component (parent widget component).
- [lever](#)

9.176.1 Detailed Description

Toggle switch object type.

These are on the control panel and represent simple toggle switches.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the switch plate on.
<code>...</code>	Options: <ul style="list-style-type: none"> • <code>-x</code> The x coordinate of the object (readonly, default 0). • <code>-y</code> The y coordinate of the object (readonly, default 0). • <code>-controlpoint</code> The name of the control point this switch is part of (readonly, default CP1). • <code>-orientation</code> The orientation of the switch, either horizontal or vertical (readonly, default horizontal). • <code>-leftlabel</code> The label of the left or upper position (default "on"). • <code>-rightlabel</code> The label of the right or lower position (default "off"). • <code>-centerlabel</code> The label of the center position (default "off"). • <code>-hascenter</code> Flag indicating if there is a center position or not (readonly, default no). • <code>-leftcommand</code> Script to run when the switch is in its left or upper position (default {}). • <code>-rightcommand</code> Script to run when the switch is in its right or lower position (default {}). • <code>-centercommand</code> Script to run when the switch is in its center position (default {}).

Defined coords terminals:

- `xy` The base position of the object.

Defined values (states):

- Left Left position.
- Center Center position.
- Right Right position.

Defined indicators: none.

Author

Robert Heller <heller@deepsoft.com>

9.176.2 Constructor & Destructor Documentation

9.176.2.1 Toggle()

```
CTCPanel::Toggle::Toggle (
    name ,
    _ctcpanel ,
    _canvas ,
    ... )
```

Construct a toggle switch object.

Parameters

<code>_ctcpanel</code>	The CTCPanel megawidget.
<code>_canvas</code>	The control panel canvas to draw the Code Button on.
<code>...</code>	Option list.

9.176.2.2 ~Toggle()

```
CTCPanel::Toggle::~~Toggle ( )
```

Clean up all data objects and free up all resources.

9.176.3 Member Function Documentation

9.176.3.1 _AddTLever()

```
CTCPanel::Toggle::_AddTLever (
    pos ) [private]
```

Method to add (draw) a toggle switch lever.

Parameters

<code>pos</code>	The lever's position (Left, Right, or Center).
------------------	--

9.176.3.2 _configureCenterLabel()

```
CTCPanel::Toggle::_configureCenterLabel (
    option ,
    value ) [private]
```

Method to update the centerlabel option.

9.176.3.3 `_configureLeftLabel()`

```
CTCPanel::Toggle::_configureLeftLabel (  
    option ,  
    value ) [private]
```

Method to update the leftlabel option.

9.176.3.4 `_configureRightLabel()`

```
CTCPanel::Toggle::_configureRightLabel (  
    option ,  
    value ) [private]
```

Method to update the rightlabel option.

9.176.3.5 `_MoveTLever()`

```
CTCPanel::Toggle::_MoveTLever (  
    mx ,  
    my ) [private]
```

Method to move an object's lever.

Parameters

<i>mx</i>	Mouse X coordinate. The lever is moved to be near the mouse pointer.
<i>my</i>	Mouse Y coordinate. The lever is moved to be near the mouse pointer.

9.176.3.6 `_VerifyOrientationHV()`

```
CTCPanel::Toggle::_VerifyOrientationHV (  
    option ,  
    value ) [private]
```

Method to validate an orientation option of horizontal or vertical.

9.176.3.7 geti()

```
CTCPanel::Toggle::geti (
    ind )
```

Method to get the state of one of our indicators (none).

9.176.3.8 getv()

```
CTCPanel::Toggle::getv ( )
```

Method to get our value (lever position).

9.176.3.9 invoke()

```
CTCPanel::Toggle::invoke ( )
```

Method to invoke the toggle switch.

One of the command scripts is executed depending on the lever position.

9.176.3.10 seti()

```
CTCPanel::Toggle::seti (
    ind ,
    value )
```

Method to set an indicator's state (none).

9.176.3.11 setv()

```
CTCPanel::Toggle::setv (
    state )
```

Method to set out value (level position).

Parameters

<i>state</i>	The new state to set.
--------------	-----------------------

9.176.4 Member Data Documentation

9.176.4.1 canvas

CTCPanel::Toggle::canvas [private]

The canvas component (parent widget component).

9.176.4.2 ctcpnl

CTCPanel::Toggle::ctcpnl [private]

The CTC Panel component (parent widget).

9.176.4.3 lever

CTCPanel::Toggle::lever [private]

9.177 Parsers::TrackBody Class Reference

List of track endpoints (T and E lines).

```
#include <TrackBody.h>
```

Public Member Functions

- [TrackBody](#) ([TrackBodyElt](#) *Element, [TrackBody](#) *Next)
Constructor.
- [~TrackBody](#) ()
Destructor.

Static Public Member Functions

- static [TrackBody](#) * [ConstTrackBody](#) ([TrackBodyElt](#) *tbe, [TrackBody](#) *tb)
Prepend a track endpoint.
- static [TrackBody](#) * [AppendTrackBodyElt](#) ([TrackBody](#) *tb, [TrackBodyElt](#) *tbe)
Append a track endpoint.
- static int [TrackBodyLength](#) (const [TrackBody](#) *tb)
Compute the count of track endpoints.

Private Attributes

- [TrackBodyElt](#) * [element](#)

Current element.

- [TrackBody](#) * [next](#)

Next element.

Friends

- class [TrackGraph](#)
- ostream & [operator<<](#) (ostream &stream, [TrackBody](#) &track)

Output operator.

9.177.1 Detailed Description

List of track endpoints (T and E lines).

Author

Robert Heller <heller@deepsoft.com>

9.177.2 Constructor & Destructor Documentation

9.177.2.1 TrackBody()

```
Parsers::TrackBody::TrackBody (
    TrackBodyElt * Element,
    TrackBody * Next ) [inline]
```

Constructor.

References [element](#), and [next](#).

Referenced by [AppendTrackBodyElt\(\)](#), and [ConsTrackBody\(\)](#).

9.177.2.2 ~TrackBody()

```
Parsers::TrackBody::~~TrackBody ( ) [inline]
```

Destructor.

9.177.3 Member Function Documentation

9.177.3.1 AppendTrackBodyElt()

```
static TrackBody * Parsers::TrackBody::AppendTrackBodyElt (  
    TrackBody * tb,  
    TrackBodyElt * tbe ) [inline], [static]
```

Append a track endpoint.

References [next](#), and [TrackBody\(\)](#).

Referenced by [Parsers::BezierBody::BezierEnds\(\)](#), [Parsers::CornuBody::CornuEnds\(\)](#), and [Parsers::TurnoutBody::TurnoutEnds\(\)](#).

9.177.3.2 ConsTrackBody()

```
static TrackBody * Parsers::TrackBody::ConsTrackBody (  
    TrackBodyElt * tbe,  
    TrackBody * tb ) [inline], [static]
```

Prepend a track endpoint.

References [TrackBody\(\)](#).

9.177.3.3 TrackBodyLength()

```
static int Parsers::TrackBody::TrackBodyLength (  
    const TrackBody * tb ) [inline], [static]
```

Compute the count of track endpoints.

References [next](#).

9.177.4 Friends And Related Function Documentation

9.177.4.1 operator<<

```
ostream & operator<< (
    ostream & stream,
    TrackBody & track ) [friend]
```

Output operator.

9.177.4.2 TrackGraph

```
friend class TrackGraph [friend]
```

9.177.5 Member Data Documentation

9.177.5.1 element

```
TrackBodyElt* Parsers::TrackBody::element [private]
```

Current element.

Referenced by [TrackBody\(\)](#).

9.177.5.2 next

```
TrackBody* Parsers::TrackBody::next [private]
```

Next element.

Referenced by [AppendTrackBodyElt\(\)](#), [TrackBody\(\)](#), and [TrackBodyLength\(\)](#).

9.178 Parsers::TrackBodyElt Class Reference

Track endpoint elements (T and E lines).

```
#include <TrackBody.h>
```

Public Member Functions

- [TrackBodyElt](#) (int ind=-1, float X=-1.0, float Y=-1.0, float A=0.0)
Constructor.
- [~TrackBodyElt](#) ()
Destructor.

Static Public Member Functions

- static [TrackBodyElt](#) * [ConnectedTrackEnd](#) (int ind, float X, float Y, float A)
Create a connected track endpoint.
- static [TrackBodyElt](#) * [UnConnectedTrackEnd](#) (float X, float Y, float A)
Create a unconnected track endpoint.

Private Attributes

- int [index](#)
Index of connected track (T lines only).
- float [x](#)
\$X\$ coordinate of track endpoint.
- float [y](#)
\$Y\$ coordinate of track endpoint.
- float [a](#)
Angle of track endpoint.

Friends

- class [TrackGraph](#)
- ostream & [operator<<](#) (ostream &stream, [TrackBodyElt](#) &elt)
Output operator.

9.178.1 Detailed Description

Track endpoint elements (T and E lines).

Author

Robert Heller <heller@deepsoft.com>

9.178.2 Constructor & Destructor Documentation

9.178.2.1 TrackBodyElt()

```
Parsers::TrackBodyElt::TrackBodyElt (
    int ind = -1,
    float X = -1.0,
    float Y = -1.0,
    float A = 0.0 ) [inline]
```

Constructor.

References [a](#), [index](#), [x](#), and [y](#).

Referenced by [ConnectedTrackEnd\(\)](#), and [UnConnectedTrackEnd\(\)](#).

9.178.2.2 ~TrackBodyElt()

```
Parsers::TrackBodyElt::~~TrackBodyElt ( ) [inline]
```

Destructor.

9.178.3 Member Function Documentation

9.178.3.1 ConnectedTrackEnd()

```
static TrackBodyElt * Parsers::TrackBodyElt::ConnectedTrackEnd (
    int ind,
    float X,
    float Y,
    float A ) [inline], [static]
```

Create a connected track endpoint.

References [a](#), [index](#), [TrackBodyElt\(\)](#), [x](#), and [y](#).

9.178.3.2 UnConnectedTrackEnd()

```
static TrackBodyElt * Parsers::TrackBodyElt::UnConnectedTrackEnd (
    float X,
    float Y,
    float A ) [inline], [static]
```

Create a unconnected track endpoint.

References [a](#), [TrackBodyElt\(\)](#), [x](#), and [y](#).

9.178.4 Friends And Related Function Documentation

9.178.4.1 `operator<<`

```
ostream & operator<< (
    ostream & stream,
    TrackBodyElt & elt ) [friend]
```

Output operator.

9.178.4.2 `TrackGraph`

```
friend class TrackGraph [friend]
```

9.178.5 Member Data Documentation

9.178.5.1 `a`

```
float Parsers::TrackBodyElt::a [private]
```

Angle of track endpoint.

Referenced by [ConnectedTrackEnd\(\)](#), [TrackBodyElt\(\)](#), and [UnConnectedTrackEnd\(\)](#).

9.178.5.2 `index`

```
int Parsers::TrackBodyElt::index [private]
```

Index of connected track (T lines only).

Referenced by [ConnectedTrackEnd\(\)](#), and [TrackBodyElt\(\)](#).

9.178.5.3 x

```
float Parsers::TrackBodyElt::x [private]
```

\$X\$ coordinate of track endpoint.

Referenced by [ConnectedTrackEnd\(\)](#), [TrackBodyElt\(\)](#), and [UnConnectedTrackEnd\(\)](#).

9.178.5.4 y

```
float Parsers::TrackBodyElt::y [private]
```

\$Y\$ coordinate of track endpoint.

Referenced by [ConnectedTrackEnd\(\)](#), [TrackBodyElt\(\)](#), and [UnConnectedTrackEnd\(\)](#).

9.179 Parsers::TrackGraph Class Reference

Track Graph class, which encapsulates the track graphs.

```
#include <TrackGraph.h>
```

Classes

- struct [CompressedEdgeValues](#)
Compressed graph edge values.
- struct [CompressedNodeValues](#)
Compressed graph node values.
- struct [EdgeValues](#)
Uncompressed graph edge values.
- struct [NodeValues](#)
Uncompressed graph node values.
- struct [Point](#)
Position structure.
- class [Transform2D](#)
Two dimensional transform class.

Public Types

- enum [NodeType](#) {
 [Undefined](#) = -1 , [Track](#) = 0 , [Turnout](#) , [Turntable](#) ,
 [Block](#) , [SwitchMotor](#) , [Signal](#) , [Sensor](#) ,
 [Control](#) }
Node types.
- typedef std::pair< int, int > [CompressedEdgePair](#)
- typedef std::vector< [CompressedEdgePair](#) > [CompressedEdgePairVector](#)

Public Member Functions

- [TrackGraph](#) ()
Constructor.
- [~TrackGraph](#) ()
Destructor.
- void [InsertCurveTrack](#) (int number, [TrackBody](#) *tb, float orgX, float orgY, float radius)
Insert a (circular) curved piece of track.
- void [InsertBezierTrack](#) (int number, [BezierBody](#) *trb, float x1, float y1, float x2, float y2, float x3, float y3, float x4, float y4)
Insert a bezier curved piece of track.
- void [InsertCornuTrack](#) (int number, [CornuBody](#) *trb, float pos1x, float pos1y, float angle1, float radius1, float center1x, float center1y, float pos2x, float pos2y, float angle2, float radius2, float center2x, float center2y)
Insert a cornu curved piece of track.
- void [InsertStraightTrack](#) (int number, [TrackBody](#) *tb)
Insert a straight piece of track.
- void [InsertJointTrack](#) (int number, [TrackBody](#) *tb, float l0, float l1, float [angle](#), float R, float L)
Insert a (spiral) curved piece of track.
- void [InsertTurnOut](#) (int number, float orgX, float orgY, float orient, const char *name, [TurnoutBody](#) *trb)
Insert a turnout or crossing.
- void [InsertTurnTable](#) (int number, float orgX, float orgY, float radius, [TrackBody](#) *tb)
Insert a turntable.
- void [InsertBlock](#) (int number, char *_name, char *_script, [IntegerList](#) *_tracklist)
Insert a Block.
- void [InsertSwitchMotor](#) (int number, int turnout, char *_name, char *_normal, char *_reverse, char *_pointsense)
Insert a switch motor.
- void [InsertSignal](#) (int number, char *_name, float _origx, float _origy, float _angle, int _numheads, [StringPairList](#) *_aspects)
Insert a signal.
- void [InsertSensor](#) (int number, char *_name, float _origx, float _origy, char *_sensescript)
Insert a sensor.
- void [InsertControl](#) (int number, char *_name, float _origx, float _origy, char *_onscript, char *_offscript)
Insert a control.
- bool [IsNodeP](#) (int nid) const
Tests if a node id exists in the graph.
- int [NumEdges](#) (int nid) const
Returns the number of edges for the specified node id.
- int [EdgeIndex](#) (int nid, int edgenum) const
Returns the node id of the specified edge of the node.
- float [EdgeX](#) (int nid, int edgenum) const
Returns the \$X\$ coordinate of the specified edge of the node.
- float [EdgeY](#) (int nid, int edgenum) const
Returns the \$Y\$ coordinate of the specified edge of the node.
- float [EdgeA](#) (int nid, int edgenum) const
Returns the angle of the specified edge of the node.
- float [EdgeLength](#) (int nid, int edgenum) const
Returns the length of an edge.
- [NodeType](#) [TypeOfNode](#) (int nid) const

- Returns the type of the node.*

 - const [TurnoutGraphic](#) * [NodeTurnoutGraphic](#) (int nid) const
- Returns the [TurnoutGraphic](#) of the node.*

 - const [TurnoutRoutelist](#) * [NodeTurnoutRoutelist](#) (int nid) const
- Returns the [TurnoutRoutelist](#) of the node.*

 - float [LengthOfNode](#) (int nid) const
- Return the track length of a node.*

 - const [IntegerList](#) * [TrackList](#) (int nid) const
- Return a block's tracklist.*

 - int [TurnoutNumber](#) (int nid) const
- Return a switchmotor's turnout number.*

 - const char * [NameOfNode](#) (int nid) const
- Return a block's or switchmotor's name.*

 - const char * [SenseScript](#) (int nid) const
- Return a block's or switchmotor's sense script.*

 - const char * [NormalActionScript](#) (int nid) const
- Return a switchmotor's normal action script.*

 - const char * [ReverseActionScript](#) (int nid) const
- Return a block's or switchmotor's reverse action script.*

 - int [NumberOfHeads](#) (int nid) const
- Return a Signal's number of heads.*

 - const StringPairList * [SignalAspects](#) (int nid) const
- Return a Signal's aspect list.*

 - float [OrigX](#) (int nid) const
- Return the x coordinate of the signal base.*

 - float [OrigY](#) (int nid) const
- Return the y coordinate of the signal base.*

 - float [Angle](#) (int nid) const
- Return the angle of the signal.*

 - const char * [OnScript](#) (int nid) const
- Return the on action script.*

 - const char * [OffScript](#) (int nid) const
- Return the off action script.*

 - int [LowestNode](#) () const
- Returns the lowest numbered node id.*

 - int [HighestNode](#) () const
- Returns the highest numbered node id.*

 - void [CompressGraph](#) ()
- Create a compressed graph.*

 - bool [IsCompressedNode](#) (int cnid) const
- Is cid a node in the compressed graph?*

 - int [CompressedEdgeCount](#) (int cnid) const
- Number of compressed graph edges for node cnid.*

 - float [CompressedEdgeLength](#) (int cnid, int edgenum) const
- Length of a compressed graph edge.*

 - int [CompressedEdgeNode](#) (int cnid, int edgenum) const
- Next Edge node.*

- [IntegerList](#) * [CompressedNodeSegments](#) (int cnid) const
Raw nodes in a compressed graph node.
- double [CompressedNodePositionX](#) (int cnid) const
X Coordinate of a Compressed Node position.
- double [CompressedNodePositionY](#) (int cnid) const
X Coordinate of a Compressed Node position.
- bool [IsCompressed](#) () const
Is the graph compressed?
- const [IntegerList](#) * [Heads](#) ()
Uncompressed graph heads.
- const [IntegerList](#) * [Roots](#) ()
Compressed graph roots.
- void [CompressedGraphCircleLayout](#) (double radius)
Run the BGL circle_graph_layout for a given radius.
- bool [CompressedGraphKamadaKawaiSpring](#) (double sidelength)
Run the BGL kamada_kawai_spring_layout for a given side length.
- [CompressedEdgePairVector](#) [CompressedGraphKruskalMinimumSpanningTree](#) ()
Run the kruskal_minimum_spanning_tree algorithm and return a vector of edge pairs.
- [CompressedEdgePairVector](#) [CompressedGraphPrimMinimumSpanningTree](#) ()
Run the prim_minimum_spanning_tree algorithm and return a Parent Vector.

Static Public Member Functions

- static float [LengthOfStraight](#) (float x1, float y1, float x2, float y2)
Compute the length of a piece of straight track.
- static float [LengthOfCurve](#) (float radius, float a1, float a2)
Compute the length of a (circular) curved piece of track.
- static float [LengthOfJoint](#) (float l0, float l1, float [angle](#), float R, float L)
Compute the length of a (spiral) curved piece of track.

Private Types

- enum [RotationUnit](#) { [Degrees](#) , [Radians](#) }
Rotational units.
- typedef adjacency_list< vecS, vecS, directedS, [NodeValues](#), [EdgeValues](#) > [Graph](#)
Boost Graph type (adjacency_list).
- typedef graph_traits< [Graph](#) >::vertex_descriptor [Node](#)
Vertex type.
- typedef std::map< int, [Node](#) > [IdNodeMap](#)
Type of Node Id map.
- typedef adjacency_list< vecS, vecS, undirectedS, [CompressedNodeValues](#), [CompressedEdgeValues](#) > [CompressedGraph](#)
Boost Compressed Graph type (adjacency_list).
- typedef graph_traits< [CompressedGraph](#) >::vertex_descriptor [CompressedNode](#)
Compressed Graph Vertex type.
- typedef std::map< int, [CompressedNode](#) > [CompressedIdNodeMap](#)
Type of Node Id map.
- typedef std::vector< graph_traits< [CompressedGraph](#) >::vertex_descriptor > [CompressedNodeVector](#)

Private Member Functions

- [Node AddNewNode](#) (int id, [NodeType](#) _type=Undefined, [TurnoutGraphic](#) *_tgr=NULL, [TurnoutRoutelist](#) *_tpo=NULL, float _length=0.0)
Helper function to create a new node.
- void [computeHeads](#) ()
Compute uncompressed graph heads (calls strong_components).
- [CompressedNode insertCompressedNode](#) ([Node](#) rawnode)
Insert a compressed graph node.
- bool [IsNone](#) ([Node](#) node)
Check if node is the none node;.
- void [traversePrimMST](#) ([CompressedEdgePairVector](#) &result, [CompressedNodeVector](#) &parents, [CompressedNode](#) r) const
Traverse a PrimMST, starting at root r, inserting EdgePairs into result.
- [Node FindNode](#) (int index) const
Find a node in the hash table.
- [TurnoutGraphic](#) * [MakeTurnoutGraphic](#) (float orgX, float orgY, float orient, [TurnoutBody](#) *trb)
Generate a turnout node's graphic.
- [TurnoutRoutelist](#) * [MakeTurnoutRouteList](#) ([TurnoutBody](#) *trb, const [TurnoutGraphic](#) *tgr, float &length)
Generate a turnout node's route list.
- bool [compressed_edge_exists](#) ([CompressedNode](#) cnode1, [CompressedNode](#) cnode2) const
Test if an edge already exists.
- [Node FindBlock](#) ([Node](#) node) const
Find the block this (raw) nodeid is in.
- [Transform2D](#) * [tr_translate](#) (float x, float y)
Construct a translation transform.
- [Transform2D](#) * [tr_scale](#) (float mag_factor)
Construct a uniform scale transform.
- [Transform2D](#) * [tr_scale](#) (float xscale, float yscale)
Construct a non-uniform scale transform.
- [Transform2D](#) * [tr_rotate](#) (float amount, [RotationUnit](#) measure)
Construct a rotational transform.

Static Private Member Functions

- static void [DeleteTurnoutGraphic](#) ([TurnoutGraphic](#) *tgr)
Free up the memory used by a turnout node's graphic.
- static void [DeleteTurnoutRouteList](#) ([TurnoutRoutelist](#) *tpo)
Free up the memory used by a turnout node's route list.
- static float [ComputeRouteLength](#) (const [TurnoutGraphic](#) *tgr, const [IntegerList](#) *il)
Compute the length of a route.

Private Attributes

- [Graph nodes](#)
Graph adjacency_list.
- [IdNodeMap idMap](#)
Node Id map.
- [IntegerList * heads](#)
Uncompressed graph heads (strong components).
- [bool valid_heads](#)
Flag to indicate if heads is valid.
- [Node none](#)
Special node that is nowhere (where all unconnected trackage goes).
- [CompressedGraph c_nodes](#)
Compressed Graph adjacency_list.
- [CompressedIdNodeMap c_idMap](#)
Node Id map.
- [IntegerList * c_roots](#)
Compressed Graph Roots.
- [bool compressedP](#)
Is graph compressed?
- [bool circleLayoutP](#)
Has CompressedGraphCircleLayout been run?
- [bool KamadaKawaiSpringLayoutP](#)
Has CompressedGraphKamadaKawaiSpring been run?
- [std::map< Node, CompressedNode > backpointers](#)
Backpointer map.

Friends

- [std::ostream & operator<<](#) ([ostream &stream](#), [TrackGraph &graph](#))
Output operator.

9.179.1 Detailed Description

Track Graph class, which encapsulates the track graphs.

Holds the two track graphs, an uncompressed, directed graph built from the layout file and a compressed, undirected graph where successive segments of plain trackage are collapsed into a single node. Both graphs use the Boost Graph Library `adjacency_list` template class as the basic graph implementation class. All nodes in both graphs have a unique node id, which is the XTrkCad layout object number.

Several of the Boost Graph Library graph algorithms are implemented, including `circle_graph_layout()`, `kamada_kawai_↔_spring_layout()`, `kruskal_minimum_spanning_tree()` and `prim_minimum_spanning_tree()`. In addition, the `strong_↔_components()` algorithm is used to gather nodes into one or more connected groups, since sometimes model train layouts have disjoint sections of track. An example would be a regular main line and an isolated mining or logging railroad. Another example would be a regular main line and one (or more) mass transit (eg trolley) line(s). The head nodes of the collected groups are accessed with the member function [Heads\(\)](#), which returns a list of nodes that are

the heads of each of the connected groups. The [CompressGraph\(\)](#) function will compress each connected group into a separately compressed graph, with its own root node. The root nodes of each of the compressed sub-graphs are returned with the [Roots\(\)](#) member function.

The computation of connected groups and graph compression are implemented using a lazy eval methodology. The connected group collection process is not run until the member function [Heads\(\)](#) is called to actually access the list of group heads. And the graph compression is not called until the member function [Roots\(\)](#) is called. Calling the [CompressGraph\(\)](#) member function (or the [Roots\(\)](#) member function), will also call the connected group collection process if it is needed.

To help discover possible mainlines, two minimum spanning tree (MST) algorithms are provided, Kruskal's and Prim's, via the member functions [CompressedGraphKruskalMinimumSpanningTree\(\)](#) and [CompressedGraphPrimMinimumSpanningTree\(\)](#), respectively. Both of these function return a list of edge pairs: a STL vector of STL pairs of compressed nodes.

Two graphical layout algorithms are also provided, circle graph layout and kamada kawai spring layout, via the two member functions, [CompressedGraphCircleLayout\(\)](#) and [CompressedGraphKamadaKawaiSpring\(\)](#), respectively. Both set or update a pair of double values (x,y) associated with every compressed node and which are accessed with the [CompressedNodePositionX\(\)](#) and [CompressedNodePositionY\(\)](#) member functions. [CompressedGraphCircleLayout\(\)](#) sets these files and [CompressedGraphKamadaKawaiSpring\(\)](#) updates them. [CompressedGraphCircleLayout\(\)](#) should be called before [CompressedGraphKamadaKawaiSpring\(\)](#). [CompressedGraphKamadaKawaiSpring\(\)](#) returns a boolean flag indicating if it was able to create a layout. Returning a false value indicates that the graph was disjoint – [CompressedGraphKamadaKawaiSpring\(\)](#) cannot be used with a disjoint graph.

Author

Robert Heller <heller@deepsoft.com>

9.179.2 Member Typedef Documentation

9.179.2.1 CompressedEdgePair

```
typedef std::pair< int, int > Parsers::TrackGraph::CompressedEdgePair
```

9.179.2.2 CompressedEdgePairVector

```
typedef std::vector< CompressedEdgePair > Parsers::TrackGraph::CompressedEdgePairVector
```

9.179.2.3 CompressedGraph

```
typedef adjacency_list< vecS, vecS, undirectedS, CompressedNodeValues , CompressedEdgeValues >
Parsers::TrackGraph::CompressedGraph [private]
```

Boost Compressed Graph type (adjacency_list).

9.179.2.4 CompressedIdNodeMap

```
typedef std::map< int, CompressedNode > Parsers::TrackGraph::CompressedIdNodeMap [private]
```

Type of Node Id map.

9.179.2.5 CompressedNode

```
typedef graph_traits<CompressedGraph>::vertex_descriptor Parsers::TrackGraph::CompressedNode  
[private]
```

Compressed Graph Vertex type.

9.179.2.6 CompressedNodeVector

```
typedef std::vector< graph_traits < CompressedGraph >::vertex_descriptor > Parsers::TrackGraph::CompressedNodeVe  
[private]
```

9.179.2.7 Graph

```
typedef adjacency_list< vecS, vecS, directedS, NodeValues , EdgeValues > Parsers::TrackGraph::Graph  
[private]
```

Boost Graph type (adjacency_list).

9.179.2.8 IdNodeMap

```
typedef std::map< int, Node > Parsers::TrackGraph::IdNodeMap [private]
```

Type of Node Id map.

9.179.2.9 Node

```
typedef graph_traits<Graph>::vertex_descriptor Parsers::TrackGraph::Node [private]
```

Vertex type.

9.179.3 Member Enumeration Documentation

9.179.3.1 NodeType

```
enum Parsers::TrackGraph::NodeType
```

Node types.

Enumerator

Undefined	Undefined type.
Track	Plain trackage: straight, curved, or easement.
Turnout	Turnout or crossing.
Turntable	Turntable.
Block	Block.
SwitchMotor	Switch Motor.
Signal	Signal.
Sensor	Sensor.
Control	Control.

9.179.3.2 RotationUnit

```
enum Parsers::TrackGraph::RotationUnit [private]
```

Rotational units.

Enumerator

Degrees	Units are in degrees.
Radians	Units are in radians.

9.179.4 Constructor & Destructor Documentation

9.179.4.1 TrackGraph()

```
Parsers::TrackGraph::TrackGraph ( )
```

Constructor.

9.179.4.2 ~TrackGraph()

```
Parsers::TrackGraph::~~TrackGraph ( )
```

Destructor.

9.179.5 Member Function Documentation

9.179.5.1 AddNewNode()

```
Node Parsers::TrackGraph::AddNewNode (
    int id,
    NodeType _type = Undefined,
    TurnoutGraphic * _tgr = NULL,
    TurnoutRoutelist * _tpo = NULL,
    float _length = 0.0 ) [private]
```

Helper function to create a new node.

9.179.5.2 Angle()

```
float Parsers::TrackGraph::Angle (
    int nid ) const
```

Return the angle of the signal.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

Referenced by [Parsers::LayoutFile::Angle\(\)](#).

9.179.5.3 compressed_edge_exists()

```
bool Parsers::TrackGraph::compressed_edge_exists (
    CompressedNode cnode1,
    CompressedNode cnode2 ) const [private]
```

Test if an edge already exists.

9.179.5.4 CompressedEdgeCount()

```
int Parsers::TrackGraph::CompressedEdgeCount (
    int cnid ) const
```

Number of compressed graph edges for node cnid.

Referenced by [Parsers::LayoutFile::CompressedEdgeCount\(\)](#).

9.179.5.5 CompressedEdgeLength()

```
float Parsers::TrackGraph::CompressedEdgeLength (
    int cnid,
    int edgenum ) const
```

Length of a compressed graph edge.

Referenced by [Parsers::LayoutFile::CompressedEdgeLength\(\)](#).

9.179.5.6 CompressedEdgeNode()

```
int Parsers::TrackGraph::CompressedEdgeNode (
    int cnid,
    int edgenum ) const
```

Next Edge node.

Referenced by [Parsers::LayoutFile::CompressedEdgeNode\(\)](#).

9.179.5.7 CompressedGraphCircleLayout()

```
void Parsers::TrackGraph::CompressedGraphCircleLayout (
    double radius )
```

Run the BGL circle_graph_layout for a given radius.

Referenced by [Parsers::LayoutFile::CompressedGraphCircleLayout\(\)](#).

9.179.5.8 CompressedGraphKamadaKawaiSpring()

```
bool Parsers::TrackGraph::CompressedGraphKamadaKawaiSpring (
    double sidelength )
```

Run the BGL kamada_kawai_spring_layout for a given side length.

Referenced by [Parsers::LayoutFile::CompressedGraphKamadaKawaiSpring\(\)](#).

9.179.5.9 CompressedGraphKruskalMinimumSpanningTree()

`CompressedEdgePairVector` `Parsers::TrackGraph::CompressedGraphKruskalMinimumSpanningTree ()`

Run the `kruskal_minimum_spanning_tree` algorithm and return a vector of edge pairs.

Referenced by `Parsers::LayoutFile::CompressedGraphKruskalMinimumSpanningTree()`.

9.179.5.10 CompressedGraphPrimMinimumSpanningTree()

`CompressedEdgePairVector` `Parsers::TrackGraph::CompressedGraphPrimMinimumSpanningTree ()`

Run the `prim_minimum_spanning_tree` algorithm and return a Parent Vector.

Referenced by `Parsers::LayoutFile::CompressedGraphPrimMinimumSpanningTree()`.

9.179.5.11 CompressedNodePositionX()

```
double Parsers::TrackGraph::CompressedNodePositionX (  
    int cnid ) const
```

X Coordinate of a Compressed Node position.

Referenced by `Parsers::LayoutFile::CompressedNodePositionX()`.

9.179.5.12 CompressedNodePositionY()

```
double Parsers::TrackGraph::CompressedNodePositionY (  
    int cnid ) const
```

X Coordinate of a Compressed Node position.

Referenced by `Parsers::LayoutFile::CompressedNodePositionY()`.

9.179.5.13 CompressedNodeSegments()

```
IntegerList * Parsers::TrackGraph::CompressedNodeSegments (
    int cnid ) const
```

Raw nodes in a compressed graph node.

Referenced by [Parsers::LayoutFile::CompressedNodeSegments\(\)](#).

9.179.5.14 CompressGraph()

```
void Parsers::TrackGraph::CompressGraph ( )
```

Create a compressed graph.

Referenced by [Parsers::LayoutFile::CompressGraph\(\)](#), and [Roots\(\)](#).

9.179.5.15 computeHeads()

```
void Parsers::TrackGraph::computeHeads ( ) [private]
```

Compute uncompressed graph heads (calls `strong_components`).

Referenced by [Heads\(\)](#).

9.179.5.16 ComputeRouteLength()

```
static float Parsers::TrackGraph::ComputeRouteLength (
    const TurnoutGraphic * tgr,
    const IntegerList * il ) [static], [private]
```

Compute the length of a route.

9.179.5.17 DeleteTurnoutGraphic()

```
static void Parsers::TrackGraph::DeleteTurnoutGraphic (
    TurnoutGraphic * tgr ) [static], [private]
```

Free up the memory used by a turnout node's graphic.

Referenced by [Parsers::TrackGraph::NodeValues::Cleanup\(\)](#).

9.179.5.18 DeleteTurnoutRouteList()

```
static void Parsers::TrackGraph::DeleteTurnoutRouteList (  
    TurnoutRouteList * tpo ) [static], [private]
```

Free up the memory used by a turnout node's route list.

Referenced by [Parsers::TrackGraph::NodeValues::Cleanup\(\)](#).

9.179.5.19 EdgeA()

```
float Parsers::TrackGraph::EdgeA (  
    int nid,  
    int edgenum ) const
```

Returns the angle of the specified edge of the node.

Referenced by [Parsers::LayoutFile::EdgeA\(\)](#).

9.179.5.20 EdgeIndex()

```
int Parsers::TrackGraph::EdgeIndex (  
    int nid,  
    int edgenum ) const
```

Returns the node id of the specified edge of the node.

Referenced by [Parsers::LayoutFile::EdgeIndex\(\)](#).

9.179.5.21 EdgeLength()

```
float Parsers::TrackGraph::EdgeLength (  
    int nid,  
    int edgenum ) const
```

Returns the length of an edge.

Referenced by [Parsers::LayoutFile::EdgeLength\(\)](#).

9.179.5.22 EdgeX()

```
float Parsers::TrackGraph::EdgeX (
    int nid,
    int edgenum ) const
```

Returns the $\$X\$$ coordinate of the specified edge of the node.

Referenced by [Parsers::LayoutFile::EdgeX\(\)](#).

9.179.5.23 EdgeY()

```
float Parsers::TrackGraph::EdgeY (
    int nid,
    int edgenum ) const
```

Returns the $\$Y\$$ coordinate of the specified edge of the node.

Referenced by [Parsers::LayoutFile::EdgeY\(\)](#).

9.179.5.24 FindBlock()

```
Node Parsers::TrackGraph::FindBlock (
    Node node ) const [private]
```

Find the block this (raw) nodeid is in.

Parameters

<i>node</i>	The (raw) Node.
-------------	-----------------

Returns

the raw Node of the block node or none, if there is no block.

9.179.5.25 FindNode()

```
Node Parsers::TrackGraph::FindNode (
    int index ) const [private]
```

Find a node in the hash table.

9.179.5.26 Heads()

```
const IntegerList * Parsers::TrackGraph::Heads ( ) [inline]
```

Uncompressed graph heads.

References [computeHeads\(\)](#), [heads](#), and [valid_heads](#).

Referenced by [Parsers::LayoutFile::Heads\(\)](#).

9.179.5.27 HighestNode()

```
int Parsers::TrackGraph::HighestNode ( ) const
```

Returns the highest numbered node id.

Referenced by [Parsers::LayoutFile::HighestNode\(\)](#).

9.179.5.28 InsertBezierTrack()

```
void Parsers::TrackGraph::InsertBezierTrack (
    int number,
    BezierBody * trb,
    float x1,
    float y1,
    float x2,
    float y2,
    float x3,
    float y3,
    float x4,
    float y4 )
```

Insert a bezier curved piece of track.

9.179.5.29 InsertBlock()

```
void Parsers::TrackGraph::InsertBlock (
    int number,
    char * _name,
    char * _script,
    IntegerList * _tracklist )
```

Insert a Block.

9.179.5.30 insertCompressedNode()

```
CompressedNode Parsers::TrackGraph::insertCompressedNode (
    Node rawnode ) [private]
```

Insert a compressed graph node.

9.179.5.31 InsertControl()

```
void Parsers::TrackGraph::InsertControl (
    int number,
    char * _name,
    float _origx,
    float _origy,
    char * _onscript,
    char * _offscript )
```

Insert a control.

9.179.5.32 InsertCornuTrack()

```
void Parsers::TrackGraph::InsertCornuTrack (
    int number,
    CornuBody * trb,
    float pos1x,
    float pos1y,
    float angle1,
    float radius1,
    float center1x,
    float center1y,
    float pos2x,
    float pos2y,
    float angle2,
    float radius2,
    float center2x,
    float center2y )
```

Insert a cornu curved piece of track.

9.179.5.33 InsertCurveTrack()

```
void Parsers::TrackGraph::InsertCurveTrack (
    int number,
    TrackBody * tb,
    float orgX,
    float orgY,
    float radius )
```

Insert a (circular) curved piece of track.

9.179.5.34 InsertJointTrack()

```
void Parsers::TrackGraph::InsertJointTrack (
    int number,
    TrackBody * tb,
    float l0,
    float l1,
    float angle,
    float R,
    float L )
```

Insert a (spiral) curved piece of track.

9.179.5.35 InsertSensor()

```
void Parsers::TrackGraph::InsertSensor (
    int number,
    char * _name,
    float _origx,
    float _origy,
    char * _sensescript )
```

Insert a sensor.

9.179.5.36 InsertSignal()

```
void Parsers::TrackGraph::InsertSignal (
    int number,
    char * _name,
    float _origx,
    float _origy,
    float _angle,
    int _numheads,
    StringPairList * _aspects )
```

Insert a signal.

9.179.5.37 InsertStraightTrack()

```
void Parsers::TrackGraph::InsertStraightTrack (
    int number,
    TrackBody * tb )
```

Insert a straight piece of track.

9.179.5.38 InsertSwitchMotor()

```
void Parsers::TrackGraph::InsertSwitchMotor (
    int number,
    int turnout,
    char * _name,
    char * _normal,
    char * _reverse,
    char * _pointsense )
```

Insert a switch motor.

9.179.5.39 InsertTurnOut()

```
void Parsers::TrackGraph::InsertTurnOut (
    int number,
    float orgX,
    float orgY,
    float orient,
    const char * name,
    TurnoutBody * trb )
```

Insert a turnout or crossing.

9.179.5.40 InsertTurnTable()

```
void Parsers::TrackGraph::InsertTurnTable (
    int number,
    float orgX,
    float orgY,
    float radius,
    TrackBody * tb )
```

Insert a turntable.

9.179.5.41 IsCompressed()

```
bool Parsers::TrackGraph::IsCompressed ( ) const [inline]
```

Is the graph compressed?

Returns

True if the graph is compressed, False otherwise.

References [compressedP](#).

Referenced by [Parsers::LayoutFile::IsCompressed\(\)](#).

9.179.5.42 IsCompressedNode()

```
bool Parsers::TrackGraph::IsCompressedNode (
    int cnid ) const
```

Is cid a node in the compressed graph?

Referenced by [Parsers::LayoutFile::IsCompressedNode\(\)](#).

9.179.5.43 IsNodeP()

```
bool Parsers::TrackGraph::IsNodeP (
    int nid ) const
```

Tests if a node id exists in the graph.

Referenced by [Parsers::LayoutFile::IsNodeP\(\)](#).

9.179.5.44 IsNone()

```
bool Parsers::TrackGraph::IsNone (
    Node node ) [inline], [private]
```

Check if node is the none node;.

References [none](#).

9.179.5.45 LengthOfCurve()

```
static float Parsers::TrackGraph::LengthOfCurve (
    float radius,
    float a1,
    float a2 ) [static]
```

Compute the length of a (circular) curved piece of track.

9.179.5.46 LengthOfJoint()

```
static float Parsers::TrackGraph::LengthOfJoint (
    float l0,
    float l1,
    float angle,
    float R,
    float L ) [static]
```

Compute the length of a (spiral) curved piece of track.

9.179.5.47 LengthOfNode()

```
float Parsers::TrackGraph::LengthOfNode (
    int nid ) const
```

Return the track length of a node.

Referenced by [Parsers::LayoutFile::LengthOfNode\(\)](#).

9.179.5.48 LengthOfStraight()

```
static float Parsers::TrackGraph::LengthOfStraight (
    float x1,
    float y1,
    float x2,
    float y2 ) [static]
```

Compute the length of a piece of straight track.

9.179.5.49 LowestNode()

```
int Parsers::TrackGraph::LowestNode ( ) const
```

Returns the lowest numbered node id.

Referenced by [Parsers::LayoutFile::LowestNode\(\)](#).

9.179.5.50 MakeTurnoutGraphic()

```
TurnoutGraphic * Parsers::TrackGraph::MakeTurnoutGraphic (
    float orgX,
    float orgY,
    float orient,
    TurnoutBody * trb ) [private]
```

Generate a turnout node's graphic.

9.179.5.51 MakeTurnoutRouteList()

```
TurnoutRoutelist * Parsers::TrackGraph::MakeTurnoutRouteList (
    TurnoutBody * trb,
    const TurnoutGraphic * tgr,
    float & length ) [private]
```

Generate a turnout node's route list.

9.179.5.52 NameOfNode()

```
const char * Parsers::TrackGraph::NameOfNode (
    int nid ) const
```

Return a block's or switchmotor's name.

Referenced by [Parsers::LayoutFile::NameOfNode\(\)](#).

9.179.5.53 NodeTurnoutGraphic()

```
const TurnoutGraphic * Parsers::TrackGraph::NodeTurnoutGraphic (  
    int nid ) const
```

Returns the [TurnoutGraphic](#) of the node.

Referenced by [Parsers::LayoutFile::NodeTurnoutGraphic\(\)](#).

9.179.5.54 NodeTurnoutRoutelist()

```
const TurnoutRoutelist * Parsers::TrackGraph::NodeTurnoutRoutelist (  
    int nid ) const
```

Returns the [TurnoutRoutelist](#) of the node.

Referenced by [Parsers::LayoutFile::NodeTurnoutRoutelist\(\)](#).

9.179.5.55 NormalActionScript()

```
const char * Parsers::TrackGraph::NormalActionScript (  
    int nid ) const
```

Return a switchmotor's normal action script.

Referenced by [Parsers::LayoutFile::NormalActionScript\(\)](#).

9.179.5.56 NumberOfHeads()

```
int Parsers::TrackGraph::NumberOfHeads (  
    int nid ) const
```

Return a Signal's number of heads.

Referenced by [Parsers::LayoutFile::NumberOfHeads\(\)](#).

9.179.5.57 NumEdges()

```
int Parsers::TrackGraph::NumEdges (  
    int nid ) const
```

Returns the number of edges for the specified node id.

Referenced by [Parsers::LayoutFile::NumEdges\(\)](#).

9.179.5.58 OffScript()

```
const char * Parsers::TrackGraph::OffScript (  
    int nid ) const
```

Return the off action script.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

Referenced by [Parsers::LayoutFile::OffScript\(\)](#).

9.179.5.59 OnScript()

```
const char * Parsers::TrackGraph::OnScript (
    int nid ) const
```

Return the on action script.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

Referenced by [Parsers::LayoutFile::OnScript\(\)](#).

9.179.5.60 OrigX()

```
float Parsers::TrackGraph::OrigX (
    int nid ) const
```

Return the x coordinate of the signal base.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

Referenced by [Parsers::LayoutFile::OrigX\(\)](#).

9.179.5.61 OrigY()

```
float Parsers::TrackGraph::OrigY (
    int nid ) const
```

Return the y coordinate of the signal base.

Parameters

<i>nid</i>	The node to look at.
------------	----------------------

Referenced by [Parsers::LayoutFile::OrigY\(\)](#).

9.179.5.62 ReverseActionScript()

```
const char * Parsers::TrackGraph::ReverseActionScript (
    int nid ) const
```

Return a block's or switchmotor's reverse action script.

Referenced by [Parsers::LayoutFile::ReverseActionScript\(\)](#).

9.179.5.63 Roots()

```
const IntegerList * Parsers::TrackGraph::Roots ( ) [inline]
```

Compressed graph roots.

References [c_roots](#), [compressedP](#), and [CompressGraph\(\)](#).

Referenced by [Parsers::LayoutFile::Roots\(\)](#).

9.179.5.64 SenseScript()

```
const char * Parsers::TrackGraph::SenseScript (
    int nid ) const
```

Return a block's or switchmotor's sense script.

Referenced by [Parsers::LayoutFile::SenseScript\(\)](#).

9.179.5.65 SignalAspects()

```
const StringPairList * Parsers::TrackGraph::SignalAspects (
    int nid ) const
```

Return a Signal's aspect list.

Referenced by [Parsers::LayoutFile::SignalAspects\(\)](#).

9.179.5.66 tr_rotate()

```
Transform2D * Parsers::TrackGraph::tr_rotate (
    float amount,
    RotationUnit measure ) [private]
```

Construct a rotational transform.

9.179.5.67 tr_scale() [1/2]

```
Transform2D * Parsers::TrackGraph::tr_scale (
    float mag_factor ) [private]
```

Construct a uniform scale transform.

9.179.5.68 tr_scale() [2/2]

```
Transform2D * Parsers::TrackGraph::tr_scale (
    float xscale,
    float yscale ) [private]
```

Construct a non-uniform scale transform.

9.179.5.69 tr_translate()

```
Transform2D * Parsers::TrackGraph::tr_translate (
    float x,
    float y ) [private]
```

Construct a translation transform.

9.179.5.70 TrackList()

```
const IntegerList * Parsers::TrackGraph::TrackList (
    int nid ) const
```

Return a block's tracklist.

Referenced by [Parsers::LayoutFile::TrackList\(\)](#).

9.179.5.71 traversePrimMST()

```
void Parsers::TrackGraph::traversePrimMST (
    CompressedEdgePairVector & result,
    CompressedNodeVector & parents,
    CompressedNode r ) const [private]
```

Traverse a PrimMST, starting at root r, inserting EdgePairs into result.

9.179.5.72 TurnoutNumber()

```
int Parsers::TrackGraph::TurnoutNumber (
    int nid ) const
```

Return a switchmotor's turnout number.

Referenced by [Parsers::LayoutFile::TurnoutNumber\(\)](#).

9.179.5.73 TypeOfNode()

```
NodeType Parsers::TrackGraph::TypeOfNode (
    int nid ) const
```

Returns the type of the node.

Referenced by [Parsers::LayoutFile::TypeOfNode\(\)](#).

9.179.6 Friends And Related Function Documentation

9.179.6.1 operator<<

```
std::ostream & operator<< (
    ostream & stream,
    TrackGraph & graph ) [friend]
```

Output operator.

9.179.7 Member Data Documentation

9.179.7.1 backpointers

```
std::map<Node, CompressedNode> Parsers::TrackGraph::backpointers [private]
```

Backpointer map.

9.179.7.2 c_idMap

```
CompressedIdNodeMap Parsers::TrackGraph::c_idMap [private]
```

Node Id map.

9.179.7.3 c_nodes

```
CompressedGraph Parsers::TrackGraph::c_nodes [private]
```

Compressed Graph adjacency_list.

9.179.7.4 c_roots

```
IntegerList* Parsers::TrackGraph::c_roots [private]
```

Compressed Graph Roots.

Referenced by [Roots\(\)](#).

9.179.7.5 circleLayoutP

```
bool Parsers::TrackGraph::circleLayoutP [private]
```

Has CompressedGraphCircleLayout been run?

9.179.7.6 compressedP

```
bool Parsers::TrackGraph::compressedP [private]
```

Is graph compressed?

Referenced by [IsCompressed\(\)](#), and [Roots\(\)](#).

9.179.7.7 heads

```
IntegerList* Parsers::TrackGraph::heads [private]
```

Uncompressed graph heads (strong components).

Referenced by [Heads\(\)](#).

9.179.7.8 idMap

```
IdNodeMap Parsers::TrackGraph::idMap [private]
```

Node Id map.

9.179.7.9 KamadaKawaiSpringLayoutP

```
bool Parsers::TrackGraph::KamadaKawaiSpringLayoutP [private]
```

Has CompressedGraphKamadaKawaiSpring been run?

9.179.7.10 nodes

```
Graph Parsers::TrackGraph::nodes [private]
```

Graph adjacency_list.

9.179.7.11 none

```
Node Parsers::TrackGraph::none [private]
```

Special node that is nowhere (where all unconnected trackage goes).

Referenced by [IsNone\(\)](#).

9.179.7.12 valid_heads

```
bool Parsers::TrackGraph::valid_heads [private]
```

Flag to indicate if heads is valid.

Referenced by [Heads\(\)](#).

9.180 FCFSupport::Train Class Reference

The [Train](#) class represents a train.

```
#include <Train.h>
```

Classes

- union [StationOrIndustry](#)
Union of stations or industries, used for stops.

Public Types

- enum [TrainType](#) {
 [Unknown](#) = 0 , [Wayfreight](#) = 'W' , [BoxMove](#) = 'B' , [Manifest](#) = 'M' ,
 [Passenger](#) = 'P' }
Types of trains.

Public Member Functions

- [Train](#) ()
Default constructor.
- [Train](#) ([Train](#) &other)
Copy constructor.
- [Train](#) & [operator=](#) ([Train](#) &other)
Assignment operator.
- [Train](#) (const char *n, const char *dl, const char *ct, const char *descr, int sh, int mc, int mcl, int mw, int ml, int od, bool p, bool d, [TrainType](#) t)
Full constructor.
- [~Train](#) ()
Destructor.
- const char * [Name](#) () const
Return the train's name.
- const char * [DivisionList](#) () const
Return the train's division list (string of symbols).
- const char * [CarTypes](#) () const
Return the train's car type list (string of char type characters).
- const char * [Description](#) () const
Return the train's description.
- int [Shift](#) () const
Return the train's shift.
- void [SetShift](#) (int newshift)
Set the train's shift.
- int [MaxCars](#) () const
Return the train's maximum number of cars.
- int [MaxClear](#) () const
Return the train's maximum clearance plate.
- int [MaxWeight](#) () const
Return the train's maximum weight class.
- void [SetMaxWeight](#) (int newmaxweight)
Set the train's maximum weight class.
- int [MaxLength](#) () const
Return the train's maximum length.
- void [SetMaxLength](#) (int newmaxlength)
Set the train's maximum length.
- int [OnDuty](#) () const
Return the train's on duty time, in minutes since midnight.
- bool [Print](#) () const
Return the train's print flag.
- void [SetPrint](#) (bool flag)
Set the train's print flag.
- bool [Done](#) () const
Return the train's done flag.
- [TrainType](#) [Type](#) () const
Return the train's type.

- int [NumberOfOrders](#) () const
Return the number of train orders for this train.
- const char * [Order](#) (int index) const
Return the lth order.
- int [NumberOfStops](#) () const
Return the number of stops this train makes.
- [FCFSupport::Industry](#) * [IndustryStop](#) (int index) const
Return the lth industry stop this train makes.
- [Station](#) * [StationStop](#) (int index) const
Return the lth station stop this train makes.

Private Attributes

- vector< string > [orders](#)
List of train orders.
- vector< [StationOrIndustry](#) > [stops](#)
List of stops.
- string [name](#)
Name of the train.
- string [divList](#)
The list of division symbols for this train.
- string [carTypes](#)
The list of car type charactes.
- string [description](#)
The description of the train.
- int [shift](#)
The train's shift.
- int [maxcars](#)
The maximum number of cars on this train.
- int [maxclear](#)
The maximum clearance plate for this train.
- int [maxweight](#)
The maximum weight class for this train.
- int [maxlength](#)
The maximum length for this train.
- int [onduty](#)
The onduty time for this train, in minutes since midnight.
- bool [print](#)
The print flag for this train.
- bool [done](#)
The done flag for this train.
- [TrainType](#) type
The type of this train.

Friends

- class [System](#)

The [System](#) class is a friend.

9.180.1 Detailed Description

The [Train](#) class represents a train.

A train has a name, a type, a description, a list of divisions it operates in, it takes a specific set of car types, operates during a specific shift (or possibly all shifts if it is a box movement), a set of stops it makes, an on duty time, a maximum number of cars, a maximum clearance plate, a maximum weight class, a maximum length and several flags.

Author

Robert Heller <heller@deepsoft.com>

9.180.2 Member Enumeration Documentation

9.180.2.1 TrainType

enum [FCFSupport::Train::TrainType](#)

Types of trains.

Enumerator

Unknown	An unknown type of train.
Wayfreight	A Way Freight train.
BoxMove	A Box Move train.
Manifest	A Manifest Freight train.
Passenger	A Passenger train.

9.180.3 Constructor & Destructor Documentation

9.180.3.1 Train() [1/3]

[FCFSupport::Train::Train](#) () [inline]

Default constructor.

Initialize all slots to empty values.

References [carTypes](#), [description](#), [divList](#), [done](#), [maxcars](#), [maxclear](#), [maxlength](#), [maxweight](#), [name](#), [onduty](#), [print](#), [shift](#), [type](#), and [Unknown](#).

9.180.3.2 Train() [2/3]

```
FCFSupport::Train::Train (
    Train & other ) [inline]
```

Copy construtor.

Copy initial values from another instance.

Parameters

<i>other</i>	The other Train instance.
--------------	---

References [carTypes](#), [description](#), [divList](#), [done](#), [maxcars](#), [maxclear](#), [maxlength](#), [maxweight](#), [name](#), [onduty](#), [orders](#), [print](#), [shift](#), [stops](#), and [type](#).

9.180.3.3 Train() [3/3]

```
FCFSupport::Train::Train (
    const char * n,
    const char * dl,
    const char * ct,
    const char * descr,
    int sh,
    int mc,
    int mcl,
    int mw,
    int ml,
    int od,
    bool p,
    bool d,
    TrainType t ) [inline]
```

Full constructor.

Initialize the class instance from a set of parameters.

Parameters

<i>n</i>	The new train's name.
<i>dl</i>	The new train's division list.
<i>ct</i>	The new train's car type list.
<i>descr</i>	The New train's description.
<i>sh</i>	The new train's shift.
<i>mc</i>	The new train's maximum car limit.
<i>mcl</i>	The new train's maximum clearance plate.
<i>mw</i>	The new train's maximum weight class.
<i>ml</i>	The new train's maximum length.
<i>od</i>	The new train's on duty time (in minutes since midnight).
<i>p</i>	A flag to indicate if a pickup / dropoff sheet should be printed for this train.
<i>d</i>	A flag to indicate if this train is done.
<i>t</i>	The new train's type.

References [carTypes](#), [description](#), [divList](#), [done](#), [maxcars](#), [maxclear](#), [maxlength](#), [maxweight](#), [name](#), [onduty](#), [print](#), [shift](#), and [type](#).

9.180.3.4 ~Train()

```
FCFSupport::Train::~~Train ( ) [inline]
```

Descructor.

9.180.4 Member Function Documentation**9.180.4.1 CarTypes()**

```
const char * FCFSupport::Train::CarTypes ( ) const [inline]
```

Return the train's car type list (string of char type characters).

References [carTypes](#).

9.180.4.2 Description()

```
const char * FCFSupport::Train::Description ( ) const [inline]
```

Return the train's description.

References [description](#).

9.180.4.3 DivisionList()

```
const char * FCFSupport::Train::DivisionList ( ) const [inline]
```

Return the train's division list (string of symbols).

References [divList](#).

9.180.4.4 Done()

```
bool FCFSupport::Train::Done ( ) const [inline]
```

Return the train's done flag.

References [done](#).

9.180.4.5 IndustryStop()

```
FCFSupport::Industry * FCFSupport::Train::IndustryStop (
    int index ) const [inline]
```

Return the lth industry stop this train makes.

Parameters

<i>index</i>	The index of the the stop to retrieve.
--------------	--

References [Manifest](#), [stops](#), and [type](#).

Referenced by [FCFSupport::SwitchListElement::DropStopEQ\(\)](#).

9.180.4.6 MaxCars()

```
int FCFSupport::Train::MaxCars ( ) const [inline]
```

Return the train's maximum number of cars.

References [maxcars](#).

9.180.4.7 MaxClear()

```
int FCFSupport::Train::MaxClear ( ) const [inline]
```

Return the train's maximum clearance plate.

References [maxclear](#).

9.180.4.8 MaxLength()

```
int FCFSupport::Train::MaxLength ( ) const [inline]
```

Return the train's maximum length.

References [maxlength](#).

9.180.4.9 MaxWeight()

```
int FCFSupport::Train::MaxWeight ( ) const [inline]
```

Return the train's maximum weight class.

References [maxweight](#).

9.180.4.10 Name()

```
const char * FCFSupport::Train::Name ( ) const [inline]
```

Return the train's name.

References [name](#).

9.180.4.11 NumberOfOrders()

```
int FCFSupport::Train::NumberOfOrders ( ) const [inline]
```

Return the number of train orders for this train.

References [orders](#).

9.180.4.12 NumberOfStops()

```
int FCFSupport::Train::NumberOfStops ( ) const [inline]
```

Return the number of stops this train makes.

References [stops](#).

9.180.4.13 OnDuty()

```
int FCFSupport::Train::OnDuty ( ) const [inline]
```

Return the train's on duty time, in minutes since midnight.

References [onduty](#).

9.180.4.14 operator=()

```
Train & FCFSupport::Train::operator= (
    Train & other ) [inline]
```

Assignment operator.

Copy values from another instance.

Parameters

<i>other</i>	The other Train instance.
--------------	---

References [carTypes](#), [description](#), [divList](#), [done](#), [maxcars](#), [maxclear](#), [maxlength](#), [maxweight](#), [name](#), [onduty](#), [orders](#), [print](#), [shift](#), [stops](#), and [type](#).

9.180.4.15 Order()

```
const char * FCFSupport::Train::Order (
    int index ) const [inline]
```

Return the lth order.

Parameters

<i>index</i>	The index of the order to retrieve.
--------------	-------------------------------------

References [orders](#).

9.180.4.16 Print()

```
bool FCFSupport::Train::Print ( ) const [inline]
```

Return the train's print flag.

References [print](#).

9.180.4.17 SetMaxLength()

```
void FCFSupport::Train::SetMaxLength (
    int newmaxlength ) [inline]
```

Set the train's maximum length.

Parameters

<i>newmaxlength</i>	New maximum length.
---------------------	---------------------

References [maxlength](#).

9.180.4.18 SetMaxWeight()

```
void FCFSupport::Train::SetMaxWeight (
    int newmaxweight ) [inline]
```

Set the train's maximum weight class.

Parameters

<i>newmaxweight</i>	New maximum weight class.
---------------------	---------------------------

References [maxweight](#).

9.180.4.19 SetPrint()

```
void FCFSupport::Train::SetPrint (
    bool flag ) [inline]
```

Set the train's print flag.

Parameters

<i>flag</i>	The new flag value.
-------------	---------------------

References [print](#).

9.180.4.20 SetShift()

```
void FCFSupport::Train::SetShift (
    int newshift ) [inline]
```

Set the train's shift.

Parameters

<i>newshift</i>	The new shift.
-----------------	----------------

References [shift](#).

9.180.4.21 Shift()

```
int FCFSupport::Train::Shift ( ) const [inline]
```

Return the train's shift.

References [shift](#).

9.180.4.22 StationStop()

```
Station * FCFSupport::Train::StationStop (
    int index ) const [inline]
```

Return the lth station stop this train makes.

Parameters

<i>index</i>	The index of the the stop to retrieve.
--------------	--

References [Manifest](#), [stops](#), and [type](#).

Referenced by [FCFSupport::SwitchListElement::DropStopEQ\(\)](#).

9.180.4.23 Type()

```
TrainType FCFSupport::Train::Type ( ) const [inline]
```

Return the train's type.

References [type](#).

Referenced by [FCFSupport::SwitchListElement::DropStopEQ\(\)](#), [FCFSupport::SwitchListElement::DropStopIndustry\(\)](#), and [FCFSupport::SwitchListElement::DropStopStation\(\)](#).

9.180.5 Friends And Related Function Documentation

9.180.5.1 System

```
friend class System [friend]
```

The [System](#) class is a friend.

9.180.6 Member Data Documentation

9.180.6.1 carTypes

```
string FCFSupport::Train::carTypes [private]
```

The list of car type charactes.

Referenced by [CarTypes\(\)](#), [operator=\(\)](#), and [Train\(\)](#).

9.180.6.2 description

```
string FCFSupport::Train::description [private]
```

The description of the train.

Referenced by [Description\(\)](#), [operator=\(\)](#), and [Train\(\)](#).

9.180.6.3 divList

```
string FCFSupport::Train::divList [private]
```

The list of division symbols for this train.

Referenced by [DivisionList\(\)](#), [operator=\(\)](#), and [Train\(\)](#).

9.180.6.4 done

```
bool FCFSupport::Train::done [private]
```

The done flag for this train.

Referenced by [Done\(\)](#), [operator=\(\)](#), and [Train\(\)](#).

9.180.6.5 maxcars

```
int FCFSupport::Train::maxcars [private]
```

The maximum number of cars on this train.

Referenced by [MaxCars\(\)](#), [operator=\(\)](#), and [Train\(\)](#).

9.180.6.6 maxclear

```
int FCFSupport::Train::maxclear [private]
```

The maximum clearance plate for this train.

Referenced by [MaxClear\(\)](#), [operator=\(\)](#), and [Train\(\)](#).

9.180.6.7 maxlength

```
int FCFSupport::Train::maxlength [private]
```

The maximum length for this train.

Referenced by [MaxLength\(\)](#), [operator=\(\)](#), [SetMaxLength\(\)](#), and [Train\(\)](#).

9.180.6.8 maxweight

```
int FCFSupport::Train::maxweight [private]
```

The maximum weight class for this train.

Referenced by [MaxWeight\(\)](#), [operator=\(\)](#), [SetMaxWeight\(\)](#), and [Train\(\)](#).

9.180.6.9 name

```
string FCFSupport::Train::name [private]
```

Name of the train.

Referenced by [Name\(\)](#), [operator=\(\)](#), and [Train\(\)](#).

9.180.6.10 onduty

```
int FCFSupport::Train::onduty [private]
```

The onduty time for this train, in minutes since midnight.

Referenced by [OnDuty\(\)](#), [operator=\(\)](#), and [Train\(\)](#).

9.180.6.11 orders

```
vector<string> FCFSupport::Train::orders [private]
```

List of train orders.

Referenced by [NumberOfOrders\(\)](#), [operator=\(\)](#), [Order\(\)](#), and [Train\(\)](#).

9.180.6.12 print

```
bool FCFSupport::Train::print [private]
```

The print flag for this train.

Referenced by [operator=\(\)](#), [Print\(\)](#), [SetPrint\(\)](#), and [Train\(\)](#).

9.180.6.13 shift

```
int FCFSupport::Train::shift [private]
```

The train's shift.

Referenced by [operator=\(\)](#), [SetShift\(\)](#), [Shift\(\)](#), and [Train\(\)](#).

9.180.6.14 stops

```
vector<StationOrIndustry> FCFSupport::Train::stops [private]
```

List of stops.

Referenced by [IndustryStop\(\)](#), [NumberOfStops\(\)](#), [operator=\(\)](#), [StationStop\(\)](#), and [Train\(\)](#).

9.180.6.15 type

```
TrainType FCFSupport::Train::type [private]
```

The type of this train.

Referenced by [IndustryStop\(\)](#), [operator=\(\)](#), [StationStop\(\)](#), [Train\(\)](#), and [Type\(\)](#).

9.181 TTSupport::Train Class Reference

This class implements a train.

```
#include <Train.h>
```

Public Member Functions

- [Train](#) ([TimeTableSystem](#) *timetable=NULL, string [name](#)="", string [number](#)="", int [speed](#)=0, int [classnumber](#)=0, int [departure](#)=0, int start=0, int end=-1)
Create and initialize a train object.
- const char * [Name](#) () const
Return the name of the train.
- const char * [Number](#) () const
Return the number (or symbol) of the train.
- int [Departure](#) () const
Return the departure time.
- void [SetDeparture](#) (int depart)
Update departure time.
- int [Speed](#) () const
Return the train's speed.
- int [ClassNumber](#) () const
Return the class number.
- int [NumberOfNotes](#) () const
Number of notes.
- int [Note](#) (int i) const
Return the ith note.
- void [AddNoteToTrain](#) (int note)
Add a note.
- void [RemoveNoteFromTrain](#) (int note)
Remove a note.
- void [UpdateStopLayover](#) (int istop, double layover)
Update stop layover.
- void [UpdateStopCab](#) (int istop, [Cab](#) *cab)
Update the cab.
- void [AddNoteToStop](#) (int istop, int note)
Add a note to a stop.
- void [RemoveNoteFromStop](#) (int istop, int note)
Remove a note from a stop.
- void [SetOriginStorageTrack](#) (string trackname)
Set the origin storage track.
- void [SetDestinationStorageTrack](#) (string trackname)
Set the destination storage track.
- void [SetTransitStorageTrack](#) (int istop, string trackname)
Set an intermediate storage track.
- int [NumberOfStops](#) () const

Return the number of stops.

- const [Stop](#) * [Stopl](#) (int i) const

Return the ith stop object.

- double [StartSMile](#) () const

Return the start Scale Mile.

- ostream & [Write](#) (ostream &stream) const

Write object to a stream.

- istream & [Read](#) (istream &stream, const [CabNameMap](#) cabs)

Read an object from a stream.

Private Attributes

- string [name](#)

Name of the train.

- string [number](#)

Number or symbol of the train;.

- int [speed](#)

The train's speed.

- int [classnumber](#)

The train's class.

- vector< int > [notes](#)

Notes about the train.

- int [departure](#)

Departure time.

- [StopVector](#) stops

The train's stops.

- double [startSMile](#)

Start scale mile.

9.181.1 Detailed Description

This class implements a train.

A train travels down the track passing or stoping at stations along the way.

Author

Robert Heller <heller@deepsoft.com>

9.181.2 Constructor & Destructor Documentation

9.181.2.1 Train()

```
TTSupport::Train::Train (
    TimeTableSystem * timetable = NULL,
    string name = "",
    string number = "",
    int speed = 0,
    int classnumber = 0,
    int departure = 0,
    int start = 0,
    int end = -1 )
```

Create and initialize a train object.

Parameters

<i>timetable</i>	The parent time table object.
<i>name</i>	The name of the train.
<i>number</i>	The number (or symbol) of the train.
<i>speed</i>	The maximum (scale) speed of the train.
<i>classnumber</i>	The class of the train.
<i>departure</i>	The train's departure time.
<i>start</i>	The originating station index.
<i>end</i>	The terminating station index.

9.181.3 Member Function Documentation

9.181.3.1 AddNoteToStop()

```
void TTSupport::Train::AddNoteToStop (
    int istop,
    int note )
```

Add a note to a stop.

Parameters

<i>istop</i>	The stop number to update.
<i>note</i>	The note to add.

9.181.3.2 AddNoteToTrain()

```
void TTSupport::Train::AddNoteToTrain (
    int note ) [inline]
```

Add a note.

Parameters

<i>note</i>	The note number to add.
-------------	-------------------------

References [i](#), and [notes](#).

9.181.3.3 ClassNumber()

```
int TTSupport::Train::ClassNumber ( ) const [inline]
```

Return the class number.

References [classnumber](#).

9.181.3.4 Departure()

```
int TTSupport::Train::Departure ( ) const [inline]
```

Return the departure time.

References [departure](#).

9.181.3.5 Name()

```
const char * TTSupport::Train::Name ( ) const [inline]
```

Return the name of the train.

References [name](#).

9.181.3.6 Note()

```
int TTSupport::Train::Note (
    int i ) const [inline]
```

Return the ith note.

Returns -1 if the index is out of range.

Parameters

<i>i</i>	The index of the note.
----------	------------------------

References [i](#), and [notes](#).

9.181.3.7 Number()

```
const char * TTSupport::Train::Number ( ) const [inline]
```

Return the number (or symbol) of the train.

References [number](#).

9.181.3.8 NumberOfNotes()

```
int TTSupport::Train::NumberOfNotes ( ) const [inline]
```

Number of notes.

References [notes](#).

9.181.3.9 NumberOfStops()

```
int TTSupport::Train::NumberOfStops ( ) const [inline]
```

Return the number of stops.

References [stops](#).

9.181.3.10 Read()

```
istream & TTSupport::Train::Read (
    istream & stream,
    const CabNameMap cabs )
```

Read an object from a stream.

Parameters

<i>stream</i>	Stream to read from.
<i>cabs</i>	The cab name map.

9.181.3.11 RemoveNoteFromStop()

```
void TTSupport::Train::RemoveNoteFromStop (  
    int istop,  
    int note )
```

Remove a note from a stop.

Parameters

<i>istop</i>	The stop number to update.
<i>note</i>	The note to remove.

9.181.3.12 RemoveNoteFromTrain()

```
void TTSupport::Train::RemoveNoteFromTrain (  
    int note ) [inline]
```

Remove a note.

Parameters

<i>note</i>	The note number to remove.
-------------	----------------------------

References [notes](#).

9.181.3.13 SetDeparture()

```
void TTSupport::Train::SetDeparture (  
    int depart ) [inline]
```

Update departure time.

Parameters

<i>depart</i>	The new departure time.
---------------	-------------------------

References [departure](#).

9.181.3.14 SetDestinationStorageTrack()

```
void TTSupport::Train::SetDestinationStorageTrack (  
    string trackname )
```

Set the destination storage track.

Parameters

<i>trackname</i>	The terminating storage track name.
------------------	-------------------------------------

9.181.3.15 SetOriginStorageTrack()

```
void TTSupport::Train::SetOriginStorageTrack (  
    string trackname )
```

Set the origin storage track.

Parameters

<i>trackname</i>	The originating storage track name.
------------------	-------------------------------------

9.181.3.16 SetTransitStorageTrack()

```
void TTSupport::Train::SetTransitStorageTrack (  
    int istop,  
    string trackname )
```

Set an intermediate storage track.

Parameters

<i>istop</i>	The stop index.
<i>trackname</i>	The intermediate storage track name.

9.181.3.17 Speed()

```
int TTSupport::Train::Speed ( ) const [inline]
```

Return the train's speed.

References [speed](#).

9.181.3.18 StartSMile()

```
double TTSupport::Train::StartSMile ( ) const [inline]
```

Return the start Scale Mile.

References [startSMile](#).

9.181.3.19 StopI()

```
const Stop * TTSupport::Train::StopI (
    int i ) const [inline]
```

Return the ith stop object.

Returns NULL if the index is out of range.

Parameters

<i>i</i>	The index of the stop.
----------	------------------------

References [i](#), and [stops](#).

9.181.3.20 UpdateStopCab()

```
void TTSupport::Train::UpdateStopCab (
    int istop,
    Cab * cab )
```

Update the cab.

Parameters

<i>istop</i>	The stop number to update.
<i>cab</i>	The new cab.

9.181.3.21 UpdateStopLayover()

```
void TTSupport::Train::UpdateStopLayover (
    int istop,
    double layover )
```

Update stop layover.

Parameters

<i>istop</i>	The stop number to update.
<i>layover</i>	The new layover time.

9.181.3.22 Write()

```
ostream & TTSupport::Train::Write (
    ostream & stream ) const
```

Write object to a stream.

Parameters

<i>stream</i>	Stream to write to.
---------------	---------------------

9.181.4 Member Data Documentation

9.181.4.1 classnumber

```
int TTSupport::Train::classnumber [private]
```

The train's class.

Referenced by [ClassNumber\(\)](#).

9.181.4.2 departure

```
int TTSupport::Train::departure [private]
```

Departure time.

Referenced by [Departure\(\)](#), and [SetDeparture\(\)](#).

9.181.4.3 name

```
string TTSupport::Train::name [private]
```

Name of the train.

Referenced by [Name\(\)](#).

9.181.4.4 notes

```
vector<int> TTSupport::Train::notes [private]
```

Notes about the train.

Referenced by [AddNoteToTrain\(\)](#), [Note\(\)](#), [NumberOfNotes\(\)](#), and [RemoveNoteFromTrain\(\)](#).

9.181.4.5 number

```
string TTSupport::Train::number [private]
```

Number or symbol of the train;.

Referenced by [Number\(\)](#).

9.181.4.6 speed

```
int TTSupport::Train::speed [private]
```

The train's speed.

Referenced by [Speed\(\)](#).

9.181.4.7 startSMile

```
double TTSupport::Train::startSMile [private]
```

Start scale mile.

Referenced by [StartSMile\(\)](#).

9.181.4.8 stops

```
StopVector TTSupport::Train::stops [private]
```

The train's stops.

Referenced by [NumberOfStops\(\)](#), and [StopI\(\)](#).

9.182 FCFSupport::TrainDisplayCallback Class Reference

Callback to manage a train status display.

```
#include <CallBack.h>
```

Public Member Functions

- [TrainDisplayCallback](#) ()
Constructor.
- virtual [~TrainDisplayCallback](#) ()
Destructor.
- virtual void [InitializeTrainDisplay](#) (string name, int stationCount, int maxLength, int maxCars) const
Initialize the train status display.
- virtual void [CloseTrainDisplay](#) () const
Close the train display.
- virtual void [GrabTrainDisplay](#) () const
Grab the train display.
- virtual void [ReleaseTrainDisplay](#) () const
Release the train display.
- virtual void [UpdateTrainDisplay](#) (string currentStationName, string currentStopName, int trainLength, int numberCars, int trainTons, int trainLoads, int trainEmpties, int trainLongest, int currentStop) const
Update the train display.

9.182.1 Detailed Description

Callback to manage a train status display.

This callback is used to manage an application supplied train status display. Used in the train running methods when train runs are simulated to move cars from place place. The train status shows the train's progress and the pickups and drops it makes as it traverses its route.

@author Robert Heller \<heller\@deepsoft.com\>

9.182.2 Constructor & Destructor Documentation

9.182.2.1 TrainDisplayCallback()

```
FCFSupport::TrainDisplayCallback::TrainDisplayCallback ( ) [inline]
```

Constructor.

The base constructor does nothing. It is presumed that a derived class might do something useful.

9.182.2.2 ~TrainDisplayCallback()

```
virtual FCFSupport::TrainDisplayCallback::~~TrainDisplayCallback ( ) [inline], [virtual]
```

Destructor.

The base destructor does nothing. It is presumed that a derived class might do something useful.

9.182.3 Member Function Documentation

9.182.3.1 CloseTrainDisplay()

```
virtual void FCFSupport::TrainDisplayCallback::CloseTrainDisplay ( ) const [inline], [virtual]
```

Close the train display.

This is called when the train status display is no longer needed.

9.182.3.2 GrabTrainDisplay()

```
virtual void FCFSupport::TrainDisplayCallback::GrabTrainDisplay ( ) const [inline], [virtual]
```

Grab the train display.

This is used when the train status display needs to be "front and center".

9.182.3.3 InitializeTrainDisplay()

```
virtual void FCFSupport::TrainDisplayCallback::InitializeTrainDisplay (
    string name,
    int stationCount,
    int maxLength,
    int maxCars ) const [inline], [virtual]
```

Initialize the train status display.

Set the train name, the station count, max length and the maximum number of cars. Generally, this initializes the train status display for a new train start.

Parameters

<i>name</i>	Name of the train.
<i>stationCount</i>	The station count (number of stops).
<i>maxLength</i>	Maximum train length.
<i>maxCars</i>	Maximum number of cars.

9.182.3.4 ReleaseTrainDisplay()

```
virtual void FCFSupport::TrainDisplayCallback::ReleaseTrainDisplay ( ) const [inline], [virtual]
```

Release the train display.

This is used when the train status display no longer needs to be "front and center".

9.182.3.5 UpdateTrainDisplay()

```
virtual void FCFSupport::TrainDisplayCallback::UpdateTrainDisplay (
    string currentStationName,
    string currentStopName,
    int trainLength,
    int numberCars,
    int trainTons,
```

```

    int trainLoads,
    int trainEmpties,
    int trainLongest,
    int currentStop ) const [inline], [virtual]

```

Update the train display.

This updates the train status display when a train arrives at a station (or industry), drops cars, picks up cars and leaves a station (or industry).

Parameters

<i>currentStationName</i>	The current station name.
<i>currentStopName</i>	The current stop name.
<i>trainLength</i>	The current train length.
<i>numberCars</i>	The current number of cars.
<i>trainTons</i>	The current number of tons.
<i>trainLoads</i>	The current number of loaded cars.
<i>trainEmpties</i>	The current number of empty cars.
<i>trainLongest</i>	The longest the train has been.
<i>currentStop</i>	The current stop number.

9.183 Parsers::TrackGraph::Transform2D Class Reference

Two dimensional transform class.

```
#include <TrackGraph.h>
```

Public Member Functions

- [Transform2D](#) ()
Default constructor.
- [Transform2D](#) (float r11, float r12, float tx, float r21, float r22, float ty, float a0=0.0, float a1=0.0, float s=1.0)
Full fledged constructor.
- [Transform2D](#) (const [Transform2D](#) *ts)
Copy constructor.
- float [Determinant](#) () const
Return the determinant.
- float [Minor](#) (int, int) const
Return the minor.
- [Transform2D](#) * [Inverse](#) () const
Return the inverse.
- void [Apply](#) (float x, float y, float s, float &tx, float &ty, float &ts) const
Apply a scaled transformation.
- int [Apply](#) (float x, float y, float &tx, float &ty) const

Apply a normal transformation/.

- int `operator==` (const `Transform2D` &other) const

Equality operator.

- int `operator!=` (const `Transform2D` &other) const

Inequality operator.

Private Attributes

- float `matrix` [3][3]

Transform matrix.

Static Private Attributes

- static constexpr float `FUZZ` = .00001

Fuzz factor.

Friends

- `Transform2D * operator*` (const `Transform2D` &t1, const `Transform2D` &t2)

Matrix multiplication.

9.183.1 Detailed Description

Two dimensional transform class.

Author

Robert Heller <heller@deepsoft.com>

9.183.2 Constructor & Destructor Documentation

9.183.2.1 Transform2D() [1/3]

```
Parsers::TrackGraph::Transform2D::Transform2D ( )
```

Default constructor.

Creates an identity tranform.

9.183.2.2 Transform2D() [2/3]

```
Parsers::TrackGraph::Transform2D::Transform2D (
    float r11,
    float r12,
    float tx,
    float r21,
    float r22,
    float ty,
    float a0 = 0.0,
    float a1 = 0.0,
    float s = 1.0 )
```

Full fledged constructor.

9.183.2.3 Transform2D() [3/3]

```
Parsers::TrackGraph::Transform2D::Transform2D (
    const Transform2D * ts )
```

Copy constructor.

9.183.3 Member Function Documentation**9.183.3.1 Apply()** [1/2]

```
int Parsers::TrackGraph::Transform2D::Apply (
    float x,
    float y,
    float & tx,
    float & ty ) const
```

Apply a normal transformation/.

9.183.3.2 Apply() [2/2]

```
void Parsers::TrackGraph::Transform2D::Apply (
    float x,
    float y,
    float s,
    float & tx,
    float & ty,
    float & ts ) const
```

Apply a scaled transformation.

9.183.3.3 Determinant()

```
float Parsers::TrackGraph::Transform2D::Determinant ( ) const
```

Return the determinant.

9.183.3.4 Inverse()

```
Transform2D * Parsers::TrackGraph::Transform2D::Inverse ( ) const
```

Return the inverse.

9.183.3.5 Minor()

```
float Parsers::TrackGraph::Transform2D::Minor (
    int ,
    int ) const
```

Return the minor.

9.183.3.6 operator"!="()

```
int Parsers::TrackGraph::Transform2D::operator!= (
    const Transform2D & other ) const [inline]
```

Inequality operator.

9.183.3.7 operator==()

```
int Parsers::TrackGraph::Transform2D::operator== (
    const Transform2D & other ) const
```

Equality operator.

9.183.4 Friends And Related Function Documentation

9.183.4.1 operator*

```
Transform2D * operator* (
    const Transform2D & t1,
    const Transform2D & t2 ) [friend]
```

Matrix multiplication.

9.183.5 Member Data Documentation

9.183.5.1 FUZZ

```
constexpr float Parsers::TrackGraph::Transform2D::FUZZ = .00001 [static], [constexpr], [private]
```

Fuzz factor.

9.183.5.2 matrix

```
float Parsers::TrackGraph::Transform2D::matrix[3][3] [private]
```

Transform matrix.

9.184 Parsers::TurnoutBody Class Reference

List of turnout body lines (T, E, P, S, C, and J lines).

```
#include <TurnoutBody.h>
```

Public Member Functions

- [TurnoutBody](#) ([TurnoutBodyElt](#) *e, [TurnoutBody](#) *n)
Basic constructor.
- [TrackBody](#) * [TurnoutEnds](#) ()
Create a track endpoint list.
- int [TurnoutSegmentCount](#) ()
Count segments (S, C, and J lines).
- int [TurnoutRouteCount](#) ()
Count routes (P lines).
- const [TurnoutBodyElt](#) * [Element](#) () const
Return current element.

Static Public Member Functions

- static [TurnoutBody](#) * [ConsTurnoutBody](#) ([TurnoutBodyElt](#) *trbe, [TurnoutBody](#) *trb)
Alternative constructor function.
- static void [CleanUpTurnoutBody](#) ([TurnoutBody](#) *trb)
Free up memory.

Private Member Functions

- void [CleanUpElement](#) ()
Free up memory.

Private Attributes

- [TurnoutBodyElt](#) * [element](#)
Current element.
- [TurnoutBody](#) * [next](#)
Next element.

Friends

- class [TurnoutBodyElt](#)
- class [TrackGraph](#)

9.184.1 Detailed Description

List of turnout body lines (T, E, P, S, C, and J lines).

Author

Robert Heller <heller@deepsoft.com>

9.184.2 Constructor & Destructor Documentation

9.184.2.1 TurnoutBody()

```
Parsers::TurnoutBody::TurnoutBody (  
    TurnoutBodyElt * e,  
    TurnoutBody * n ) [inline]
```

Basic constructor.

References [element](#), and [next](#).

Referenced by [ConsTurnoutBody\(\)](#).

9.184.3 Member Function Documentation

9.184.3.1 CleanUpElement()

```
void Parsers::TurnoutBody::CleanUpElement ( ) [inline], [private]
```

Free up memory.

References [element](#), [Parsers::TurnoutBodyElt::None](#), [Parsers::TurnoutBodyElt::theEnd](#), [Parsers::TurnoutBodyElt::theType](#), [Parsers::TurnoutBodyElt::TurnoutCurveSegment](#), [Parsers::TurnoutBodyElt::TurnoutEnd](#), [Parsers::TurnoutBodyElt::TurnoutJointSegment](#), [Parsers::TurnoutBodyElt::TurnoutRoute](#), and [Parsers::TurnoutBodyElt::TurnoutStraightSegment](#).

Referenced by [CleanUpTurnoutBody\(\)](#).

9.184.3.2 CleanUpTurnoutBody()

```
static void Parsers::TurnoutBody::CleanUpTurnoutBody (
    TurnoutBody * trb ) [inline], [static]
```

Free up memory.

References [CleanUpElement\(\)](#), [element](#), and [next](#).

9.184.3.3 ConsTurnoutBody()

```
static TurnoutBody * Parsers::TurnoutBody::ConsTurnoutBody (
    TurnoutBodyElt * trbe,
    TurnoutBody * trb ) [inline], [static]
```

Alternative constructor function.

References [TurnoutBody\(\)](#).

9.184.3.4 Element()

```
const TurnoutBodyElt * Parsers::TurnoutBody::Element ( ) const [inline]
```

Return current element.

References [element](#).

9.184.3.5 TurnoutEnds()

```
TrackBody * Parsers::TurnoutBody::TurnoutEnds ( ) [inline]
```

Create a track endpoint list.

References [Parsers::TrackBody::AppendTrackBodyElt\(\)](#), [element](#), [next](#), [Parsers::TurnoutBodyElt::theEnd](#), [Parsers::TurnoutBodyElt::theType](#), and [Parsers::TurnoutBodyElt::TurnoutEnd](#).

9.184.3.6 TurnoutRouteCount()

```
int Parsers::TurnoutBody::TurnoutRouteCount ( ) [inline]
```

Count routes (P lines).

References [element](#), [next](#), [Parsers::TurnoutBodyElt::theType](#), and [Parsers::TurnoutBodyElt::TurnoutRoute](#).

9.184.3.7 TurnoutSegmentCount()

```
int Parsers::TurnoutBody::TurnoutSegmentCount ( ) [inline]
```

Count segments (S, C, and J lines).

References [element](#), [next](#), [Parsers::TurnoutBodyElt::theType](#), [Parsers::TurnoutBodyElt::TurnoutCurveSegment](#), [Parsers::TurnoutBodyElt::TurnoutJointSegment](#), and [Parsers::TurnoutBodyElt::TurnoutStraightSegment](#).

9.184.4 Friends And Related Function Documentation

9.184.4.1 TrackGraph

```
friend class TrackGraph [friend]
```

9.184.4.2 TurnoutBodyElt

```
friend class TurnoutBodyElt [friend]
```

9.184.5 Member Data Documentation

9.184.5.1 element

`TurnoutBodyElt*` `Parsers::TurnoutBody::element` [private]

Current element.

Referenced by [CleanUpElement\(\)](#), [CleanUpTurnoutBody\(\)](#), [Element\(\)](#), [TurnoutBody\(\)](#), [TurnoutEnds\(\)](#), [TurnoutRouteCount\(\)](#), and [TurnoutSegmentCount\(\)](#).

9.184.5.2 next

`TurnoutBody*` `Parsers::TurnoutBody::next` [private]

Next element.

Referenced by [CleanUpTurnoutBody\(\)](#), [TurnoutBody\(\)](#), [TurnoutEnds\(\)](#), [TurnoutRouteCount\(\)](#), and [TurnoutSegmentCount\(\)](#).

9.185 Parsers::TurnoutBodyElt Class Reference

Turnout body elements: T, E, P, S, C, and J lines are collected.

```
#include <TurnoutBody.h>
```

Classes

- struct [Pos](#)
Position structure.

Public Types

- enum [TurnoutBodyEltType](#) {
 [None](#) , [TurnoutEnd](#) , [TurnoutRoute](#) , [TurnoutStraightSegment](#) ,
 [TurnoutCurveSegment](#) , [TurnoutJointSegment](#) }
Element types.

Public Member Functions

- [TurnoutBodyElt](#) ()
Constructor.
- [~TurnoutBodyElt](#) ()
Destructor.
- [TurnoutBodyEltType TheType](#) () const
Type accessor.
- void [GetTurnoutRoute](#) (char *&pName, [IntegerList](#) *&cList) const
Fetch turnout route data.
- int [GetTurnoutStraightSegment](#) (float &x1, float &y1, float &x2, float &y2) const
Fetch turnout straight segment data.
- int [GetTurnoutCurveSegment](#) (float &r, float &x, float &y, float &a0, float &a1) const
Fetch turnout curve segment data.
- int [GetTurnoutJointSegment](#) (float &x, float &y, float &a, float &l0, float &l1, float &r, float &l) const
Fetch turnout joint segment data.

Static Public Member Functions

- static void [InitTSegId](#) ()
Segment count initializer.
- static [TurnoutBodyElt](#) * [MakeTurnoutEnd](#) ([TrackBodyElt](#) *tbe)
Create an endpoint (T or E lines).
- static [TurnoutBodyElt](#) * [MakeTurnoutRoute](#) (char *pName, [IntegerList](#) *cList)
Create a turnout route (P lines).
- static [TurnoutBodyElt](#) * [MakeTurnoutStraightSegment](#) (float x1, float y1, float x2, float y2)
Create a turnout straight segment (S lines).
- static [TurnoutBodyElt](#) * [MakeTurnoutCurveSegment](#) (float r, float x, float y, float a0, float a1)
Create a turnout curve segment (C lines).
- static [TurnoutBodyElt](#) * [MakeTurnoutJointSegment](#) (float x, float y, float a, float l0, float l1, float r, float l)
Create a turnout joint segment (J lines).

Private Attributes

- [TurnoutBodyEltType](#) theType
Element type.
- [TrackBodyElt](#) * theEnd
Pointer to T or E line data.
- char * [RouteName](#)
Route name (P lines).
- [IntegerList](#) * routeList
Segment list (P Lines).
- int segmentId
Segment index (S, C, or J lines).
- [Pos](#) pos1
First position.

- [Pos pos2](#)
Second position.
- float [radius](#)
A radius value.
- float [ang0](#)
An angle value.
- float [ang1](#)
Another angle value.
- float [R](#)
\$R\$ value (for J lines).
- float [L](#)
\$L\$ value (for J lines).

Static Private Attributes

- static int [segCount](#)
Counter for S, C, and J segments.

Friends

- class [TrackGraph](#)
- class [TurnoutBody](#)

9.185.1 Detailed Description

Turnout body elements: T, E, P, S, C, and J lines are collected.

others are discarded.

Author

Robert Heller <heller@deepsoft.com>

9.185.2 Member Enumeration Documentation

9.185.2.1 TurnoutBodyEltType

```
enum Parsers::TurnoutBodyElt::TurnoutBodyEltType
```

Element types.

Enumerator

None	Placeholder.
TurnoutEnd	T or E line.
TurnoutRoute	P line.
TurnoutStraightSegment	S line.
TurnoutCurveSegment	C line.
TurnoutJointSegment	J Line.

9.185.3 Constructor & Destructor Documentation

9.185.3.1 TurnoutBodyElt()

```
Parsers::TurnoutBodyElt::TurnoutBodyElt ( ) [inline]
```

Constructor.

References [None](#), [routeList](#), [RouteName](#), [theEnd](#), and [theType](#).

Referenced by [MakeTurnoutCurveSegment\(\)](#), [MakeTurnoutEnd\(\)](#), [MakeTurnoutJointSegment\(\)](#), [MakeTurnoutRoute\(\)](#), and [MakeTurnoutStraightSegment\(\)](#).

9.185.3.2 ~TurnoutBodyElt()

```
Parsers::TurnoutBodyElt::~~TurnoutBodyElt ( ) [inline]
```

Destructor.

9.185.4 Member Function Documentation

9.185.4.1 GetTurnoutCurveSegment()

```
int Parsers::TurnoutBodyElt::GetTurnoutCurveSegment (
    float & r,
    float & x,
    float & y,
    float & a0,
    float & a1 ) const [inline]
```

Fetch turnout curve segment data.

References [ang0](#), [ang1](#), [pos1](#), [radius](#), [segmentId](#), [Parsers::TurnoutBodyElt::Pos::x](#), and [Parsers::TurnoutBodyElt::Pos::y](#).

9.185.4.2 GetTurnoutJointSegment()

```
int Parsers::TurnoutBodyElt::GetTurnoutJointSegment (
    float & x,
    float & y,
    float & a,
    float & l0,
    float & l1,
    float & r,
    float & l ) const [inline]
```

Fetch turnout joint segment data.

References [angle](#), [L](#), [len0](#), [len1](#), [pos1](#), [R](#), [segmentId](#), [Parsers::TurnoutBodyElt::Pos::x](#), and [Parsers::TurnoutBodyElt::Pos::y](#).

9.185.4.3 GetTurnoutRoute()

```
void Parsers::TurnoutBodyElt::GetTurnoutRoute (
    char *& pName,
    IntegerList *& cList ) const [inline]
```

Fetch turnout route data.

References [routeList](#), and [RouteName](#).

9.185.4.4 GetTurnoutStraightSegment()

```
int Parsers::TurnoutBodyElt::GetTurnoutStraightSegment (
    float & x1,
    float & y1,
    float & x2,
    float & y2 ) const [inline]
```

Fetch turnout straight segment data.

References [pos1](#), [pos2](#), [segmentId](#), [Parsers::TurnoutBodyElt::Pos::x](#), and [Parsers::TurnoutBodyElt::Pos::y](#).

9.185.4.5 InitTSegId()

```
static void Parsers::TurnoutBodyElt::InitTSegId ( ) [inline], [static]
```

Segment count initializer.

References [segCount](#).

9.185.4.6 MakeTurnoutCurveSegment()

```
static TurnoutBodyElt * Parsers::TurnoutBodyElt::MakeTurnoutCurveSegment (
    float r,
    float x,
    float y,
    float a0,
    float a1 ) [inline], [static]
```

Create a turnout curve segment (C lines).

References [ang0](#), [ang1](#), [pos1](#), [radius](#), [segCount](#), [segmentId](#), [theType](#), [TurnoutBodyElt\(\)](#), [TurnoutCurveSegment](#), [Parsers::TurnoutBodyElt::Pos::x](#), and [Parsers::TurnoutBodyElt::Pos::y](#).

9.185.4.7 MakeTurnoutEnd()

```
static TurnoutBodyElt * Parsers::TurnoutBodyElt::MakeTurnoutEnd (
    TrackBodyElt * tbe ) [inline], [static]
```

Create an endpoint (T or E lines).

References [theEnd](#), [theType](#), [TurnoutBodyElt\(\)](#), and [TurnoutEnd](#).

9.185.4.8 MakeTurnoutJointSegment()

```
static TurnoutBodyElt * Parsers::TurnoutBodyElt::MakeTurnoutJointSegment (
    float x,
    float y,
    float a,
    float l0,
    float l1,
    float r,
    float l ) [inline], [static]
```

Create a turnout joint segment (J lines).

References [L](#), [pos1](#), [R](#), [segCount](#), [segmentId](#), [theType](#), [TurnoutBodyElt\(\)](#), [TurnoutJointSegment](#), [Parsers::TurnoutBodyElt::Pos::x](#), and [Parsers::TurnoutBodyElt::Pos::y](#).

9.185.4.9 MakeTurnoutRoute()

```
static TurnoutBodyElt * Parsers::TurnoutBodyElt::MakeTurnoutRoute (
    char * pName,
    IntegerList * cList ) [inline], [static]
```

Create a turnout route (P lines).

References [routeList](#), [RouteName](#), [theType](#), [TurnoutBodyElt\(\)](#), and [TurnoutRoute](#).

9.185.4.10 MakeTurnoutStraightSegment()

```
static TurnoutBodyElt * Parsers::TurnoutBodyElt::MakeTurnoutStraightSegment (
    float x1,
    float y1,
    float x2,
    float y2 ) [inline], [static]
```

Create a turnout straight segment (S lines).

References [pos1](#), [pos2](#), [segCount](#), [segmentId](#), [theType](#), [TurnoutBodyElt\(\)](#), [TurnoutStraightSegment](#), [Parsers::TurnoutBodyElt::Pos::x](#), and [Parsers::TurnoutBodyElt::Pos::y](#).

9.185.4.11 TheType()

```
TurnoutBodyEltType Parsers::TurnoutBodyElt::TheType ( ) const [inline]
```

Type accessor.

References [theType](#).

9.185.5 Friends And Related Function Documentation

9.185.5.1 TrackGraph

```
friend class TrackGraph [friend]
```

9.185.5.2 TurnoutBody

```
friend class TurnoutBody [friend]
```

9.185.6 Member Data Documentation

9.185.6.1 ang0

```
float Parsers::TurnoutBodyElt::ang0 [private]
```

An angle value.

Referenced by [GetTurnoutCurveSegment\(\)](#), and [MakeTurnoutCurveSegment\(\)](#).

9.185.6.2 ang1

```
float Parsers::TurnoutBodyElt::ang1 [private]
```

Another angle value.

Referenced by [GetTurnoutCurveSegment\(\)](#), and [MakeTurnoutCurveSegment\(\)](#).

9.185.6.3 L

```
float Parsers::TurnoutBodyElt::L [private]
```

\$L\$ value (for J lines).

Referenced by [GetTurnoutJointSegment\(\)](#), and [MakeTurnoutJointSegment\(\)](#).

9.185.6.4 pos1

```
Pos Parsers::TurnoutBodyElt::pos1 [private]
```

First position.

Referenced by [GetTurnoutCurveSegment\(\)](#), [GetTurnoutJointSegment\(\)](#), [GetTurnoutStraightSegment\(\)](#), [MakeTurnoutCurveSegment\(\)](#), [MakeTurnoutJointSegment\(\)](#), and [MakeTurnoutStraightSegment\(\)](#).

9.185.6.5 pos2

```
Pos Parsers::TurnoutBodyElt::pos2 [private]
```

Second position.

Referenced by [GetTurnoutStraightSegment\(\)](#), and [MakeTurnoutStraightSegment\(\)](#).

9.185.6.6 R

```
float Parsers::TurnoutBodyElt::R [private]
```

\$R\$ value (for J lines).

Referenced by [GetTurnoutJointSegment\(\)](#), and [MakeTurnoutJointSegment\(\)](#).

9.185.6.7 radius

```
float Parsers::TurnoutBodyElt::radius [private]
```

A radius value.

Referenced by [GetTurnoutCurveSegment\(\)](#), and [MakeTurnoutCurveSegment\(\)](#).

9.185.6.8 routeList

```
IntegerList* Parsers::TurnoutBodyElt::routeList [private]
```

Segment list (P Lines).

Referenced by [GetTurnoutRoute\(\)](#), [MakeTurnoutRoute\(\)](#), and [TurnoutBodyElt\(\)](#).

9.185.6.9 RouteName

```
char* Parsers::TurnoutBodyElt::RouteName [private]
```

Route name (P lines).

Referenced by [GetTurnoutRoute\(\)](#), [MakeTurnoutRoute\(\)](#), and [TurnoutBodyElt\(\)](#).

9.185.6.10 segCount

```
int Parsers::TurnoutBodyElt::segCount [static], [private]
```

Counter for S, C, and J segments.

Referenced by [InitTSegId\(\)](#), [MakeTurnoutCurveSegment\(\)](#), [MakeTurnoutJointSegment\(\)](#), and [MakeTurnoutStraightSegment\(\)](#).

9.185.6.11 segmentId

```
int Parsers::TurnoutBodyElt::segmentId [private]
```

Segment index (S, C, or J lines).

Referenced by [GetTurnoutCurveSegment\(\)](#), [GetTurnoutJointSegment\(\)](#), [GetTurnoutStraightSegment\(\)](#), [MakeTurnoutCurveSegment\(\)](#), [MakeTurnoutJointSegment\(\)](#), and [MakeTurnoutStraightSegment\(\)](#).

9.185.6.12 theEnd

```
TrackBodyElt* Parsers::TurnoutBodyElt::theEnd [private]
```

Pointer to T or E line data.

Referenced by [Parsers::TurnoutBody::CleanupElement\(\)](#), [MakeTurnoutEnd\(\)](#), [TurnoutBodyElt\(\)](#), and [Parsers::TurnoutBody::TurnoutEnds\(\)](#).

9.185.6.13 theType

```
TurnoutBodyEltType Parsers::TurnoutBodyElt::theType [private]
```

Element type.

Referenced by [Parsers::TurnoutBody::CleanupElement\(\)](#), [MakeTurnoutCurveSegment\(\)](#), [MakeTurnoutEnd\(\)](#), [MakeTurnoutJointSegment\(\)](#), [MakeTurnoutRoute\(\)](#), [MakeTurnoutStraightSegment\(\)](#), [TheType\(\)](#), [TurnoutBodyElt\(\)](#), [Parsers::TurnoutBody::TurnoutEnds\(\)](#), [Parsers::TurnoutBody::TurnoutRouteCount\(\)](#), and [Parsers::TurnoutBody::TurnoutSegmentCount\(\)](#).

9.186 Parsers::TurnoutGraphic Struct Reference

Structure holding a turnout's graphical information.

```
#include <TrackGraph.h>
```

Public Attributes

- float `minX`
Minimum \$X\$ coordinate.
- float `minY`
Minimum \$Y\$ coordinate.
- float `maxX`
Maximum \$X\$ coordinate.
- float `maxY`
Maximum \$Y\$ coordinate.
- int `numSegments`
Number of segments.
- `SegVector` * `segments`
Segment vector.

9.186.1 Detailed Description

Structure holding a turnout's graphical information.

Author

Robert Heller <heller@deepsoft.com>

9.186.2 Member Data Documentation

9.186.2.1 `maxX`

```
float Parsers::TurnoutGraphic::maxX
```

Maximum \$X\$ coordinate.

9.186.2.2 `maxY`

```
float Parsers::TurnoutGraphic::maxY
```

Maximum \$Y\$ coordinate.

9.186.2.3 minX

```
float Parsers::TurnoutGraphic::minX
```

Minimum \$X\$ coordinate.

9.186.2.4 minY

```
float Parsers::TurnoutGraphic::minY
```

Minimum \$Y\$ coordinate.

9.186.2.5 numSegments

```
int Parsers::TurnoutGraphic::numSegments
```

Number of segments.

9.186.2.6 segments

```
SegVector* Parsers::TurnoutGraphic::segments
```

Segment vector.

9.187 Parsers::TurnoutRoutelist Struct Reference

Turnout route list structure.

```
#include <TrackGraph.h>
```

Public Attributes

- int [numRoutelists](#)
Number of routes.
- [RouteVec](#) * [routes](#)
Route vector.

9.187.1 Detailed Description

Turnout route list structure.

Author

Robert Heller <heller@deepsoft.com>

9.187.2 Member Data Documentation

9.187.2.1 numRoutelists

```
int Parsers::TurnoutRoutelist::numRoutelists
```

Number of routes.

9.187.2.2 routes

```
RouteVec* Parsers::TurnoutRoutelist::routes
```

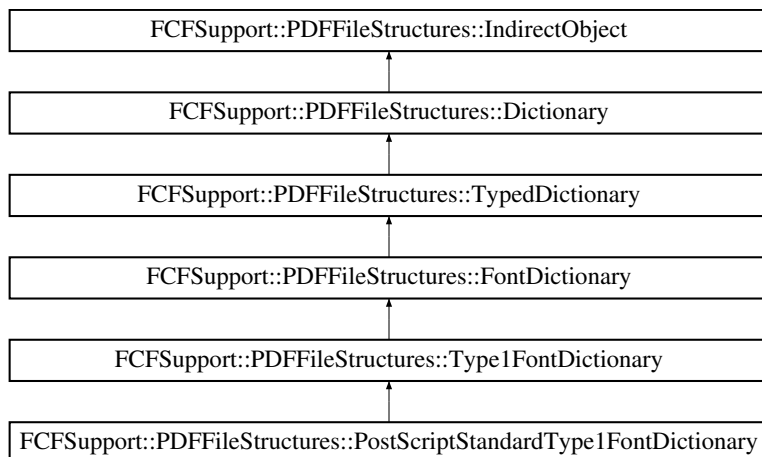
Route vector.

9.188 FCFSupport::PDFFFileStructures::Type1FontDictionary Class Reference

Type 1 Font dictionary.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFFileStructures::Type1FontDictionary:



Public Member Functions

- [Type1FontDictionary](#) (const string basefont, int firstchar, int lastchar, [IndirectFloatVector](#) *widths_↵, [TypedDictionary](#) *fontdescriptor, const string encoding="", unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [Type1FontDictionary](#) (const string basefont, int firstchar, int lastchar, [IndirectFloatVector](#) *widths_↵, [TypedDictionary](#) *fontdescriptor, [TypedDictionary](#) *encoding, unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~Type1FontDictionary](#) ()
Destructor.

Protected Member Functions

- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const
Write an object directly.

Private Attributes

- string [baseFont](#)
Base font name.
- int [firstChar](#)
First character in widths array;.
- int [lastChar](#)
Last character in widths array.
- [IndirectFloatVector](#) * [widths](#)
Widths array.
- [TypedDictionary](#) * [fontDescriptor](#)
Font Descriptor.
- string [encodingName](#)
Encoding as a name.
- [TypedDictionary](#) * [encodingDictionary](#)
Encoding as a dictionary.

9.188.1 Detailed Description

Type 1 Font dictionary.

Author

Robert Heller <heller@deepsoft.com>

9.188.2 Constructor & Destructor Documentation

9.188.2.1 Type1FontDictionary() [1/2]

```
FCFSupport::PDFFileStructures::Type1FontDictionary::Type1FontDictionary (
    const string basefont,
    int firstchar,
    int lastchar,
    IndirectFloatVector * widths_,
    TypedDictionary * fontdescriptor,
    const string encoding = "",
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Build a Type 1 font.

Parameters

<i>basefont</i>	Name of the base font.
<i>firstchar</i>	The first character code.
<i>lastchar</i>	The last character code.
<i>widths_</i>	The widths of the characters.
<i>fontdescriptor</i>	The font description.
<i>encoding</i>	The encoding of the font.
<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [baseFont](#), [encodingDictionary](#), [encodingName](#), [firstChar](#), [fontDescriptor](#), [lastChar](#), and [widths](#).

9.188.2.2 Type1FontDictionary() [2/2]

```
FCFSupport::PDFFileStructures::Type1FontDictionary::Type1FontDictionary (
    const string basefont,
    int firstchar,
    int lastchar,
    IndirectFloatVector * widths_,
    TypedDictionary * fontdescriptor,
    TypedDictionary * encoding,
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Build a Type 1 font.

Parameters

<i>basefont</i>	Name of the base font.
<i>firstchar</i>	The first character code.
<i>lastchar</i>	The last character code.
<i>widths_</i>	The widths of the characters.
<i>fontdescriptor</i>	The font description.
<i>encoding</i>	The encoding of the font.
<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [baseFont](#), [encodingDictionary](#), [encodingName](#), [firstChar](#), [fontDescriptor](#), [lastChar](#), and [widths](#).

9.188.2.3 ~Type1FontDictionary()

```
FCFSupport::PDFFileStructures::Type1FontDictionary::~Type1FontDictionary ( ) [inline]
```

Destructor.

9.188.3 Member Function Documentation

9.188.3.1 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::Type1FontDictionary::WriteDictionaryElements (
    ostream & stream ) const [protected], [virtual]
```

Write an object directly.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::FontDictionary](#).

9.188.4 Member Data Documentation

9.188.4.1 baseFont

```
string FCFSupport::PDFFileStructures::Type1FontDictionary::baseFont [private]
```

Base font name.

Referenced by [Type1FontDictionary\(\)](#).

9.188.4.2 encodingDictionary

```
TypedDictionary* FCFSupport::PDFFileStructures::Type1FontDictionary::encodingDictionary [private]
```

Encoding as a dictionary.

Referenced by [Type1FontDictionary\(\)](#).

9.188.4.3 encodingName

```
string FCFSupport::PDFFileStructures::Type1FontDictionary::encodingName [private]
```

Encoding as a name.

Referenced by [Type1FontDictionary\(\)](#).

9.188.4.4 firstChar

```
int FCFSupport::PDFFileStructures::Type1FontDictionary::firstChar [private]
```

First character in widths array;.

Referenced by [Type1FontDictionary\(\)](#).

9.188.4.5 fontDescriptor

```
TypedDictionary* FCFSupport::PDFFileStructures::Type1FontDictionary::fontDescriptor [private]
```

Font Descriptor.

Referenced by [Type1FontDictionary\(\)](#).

9.188.4.6 lastChar

```
int FCFSupport::PDFFileStructures::Type1FontDictionary::lastChar [private]
```

Last character in widths array.

Referenced by [Type1FontDictionary\(\)](#).

9.188.4.7 widths

```
IndirectFloatVector* FCFSupport::PDFFileStructures::Type1FontDictionary::widths [private]
```

Widths array.

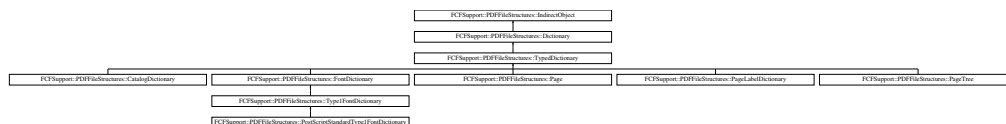
Referenced by [Type1FontDictionary\(\)](#).

9.189 FCFSupport::PDFFileStructures::TypedDictionary Class Reference

Typed dictionary.

```
#include <PDFPrinterSupport.h>
```

Inheritance diagram for FCFSupport::PDFFileStructures::TypedDictionary:



Public Member Functions

- [TypedDictionary](#) (string t, unsigned long int objNum=0L, unsigned short int genNum=0, [CrossReferenceTable](#) *tab=NULL)
Constructor.
- [~TypedDictionary](#) ()
Destructor.

Protected Member Functions

- ostream & [WriteDictionaryType](#) (ostream &stream) const
Write the dictionary's type.
- virtual ostream & [WriteDictionaryElements](#) (ostream &stream) const
Write this dictionary's elements.

Private Attributes

- string [type](#)

The dictionary's type name.

9.189.1 Detailed Description

Typed dictionary.

A dictionary with a /Type field.

Author

Robert Heller <heller@deepsoft.com>

9.189.2 Constructor & Destructor Documentation

9.189.2.1 TypedDictionary()

```
FCFSSupport::PDFFileStructures::TypedDictionary::TypedDictionary (
    string t,
    unsigned long int objNum = 0L,
    unsigned short int genNum = 0,
    CrossReferenceTable * tab = NULL ) [inline]
```

Constructor.

Set the type member.

Parameters

<i>t</i>	The type of this dictionary.
<i>objNum</i>	The next object number.
<i>genNum</i>	The generation number.
<i>tab</i>	The cross reference table we are in.

References [type](#).

9.189.2.2 ~TypedDictionary()

```
FCFSSupport::PDFFileStructures::TypedDictionary::~~TypedDictionary ( ) [inline]
```

Destructor.

9.189.3 Member Function Documentation

9.189.3.1 WriteDictionaryElements()

```
virtual ostream & FCFSupport::PDFFileStructures::TypedDictionary::WriteDictionaryElements (
    ostream & stream ) const [inline], [protected], [virtual]
```

Write this dictionary's elements.

Start with its type.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

Reimplemented from [FCFSupport::PDFFileStructures::Dictionary](#).

Reimplemented in [FCFSupport::PDFFileStructures::Page](#), [FCFSupport::PDFFileStructures::PageTree](#), [FCFSupport::PDFFileStructures::FontDictionary](#), [FCFSupport::PDFFileStructures::Type1FontDictionary](#), and [FCFSupport::PDFFileStructures::Type3FontDictionary](#).

References [lcc::stream](#), and [WriteDictionaryType\(\)](#).

9.189.3.2 WriteDictionaryType()

```
ostream & FCFSupport::PDFFileStructures::TypedDictionary::WriteDictionaryType (
    ostream & stream ) const [inline], [protected]
```

Write the dictionary's type.

Parameters

<i>stream</i>	The output stream to write to.
---------------	--------------------------------

References [lcc::stream](#), and [type](#).

Referenced by [WriteDictionaryElements\(\)](#), and [FCFSupport::PDFFileStructures::FontDictionary::WriteDictionaryElements\(\)](#).

9.189.4 Member Data Documentation

9.189.4.1 type

```
string FCFSupport::PDFFileStructures::TypedDictionary::type [private]
```

The dictionary's type name.

Referenced by [TypedDictionary\(\)](#), and [WriteDictionaryType\(\)](#).

9.190 FCFSupport::WorkInProgressCallback Class Reference

Work In Progress Callback.

```
#include <CallBack.h>
```

Public Member Functions

- [WorkInProgressCallback \(\)](#)
Constructor.
- virtual [~WorkInProgressCallback \(\)](#)
Destructor.
- virtual void [ProgressStart](#) (const string Message) const
Start up the work in progress display.
- virtual void [ProgressUpdate](#) (int Percent, const string Message) const
Update the progress meter.
- virtual void [ProgressDone](#) (const string Message) const
Mark the process meter as done.

9.190.1 Detailed Description

Work In Progress Callback.

Provides a callback to manage a work in progress display. This class is a dummy base class. Applications can define member functions that manage an application specific work in progress display.

Author

Robert Heller <heller@deepsoft.com>

9.190.2 Constructor & Destructor Documentation

9.190.2.1 WorkInProgressCallback()

```
FCFSupport::WorkInProgressCallback::WorkInProgressCallback ( ) [inline]
```

Constructor.

The base constructor does nothing. It is presumed that a derived class might do something useful.

9.190.2.2 ~WorkInProgressCallback()

```
virtual FCFSupport::WorkInProgressCallback::~~WorkInProgressCallback ( ) [inline], [virtual]
```

Destructor.

The base destructor does nothing. It is presumed that a derived class might do something useful.

9.190.3 Member Function Documentation

9.190.3.1 ProgressDone()

```
virtual void FCFSupport::WorkInProgressCallback::ProgressDone (
    const string Message ) const [inline], [virtual]
```

Mark the process meter as done.

Forces the meter to 100 percent and display a work completion message.

Parameters

<i>Message</i>	A message to display.
----------------	-----------------------

9.190.3.2 ProgressStart()

```
virtual void FCFSupport::WorkInProgressCallback::ProgressStart (
    const string Message ) const [inline], [virtual]
```

Start up the work in progress display.

An initial message is passed to be displayed.

Parameters

<i>Message</i>	An initial message string.
----------------	----------------------------

9.190.3.3 ProgressUpdate()

```
virtual void FCFSupport::WorkInProgressCallback::ProgressUpdate (
    int Percent,
    const string Message ) const [inline], [virtual]
```

Update the progress meter.

Advance the progress meter to the percent completed and display an updated message describing the progress.

Parameters

<i>Percent</i>	The completion percentage, between 0 and 100. A value of 100 indicates that the job is done.
<i>Message</i>	A message to display, typically something identifying what tasks have been completed.

9.191 xpressnet::XPressNet Class Reference

Main [XPressNet](#) interface class.

Public Member Functions

- [XPressNet](#) (name, port="/dev/ttyS0")
The constructor opens the serial port and initializes the port.
- [~XPressNet](#) ()
The destructor restores the serial port's state and closes it.
- [CheckForResponse](#) (timeout=5)
Check for a response from the command station.
- [GetNextCommandStationResponse](#) (timeout=5)
Return the next response from the command station.
- [ResumeOperations](#) ()
Resume operations request.
- [StopOperations](#) ()
Stop operations request.
- [EmergencyStopAllLocomotives](#) ()
Emergency stop all locomotives.
- [EmergencyStopALocomotive](#) (la)
Emergency stop a locomotive.

- [RegisterModeRead](#) (r)
Register mode read.
- [DirectModeCVRead](#) (cv)
Direct mode CV read.
- [PagedModeCVRead](#) (cv)
Paged mode CV read.
- [RequestForServiceModeResults](#) ()
Request for service mode results.
- [RegisterModeWrite](#) (r, d)
Register mode write.
- [DirectModeCVWrite](#) (cv, d)
Direct mode CV write.
- [PagedModeCVWrite](#) (cv, d)
Paged mode CV write.
- [CommandStationSoftwareVersion](#) ()
Command station software version request.
- [CommandStationStatusRequest](#) ()
Command station status request.
- [SetCommandStationPowerUpMode](#) (mode)
Set command station power up mode.
- [AccessoryDecoderInformationRequest](#) (address, nibble)
Accessory decoder information request.
- [AccessoryDecoderOperation](#) (groupaddr, elementaddr, activateOutput, useOutput2)
Accessory decoder operation request.
- [LocomotiveInformationRequest](#) (address)
Locomotive information request.
- [FunctionStatusRequest](#) (address)
Function status request.
- [SetLocomotiveSpeedAndDirection](#) (address, ssm, dir, speed)
Set locomotive speed and direction.
- [SetLocomotiveFunctionsGroup1](#) (address, f0, f1, f2, f3, f4)
Set locomotive functions, group 1.
- [SetLocomotiveFunctionsGroup2](#) (address, f5, f6, f7, f8)
Set locomotive functions, group 2.
- [SetLocomotiveFunctionsGroup3](#) (address, f9, f10, f11, f12)
Set locomotive functions, group 3.
- [SetFunctionStateGroup1](#) (address, f0, f1, f2, f3, f4)
Set locomotive function state, group 1.
- [SetFunctionStateGroup2](#) (address, f5, f6, f7, f8)
Set locomotive function state, group 2.
- [SetFunctionStateGroup3](#) (address, f9, f10, f11, f12)
Set locomotive function state, group 3.
- [EstablishDoubleHeader](#) (address1, address2)
Establish a double header.
- [DissolveDoubleHeader](#) (address1)
Dissolve a double header.
- [OperatingModeProgrammingByteModeWrite](#) (address, cv, data)

- Operating mode programming byte mode write.*

 - [OperatingModeProgrammingBitModeWrite](#) (address, cv, bitnum, value)
- Operating mode programming bit mode write.*

 - [AddLocomotiveToMultiUnit](#) (address, mtr, samedirection)
- Add locomotive to Multi-Unit.*

 - [RemoveLocomotiveFromMultiUnit](#) (address, mtr)
- Remove locomotive to Multi-Unit.*

 - [AddressInquiryNextMUMember](#) (mtr, address)
- Address inquire next MU member.*

 - [AddressInquiryPreviousMUMember](#) (mtr, address)
- Address inquire previous MU member.*

 - [AddressInquiryNextMU](#) (mtr)
- Address inquire next MU.*

 - [AddressInquiryPreviousMU](#) (mtr)
- Address inquire previous MU.*

 - [AddressInquiryNextStack](#) (address)
- Address inquire next stack.*

 - [AddressInquiryPreviousStack](#) (address)
- Address inquire previous stack.*

 - [DeleteLocomotiveFromStack](#) (address)
- Delete locomotive from stack.*

 - [GetLI100VersionNumbers](#) ()
- Fetch version numbers from LI100F and LI101.*

 - [SetLI101Address](#) (addr)
- Set LI101's XPressNet address.*

 - [readevent](#) (script)
- Establish an external read event handler.*

Private Member Functions

- [_appendXORByte](#) (messageVar)

Compute and append the XOR check byte.
- [_readevent](#) ()

Read event handler, toggle timeout flag.
- [_timeoutevent](#) ()

Timeout event handler, toggle timeout flag.
- [_transmit](#) (themessage)

Transmit a message.
- [_readbyte](#) (thebytevar, timeout)

Read next available byte or return false.

Static Private Member Functions

- static [_CheckForResponse_0x00](#) (message)
Helper function for CheckForResponse: handles the 0x00 arm.
- static [_CheckForResponse_0x40](#) (message)
Helper function for CheckForResponse: handles the 0x40 arm.
- static [_CheckForResponse_0x60](#) (message)
Helper function for CheckForResponse: handles the 0x60 arm.
- static [_CheckForResponse_0x80](#) (message)
Helper function for CheckForResponse: handles the 0x80 arm.
- static [_CheckForResponse_0xa0](#) (message)
Helper function for CheckForResponse: handles the 0xa0 arm.
- static [_CheckForResponse_0xc0](#) (message)
Helper function for CheckForResponse: handles the 0xc0 arm.
- static [_CheckForResponse_0xe0](#) (message)
Helper function for CheckForResponse: handles the 0xe0 arm.
- static [_ADDRESS](#) (a)
Helper function to insure a proper address.

Private Attributes

- [ttyfd](#)
Terminal file descriptor.
- [responseList](#)
Response list.
- [_timeout](#)
Timeout or data available flag.

9.191.1 Detailed Description

Main [XPressNet](#) interface class.

This class implements the interface logic to connect to the XpressNet.

Author

Robert Heller <heller@deepsoft.com>

9.191.2 Constructor & Destructor Documentation

9.191.2.1 XPressNet()

```
xpressnet::XPressNet::XPressNet (
    name ,
    port = "/dev/ttyS0" )
```

The constructor opens the serial port and initializes the port.

Parameters

<i>port</i>	The serial port device file.
-------------	------------------------------

9.191.2.2 ~XPressNet()

```
xpressnet::XPressNet::~~XPressNet ( )
```

The destructor restores the serial port's state and closes it.

9.191.3 Member Function Documentation**9.191.3.1 _ADDRESS()**

```
static xpressnet::XPressNet::_ADDRESS (
    a ) [static], [private]
```

Helper function to insure a proper address.

If it is a long address (≥ 100), 0x0c000 is added.

Parameters

<i>a</i>	Raw address.
----------	--------------

9.191.3.2 _appendXORByte()

```
xpressnet::XPressNet::_appendXORByte (
    messageVar ) [private]
```

Compute and append the XOR check byte.

Parameters

<i>messageVar</i>	Name of the list holding the message bytes.
-------------------	---

9.191.3.3 _CheckForResponse_0x00()

```
static xpressnet::XPressNet::_CheckForResponse_0x00 (  
    message ) [static], [private]
```

Helper function for CheckForResponse: handles the 0x00 arm.

9.191.3.4 _CheckForResponse_0x40()

```
static xpressnet::XPressNet::_CheckForResponse_0x40 (  
    message ) [static], [private]
```

Helper function for CheckForResponse: handles the 0x40 arm.

9.191.3.5 _CheckForResponse_0x60()

```
static xpressnet::XPressNet::_CheckForResponse_0x60 (  
    message ) [static], [private]
```

Helper function for CheckForResponse: handles the 0x60 arm.

9.191.3.6 _CheckForResponse_0x80()

```
static xpressnet::XPressNet::_CheckForResponse_0x80 (  
    message ) [static], [private]
```

Helper function for CheckForResponse: handles the 0x80 arm.

9.191.3.7 _CheckForResponse_0xa0()

```
static xpressnet::XPressNet::_CheckForResponse_0xa0 (  
    message ) [static], [private]
```

Helper function for CheckForResponse: handles the 0xa0 arm.

9.191.3.8 _CheckForResponse_0xc0()

```
static xpressnet::XPressNet::_CheckForResponse_0xc0 (
    message ) [static], [private]
```

Helper function for CheckForResponse: handles the 0xc0 arm.

9.191.3.9 _CheckForResponse_0xe0()

```
static xpressnet::XPressNet::_CheckForResponse_0xe0 (
    message ) [static], [private]
```

Helper function for CheckForResponse: handles the 0xe0 arm.

9.191.3.10 _readbyte()

```
xpressnet::XPressNet::_readbyte (
    thebytevar ,
    timeout ) [private]
```

Read next available byte or return false.

Parameters

<i>thebytevar</i>	Name of a variable to receive the byte.
<i>timeout</i>	Timeout in seconds.

If there is a defined external read event handler, the timeout parameter is ignored and false is returned if there are no bytes available. The presumption is that the read is being called from event handler and that means that there is data available.

9.191.3.11 _readevent()

```
xpressnet::XPressNet::_readevent ( ) [private]
```

Read event handler, toggle timeout flag.

9.191.3.12 _timeoutevent()

```
xpressnet::XPressNet::_timeoutevent ( ) [private]
```

Timeout event handler, toggle timeout flag.

9.191.3.13 _transmit()

```
xpressnet::XPressNet::_transmit (
    themessage ) [private]
```

Transmit a message.

9.191.3.14 AccessoryDecoderInformationRequest()

```
xpressnet::XPressNet::AccessoryDecoderInformationRequest (
    address ,
    nibble )
```

Accessory decoder information request.

Parameters

<i>address</i>	Address of decoder.
<i>nibble</i>	Which nibble.

9.191.3.15 AccessoryDecoderOperation()

```
xpressnet::XPressNet::AccessoryDecoderOperation (
    groupaddr ,
    elementaddr ,
    activateOutput ,
    useOutput2 )
```

Accessory decoder operation request.

Parameters

<i>groupaddr</i>	Address of decoder.
<i>elementaddr</i>	Address of element.
<i>activateOutput</i>	Set or clear output.
<i>useOutput2</i>	Use output 2?

9.191.3.16 AddLocomotiveToMultiUnit()

```
xpressnet::XPressNet::AddLocomotiveToMultiUnit (
    address ,
    mtr ,
    samedirection )
```

Add locomotive to Multi-Unit.

Parameters

<i>address</i>	Locomotive address.
<i>mtr</i>	Multi-Unit address.
<i>samedirection</i>	The locomotive direction is the same as the consist direction.

9.191.3.17 AddressInquiryNextMU()

```
xpressnet::XPressNet::AddressInquiryNextMU (
    mtr )
```

Address inquire next MU.

Parameters

<i>mtr</i>	Multi-Unit address.
------------	---------------------

9.191.3.18 AddressInquiryNextMUMember()

```
xpressnet::XPressNet::AddressInquiryNextMUMember (
    mtr ,
    address )
```

Address inquire next MU member.

Parameters

<i>mtr</i>	Multi-Unit address.
<i>address</i>	Locomotive address.

9.191.3.19 AddressInquiryNextStack()

```
xpressnet::XPressNet::AddressInquiryNextStack (
    address )
```

Address inquire next stack.

Parameters

<i>address</i>	Locomotive address.
----------------	---------------------

9.191.3.20 AddressInquiryPreviousMU()

```
xpressnet::XPressNet::AddressInquiryPreviousMU (
    mtr )
```

Address inquire previous MU.

Parameters

<i>mtr</i>	Multi-Unit address.
------------	---------------------

9.191.3.21 AddressInquiryPreviousMUMember()

```
xpressnet::XPressNet::AddressInquiryPreviousMUMember (
    mtr ,
    address )
```

Address inquire previous MU member.

Parameters

<i>mtr</i>	Multi-Unit address.
<i>address</i>	Locomotive address.

9.191.3.22 AddressInquiryPreviousStack()

```
xpressnet::XPressNet::AddressInquiryPreviousStack (
    address )
```

Address inquire previous stack.

Parameters

<i>address</i>	Locomotive address.
----------------	---------------------

9.191.3.23 CheckForResponse()

```
xpressnet::XPressNet::CheckForResponse (
    timeout = 5 )
```

Check for a response from the command station.

Parameters

<i>timeout</i>	Timeout in seconds
----------------	--------------------

9.191.3.24 CommandStationSoftwareVersion()

```
xpressnet::XPressNet::CommandStationSoftwareVersion ( )
```

Command station software version request.

9.191.3.25 CommandStationStatusRequest()

```
xpressnet::XPressNet::CommandStationStatusRequest ( )
```

Command station status request.

9.191.3.26 DeleteLocomotiveFromStack()

```
xpressnet::XPressNet::DeleteLocomotiveFromStack (
    address )
```

Delete locomotive from stack.

Parameters

<i>address</i>	Locomotive address.
----------------	---------------------

9.191.3.27 DirectModeCVRead()

```
xpressnet::XPressNet::DirectModeCVRead (
    cv )
```

Direct mode CV read.

Parameters

<i>cv</i>	CV to read.
-----------	-------------

9.191.3.28 DirectModeCVWrite()

```
xpressnet::XPressNet::DirectModeCVWrite (
    cv ,
    d )
```

Direct mode CV write.

Parameters

<i>cv</i>	CV to write to.
<i>d</i>	Data to write.

9.191.3.29 DissolveDoubleHeader()

```
xpressnet::XPressNet::DissolveDoubleHeader (
    address1 )
```

Dissolve a double header.

Parameters

<i>address1</i>	Locomotive address1.
-----------------	----------------------

9.191.3.30 EmergencyStopAllLocomotives()

```
xpressnet::XPressNet::EmergencyStopAllLocomotives ( )
```

Emergency stop all locomotives.

9.191.3.31 EmergencyStopALocomotive()

```
xpressnet::XPressNet::EmergencyStopALocomotive (
    la )
```

Emergency stop a locomotive.

Parameters

<i>la</i>	Address of the locomotive to stop.
-----------	------------------------------------

9.191.3.32 EstablishDoubleHeader()

```
xpressnet::XPressNet::EstablishDoubleHeader (
    address1 ,
    address2 )
```

Establish a double header.

Parameters

<i>address1</i>	Locomotive address1.
<i>address2</i>	Locomotive address2.

9.191.3.33 FunctionStatusRequest()

```
xpressnet::XPressNet::FunctionStatusRequest (
    address )
```

Function status request.

Parameters

<i>address</i>	Address of locomotive.
----------------	------------------------

9.191.3.34 GetLI100VersionNumbers()

```
xpressnet::XPressNet::GetLI100VersionNumbers ( )
```

Fetch version numbers from LI100F and LI101.

9.191.3.35 GetNextCommandStationResponse()

```
xpressnet::XPressNet::GetNextCommandStationResponse (
    timeout = 5 )
```

Return the next response from the command station.

Parameters

<i>timeout</i>	Timeout in seconds
----------------	--------------------

9.191.3.36 LocomotiveInformationRequest()

```
xpressnet::XPressNet::LocomotiveInformationRequest (
    address )
```

Locomotive information request.

Parameters

<i>address</i>	Address of locomotive.
----------------	------------------------

9.191.3.37 OperatingModeProgrammingBitModeWrite()

```
xpressnet::XPressNet::OperatingModeProgrammingBitModeWrite (
    address ,
```

```
cv ,  
bitnum ,  
value )
```

Operating mode programming bit mode write.

Parameters

<i>address</i>	Locomotive address.
<i>cv</i>	CV to set.
<i>bitnum</i>	Bit number.
<i>value</i>	Value to set.

9.191.3.38 OperatingModeProgrammingByteModeWrite()

```
xpressnet::XPressNet::OperatingModeProgrammingByteModeWrite (  
    address ,  
    cv ,  
    data )
```

Operating mode programming byte mode write.

Parameters

<i>address</i>	Locomotive address.
<i>cv</i>	CV to set.
<i>data</i>	Data to set.

9.191.3.39 PagedModeCVRead()

```
xpressnet::XPressNet::PagedModeCVRead (  
    cv )
```

Paged mode CV read.

Parameters

<i>cv</i>	CV to read.
-----------	-------------

9.191.3.40 PagedModeCVWrite()

```
xpressnet::XPressNet::PagedModeCVWrite (
    cv ,
    d )
```

Paged mode CV write.

Parameters

<i>cv</i>	CV to write to.
<i>d</i>	Data to write.

9.191.3.41 readevent()

```
xpressnet::XPressNet::readevent (
    script )
```

Establish an external read event handler.

Parameters

<i>script</i>	The external event handler script.
---------------	------------------------------------

9.191.3.42 RegisterModeRead()

```
xpressnet::XPressNet::RegisterModeRead (
    r )
```

Register mode read.

Parameters

<i>r</i>	Register to read.
----------	-------------------

9.191.3.43 RegisterModeWrite()

```
xpressnet::XPressNet::RegisterModeWrite (
```

```
    r ,  
    d )
```

Register mode write.

Parameters

<i>r</i>	Register to write to.
<i>d</i>	Data to write.

9.191.3.44 RemoveLocomotiveFromMultiUnit()

```
xpressnet::XPressNet::RemoveLocomotiveFromMultiUnit (  
    address ,  
    mtr )
```

Remove locomotive to Multi-Unit.

Parameters

<i>address</i>	Locomotive address.
<i>mtr</i>	Multi-Unit address.

9.191.3.45 RequestForServiceModeResults()

```
xpressnet::XPressNet::RequestForServiceModeResults ( )
```

Request for service mode results.

9.191.3.46 ResumeOperations()

```
xpressnet::XPressNet::ResumeOperations ( )
```

Resume operations request.

9.191.3.47 SetCommandStationPowerUpMode()

```
xpressnet::XPressNet::SetCommandStationPowerUpMode (  
    mode )
```

Set command station power up mode.

Parameters

<i>mode</i>	Mode to set.
-------------	--------------

9.191.3.48 SetFunctionStateGroup1()

```
xpressnet::XPressNet::SetFunctionStateGroup1 (
    address ,
    f0 ,
    f1 ,
    f2 ,
    f3 ,
    f4 )
```

Set locomotive function state, group 1.

Parameters

<i>address</i>	Locomotive address.
<i>f0</i>	Function 0.
<i>f1</i>	Function 1.
<i>f2</i>	Function 2.
<i>f3</i>	Function 3.
<i>f4</i>	Function 4.

9.191.3.49 SetFunctionStateGroup2()

```
xpressnet::XPressNet::SetFunctionStateGroup2 (
    address ,
    f5 ,
    f6 ,
    f7 ,
    f8 )
```

Set locomotive function state, group 2.

Parameters

<i>address</i>	Locomotive address.
<i>f5</i>	Function 5.
<i>f6</i>	Function 6.
<i>f7</i>	Function 7.
<i>f8</i>	Function 8.

9.191.3.50 SetFunctionStateGroup3()

```
xpressnet::XPressNet::SetFunctionStateGroup3 (
    address ,
    f9 ,
    f10 ,
    f11 ,
    f12 )
```

Set locomotive function state, group 3.

Parameters

<i>address</i>	Locomotive address.
<i>f9</i>	Function 9.
<i>f10</i>	Function 10.
<i>f11</i>	Function 11.
<i>f12</i>	Function 12.

9.191.3.51 SetLI101Address()

```
xpressnet::XPressNet::SetLI101Address (
    addr )
```

Set LI101's [XPressNet](#) address.

9.191.3.52 SetLocomotiveFunctionsGroup1()

```
xpressnet::XPressNet::SetLocomotiveFunctionsGroup1 (
    address ,
    f0 ,
    f1 ,
    f2 ,
    f3 ,
    f4 )
```

Set locomotive functions, group 1.

Parameters

<i>address</i>	Locomotive address.
<i>f0</i>	Function 0.
<i>f1</i>	Function 1.
<i>f2</i>	Function 2.
<i>f3</i>	Function 3.
<i>f4</i>	Function 4.

9.191.3.53 SetLocomotiveFunctionsGroup2()

```
xpressnet::XPressNet::SetLocomotiveFunctionsGroup2 (
    address ,
    f5 ,
    f6 ,
    f7 ,
    f8 )
```

Set locomotive functions, group 2.

Parameters

<i>address</i>	Locomotive address.
<i>f5</i>	Function 5.
<i>f6</i>	Function 6.
<i>f7</i>	Function 7.
<i>f8</i>	Function 8.

9.191.3.54 SetLocomotiveFunctionsGroup3()

```
xpressnet::XPressNet::SetLocomotiveFunctionsGroup3 (
    address ,
    f9 ,
    f10 ,
    f11 ,
    f12 )
```

Set locomotive functions, group 3.

Parameters

<i>address</i>	Locomotive address.
<i>f9</i>	Function 9.
<i>f10</i>	Function 10.
<i>f11</i>	Function 11.
<i>f12</i>	Function 12.

9.191.3.55 SetLocomotiveSpeedAndDirection()

```
xpressnet::XPressNet::SetLocomotiveSpeedAndDirection (
```

```
    address ,  
    ssm ,  
    dir ,  
    speed )
```

Set locomotive speed and direction.

Parameters

<i>address</i>	Address of locomotive.
<i>ssm</i>	Speed step mode to use.
<i>dir</i>	Desired direction.
<i>speed</i>	Desired speed.

9.191.3.56 StopOperations()

```
xpressnet::XPressNet::StopOperations ( )
```

Stop operations request.

9.191.4 Member Data Documentation

9.191.4.1 _timeout

```
xpressnet::XPressNet::_timeout [private]
```

Timeout or data available flag.

9.191.4.2 responseList

```
xpressnet::XPressNet::responseList [private]
```

Response list.

9.191.4.3 ttyfd

xpressnet::XpressNet::ttyfd [private]

Terminal file descriptor.

9.192 xpressnet::XpressNetEvent Class Reference

[XPressNet](#) Event class.

Public Member Functions

- [XpressNetEvent](#) (name, script, port="/dev/ttyS0")
Constructor.
- [~XpressNetEvent](#) ()
Destructor.

Private Member Functions

- [_eventhandler](#) ()
The event handler.

Private Attributes

- [xpressnet](#)
Holds the [XPressNet](#) component.
- [_script](#)
Holds the event script.

9.192.1 Detailed Description

[XPressNet](#) Event class.

This class implements the Tcl Event interface to the [XPressNet](#) serial port interface. A Tcl script is bound to [XPressNet](#) serial port events. This script is called from the event procedures when [XPressNet](#) events occur.

Author

Robert Heller <heller@deepsoft.com>

9.192.2 Constructor & Destructor Documentation

9.192.2.1 XpressNetEvent()

```
xpressnet::XpressNetEvent::XpressNetEvent (
    name ,
    script ,
    port = "/dev/ttyS0" )
```

Constructor.

The constructor opens serial port and initializes the port, stashes the interpreter and creates an event source.

Parameters

<i>script</i>	The event script.
<i>port</i>	The serial port device file.

9.192.2.2 ~XpressNetEvent()

```
xpressnet::XpressNetEvent::~XpressNetEvent ( )
```

Destructor.

The destructor closes the serial port and deletes the event source.

9.192.3 Member Function Documentation

9.192.3.1 _eventhandler()

```
xpressnet::XpressNetEvent::_eventhandler ( ) [private]
```

The event handler.

References [linuxgpio::in](#), and [linuxgpio::out](#).

9.192.4 Member Data Documentation

9.192.4.1 _script

```
xpressnet::XpressNetEvent::_script [private]
```

Holds the event script.

9.192.4.2 xpressnet

```
xpressnet::XpressNetEvent::xpressnet [private]
```

Holds the [XPressNet](#) component.

9.193 YY_MRRXtrkCad_INHERIT Class Reference

```
#include <MRRXtrkCad.tab.h>
```

Public Types

- enum [YY_MRRXtrkCad_ENUM_TOKEN](#) {
[YY_MRRXtrkCad_NULL_TOKEN](#) =0, [INTEGER](#) =258, [FLOAT](#) =259, [STRING](#) =260,
[RESTOFLINE](#) =261, [MULTILINE](#) =262, [EOL](#) =263, [UNTERMSTRING](#) =264,
[NOTWORD](#) =265, [ENDSEGS](#) =266, [ENDSIGNAL](#) =267, [ENDBLOCK](#) =268,
[ENDTRACKS](#) =269, [_VERSION](#) =270, [TITLE](#) =271, [MAPSCALE](#) =272,
[ROOMSIZE](#) =273, [SCALE](#) =274, [HO](#) =275, [N](#) =276,
[O](#) =277, [LAYERS](#) =278, [CURRENT](#) =279, [STRUCTURE](#) =280,
[DRAW](#) =281, [BEZIER](#) =282, [BZRLIN](#) =283, [CORNU](#) =284,
[SUBSEGS](#) =285, [SUBSEND](#) =286, [CURVE](#) =287, [TURNOUT](#) =288,
[TURNTABLE](#) =289, [STRAIGHT](#) =290, [CAR](#) =291, [JOINT](#) =292,
[NOTE](#) =293, [TEXT](#) =294, [MAIN](#) =295, [B](#) =296,
[J](#) =297, [D](#) =298, [L](#) =299, [M](#) =300,
[F](#) =301, [T](#) =302, [E](#) =303, [G](#) =304,
[A](#) =305, [P](#) =306, [S](#) =307, [C](#) =308,
[X](#) =309, [Y](#) =310, [Z](#) =311, [Q](#) =312,
[W](#) =313, [H](#) =314, [BLOCK](#) =315, [TRK](#) =316,
[SWITCHMOTOR](#) =317, [SIGNAL](#) =318, [ASPECT](#) =319, [SENSOR](#) =320,
[CONTROL](#) =321, [ADJUSTABLE](#) =322, [PIER](#) =323 }

Public Member Functions

- int [YY_MRRXtrkCad_PARSE](#) ([YY_MRRXtrkCad_PARSE_PARAM](#))
- virtual void [YY_MRRXtrkCad_ERROR](#) (char *msg) [YY_MRRXtrkCad_ERROR_BODY](#)
- virtual int [YY_MRRXtrkCad_LEX](#) () [YY_MRRXtrkCad_LEX_BODY](#)
- [YY_MRRXtrkCad_CLASS](#) ([YY_MRRXtrkCad_CONSTRUCTOR_PARAM](#))
- virtual [~MRRXtrkCad](#) ()

Public Attributes

- [YY_MRRXtrkCad_STYPE](#) [YY_MRRXtrkCad_LVAL](#)
- [YY_MRRXtrkCad_LTYPE](#) [YY_MRRXtrkCad_LLOC](#)
- int [YY_MRRXtrkCad_NERRS](#)
- int [YY_MRRXtrkCad_CHAR](#)
- int [YY_MRRXtrkCad_DEBUG_FLAG](#)

Private Member Functions

- int [lookup_word](#) (const char *word) const
- void [yyerror1](#) (const char *message, const char *s) const

Private Attributes

- bool [scanEol](#)
- bool [scanToEND](#)
- int [fieldflag](#)
- double [CurrentScale](#)

9.193.1 Member Enumeration Documentation

9.193.1.1 YY_MRRXtrkCad_ENUM_TOKEN

```
enum YY_MRRXtrkCad_INHERIT:YY_MRRXtrkCad_ENUM_TOKEN
```

Enumerator

YY_MRRXtrkCad_NULL_TOKEN	
INTEGER	
FLOAT	
STRING	
RESTOFLINE	
MULTILINE	
EOL	
UNTERMSTRING	
NOTWORD	
ENDSEGS	
ENDSIGNAL	
ENDBLOCK	
ENDTRACKS	
_VERSION	
TITLE	
MAPSCALE	

Enumerator

ROOMSIZE	
SCALE	
HO	
N	
O	
LAYERS	
CURRENT	
STRUCTURE	
DRAW	
BEZIER	
BZRLIN	
CORNU	
SUBSEGS	
SUBSEND	
CURVE	
TURNOUT	
TURNTABLE	
STRAIGHT	
CAR	
JOINT	
NOTE	
TEXT	
MAIN	
B	
J	
D	
L	
M	
F	
T	
E	
G	
A	
P	
S	
C	
X	
Y	
Z	
Q	
W	
H	
BLOCK	
TRK	
SWITCHMOTOR	
SIGNAL	
ASPECT	

Enumerator

SENSOR	
CONTROL	
ADJUSTABLE	
PIER	

9.193.2 Constructor & Destructor Documentation**9.193.2.1 ~MRRXtrkCad()**

```
virtual YY_MRRXtrkCad_INHERIT::~~MRRXtrkCad ( ) [inline], [virtual]
```

9.193.3 Member Function Documentation**9.193.3.1 lookup_word()**

```
int YY_MRRXtrkCad_INHERIT::lookup_word (
    const char * word ) const [private]
```

9.193.3.2 YY_MRRXtrkCad_CLASS()

```
YY_MRRXtrkCad_INHERIT::YY_MRRXtrkCad_CLASS (
    YY_MRRXtrkCad_CONSTRUCTOR_PARAM )
```

9.193.3.3 YY_MRRXtrkCad_ERROR()

```
virtual void YY_MRRXtrkCad_INHERIT::YY_MRRXtrkCad_ERROR (
    char * msg ) [virtual]
```

9.193.3.4 YY_MRRXtrkCad_LEX()

```
virtual int YY_MRRXtrkCad_INHERIT::YY_MRRXtrkCad_LEX ( ) [virtual]
```

9.193.3.5 YY_MRRXtrkCad_PARSE()

```
int YY_MRRXtrkCad_INHERIT::YY_MRRXtrkCad_PARSE (
    YY_MRRXtrkCad_PARSE_PARAM )
```

9.193.3.6 yyerror1()

```
void YY_MRRXtrkCad_INHERIT::yyerror1 (
    const char * message,
    const char * s ) const [private]
```

9.193.4 Member Data Documentation

9.193.4.1 CurrentScale

```
double YY_MRRXtrkCad_INHERIT::CurrentScale [private]
```

9.193.4.2 fieldflag

```
int YY_MRRXtrkCad_INHERIT::fieldflag [private]
```

9.193.4.3 scanEol

```
bool YY_MRRXtrkCad_INHERIT::scanEol [private]
```

9.193.4.4 scanToEND

```
bool YY_MRRXtrkCad_INHERIT::scanToEND [private]
```

9.193.4.5 YY_MRRXtrkCad_CHAR

```
int YY_MRRXtrkCad_INHERIT::YY_MRRXtrkCad_CHAR
```

9.193.4.6 YY_MRRXtrkCad_DEBUG_FLAG

```
int YY_MRRXtrkCad_INHERIT::YY_MRRXtrkCad_DEBUG_FLAG
```

9.193.4.7 YY_MRRXtrkCad_LLOC

```
YY_MRRXtrkCad_LTYPE YY_MRRXtrkCad_INHERIT::YY_MRRXtrkCad_LLOC
```

9.193.4.8 YY_MRRXtrkCad_LVAL

```
YY_MRRXtrkCad_STYPE YY_MRRXtrkCad_INHERIT::YY_MRRXtrkCad_LVAL
```

9.193.4.9 YY_MRRXtrkCad_NERRS

```
int YY_MRRXtrkCad_INHERIT::YY_MRRXtrkCad_NERRS
```

9.194 yy_MRRXtrkCad_stype Union Reference

```
#include <MRRXtrkCad.tab.h>
```


Public Attributes

- int [ival](#)
- char * [sval](#)
- float [fval](#)
- [TrackBody](#) * [tb](#)
- [TrackBodyElt](#) * [tbe](#)
- [TurnoutBody](#) * [trb](#)
- [TurnoutBodyElt](#) * [trbe](#)
- [BezierBody](#) * [tbb](#)
- [BezierBodyElt](#) * [tbbe](#)
- [CornuBody](#) * [tcb](#)
- [CornuBodyElt](#) * [tcbe](#)
- [IntegerList](#) * [il](#)
- [StringPairList](#) * [spl](#)

9.194.1 Member Data Documentation

9.194.1.1 fval

```
float yy_MRRXtrkCad_stype::fval
```

9.194.1.2 il

```
IntegerList* yy_MRRXtrkCad_stype::il
```

9.194.1.3 ival

```
int yy_MRRXtrkCad_stype::ival
```

9.194.1.4 spl

```
StringPairList* yy_MRRXtrkCad_stype::spl
```

9.194.1.5 sval

`char* yy_MRRXtrkCad_stype::sval`

9.194.1.6 tb

`TrackBody* yy_MRRXtrkCad_stype::tb`

9.194.1.7 tbb

`BezierBody* yy_MRRXtrkCad_stype::tbb`

9.194.1.8 tbbe

`BezierBodyElt* yy_MRRXtrkCad_stype::tbbe`

9.194.1.9 tbe

`TrackBodyElt* yy_MRRXtrkCad_stype::tbe`

9.194.1.10 tcb

`CornuBody* yy_MRRXtrkCad_stype::tcb`

9.194.1.11 tcbe

`CornuBodyElt* yy_MRRXtrkCad_stype::tcbe`

9.194.1.12 trb

```
TurnoutBody* yy_MRRXtrkCad_stype::trb
```

9.194.1.13 trbe

```
TurnoutBodyElt* yy_MRRXtrkCad_stype::trbe
```

9.195 yyltype Struct Reference

```
#include <MRRXtrkCad.tab.h>
```

Public Attributes

- int `timestamp`
- int `first_line`
- int `first_column`
- int `last_line`
- int `last_column`
- char * `text`

9.195.1 Member Data Documentation

9.195.1.1 first_column

```
int yytype::first_column
```

9.195.1.2 first_line

```
int yytype::first_line
```

9.195.1.3 last_column

```
int yytype::last_column
```

9.195.1.4 last_line

```
int yytype::last_line
```

9.195.1.5 text

```
char* yytype::text
```

9.195.1.6 timestamp

```
int yytype::timestamp
```

Chapter 10

File Documentation

10.1 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/↵ Azatrax/Azatrax.h File Reference

```
#include "config.h"
```

Classes

- class [azatrax::Azatrax](#)
Azatrax I/O Class.
- struct [azatrax::Azatrax::StateDataPacket](#)
Raw USB Data Packet.

Namespaces

- namespace [azatrax](#)
Azatrax C++ LibUSB 1.0 Interface.

Macros

- #define [ErrorCode](#) int
- #define [stopwatchFract](#) status3
- #define [stopwatchSeconds](#) status4

10.1.1 Macro Definition Documentation

10.1.1.1 ErrorCode

```
#define ErrorCode int
```

10.1.1.2 stopwatchFract

```
#define stopwatchFract status3
```

10.1.1.3 stopwatchSeconds

```
#define stopwatchSeconds status4
```

10.2 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/↵ FCFSupport/System.h File Reference

```
#include <Common.h>  
#include <PathName.h>  
#include <Station.h>  
#include <Division.h>  
#include <Train.h>  
#include <Industry.h>  
#include <CarType.h>  
#include <Owner.h>  
#include <Car.h>  
#include <CallBack.h>  
#include <Printer.h>  
#include <SwitchList.h>
```

Classes

- class [FCFSupport::System](#)
This is the main Freight [Car](#) Forwarder class.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

10.3 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/ParserClasses/MRRXtrkCad.tab.h File Reference

```
#include "config.h"
#include <stdio.h>
#include <iostream>
#include <ctype.h>
#include <stdlib.h>
#include <string.h>
#include <math.h>
#include <ParseFile.h>
#include <IntegerList.h>
#include <StringPairList.h>
```

Classes

- union [yy_MRRXtrkCad_stype](#)
- struct [yyltype](#)
- class [YY_MRRXtrkCad_INHERIT](#)

Macros

- #define [YY_USE_CLASS](#)
- #define [TRUE](#) true
- #define [FALSE](#) false
- #define [RADIANS](#)(x) (((x) / 180.0) * M_PI)
- #define [YY_MRRXtrkCad_CLASS](#) [MRRXtrkCad](#)
- #define [YY_MRRXtrkCad_INHERIT](#) : public [LayoutFile](#)
- #define [YY_MRRXtrkCad_CONSTRUCTOR_PARAM](#) const char * filename
- #define [YY_MRRXtrkCad_CONSTRUCTOR_INIT](#) : [LayoutFile](#) (filename,this)
- #define [YY_MRRXtrkCad_CONSTRUCTOR_CODE](#)
- #define [YY_MRRXtrkCad_MEMBERS](#)
- #define [YY_MRRXtrkCad_LSP_NEEDED](#) 1
- #define [YY_MRRXtrkCad_ERROR_VERBOSE](#)
- #define [YY_MRRXtrkCad_DEBUG](#) 1
- #define [YY_MRRXtrkCad_STYPE](#) [yy_MRRXtrkCad_stype](#)
- #define [YY_MRRXtrkCad_COMPATIBILITY](#) 0
- #define [YY_MRRXtrkCad_USE_GOTO](#) 0
- #define [BISON_YYLTYPE_ISDECLARED](#)
- #define [YY_MRRXtrkCad_LTYPE](#) [yyltype](#)
- #define [YY_MRRXtrkCad_PARSE](#) [yyparse](#)
- #define [YY_MRRXtrkCad_LEX](#) [yylex](#)
- #define [YY_MRRXtrkCad_LVAL](#) [yylval](#)
- #define [YY_MRRXtrkCad_LLOC](#) [yylloc](#)
- #define [YY_MRRXtrkCad_CHAR](#) [yychar](#)
- #define [YY_MRRXtrkCad_NERRS](#) [yynerrs](#)
- #define [YY_MRRXtrkCad_DEBUG_FLAG](#) [yydebug](#)
- #define [YY_MRRXtrkCad_ERROR](#) [yyerror](#)
- #define [YY_MRRXtrkCad_PARSE_PARAM](#) void
- #define [YY_MRRXtrkCad_LEX_BODY](#)
- #define [YY_MRRXtrkCad_ERROR_BODY](#)
- #define [YY_MRRXtrkCad_USE_CONST_TOKEN](#) 0

Typedefs

- typedef struct [yyltype](#) [yyltype](#)

Variables

- const double [INCHESperMM](#)
- const double [FEETperMM](#)
- const double [YARDSperMM](#)
- const double [METERSperMM](#)
- const double [CENTIMETERSperMM](#)
- const double [HOScale](#)
- const double [NScale](#)
- const double [OScale](#)
- const double [IScale](#)
- const double [GScale](#)

10.3.1 Macro Definition Documentation

10.3.1.1 BISON_YYLTYPE_ISDECLARED

```
#define BISON_YYLTYPE_ISDECLARED
```

10.3.1.2 FALSE

```
#define FALSE false
```

10.3.1.3 RADIANS

```
#define RADIANS(  
    x ) ((x) / 180.0) * M_PI
```

10.3.1.4 TRUE

```
#define TRUE true
```


10.3.1.5 YY_MRRXtrkCad_CHAR

```
#define YY_MRRXtrkCad_CHAR yychar
```

10.3.1.6 YY_MRRXtrkCad_CLASS

```
#define YY_MRRXtrkCad_CLASS MRRXtrkCad
```

10.3.1.7 YY_MRRXtrkCad_COMPATIBILITY

```
#define YY_MRRXtrkCad_COMPATIBILITY 0
```

10.3.1.8 YY_MRRXtrkCad_CONSTRUCTOR_CODE

```
#define YY_MRRXtrkCad_CONSTRUCTOR_CODE
```

Value:

```
CurrentScale = 1.0;\nscanEol = false; \nscanToEND = false;\n/*YY_MRRXtrkCad_DEBUG_FLAG = 1;*/
```

10.3.1.9 YY_MRRXtrkCad_CONSTRUCTOR_INIT

```
#define YY_MRRXtrkCad_CONSTRUCTOR_INIT : LayoutFile (filename,this)
```

10.3.1.10 YY_MRRXtrkCad_CONSTRUCTOR_PARAM

```
#define YY_MRRXtrkCad_CONSTRUCTOR_PARAM const char * filename
```

10.3.1.11 YY_MRRXtrkCad_DEBUG

```
#define YY_MRRXtrkCad_DEBUG 1
```

10.3.1.12 YY_MRRXtrkCad_DEBUG_FLAG

```
#define YY_MRRXtrkCad_DEBUG_FLAG yydebug
```

10.3.1.13 YY_MRRXtrkCad_ERROR

```
#define YY_MRRXtrkCad_ERROR yyerror
```

10.3.1.14 YY_MRRXtrkCad_ERROR_BODY

```
#define YY_MRRXtrkCad_ERROR_BODY
```

10.3.1.15 YY_MRRXtrkCad_ERROR_VERBOSE

```
#define YY_MRRXtrkCad_ERROR_VERBOSE
```

10.3.1.16 YY_MRRXtrkCad_INHERIT

```
#define YY_MRRXtrkCad_INHERIT : public LayoutFile
```

10.3.1.17 YY_MRRXtrkCad_LEX

```
#define YY_MRRXtrkCad_LEX yylex
```

10.3.1.18 YY_MRRXtrkCad_LEX_BODY

```
#define YY_MRRXtrkCad_LEX_BODY
```

10.3.1.19 YY_MRRXtrkCad_LLOC

```
#define YY_MRRXtrkCad_LLOC yylloc
```

10.3.1.20 YY_MRRXtrkCad_LSP_NEEDED

```
#define YY_MRRXtrkCad_LSP_NEEDED 1
```

10.3.1.21 YY_MRRXtrkCad_LTYPE

```
#define YY_MRRXtrkCad_LTYPE yyltype
```

10.3.1.22 YY_MRRXtrkCad_LVAL

```
#define YY_MRRXtrkCad_LVAL yylval
```

10.3.1.23 YY_MRRXtrkCad_MEMBERS

```
#define YY_MRRXtrkCad_MEMBERS
```

Value:

```
virtual ~MRRXtrkCad() {}\  
private:\br/>int lookup_word(const char *word) const;\br/>void yyerror1(const char *message, const char *s) const;\br/>bool scanEol, scanToEnd; \  
int fieldflag;\br/>double CurrentScale;
```

10.3.1.24 YY_MRRXtrkCad_NERRS

```
#define YY_MRRXtrkCad_NERRS yynerrs
```

10.3.1.25 YY_MRRXtrkCad_PARSE

```
#define YY_MRRXtrkCad_PARSE yyparse
```

10.3.1.26 YY_MRRXtrkCad_PARSE_PARAM

```
#define YY_MRRXtrkCad_PARSE_PARAM void
```

10.3.1.27 YY_MRRXtrkCad_STYPE

```
#define YY_MRRXtrkCad_STYPE yy\_MRRXtrkCad\_stype
```

10.3.1.28 YY_MRRXtrkCad_USE_CONST_TOKEN

```
#define YY_MRRXtrkCad_USE_CONST_TOKEN 0
```

10.3.1.29 YY_MRRXtrkCad_USE_GOTO

```
#define YY_MRRXtrkCad_USE_GOTO 0
```

10.3.1.30 YY_USE_CLASS

```
#define YY_USE_CLASS
```

10.3.2 Typedef Documentation

10.3.2.1 yyltype

```
typedef struct yytype yytype
```

10.3.3 Variable Documentation

10.3.3.1 CENTIMETERSperMM

```
const double CENTIMETERSperMM
```

10.3.3.2 FEETperMM

```
const double FEETperMM
```

10.3.3.3 GScale

```
const double GScale
```

10.3.3.4 HOScale

```
const double HOScale
```

10.3.3.5 INCHESperMM

```
const double INCHESperMM [extern]
```

10.3.3.6 IScale

```
const double IScale
```

10.3.3.7 METERSperMM

```
const double METERSperMM
```

10.3.3.8 NScale

```
const double NScale
```

10.3.3.9 OScale

```
const double OScale
```

10.3.3.10 YARDSperMM

```
const double YARDSperMM
```

10.4 [/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/Parser](#)↔ Classes/ParserClassesGroup.h File Reference

Classes

- class [Parsers::MRRXtrkCad](#)
[MRRXtrkCad](#) parser class.

Namespaces

- namespace [Parsers](#)
File-based parser classes.

10.5 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/RailDriver/RaildriverIO.h File Reference

```
#include <hidapi.h>
```

Classes

- class [RaildriverIO](#)
Low-level Raildriver I/O functions.

10.6 /home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/TTSupport/TTSupportGroup.h File Reference

Namespaces

- namespace [TTSupport](#)
Time Table Support Namespace.

10.7 C++/Azatrax/mrd.h File Reference

```
#include <Azatrax.h>
```

Classes

- class [azatrax::MRD](#)
MRD I/O Class.
- union [azatrax::MRD::status1_union](#)
Status byte 1 union type.
- union [azatrax::MRD::status2_union](#)
Status byte 2 union type.

Namespaces

- namespace [azatrax](#)
Azatrax C++ LibUSB 1.0 Interface.

10.8 C++/Azatrax/sl2.h File Reference

```
#include <Azatrax.h>
```

Classes

- class [azatrax::SL2](#)
SL2 I/O Class.
- union [azatrax::SL2::status1_union](#)
Status byte 1 union type (Output states)
- union [azatrax::SL2::status2_union](#)
Status byte 2 union type (Input sense)
- union [azatrax::SL2::status3_union](#)
Status byte 3 union type (Input control state)

Namespaces

- namespace [azatrax](#)
Azatrax C++ LibUSB 1.0 Interface.

10.9 C++/Azatrax/sr4.h File Reference

```
#include <Azatrax.h>
```

Classes

- class [azatrax::SR4](#)
SR4 I/O Class.
- union [azatrax::SR4::status1_union](#)
Status byte 1 union type (Outputs)
- union [azatrax::SR4::status2_union](#)
Status byte 2 union type (Input sense)
- union [azatrax::SR4::status3_union](#)
Status byte 3 union type (Input Control Status)

Namespaces

- namespace [azatrax](#)
Azatrax C++ LibUSB 1.0 Interface.

10.10 C++/FCFSupport/CallBack.h File Reference

```
#include <Common.h>
```

Classes

- class [FCFSupport::WorkInProgressCallback](#)
Work In Progress Callback.
- class [FCFSupport::LogMessageCallback](#)
A callback to log a message.
- class [FCFSupport::ShowBannerCallback](#)
Display a page heading type message on the screen.
- class [FCFSupport::TrainDisplayCallback](#)
Callback to manage a train status display.
- class [FCFSupport::PauseCallback](#)
The Pause callback.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

10.11 C++/FCFSupport/Car.h File Reference

```
#include <Common.h>
```

Classes

- class [FCFSupport::Car](#)
This class holds all of the information for a single car.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

10.12 C++/FCFSupport/CarType.h File Reference

```
#include <Common.h>
```

Classes

- class [FCFSupport::CarType](#)
The *CarType* class represents a type of railroad car (rolling stock).
- class [FCFSupport::CarGroup](#)
Car group class.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

Typedefs

- typedef vector< char > [FCFSupport::CarTypeOrderVector](#)
A vector of ordered car types.
- typedef map< char, CarType *, less< char > > [FCFSupport::CarTypeMap](#)
A map of car types indexed by type character.

10.13 C++/FCFSupport/Division.h File Reference

```
#include <Common.h>
#include <Station.h>
```

Classes

- class [FCFSupport::Division](#)
The *Division* class implements a single division, which contains a number of contiguous stations.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

Typedefs

- typedef vector< Division * > [FCFSupport::DivisionVector](#)
A vector of divisions.
- typedef map< int, Division *, less< int > > [FCFSupport::DivisionMap](#)
A map of divisions, by integer index (division index).
- typedef map< char, Division *, less< char > > [FCFSupport::DivisionSymbolMap](#)
A map of divisions, by division symbol (a character).

10.14 C++/FCFSupport/FCFSupportGroup.h File Reference

10.15 C++/FCFSupport/Industry.h File Reference

```
#include <Common.h>
#include <Station.h>
#include <Division.h>
#include <limits.h>
#include <iostream>
#include <assert.h>
```

Classes

- class [FCFSupport::Industry](#)
The [Industry](#) class represents an industry.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

Typedefs

- typedef vector< Car * > [FCFSupport::CarVector](#)
A vector of cars.
- typedef map< int, Industry *, less< int > > [FCFSupport::IndustryMap](#)
A map of industry pointers indexed by an integer.
- typedef vector< Industry * > [FCFSupport::IndustryVector](#)
A vector of industry pointers.

10.16 C++/FCFSupport/LQ24Printer.h File Reference

```
#include <Printer.h>
```

Classes

- class [FCFSupport::LQ24PrinterDevice](#)
Class for an LQ24 compatible printer.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

10.17 C++/FCFSupport/Owner.h File Reference

```
#include <Common.h>
```

Classes

- class [FCFSupport::Owner](#)
The [Owner](#) class describes a car owner.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

Typedefs

- typedef map< string, Owner *, less< string > > [FCFSupport::OwnerMap](#)
Map of owners, indexed by their initials.

10.18 C++/FCFSupport/PathName.h File Reference

```
#include <Common.h>
```

Classes

- class [FCFSupport::PathName](#)
A Class that portably represents a pathname.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

Typedefs

- typedef vector< string > [FCFSupport::stringVector](#)
A Vector of strings.

10.19 C++/TTSupport/PathName.h File Reference

```
#include <Common.h>
```

Classes

- class [TTSupport::PathName](#)
A Class that portably represents a pathname.

Namespaces

- namespace [TTSupport](#)
Time Table Support Namespace.

Typedefs

- typedef vector< string > [TTSupport::stringVector](#)
A Vector of strings.

10.20 C++/FCFSupport/PDFPrinter.h File Reference

```
#include <Printer.h>  
#include <PDFPrinterSupport.h>  
#include <map>
```

Classes

- class [FCFSupport::PDFPrinterDevice](#)
PDF Printer device.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

Macros

- `#define oneColumnWidthFraction (((double)horizontalScaling)/100.0)`

10.20.1 Macro Definition Documentation

10.20.1.1 oneColumnWidthFraction

```
#define oneColumnWidthFraction (((double)horizontalScaling)/100.0)
```

10.21 C++/FCFSupport/PDFPrinterSupport.h File Reference

```
#include <assert.h>
#include <time.h>
#include <PDFPrinterSupport.h>
#include <Common.h>
#include <iostream>
#include <sstream>
#include <map>
#include <vector>
```

Classes

- class [FCFSupport::PDFFileStructures::CrossReferenceTable](#)
The cross reference table object.
- class [FCFSupport::PDFFileStructures::IndirectObject](#)
Indirect object base class.
- class [FCFSupport::PDFFileStructures::FreedObject](#)
A deleted indirect object.
- class [FCFSupport::PDFFileStructures::Dictionary](#)
PDF Dictionary class.
- class [FCFSupport::PDFFileStructures::PDFNameArray](#)
PDF Name array.
- class [FCFSupport::PDFFileStructures::TypedDictionary](#)
Typed dictionary.
- class [FCFSupport::PDFFileStructures::IndirectObjectDictionary](#)
PDF Indirect Object [Dictionary](#), used for named resources in a Resource [Dictionary](#).
- class [FCFSupport::PDFFileStructures::ResourceDictionary](#)
Resource dictionary.
- class [FCFSupport::PDFFileStructures::Rectangle](#)
A rectangle object.

- class [FCFSupport::PDFFileStructures::PDFStream](#)
Stream object.
- class [FCFSupport::PDFFileStructures::Page](#)
Describes a single page.
- class [FCFSupport::PDFFileStructures::PageTree](#)
A tree of pages.
- class [FCFSupport::PDFFileStructures::PageLabelDictionary](#)
Page label dictionary.
- class [FCFSupport::PDFFileStructures::PageLabelTree](#)
A tree of page label dictionaries.
- class [FCFSupport::PDFFileStructures::FontDictionary](#)
A Font dictionary object.
- class [FCFSupport::PDFFileStructures::IndirectFloatVector](#)
Indirect array of floats.
- class [FCFSupport::PDFFileStructures::Type1FontDictionary](#)
Type 1 Font dictionary.
- class [FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary](#)
A standard Type1 PostScript font dictionary.
- class [FCFSupport::PDFFileStructures::CatalogDictionary](#)
Master catalog of the PDF file.
- class [FCFSupport::PDFFileStructures::InformationDirectory](#)
Information directory.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.
- namespace [FCFSupport::PDFFileStructures](#)
PDF File support structures.

Typedefs

- typedef map< string, IndirectObject *, less< string > > [FCFSupport::PDFFileStructures::NamedIndirectObjectMap](#)
A "vector" of named indirect objects, implemented as a map.
- typedef vector< PDFStream * > [FCFSupport::PDFFileStructures::PDFStreamVector](#)
A vector of PDF Streams.
- typedef vector< PageLabelTree * > [FCFSupport::PDFFileStructures::PageLabelTreeKidVector](#)
Map of [PageLabelTree](#) kids.
- typedef map< int, PageLabelDictionary *, less< int > > [FCFSupport::PDFFileStructures::PageLabelDictionaryNumMap](#)
Map of [PageLabelDictionary](#) numbers.

Functions

- struct tm * [localtime_r](#) (const time_t *, struct tm *)
- char * [asctime_r](#) (const struct tm *, char *)
- string [FCFSupport::PDFFileStructures::QuotePDFString](#) (const string &str)
Quote a string (protect special character with a backslash).
- ostream & [FCFSupport::operator<<](#) (ostream &stream, const PDFFileStructures::PDFNameArray &pnarray)
Output stream operator for PDFNameArrays.

10.21.1 Function Documentation

10.21.1.1 asctime_r()

```
char * asctime_r (  
    const struct tm * ,  
    char * )
```

10.21.1.2 localtime_r()

```
struct tm * localtime_r (  
    const time_t * ,  
    struct tm * )
```

10.22 C++/FCFSupport/PostScriptPrinter.h File Reference

```
#include <Printer.h>
```

Classes

- class [FCFSupport::PostScriptPrinterDevice](#)
Derived class for printing on Postscript printers.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

10.23 C++/FCFSupport/Printer.h File Reference

```
#include <Common.h>
#include <iostream>
#include <fstream>
#include <stdio.h>
```

Classes

- class [FCFSupport::PrinterDevice](#)
Base class for printer devices (hard copy output).

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

10.24 C++/FCFSupport/Station.h File Reference

```
#include <Common.h>
```

Classes

- class [FCFSupport::Station](#)
The [Station](#) class implements a single station.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

Typedefs

- typedef vector< Station * > [FCFSupport::StationVector](#)
A station vector.
- typedef map< int, Station *, less< int > > [FCFSupport::StationMap](#)
A station map by integer index.

10.25 C++/TTSupport/Station.h File Reference

```
#include <Common.h>
#include <iostream>
#include <fstream>
```

Classes

- class [TTSupport::Occupied](#)
This class records a train sitting on a storage track during a specified time frame.
- class [TTSupport::TimeRange](#)
The [TimeRange](#) class implements a range of times.
- class [TTSupport::StorageTrack](#)
The [StorageTrack](#) class implements a storage track.
- class [TTSupport::Station](#)
The [Station](#) class implements a station.

Namespaces

- namespace [TTSupport](#)
Time Table Support Namespace.

Typedefs

- typedef map< TimeRange, Occupied, less< TimeRange > > [TTSupport::OccupiedMap](#)
The [Occupied](#) Map type, ordered by time ranges.
- typedef map< string, StorageTrack, less< string > > [TTSupport::StorageTrackMap](#)
Storage track map.
- typedef vector< Station > [TTSupport::StationVector](#)
[Station](#) Vector.

10.26 C++/FCFSupport/SwitchList.h File Reference

```
#include <iostream>
#include <Common.h>
#include <Train.h>
#include <Industry.h>
#include <Car.h>
#include <Station.h>
```

Classes

- class [FCFSupport::SwitchListElement](#)
This class implements each switch list element.
- union [FCFSupport::SwitchListElement::StationOrIndustry](#)
A const pointer to a train's stop, which can be either a station or an industry, depending on what kind of train it is.
- class [FCFSupport::SwitchList](#)
The global switch list structure.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

Typedefs

- typedef vector< SwitchListElement > [FCFSupport::SwitchListElementVector](#)
A vector of switch list elements.

Functions

- ostream & [FCFSupport::operator<<](#) (ostream &stream, const SwitchListElement &element)
Output stream operator for SwitchListElements.

10.27 C++/FCFSupport/TextPrinter.h File Reference

```
#include <Printer.h>
```

Classes

- class [FCFSupport::TextPrinterDevice](#)
Derived class for printing on generic plain text printers.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

10.28 C++/FCFSupport/Train.h File Reference

```
#include <Common.h>
#include <Station.h>
#include <Division.h>
#include <Industry.h>
```

Classes

- class [FCFSupport::Train](#)
The [Train](#) class represents a train.
- union [FCFSupport::Train::StationOrIndustry](#)
Union of stations or industries, used for stops.

Namespaces

- namespace [FCFSupport](#)
Namespace to hold all of the FCF Support code.

Typedefs

- typedef map< int, Train *, less< int > > [FCFSupport::TrainMap](#)
A map of trains, indexed by integer (train index).
- typedef map< string, Train *, less< string > > [FCFSupport::TrainNameMap](#)
A map of trains, indexed by string ([Train](#) name).

10.29 C++/TTSupport/Train.h File Reference

```
#include <Common.h>
#include <Cab.h>
```

Classes

- class [TTSupport::Stop](#)
This class implements a stop.
- class [TTSupport::Train](#)
This class implements a train.

Namespaces

- namespace [TTSupport](#)
Time Table Support Namespace.

Typedefs

- typedef vector< Stop > [TTSupport::StopVector](#)
A vector of stops.
- typedef map< string, Train *, less< string > > [TTSupport::TrainNumberMap](#)
Train number map, indexed by train number (symbol).

10.30 C++/ParserClasses/BezierBody.h File Reference

```
#include <TrackBody.h>
#include <string.h>
#include <iostream>
```

Classes

- class [Parsers::BezierBodyElt](#)
Bezier Body elements: T, E, S, and C lines are collected.
- struct [Parsers::BezierBodyElt::Pos](#)
Position structure.
- class [Parsers::BezierBody](#)
List of Bezier body lines (T, E, S, and C lines).

Namespaces

- namespace [Parsers](#)
File-based parser classes.

Macros

- #define [angle](#) radius
- #define [len0](#) ang0
- #define [len1](#) ang1

10.30.1 Macro Definition Documentation

10.30.1.1 angle

```
#define angle radius
```

10.30.1.2 len0

```
#define len0 ang0
```

10.30.1.3 len1

```
#define len1 angl
```

10.31 C++/ParserClasses/CornuBody.h File Reference

```
#include <TrackBody.h>
#include <string.h>
#include <iostream>
```

Classes

- class [Parsers::CornuBodyElt](#)
Cornu Body elements: T, E, S, and C lines are collected.
- struct [Parsers::CornuBodyElt::Pos](#)
Position structure.
- class [Parsers::CornuBody](#)
List of Cornu body lines (T, E, S, and C lines).

Namespaces

- namespace [Parsers](#)
File-based parser classes.

Macros

- `#define` [angle](#) radius
- `#define` [len0](#) ang0
- `#define` [len1](#) angl

10.31.1 Macro Definition Documentation

10.31.1.1 angle

```
#define angle radius
```

10.31.1.2 len0

```
#define len0 ang0
```

10.31.1.3 len1

```
#define len1 angl
```

10.32 C++/ParserClasses/IntegerList.h File Reference

Classes

- class [Parsers::IntegerList](#)

The *IntegerList* class implements a linked list of integers, used for turnout route lists.

Namespaces

- namespace [Parsers](#)

File-based parser classes.

10.33 C++/ParserClasses/ParseFile.h File Reference

```
#include <iostream>
#include <string.h>
#include <stdio.h>
#include <TrackGraph.h>
```

Classes

- class [Parsers::ParseFile](#)
Virtual base class for file-based parsers.
- class [Parsers::LayoutFile](#)
File to parse an XTrkCad layout file and create a track graph.

Namespaces

- namespace [Parsers](#)
File-based parser classes.

10.34 C++/ParserClasses/SocketPair.h File Reference

Functions

- list [tcl_socketpair](#) ()
Tcl interface to socketpair.

10.35 C++/ParserClasses/TrackBody.h File Reference

```
#include <iostream>
```

Classes

- class [Parsers::TrackBodyElt](#)
Track endpoint elements (T and E lines).
- class [Parsers::TrackBody](#)
List of track endpoints (T and E lines).

Namespaces

- namespace [Parsers](#)
File-based parser classes.

10.36 C++/ParserClasses/TrackGraph.h File Reference

```
#include <iostream>
#include <boost/config.hpp>
#include <boost/version.hpp>
#include <boost/graph/adjacency_list.hpp>
#include <list>
#include <TrackBody.h>
#include <TurnoutBody.h>
#include <BezierBody.h>
#include <CornuBody.h>
#include <IntegerList.h>
#include <StringPairList.h>
```

Classes

- struct [Parsers::SegPos](#)
Segment position, endpoint or other coordinate.
- struct [Parsers::SegVector](#)
Segemnt structure.
- struct [Parsers::TurnoutGraphic](#)
Structure holding a turnout's graphical information.
- struct [Parsers::RouteVec](#)
Route structure.
- struct [Parsers::TurnoutRoutelist](#)
Turnout route list structure.
- class [Parsers::TrackGraph](#)
Track Graph class, which encapsulates the track graphs.
- struct [Parsers::TrackGraph::EdgeValues](#)
Uncompressed graph edge values.
- struct [Parsers::TrackGraph::NodeValues](#)
Uncompressed graph node values.
- struct [Parsers::TrackGraph::CompressedEdgeValues](#)
Compressed graph edge values.
- struct [Parsers::TrackGraph::Point](#)
Position structure.
- struct [Parsers::TrackGraph::CompressedNodeValues](#)
Compressed graph node values.
- class [Parsers::TrackGraph::Transform2D](#)
Two dimensional transform class.

Namespaces

- namespace [Parsers](#)
File-based parser classes.

10.37 C++/ParserClasses/TurnoutBody.h File Reference

```
#include <TrackBody.h>
#include <IntegerList.h>
#include <string.h>
#include <iostream>
```

Classes

- class [Parsers::TurnoutBodyElt](#)
Turnout body elements: T, E, P, S, C, and J lines are collected.
- struct [Parsers::TurnoutBodyElt::Pos](#)
Position structure.
- class [Parsers::TurnoutBody](#)
List of turnout body lines (T, E, P, S, C, and J lines).

Namespaces

- namespace [Parsers](#)
File-based parser classes.

Macros

- `#define` [angle](#) radius
- `#define` [len0](#) ang0
- `#define` [len1](#) ang1

10.37.1 Macro Definition Documentation

10.37.1.1 angle

```
#define angle radius
```

10.37.1.2 len0

```
#define len0 ang0
```

10.37.1.3 len1

```
#define len1 angl
```

10.38 C++/TclSocketCAN/TclSocketCAN.i File Reference

Macros

- #define [SWIG_name](#) "Tclsocketcan"
- #define [SWIG_version](#) TCLSOCKETCAN_VERSIONLIB

Functions

- SWIGEXPORT int [Tclsocketcan_SafeInit](#) (Tcl_Interp *)
- int [SocketCAN](#) (Tcl_Interp *interp, const char *candev)
Open a CAN Socket.

Variables

- module [TclSocketCAN](#)
- include typemaps [i](#)

10.38.1 Macro Definition Documentation

10.38.1.1 SWIG_name

```
#define SWIG_name "Tclsocketcan"
```

10.38.1.2 SWIG_version

```
#define SWIG_version TCLSOCKETCAN_VERSIONLIB
```

10.39 C++/TTSupport/Cab.h File Reference

```
#include <Common.h>  
#include <iostream>
```

Classes

- class [TTSupport::Cab](#)

This class maintains information about cabs.

Namespaces

- namespace [TTSupport](#)

Time Table Support Namespace.

Typedefs

- typedef map< string, Cab *, less< string > > [TTSupport::CabNameMap](#)

[Cab](#) name map, cabs indexed by name.

10.40 C++/TTSupport/TimeTableSystem.h File Reference

```
#include <string.h>
#include <Common.h>
#include <PathName.h>
#include <Station.h>
#include <Cab.h>
#include <Train.h>
#include <list>
#include <unordered_map>
```

Classes

- struct [TTSupport::hash](#)

Option hash map, used for Print options.

- struct [TTSupport::eqstr](#)

- class [TTSupport::StationTimes](#)

[Station](#) times class, used by the LaTeX generator methods.

- class [TTSupport::TimeTableSystem](#)

This is the main Time Table Class.

Namespaces

- namespace [TTSupport](#)

Time Table Support Namespace.

Macros

- #define [USE_UNORDERED_MAP](#)

Typedefs

- typedef vector< double > [TTSupport::doubleVector](#)
A Vector of doubles.
- typedef std::unordered_map< const char *, std::string, hash, eqstr > [TTSupport::OptionHashMap](#)
- typedef list< Train * > [TTSupport::TrainList](#)
List of trains.
- typedef map< string, StationTimes, less< string > > [TTSupport::TrainStationTimes](#)
Map of station times, indexed by train number.
- typedef map< int, TrainStationTimes, less< int > > [TTSupport::TrainTimesAtStation](#)
Map of maps of station times, indexed by station index.
- typedef list< string > [TTSupport::StringList](#)
List of strings.

Functions

- const char * [TTSupport::StringListToString](#) (const StringList &list)
Convert a list of strings to a flat string.
- bool [TTSupport::StringListFromString](#) (string strlinList, StringList &result)
Convert a flat string to a list of strings.

10.40.1 Macro Definition Documentation

10.40.1.1 USE_UNORDERED_MAP

```
#define USE_UNORDERED_MAP
```

10.41 C++/TTSupport/TimeTableSystemTcl.h File Reference

Functions

- TimeTableSystem * [NewCreateTimeTable](#) (const char *name, int timescale, int timeinterval)
Tcl constructor to create a new TimeTable.
- TimeTableSystem * [OldCreateTimeTable](#) (const char *filename, char **outmessage)
Tcl constructor to create a time table system from an existing file.
- int [ForEveryStation](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for Stations.
- int [ForEveryCab](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for Cabs.
- int [ForEveryTrain](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for Trains.
- int [ForEveryNote](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for notes.
- int [ForEveryPrintOption](#) (Tcl_Interp *interp, TimeTableSystem *timetable, Tcl_Obj *variable, Tcl_Obj *body)
Tcl looping construct for print options.
- int [TT_StringListToList](#) (Tcl_Interp *interp, const char *stringList)
Tcl function to convert a serialized string list to a Tcl list.
- int [TT_ListToStringListString](#) (Tcl_Interp *interp, Tcl_Obj *list)
Tcl function to convert a Tcl list to a serialized string list.

Variables

- apply int [Tcl_Result](#) { int [TTSupport::ForEveryStation](#) }

10.42 C++/wiringPi/tclwiringpi.i File Reference

```
#include <wiringPi.h>
#include <wiringPiI2C.h>
#include <wiringPiSPI.h>
#include <mcp23008.h>
#include <mcp23017.h>
```

Macros

- #define [SWIG_name](#) "Tclwiringpi"
- #define [SWIG_version](#) "1.0.0"

Variables

- module [Tclwiringpi](#)

10.42.1 Macro Definition Documentation

10.42.1.1 SWIG_name

```
#define SWIG_name "Tclwiringpi"
```

10.42.1.2 SWIG_version

```
#define SWIG_version "1.0.0"
```

10.42.2 Variable Documentation

10.42.2.1 Tclwiringpi

```
module Tclwiringpi
```

Initial value:

```
{  
static const char rcsid[] = "@(#) : $Id$"
```

10.43 Doc/doxygen/titlepage.h File Reference

10.44 Scripts/CMri/cmri.tcl File Reference

Classes

- class [cmri::CMri](#)
Main C/MRI interface class.

Namespaces

- namespace [cmri](#)
CMR/I Tcl Serial Port Interface.

Typedefs

- typedef int [cmri::uatype](#)
Board address type.
- typedef int [cmri::ubyte](#)
Unsigned byte.
- typedef listtype [cmri::ByteList](#)
List of bytes.

Enumerations

- enum [cmri::CardType](#) { [cmri::USIC](#) , [cmri::SUSIC](#) , [cmri::SMINI](#) }
Card type codes.

10.45 Scripts/Common/CabWidgets.tcl File Reference

Classes

- class [CabWidgets::LocomotiveSpeed](#)
Locomotive Speed widget.
- class [CabWidgets::LocomotiveDirection](#)
Locomotive Direction widget.
- class [CabWidgets::SelectLocomotive](#)
Select or enter a Locomotive address.

Namespaces

- namespace [CabWidgets](#)
Cab Widget code.

10.46 Scripts/Common/CommonTclGroup.h File Reference

10.47 Scripts/Common/CTCPanel2.tcl File Reference

Classes

- class [CTCPanel::CTCPanel](#)
Main CTC Panel megawidget.
- class [CTCPanel::SWPlate](#)
Switch plate object type.
- class [CTCPanel::SIGPlate](#)
Signal plate object type.

- class [CTCPanel::CodeButton](#)
Code button object type.
- class [CTCPanel::Toggle](#)
Toggle switch object type.
- class [CTCPanel::Lamp](#)
Lamp object type.
- class [CTCPanel::PushButton](#)
Push Button object type.
- class [CTCPanel::CTCLabel](#)
CTC Label object type.
- class [CTCPanel::SchLabel](#)
Schematic Label object type.
- class [CTCPanel::Switch](#)
Switch (turnout) object type.
- class [CTCPanel::Signal](#)
Signal object type.
- class [CTCPanel::StraightBlock](#)
Straight Block object type.
- class [CTCPanel::EndBumper](#)
End Bumper object type.
- class [CTCPanel::CurvedBlock](#)
Curved Block object type.
- class [CTCPanel::ScissorCrossover](#)
Scissor [Crossover](#) (turnout) object type.
- class [CTCPanel::Crossover](#)
[Crossover](#) (turnout) object type.
- class [CTCPanel::Crossing](#)
Crossing object type.
- class [CTCPanel::SingleSlip](#)
Single Slip (turnout) object type.
- class [CTCPanel::DoubleSlip](#)
Double Slip (turnout) object type.
- class [CTCPanel::ThreeWaySW](#)
Three Way Switch (turnout) object type.
- class [CTCPanel::HiddenBlock](#)
Hidden Block object type.
- class [CTCPanel::StubYard](#)
Stub Yard object type.
- class [CTCPanel::ThroughYard](#)
Through Yard object type.

Namespaces

- namespace [CTCPanel](#)
CTC Panel code, Version 2.

Functions

- [CTCPanel::leverMethods](#) (hasCenter)
Macro to add lever methods to object types.
- [CTCPanel::verifyDoubleMethod](#) ()
Macro to add a verify double method to a snit type.
- [CTCPanel::verifyBoolMethod](#) ()
Macro to add a verify boolean method to a snit type.
- [CTCPanel::verifyColorMethod](#) ()
Macro to add a verify color method to a snit type.
- [CTCPanel::verifyOrientation8Method](#) ()
Macro to add a verify 8-way orientation method to a snit type.
- [CTCPanel::verifyPositionMethod](#) ()
Macro to add a verify position method to a snit type.
- [CTCPanel::standardMethods](#) ()
Macro to add a standard set of methods to an object type.
- [CTCPanel::trackworkmethods](#) ()
Macro to include trackwork drawing methods.

10.48 Scripts/Common/fileentry.tcl File Reference

Namespaces

- namespace [FileEntry](#)
This is a specialized form of the LabelEntry widget intended for selecting file names.

Functions

- [FileEntry::create](#) (path,...)
Creation procedure.
- [FileEntry::configure](#) (path,...)
Configuration procedure: configure one or more options for this widget.
- [FileEntry::cget](#) (path, option)
Configuration option accessor procedure: access one option directly.
- [FileEntry::bind](#) (path,...)
Bind function.
- [FileEntry::_path_command](#) (path, cmd, larg)
Path command for this megawidget.
- [FileEntry::_destroy](#) (path)
Destructor function.
- [FileEntry::_openFile](#) (path)
Prodedure bound to the file open button.

10.49 Scripts/Common/gettext.tcl File Reference

Namespaces

- namespace [gettext](#)
Localization functions.

Functions

- [gettext::_m](#) (msgid,...)
Handle messages with a context hint prefix (eg Label|lab).
- [gettext::_mx](#) (...)
Get maxlength of a set of messages with a context hint prefix.
- [gettext::_](#) (...)
Get a localized from the message catalog and deal with formatting possible arguments, by calling ::msgcat::mc.

10.50 Scripts/Common/HTMLHelp.tcl File Reference

Classes

- class [HTMLHelp::HTMLHelp](#)
A widget that implements a help dialog that renders HTML coded help pages (generally generated from LaTeX using tex4ht's hltatex script).

Namespaces

- namespace [HTMLHelp](#)
[HTMLHelp](#) namespace, which contains the [HTMLHelp](#) snit widget adapter object and associated code.

10.51 Scripts/Common/labelcombobox.tcl File Reference

Namespaces

- namespace [LabelComboBox](#)
This is a specialized form of the LabelFrame widget containing a ComboBox Widget.

Functions

- [LabelComboBox::create](#) (path,...)
Procedure to create a [LabelComboBox](#).
- [LabelComboBox::configure](#) (path,...)
Procedure to configure a [LabelComboBox](#).
- [LabelComboBox::cget](#) (path, option)
Procedure to get a configuration option.
- [LabelComboBox::bind](#) (path,...)
Procedure to set a binding on the ComboBox entry.
- [LabelComboBox::get](#) (path,...)
Procedure to get the ComboBox value.
- [LabelComboBox::getlistbox](#) (path,...)
Procedure to get the listbox of the ComboBox widget.
- [LabelComboBox::getvalue](#) (path,...)
Procedure to get the value of the ComboBox.
- [LabelComboBox::icursor](#) (path,...)
Pass through procedure for the ComboBox icursor function.
- [LabelComboBox::post](#) (path,...)
Pass through procedure for the ComboBox post function.
- [LabelComboBox::setvalue](#) (path,...)
Pass through procedure for the ComboBox setvalue function.
- [LabelComboBox::unpost](#) (path,...)
Pass through procedure for the ComboBox unpost function.
- [LabelComboBox::_path_command](#) (path, cmd, larg)
Path command for this megawidget.
- [LabelComboBox::_destroy](#) (path)
Destructor function.

10.52 Scripts/Common/labelselectcolor.tcl File Reference

Namespaces

- namespace [LabelSelectColor](#)
This package provides a BWidget style megawidget for selecting colors, in the same style as a [LabelEntry](#) widget.

Functions

- [LabelSelectColor::create](#) (path,...)
Creation procedure.
- [LabelSelectColor::ColorPopup](#) (path)
Procedure bound to the palette button to select a color.
- [LabelSelectColor::configure](#) (path,...)
Configuration procedure: configure one or more options for this widget.
- [LabelSelectColor::cget](#) (path, option)
Configuration option accessor procedure: access one option directly.
- [LabelSelectColor::_path_command](#) (path, cmd, larg)
Path command for this megawidget.
- [LabelSelectColor::_destroy](#) (path)
Destructor function.

10.53 Scripts/Common/labelspinbox.tcl File Reference

Namespaces

- namespace [LabelSpinBox](#)

This is a specialized form of the LabelFrame widget containing a SpinBox Widget.

Functions

- [LabelSpinBox::create](#) (path,...)
Procedure to create a [LabelSpinBox](#).
- [LabelSpinBox::configure](#) (path,...)
Procedure to configure a [LabelSpinBox](#).
- [LabelSpinBox::cget](#) (path, option)
Procedure to get a configuration option.
- [LabelSpinBox::setvalue](#) (path,...)
Procedure to set the value of the SpinBox.
- [LabelSpinBox::getvalue](#) (path,...)
Procedure to get the value of the SpinBox.
- [LabelSpinBox::bind](#) (path,...)
Procedure to set a binding on the SpinBox entry.
- [LabelSpinBox::_path_command](#) (path, cmd, larg)
Path command for this megawidget.
- [LabelSpinBox::_destroy](#) (path)
Destructor function.

10.54 Scripts/Common/mainwindow.tcl File Reference

Classes

- class [mainwindow](#)

A widget that is heavily extended from the BWidget MainFrame widget.

10.55 Scripts/Common/panedw.tcl File Reference

Namespaces

- namespace [PanedWindow](#)

A modified version of the BWidget [PanedWindow](#).

10.56 Scripts/Common/ParseXML.tcl File Reference

Parse XML and create a simple DOM tree.

Classes

- class [SimpleDOMElement](#)
A simple DOM element coded in Tcl using SNIT.
- class [ParseXML](#)
Class to hold an XML tree.

10.56.1 Detailed Description

Parse XML and create a simple DOM tree.

Contains two SNI types, one of which is a simple DOM element, used to hold XML elements.

10.57 Scripts/Common/ReadConfiguration.tcl File Reference

Namespaces

- namespace [ReadConfiguration](#)
The Read Configuration File code is contained in this namespace.

Functions

- [ReadConfiguration::ReadConfiguration](#) (filename, configurationArrayName)
This procedure reads in the configuration file named by the filename into the array named by configurationArrayName.
- [ReadConfiguration::IsEven](#) (i)
Checks if its argument is an even number.
- [ReadConfiguration::WriteConfiguration](#) (filename, configurationArrayName)
This procedure writes the configuration contained in configurationArrayName to the file named by the filename.
- [ReadConfiguration::ConfigurationType](#) (...)
This macro defines the body of a snit::type that implements a program's global configuration (or preferences).

10.58 Scripts/Common/snitScrollNotebook.tcl File Reference

Classes

- class [ScrollTabNotebook](#)
Tabbed Notebook with scrollable tabs.

10.59 Scripts/Common/splash.tcl File Reference

Classes

- class [splash](#)
Widget that implements a splash window.

10.60 Scripts/ControlSupport/CmriSupport.tcl File Reference

Classes

- class [CmriSupport::CmriNode](#)
CMR/I node type.

Namespaces

- namespace [CmriSupport](#)
Cmri Support code.

10.61 Scripts/CTIAcela/CTIAcela.tcl File Reference

Classes

- class [ctiacela::CTIAcela](#)
Main [CTIAcela](#) interface class.

Namespaces

- namespace [ctiacela](#)
CTI Acela Tcl Serial Port Interface.

Typedefs

- typedef int [ctiacela::addresstype](#)
Module address type.
- typedef int [ctiacela::ubyte](#)
Unsigned byte type.
- typedef int [ctiacela::speedtype](#)
Speed type.
- typedef int [ctiacela::momtype](#)
Momentum control type.
- typedef int [ctiacela::filterthreshtype](#)
Filter threshold type.

Variables

- [ctiacela::ctiacela](#)

10.62 Scripts/GRSupport/grsupport2.tcl File Reference

Namespaces

- namespace [GRSupport](#)
Code to support the various graphics packages.

Functions

- [GRSupport::_ROPI2](#) (name1, name2, op)
A variable trace to enforce the read-only-ness of PI2.
- [GRSupport::_ROPI](#) (name1, name2, op)
A variable trace to enforce the read-only-ness of PI.
- [GRSupport::DegreesToRadians](#) (degrees)
Function to convert from degrees to radians.
- [GRSupport::RadiansToDegrees](#) (rads)
Function to convert from radians to degrees.
- [GRSupport::VerifyDoubleMethod](#) ()
Snit macro defining a validate method for doubles.
- [GRSupport::VerifyBooleanMethod](#) ()
Snit macro defining a validate method for booleans.
- [GRSupport::VerifyIntegerMethod](#) ()
Snit macro defining a validate method integers.
- [GRSupport::VerifyOrientationHVMethod](#) ()
Snit macro defining a validate method for orientation (horizontal or vertical).
- [GRSupport::VerifyColorMethod](#) ()
Snit macro defining a validate method for colors.

Variables

- [GRSupport::PI2](#)
Variable containing $\pi/2$.
- [GRSupport::PI](#)
Variable containing π .

10.63 Scripts/GRSupport/GRSupportTclGroup.h File Reference

10.64 Scripts/GRSupport/Instruments2.tcl File Reference

Classes

- class [Instruments::DialInstrument](#)
Generic dial instrument.
- class [Instruments::AnalogClock](#)
Analog clock instrument.
- class [Instruments::DigitalInstrument](#)
Digital instrument.
- class [Instruments::DigitalClock](#)
Digital clock instrument.
- class [Instruments::CabSignalLamp](#)
Cab signal lamp type.

Namespaces

- namespace [Instruments](#)
Namespace used for instruments code.

Functions

- [Instruments::CommonOptions](#) (defaultLabel)
Snit macro to define common options used by all instruments.

10.65 Scripts/GRSupport/LCARSWidgets2.tcl File Reference

Namespaces

- namespace [LCARS](#)
Namespace where the [LCARS](#) code lives.

10.66 Scripts/GRSupport/OvalWidgets2.tcl File Reference

Classes

- class [OvalWidgets::OvalButton](#)
Oval button.
- class [OvalWidgets::OvalScrollBar](#)
Oval ScrollBar.
- class [OvalWidgets::OvalScale](#)
An oval scale widget, much like a standard Tk scale widget.
- class [OvalWidgets::OvalSlider](#)
Oval Slider.
- class [OvalWidgets::OvalRoundCornerRectangle](#)
Oval Round Corner Rectangle.

Namespaces

- namespace [OvalWidgets](#)

These oval shaped widgets are much like the Star Trek NG computer screens.

Functions

- [OvalWidgets::XYWH](#) (width, height)
Defines the options for position (-x,-y) and size (-width,-height).
- [OvalWidgets::ColorOptionMethods](#) ()
Snit macro to default color option methods.
- [OvalWidgets::CommonValidateMethods](#) ()
Macro to include the common validation methods.
- [OvalWidgets::ColorFillOption](#) (optspec, default)
Method to define a fill color option.
- [OvalWidgets::ColorOutlineOption](#) (optspec, default)
Method to define an outline color option.
- [OvalWidgets::FontFamily](#) (default)
Macro to define the -fontfamily option.
- [OvalWidgets::SquareEndOptions](#) ()
Macro to define the square end options (-rightsquare, -leftsquare).
- [OvalWidgets::_VerifyFont](#) (option, value)
Method to validate a font value.
- [OvalWidgets::_ConfigureFont](#) (option, value)
Method to configure a font value.
- [OvalWidgets::_ConfigureText](#) (option, value)
Method to configure the text of the button.
- [OvalWidgets::_VerifyIntegerOrEmpty](#) (option, value)
Method to validate an integer or empty string option.
- [OvalWidgets::OvalLabel](#) (name, _canvas,...)
Construct some text.
- [OvalWidgets::~~OvalLabel](#) ()
Destructor free up all resources.
- [OvalWidgets::_UnderSplit](#) (beforevar, undervar, aftervar)
Method to split label text into before, under, and after segments.

Variables

- [OvalWidgets::HBar](#)
Holds the horizontal bar bitmap.
- [OvalWidgets::VBar](#)
Holds the vertical bar bitmap.
- var [OvalWidgets::canvas](#)
Canvas the widget is on.

10.67 Scripts/LCC/ConfigDialogs.tcl File Reference

Classes

- class [lcc::ConfigOptions](#)
Display memory config options.
- class [lcc::ConfigMemory](#)
Configure memory.

Namespaces

- namespace [lcc](#)
Namespace that holds the LCC interface code.

10.68 Scripts/LCC/ConfigurationEditor.tcl File Reference

Classes

- class [lcc::ConfigurationEditor](#)
Generate OpenLCB Memory Configuration Window.

Namespaces

- namespace [lcc](#)
Namespace that holds the LCC interface code.

10.69 Scripts/LCC/eventDialogs.tcl File Reference

Classes

- class [lcc::EventLog](#)
Event received log, with event sender.
- class [lcc::EventReceived](#)
Display a received event.
- class [lcc::SendEvent](#)
Send Event Dialog – send PCRE message.

Namespaces

- namespace [lcc](#)
Namespace that holds the LCC interface code.

10.70 Scripts/LCC/lcc.tcl File Reference

Classes

- class [lcc::EventID](#)
An event id structure.
- class [lcc::EventID_or_null](#)
An [EventID](#) or empty string.
- class [lcc::CANHeader](#)
CAN Header type.
- class [lcc::MTIHeader](#)
MTI Header type.
- class [lcc::MTIDetail](#)
MTI Header type, detailed version.
- class [lcc::CanMessage](#)
A CAN Message, containing a 29-bit header and upto 8 bytes of data.
- class [lcc::GridConnectMessage](#)
A Grid Connect formatted CAN message.
- class [lcc::GridConnectReply](#)
A Grid Connect formatted CAN message (reply).
- class [lcc::nid_or_null](#)
Node ID regexp pattern or the empty string.
- class [lcc::CanAlias](#)
Implements a CAN Alias.
- class [lcc::CanTransport](#)
Logical transport of CAN Messages.
- class [lcc::OpenLCBMessage](#)
OpenLCB Message type.
- class [lcc::CANGridConnect](#)
Base class to connect to a CAN bus using GridConnect formatted message over.
- class [lcc::CANGridConnectOverUSBSerial](#)
Connect to a CAN bus using GridConnect formatted message over a USB Serial port.
- class [lcc::OpenLCBOverTcp](#)
Connect to a OpenLCB over Tcp/Ip.
- class [lcc::CANGridConnectOverTcp](#)
Connect to a CAN bus using GridConnect formatted message over a Tcp/Ip connection.
- class [lcc::CANGridConnectOverCANSocket](#)
Connect to a CAN bus using GridConnect formatted message over a CAN Socket connection.
- class [lcc::OpenLCBProtocols](#)
Supported LCC Protocol name type.
- class [lcc::OpenLCBNode](#)
Connect to a OpenLCB interface.

Namespaces

- namespace [lcc](#)
Namespace that holds the LCC interface code.

Typedefs

- typedef int [lcc::twobits](#)
A 2 bit integer.
- typedef int [lcc::threebits](#)
A 3 bit integer.
- typedef int [lcc::fivebits](#)
A 5 bit integer.
- typedef int [lcc::sixbits](#)
A 6 bit integer.
- typedef int [lcc::length](#)
An integer from 1 to 64.
- typedef int [lcc::byte](#)
An 8-bit unsigned byte.
- typedef int [lcc::twelvebits](#)
A 12 bit integer.
- typedef int [lcc::fifteenbits](#)
A 15 bit integer.
- typedef int [lcc::sixteenbits](#)
A 16 bit integer.
- typedef int [lcc::headerword](#)
A 29 bit integer.
- typedef int [lcc::uint32](#)
A 32 bit unsigned integer.
- typedef listtype [lcc::eightbytes](#)
A list of bytes, from 0 to 8 elements.
- typedef listtype [lcc::bytelist72](#)
A list of bytes, from 0 to 72 elements.
- typedef listtype [lcc::bytelist](#)
A list of bytes, unbounded.
- typedef listtype [lcc::databuf](#)
A list of bytes, from 1 to 64 elements.
- typedef char * [lcc::nid](#)
Node ID regexp pattern.

Enumerations

- enum [lcc::datagramcontent](#) {
 [lcc::complete](#) , [lcc::first](#) , [lcc::middle](#) , [lcc::last](#) ,
 [lcc::stream](#) }
Datagram and stream types.
- enum [lcc::eventvalidity](#) { [lcc::valid](#) , [lcc::invalid](#) , [lcc::unknown](#) }
Event validity.

Functions

- [lcc::AbstractMessage](#) ()
Define common variables and accessor methods.
- [lcc::AbstractMRMessage](#) ()
@Brief Macro to create common methods and variables for an AbstractMRMessage

10.71 Scripts/LinuxGpio/LinuxGpio.tcl File Reference

Classes

- class [linuxgpio::LinuxGpio](#)
Base generic GPIO interface class.
- class [linuxgpio::GpioOutputSafeLow](#)
Output pin, initialized to low.
- class [linuxgpio::GpioOutputSafeHigh](#)
Output pin, initialized to high.
- class [linuxgpio::GpioOutputSafeLowInverted](#)
Output pin, initialized to low, with inverted logic.
- class [linuxgpio::GpioOutputSafeHighInvert](#)
Output pin, initialized to high, inverted.
- class [linuxgpio::GpioInputActiveHigh](#)
Input pin, active high (high is true).
- class [linuxgpio::GpioInputActiveLow](#)
Input pin, active low (low is true).

Namespaces

- namespace [linuxgpio](#)
Linux GPIO Interface.

Typedefs

- typedef int [linuxgpio::pinnotype](#)
Pin number type, a positive integer.

Enumerations

- enum [linuxgpio::pindirection](#) { [linuxgpio::in](#) , [linuxgpio::out](#) , [linuxgpio::high](#) , [linuxgpio::low](#) }
Pin direction and initial type code.

10.72 Scripts/NCE/nce.tcl File Reference

Classes

- class [nce::NCE](#)
Main [NCE](#) Cab Bus interface class.

Namespaces

- namespace [nce](#)
Namespace that holds the [NCE](#) interface code.

Typedefs

- typedef int [nce::LocoAddress](#)
Locomotive address type.
- typedef int [nce::ConsistAddress](#)
Consist address type.
- typedef int [nce::AccessoryNumber](#)
Accessory address type.
- typedef int [nce::MacroNumber](#)
[NCE](#) Macro number.
- typedef int [nce::CabNumber](#)
Cab number type.
- typedef int [nce::Hours](#)
Hours type.
- typedef int [nce::Minutes](#)
Minutes type.
- typedef int [nce::ScaleClockRatio](#)
Scale clock ratio range.
- typedef int [nce::EchoMode](#)
This is really should be an enumeration, but works as a limited range integer.
- typedef int [nce::Speed28](#)
28 speed step speeds.
- typedef int [nce::Speed128](#)
128 speed step speeds.
- typedef int [nce::CSAddress](#)
CSAddress type.
- typedef int [nce::UByte](#)
Unsigned byte type (data byte).
- typedef listtype [nce::RAMData](#)
Datalist for RAM data, 1 to 16 unsigned bytes.
- typedef char * [nce::LCDMessage16](#)
Data for 16 character LCD lines.
- typedef char * [nce::LCDMessage8](#)

- *Data for 8 character LCD lines.*
• typedef listtype [nce::RawPacket](#)
Raw packets for writing raw packets to the temp queue.
- typedef listtype [nce::RawTrackPacket](#)
Raw packets for writing raw packets to the track queue.
- typedef listtype [nce::RAMData8](#)
Datalist for RAM data 8 unsigned bytes.
- typedef int [nce::MomentumLevel](#)
Momentum level.
- typedef int [nce::AspectBits](#)
Aspect bit mask.

Enumerations

- enum [nce::SpeedMode](#) { [nce::S14](#) , [nce::S28](#) , [nce::S128](#) }
- enum [nce::Direction](#) { [nce::Forward](#) , [nce::Reverse](#) }

Functions

- [nce::ErrorMessage](#) (code)
Return the error message, given the error code.

10.73 Scripts/RailDriverSupport/raildriver_client.tcl File Reference

Classes

- class [raildriver::RaildriverClient](#)
Raildriver Client class – connects to the Raildriver daemon.

Namespaces

- namespace [raildriver](#)
Namespace that holds the Raildriver Client class code.

Typedefs

- typedef listtype [raildriver::eventlist](#)
List of event codes.

Enumerations

- enum [raildriver::RaildriverEvents](#) {
[raildriver::REVERSER](#) , [raildriver::THROTTLE](#) , [raildriver::AUTOBRAKE](#) , [raildriver::INDEPENDBRK](#) ,
[raildriver::BAILOFF](#) , [raildriver::WIPER](#) , [raildriver::HEADLIGHT](#) , [raildriver::DIGITAL1](#) ,
[raildriver::DIGITAL2](#) , [raildriver::DIGITAL3](#) , [raildriver::DIGITAL4](#) , [raildriver::DIGITAL5](#) ,
[raildriver::DIGITAL6](#) }

These are the event codes for the Rail Driver's report message.

10.74 Scripts/Satellite/Satellite.tcl File Reference

Classes

- class [Satellite](#)
[Satellite](#) class.

10.75 Scripts/XPressNet/xpressnet.tcl File Reference

Classes

- class [xpressnet::CommandStationResponse](#)
General response class.
- class [xpressnet::ServiceModeResponse](#)
Service mode response.
- class [xpressnet::SoftwareVersion](#)
Software version.
- class [xpressnet::CommandStationStatus](#)
Command station status.
- class [xpressnet::AccessoryDecoderInformation](#)
Accessory decoder information.
- class [xpressnet::LocomotiveInformation](#)
Locomotive information.
- class [xpressnet::FunctionStatus](#)
Function status.
- class [xpressnet::LocomotiveAddress](#)
Locomotive address.
- class [xpressnet::DoubleHeaderInformation](#)
Double header information.
- class [xpressnet::DoubleHeaderMuError](#)
Double header or MU error.
- class [xpressnet::LI100Message](#)
LI100 messages.
- class [xpressnet::LI100VersionNumbers](#)
LI100 Version Numbers.
- class [xpressnet::LI101XPressNetAddress](#)
LI101 XPress Net Address.
- class [xpressnet::XPressNet](#)
Main XPressNet interface class.
- class [xpressnet::XpressNetEvent](#)
[XPressNet](#) Event class.

Namespaces

- namespace [xpressnet](#)
Namespace that holds the [XPressNet](#) interface code.

Typedefs

- typedef int [xpressnet::nibble](#)
A 4 bit unsigned integer.
- typedef int [xpressnet::ubyte](#)
An 8 bit unsigned integer.
- typedef int [xpressnet::DecoderLongAddress](#)
Decoder address, an unsigned 14 bit integer.
- typedef int [xpressnet::ElementAddress](#)
A 2 bit unsigned integer.
- typedef int [xpressnet::S_14](#)
14 Speed steps.
- typedef int [xpressnet::S_27](#)
27 Speed steps.
- typedef int [xpressnet::S_28](#)
28 Speed steps.
- typedef int [xpressnet::S_128](#)
128 Speed steps.
- typedef int [xpressnet::u10](#)
An unsigned 10 bit integer.
- typedef int [xpressnet::u3](#)
An unsigned 3 bit integer.
- typedef int [xpressnet::u7](#)
An unsigned 7 bit integer.
- typedef int [xpressnet::ConsistAddress](#)
Multi-unit Address.

Enumerations

- enum [xpressnet::TypeCode](#) {
[xpressnet::NO_RESPONSE_AVAILABLE](#) , [xpressnet::NORMAL_OPERATION_RESUMED](#) , [xpressnet::TRACK_POWER_OFF](#)
[xpressnet::EMERGENCY_STOP](#) ,
[xpressnet::SERVICE_MODE_ENTRY](#) , [xpressnet::PROGRAMMING_INFO_SHORT_CIRCUIT](#) , [xpressnet::PROGRAMMING_INFO](#)
[xpressnet::PROGRAMMING_INFO_COMMAND_STATION_BUSY](#) ,
[xpressnet::PROGRAMMING_INFO_COMMAND_STATION_READY](#) , [xpressnet::SERVICE_MODE_RESPONSE](#)
[xpressnet::SOFTWARE_VERSION](#) , [xpressnet::COMMAND_STATION_STATUS](#) ,
[xpressnet::TRANSFER_ERRORS](#) , [xpressnet::COMMAND_STATION_BUSY](#) , [xpressnet::INSTRUCTION_NOT_SUPPORTED](#)
[xpressnet::ACCESSORY_DECODER_INFORMATION](#) ,
[xpressnet::LOCOMOTIVE_INFORMATION](#) , [xpressnet::FUNCTION_STATUS](#) , [xpressnet::LOCOMOTIVE_ADDRESS](#)
[xpressnet::DOUBLE_HEADER_INFORMATION](#) ,
[xpressnet::DOUBLE_HEADER_MU_ERROR](#) , [xpressnet::LI100_MESSAGE](#) , [xpressnet::LI100_VERSION](#) ,
[xpressnet::LI101_XPRESSNET_ADDRESS](#) }

Response types.

- enum `xpressnet::PowerUpMode` { `xpressnet::Manual` , `xpressnet::Automatic` }

Power up modes.

- enum `xpressnet::NibbleCode` { `xpressnet::Lower` , `xpressnet::Upper` }

Accessory nibble code.

- enum `xpressnet::SpeedStepModeCode` { `xpressnet::S14` , `xpressnet::S27` , `xpressnet::S28` , `xpressnet::S128` }

Speed step mode code.

- enum `xpressnet::DirectionCode` { `xpressnet::Forward` , `xpressnet::Reverse` }

Direction flag.

- enum `xpressnet::ErrorTypeCode` {
`xpressnet::NotOperatedOr0` , `xpressnet::UsedByAnotherDevice` , `xpressnet::UsedInANotherDHMU` , `xpressnet::SpeedNotZero`
 ,
`xpressnet::NotMU` , `xpressnet::NotMUBaseAddress` , `xpressnet::CantDelete` , `xpressnet::StackFull` }

Error type code.

- enum `xpressnet::MessageTypeCode` {
`xpressnet::ErrorBetweenLI100AndPC` , `xpressnet::ErrorBetweenLI100AndCommandStation` , `xpressnet::UnknownCommunications`
 , `xpressnet::Success` ,
`xpressnet::NoTimeslot` , `xpressnet::BufferOverflow` , `xpressnet::Other` }

Message type code.

Index

```

/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/AzatraX/ConfigOptions, 307
1299 lcc::EventReceived, 440
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/FCSupportSystem, 894
1300 _Command
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/ParallelWidgets/MRPS/OvalButton, 726
1301 _Configure
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/ParallelWidgets/ParallelCanvasGroup.h, 173
1308 _ConfigureFillColor
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/RailDriver/DriverCabSignalLamp, 192
1309 _ConfigureFont
/home/heller/Deepwoods/MRRSystem-2.2.2-Linuxamd64/C++/TTSupport/TTSupportGroup.h, 100
1309 _ConfigureL
OvalWidgets::OvalSlider, 721
gettext, 90
_ADDRESS
xpressnet::XPressNet, 1270
_AddTLever
CTCPanel::Toggle, 1169
_BaseRect
OvalWidgets::OvalScale, 716
OvalWidgets::OvalScrollBar, 725
_CancelOpenTransport
lcc::CANGridConnectOverCANSocket, 212
lcc::CANGridConnectOverTcp, 216
lcc::CANGridConnectOverUSBSerial, 221
lcc::OpenLCBOverTcp, 701
_CancelSelectTransport
lcc::OpenLCBNode, 689
_CheckForResponse_0x00
xpressnet::XPressNet, 1271
_CheckForResponse_0x40
xpressnet::XPressNet, 1271
_CheckForResponse_0x60
xpressnet::XPressNet, 1271
_CheckForResponse_0x80
xpressnet::XPressNet, 1271
_CheckForResponse_0xa0
xpressnet::XPressNet, 1271
_CheckForResponse_0xc0
xpressnet::XPressNet, 1271
_CheckForResponse_0xe0
xpressnet::XPressNet, 1272
_Close
HTMLHelp::HTMLHelp, 487
lcc::ConfigMemory, 299
AzatraX::ConfigOptions, 307
lcc::EventReceived, 440
FCSupportSystem, 894
_ParallelWidgets/MRPS/OvalButton, 726
_ParallelWidgets/ParallelCanvasGroup.h, 173
_RailDriver/DriverCabSignalLamp, 192
_TTSupport/TTSupportGroup.h, 100
OvalWidgets::OvalSlider, 721
xpressnet::XPressNet, 1270
CTCPanel::Toggle, 1169
OvalWidgets::OvalScale, 716
OvalWidgets::OvalScrollBar, 725
lcc::CANGridConnectOverCANSocket, 212
lcc::CANGridConnectOverTcp, 216
lcc::CANGridConnectOverUSBSerial, 221
lcc::OpenLCBOverTcp, 701
OvalWidgets::OvalScale, 716
OvalWidgets::OvalSlider, 721
OvalWidgets::OvalButton, 711
OvalWidgets::OvalScale, 716
OvalWidgets::OvalSlider, 721
OvalWidgets::OvalScale, 716
OvalWidgets::OvalScrollBar, 726
CTCPanel::CTCPanel, 369
CTCPanel::CTCPanel, 369
lcc::ConfigMemory, 300
azatrax::Azatrax, 168
azatrax::Azatrax, 168
CTCPanel::Toggle, 1170
OvalWidgets::OvalScale, 717
OvalWidgets::OvalSlider, 721
OvalWidgets::OvalScrollBar, 727

```

- `_OpenTransport`
 - `lcc::CANGridConnectOverCANSocket`, 212
 - `lcc::CANGridConnectOverTcp`, 216
 - `lcc::CANGridConnectOverUSBSerial`, 221
 - `lcc::OpenLCBOverTcp`, 701
- `_PI`
 - `CTCPanel::CurvedBlock`, 395
- `_PlatePolygon`
 - `CTCPanel::SIGPlate`, 909
 - `CTCPanel::SWPlate`, 1033
- `_PosInteger`
 - `CTCPanel::CTCPanel`, 369
- `_RAM_check_error`
 - `xpressnet::CommandStationStatus`, 293
- `_ROPI`
 - `GRSupport`, 92
- `_ROPI2`
 - `GRSupport`, 92
- `_RTROffset`
 - `lcc::GridConnectReply`, 476
- `_RadiansToDegrees`
 - `CTCPanel::CurvedBlock`, 393
- `_Read`
 - `lcc::ConfigMemory`, 302
- `_Restore`
 - `lcc::ConfigMemory`, 302
- `_SBackward`
 - `HTMLHelp::HTMLHelp`, 487
- `_SForward`
 - `HTMLHelp::HTMLHelp`, 487
- `_SchematicDrawOval`
 - `CTCPanel::Signal`, 901
- `_SchematicDrawThinLine`
 - `CTCPanel::Signal`, 901
- `_SelectTransport`
 - `lcc::OpenLCBNode`, 689
- `_Send`
 - `lcc::SendEvent`, 894
- `_StubYard_Poly`
 - `CTCPanel::StubYard`, 1009
- `_ThroughYard_Poly`
 - `CTCPanel::ThroughYard`, 1134
- `_TypeCodes`
 - `CmriSupport::CmriNode`, 284
- `_UnderSplit`
 - `OvalWidgets`, 130
- `_VERSION`
 - `Parsers::MRRXtrkCad`, 629
 - `YY_MRRXtrkCad_INHERIT`, 1290
- `_ValidateAddress`
 - `CmriSupport::CmriNode`, 280
- `_ValidateByte`
 - `CmriSupport::CmriNode`, 281
- `_ValidateListOfBytes`
 - `CmriSupport::CmriNode`, 281
- `_ValidateSixElementListOfBytes`
 - `CmriSupport::CmriNode`, 281
- `_ValidateType`
 - `CmriSupport::CmriNode`, 282
- `_ValidateWord`
 - `CmriSupport::CmriNode`, 282
- `_VerifyBitmap`
 - `OvalWidgets::OvalSlider`, 722
- `_VerifyCrossingType`
 - `CTCPanel::Crossing`, 349
- `_VerifyFont`
 - `OvalWidgets`, 130
- `_VerifyHeads`
 - `CTCPanel::Signal`, 902
- `_VerifyIntegerOrEmpty`
 - `OvalWidgets`, 130
- `_VerifyOrientationHV`
 - `CTCPanel::Toggle`, 1170
- `_WidgetMap`
 - `HTMLHelp::HTMLHelp`, 507
- `_Write`
 - `lcc::ConfigMemory`, 302
- `_accessory_type`
 - `xpressnet::AccessoryDecoderInformation`, 159
- `_actionWrite`
 - `lcc::ConfigurationEditor`, 314
- `_addnewloco`
 - `CabWidgets::SelectLocomotive`, 891
- `_address`
 - `xpressnet::AccessoryDecoderInformation`, 159
 - `xpressnet::DoubleHeaderInformation`, 416
 - `xpressnet::LI101XPressNetAddress`, 568
 - `xpressnet::LocomotiveAddress`, 574
 - `xpressnet::LocomotiveInformation`, 582
- `_address2`
 - `xpressnet::DoubleHeaderInformation`, 416
 - `xpressnet::LocomotiveInformation`, 582
- `_addressType`
 - `xpressnet::LocomotiveAddress`, 574
- `_appendXORByte`
 - `xpressnet::XPressNet`, 1270
- `_available`
 - `xpressnet::DoubleHeaderInformation`, 416
 - `xpressnet::LocomotiveInformation`, 583
- `_buildSelectTransportConstructorDialog`
 - `lcc::OpenLCBNode`, 688
- `_cgetdata`
 - `lcc::OpenLCBMessage`, 684
- `_ch_oldfocus`
 - `CTCPanel::CTCPanel`, 386
- `_ch_oldgrab`
 - `CTCPanel::CTCPanel`, 386
- `_characterdata`

- ParseXML, 756
- _children
 - SimpleDOMEElement, 917
- _clear
 - lcc::EventLog, 437
- _clientRow
 - ScrollTabNotebook, 881
- _close
 - lcc::ConfigurationEditor, 315
 - lcc::EventLog, 437
- _command_station_type
 - xpressnet::SoftwareVersion, 931
- _completed
 - xpressnet::AccessoryDecoderInformation, 159
- _compute_height
 - ScrollTabNotebook, 873
- _compute_width
 - ScrollTabNotebook, 873
- _configureCenterLabel
 - CTCPanel::Toggle, 1169
- _configureColor
 - CTCPanel::CTCLabel, 361
 - CTCPanel::Lamp, 546
 - CTCPanel::SchLabel, 862
- _configureLabel
 - CTCPanel::Crossing, 349
 - CTCPanel::Crossover, 354
 - CTCPanel::CTCLabel, 361
 - CTCPanel::CurvedBlock, 393
 - CTCPanel::DoubleSlip, 423
 - CTCPanel::EndBumper, 429
 - CTCPanel::HiddenBlock, 479
 - CTCPanel::Lamp, 546
 - CTCPanel::PushButton, 816
 - CTCPanel::SchLabel, 863
 - CTCPanel::ScissorCrossover, 867
 - CTCPanel::Signal, 900
 - CTCPanel::SIGPlate, 907
 - CTCPanel::SingleSlip, 920
 - CTCPanel::StraightBlock, 1004
 - CTCPanel::StubYard, 1008
 - CTCPanel::Switch, 1012
 - CTCPanel::SWPlate, 1031
 - CTCPanel::ThreeWaySW, 1129
 - CTCPanel::ThroughYard, 1133
- _configureLeftLabel
 - CTCPanel::Toggle, 1169
- _configureRightLabel
 - CTCPanel::Toggle, 1170
- _configuredata
 - lcc::OpenLCBMessage, 684
- _copyCM
 - lcc::GridConnectMessage, 466
- _copyGCM
 - lcc::GridConnectReply, 472
- _crosshairEnd
 - CTCPanel::CTCPanel, 367
- _crosshairMove
 - CTCPanel::CTCPanel, 368
- _crosshairStart
 - CTCPanel::CTCPanel, 368
- _cv
 - xpressnet::ServiceModeResponse, 896
- _data
 - SimpleDOMEElement, 917
 - xpressnet::ServiceModeResponse, 896
- _datagramhandler
 - lcc::ConfigMemory, 300
 - lcc::ConfigurationEditor, 315
- _datagramrejecterror
 - lcc::ConfigMemory, 303
 - lcc::ConfigurationEditor, 333
- _destroy
 - FileEntry, 87
 - LabelComboBox, 98
 - LabelSelectColor, 104
 - LabelSpinBox, 109
- _direction
 - CabWidgets::LocomotiveDirection, 577
 - xpressnet::DoubleHeaderInformation, 416
 - xpressnet::LocomotiveInformation, 583
- _down
 - CabWidgets::LocomotiveSpeed, 590
- _down1
 - CabWidgets::LocomotiveSpeed, 588
- _down10
 - CabWidgets::LocomotiveSpeed, 588, 590
- _draw_arrows
 - ScrollTabNotebook, 873
- _draw_page
 - ScrollTabNotebook, 874
- _dumpAsHex
 - lcc::ConfigMemory, 300
- _dumpAsText
 - lcc::ConfigMemory, 301
- _elementend
 - ParseXML, 756
- _elementstart
 - ParseXML, 757
- _emergency_off
 - xpressnet::CommandStationStatus, 293
- _emergency_stop
 - xpressnet::CommandStationStatus, 293
- _error
 - xpressnet::DoubleHeaderMuError, 420
- _eventID
 - lcc::EventID, 434
- _eventhandler

- xpressnet::XpressNetEvent, [1288](#)
- _eventidComboRead
 - lcc::ConfigurationEditor, [315](#)
- _eventidComboWrite
 - lcc::ConfigurationEditor, [316](#)
- _eventidEntryRead
 - lcc::ConfigurationEditor, [316](#)
- _eventidEntryWrite
 - lcc::ConfigurationEditor, [317](#)
- _eventidnumber
 - lcc::ConfigurationEditor, [333](#)
- _explodechars
 - nce::NCE, [647](#)
- _flags0
 - lcc::CANGridConnect, [200](#)
- _formattrlist
 - SimpleDOMElement, [911](#)
- _function0
 - xpressnet::DoubleHeaderInformation, [416](#)
 - xpressnet::LocomotiveInformation, [583](#)
- _function1
 - xpressnet::DoubleHeaderInformation, [417](#)
 - xpressnet::LocomotiveInformation, [583](#)
- _function10
 - xpressnet::DoubleHeaderInformation, [417](#)
 - xpressnet::LocomotiveInformation, [583](#)
- _function11
 - xpressnet::DoubleHeaderInformation, [417](#)
 - xpressnet::LocomotiveInformation, [583](#)
- _function12
 - xpressnet::DoubleHeaderInformation, [417](#)
 - xpressnet::LocomotiveInformation, [584](#)
- _function2
 - xpressnet::DoubleHeaderInformation, [417](#)
 - xpressnet::LocomotiveInformation, [584](#)
- _function3
 - xpressnet::DoubleHeaderInformation, [417](#)
 - xpressnet::LocomotiveInformation, [584](#)
- _function4
 - xpressnet::DoubleHeaderInformation, [418](#)
 - xpressnet::LocomotiveInformation, [584](#)
- _function5
 - xpressnet::DoubleHeaderInformation, [418](#)
 - xpressnet::LocomotiveInformation, [584](#)
- _function6
 - xpressnet::DoubleHeaderInformation, [418](#)
 - xpressnet::LocomotiveInformation, [584](#)
- _function7
 - xpressnet::DoubleHeaderInformation, [418](#)
 - xpressnet::LocomotiveInformation, [585](#)
- _function8
 - xpressnet::DoubleHeaderInformation, [418](#)
 - xpressnet::LocomotiveInformation, [585](#)
- _function9
 - xpressnet::DoubleHeaderInformation, [418](#)
 - xpressnet::LocomotiveInformation, [585](#)
- _getAddressRange
 - lcc::ConfigMemory, [301](#)
- _getEventID
 - lcc::EventID, [433](#)
- _get_extended
 - lcc::GridConnectMessage, [466](#)
 - lcc::GridConnectReply, [472](#)
- _get_rtr
 - lcc::GridConnectMessage, [467](#)
 - lcc::GridConnectReply, [473](#)
- _get_x_page
 - ScrollTabNotebook, [874](#)
- _groupnumber
 - lcc::ConfigurationEditor, [333](#)
- _handleSRQ
 - CTIAcela, [42](#)
- _hardware_version
 - xpressnet::LI100VersionNumbers, [566](#)
- _header
 - lcc::CanMessage, [234](#)
- _highlight
 - ScrollTabNotebook, [874](#)
- _hpage
 - ScrollTabNotebook, [881](#)
- _intCBRead
 - lcc::ConfigurationEditor, [317](#)
- _intCBWrite
 - lcc::ConfigurationEditor, [317](#)
- _intComboRead
 - lcc::ConfigurationEditor, [318](#)
- _intComboWrite
 - lcc::ConfigurationEditor, [318](#)
- _intRBRead
 - lcc::ConfigurationEditor, [319](#)
- _intRBWrite
 - lcc::ConfigurationEditor, [319](#)
- _intScaleRead
 - lcc::ConfigurationEditor, [320](#)
- _intScaleWrite
 - lcc::ConfigurationEditor, [320](#)
- _intSpinRead
 - lcc::ConfigurationEditor, [321](#)
- _intSpinWrite
 - lcc::ConfigurationEditor, [321](#)
- _intnumber
 - lcc::ConfigurationEditor, [333](#)
- _ioComplete
 - lcc::ConfigMemory, [304](#)
 - lcc::ConfigurationEditor, [333](#)
- _lastSet
 - OvalWidgets::OvalScrollBar, [729](#)
- _left

- CabWidgets::LocomotiveDirection, [577](#)
- ScrollTabNotebook, [881](#)
- _m
 - gettext, [90](#)
- _major
 - xpressnet::SoftwareVersion, [931](#)
- _menu
 - lcc::ConfigurationEditor, [334](#)
- _messageHandler
 - lcc::OpenLCBNode, [689](#)
- _messageReader
 - lcc::CANGridConnect, [200](#)
- _message_type
 - xpressnet::LI100Message, [564](#)
- _messagehandler
 - lcc::ConfigMemory, [301](#)
- _minor
 - xpressnet::SoftwareVersion, [931](#)
- _mkbuttons
 - lcc::ConfigurationEditor, [334](#)
- _mtraddress
 - xpressnet::LocomotiveInformation, [585](#)
- _mx
 - gettext, [90](#)
- _nibble
 - xpressnet::AccessoryDecoderInformation, [160](#)
- _numberOfFeedbackElements
 - xpressnet::AccessoryDecoderInformation, [160](#)
- _openFile
 - FileEntry, [87](#)
- _paddingtype
 - ScrollTabNotebook, [881](#)
- _path_command
 - FileEntry, [87](#)
 - LabelComboBox, [99](#)
 - LabelSelectColor, [105](#)
 - LabelSpinBox, [109](#)
- _peelnid
 - lcc::CanAlias, [195](#)
- _poller
 - raildriver::RaildriverClient, [820](#)
- _poweringup
 - xpressnet::CommandStationStatus, [293](#)
- _printexport
 - lcc::ConfigurationEditor, [322](#)
- _printexport_csv
 - lcc::ConfigurationEditor, [322](#)
- _printexport_csv_frame
 - lcc::ConfigurationEditor, [323](#)
- _printexport_csv_frameAcross
 - lcc::ConfigurationEditor, [323](#)
- _printexport_csv_framesAcross
 - lcc::ConfigurationEditor, [323](#)
- _printexport_csv_vframe
 - lcc::ConfigurationEditor, [324](#)
- _printexport_csv_vframeAcross
 - lcc::ConfigurationEditor, [324](#)
- _printexport_pdf
 - lcc::ConfigurationEditor, [324](#)
- _printexport_pdf_frame
 - lcc::ConfigurationEditor, [325](#)
- _printexport_pdf_newpage
 - lcc::ConfigurationEditor, [325](#)
- _printexport_pdf_vframe
 - lcc::ConfigurationEditor, [326](#)
- _printexport_txt
 - lcc::ConfigurationEditor, [326](#)
- _printexport_txt_frame
 - lcc::ConfigurationEditor, [327](#)
- _printexport_txt_vframe
 - lcc::ConfigurationEditor, [327](#)
- _printexport_xml
 - lcc::ConfigurationEditor, [328](#)
- _printexport_xml_frame
 - lcc::ConfigurationEditor, [328](#)
- _printexport_xml_vframe
 - lcc::ConfigurationEditor, [328](#)
- _processXMLnode
 - lcc::ConfigurationEditor, [329](#)
- _quoteXML
 - SimpleDOMElement, [912](#)
- _radiustype
 - ScrollTabNotebook, [881](#)
- _readall
 - lcc::ConfigurationEditor, [329](#), [334](#)
- _readbyte
 - cmri::CMri, [274](#)
 - CTIAcela, [42](#)
 - nce::NCE, [647](#)
 - xpressnet::XPressNet, [1272](#)
- _readevent
 - cmri::CMri, [274](#)
 - CTIAcela, [43](#)
 - nce::NCE, [648](#)
 - raildriver::RaildriverClient, [820](#)
 - xpressnet::XPressNet, [1272](#)
- _readmemory
 - lcc::ConfigMemory, [302](#)
 - lcc::ConfigurationEditor, [330](#)
- _readresponse
 - nce::NCE, [648](#)
- _redraw
 - ScrollTabNotebook, [875](#)
- _reserveMyAlias
 - lcc::CANGridConnect, [200](#)
- _resize
 - ScrollTabNotebook, [875](#)
- _right

- CabWidgets::LocomotiveDirection, 577
 - ScrollTabNotebook, 882
- _script
 - xpressnet::XpressNetEvent, 1288
- _segmentnumber
 - lcc::ConfigurationEditor, 334
- _select
 - ScrollTabNotebook, 875
- _sendDatagram
 - lcc::CANGridConnect, 201
- _sendMessageAndReturnResponse
 - nce::NCE, 648
- _sendmessage
 - lcc::CANGridConnect, 201
- _sendtheevent
 - lcc::EventLog, 437
- _service_mode
 - xpressnet::CommandStationStatus, 293
 - xpressnet::ServiceModeResponse, 897
- _setEventID
 - lcc::EventID, 433
- _set_extended
 - lcc::GridConnectMessage, 467
- _set_rtr
 - lcc::GridConnectMessage, 467
- _setdirection
 - CabWidgets::LocomotiveDirection, 576
- _setspeed
 - CabWidgets::LocomotiveSpeed, 588
- _software_version
 - xpressnet::LI100VersionNumbers, 566
- _spaces
 - lcc::ConfigMemory, 304
- _speed
 - CabWidgets::LocomotiveSpeed, 590
 - xpressnet::DoubleHeaderInformation, 419
 - xpressnet::LocomotiveInformation, 585
- _speedstep
 - xpressnet::DoubleHeaderInformation, 419
 - xpressnet::LocomotiveInformation, 585
- _square
 - CTCPanel::CurvedBlock, 394
- _start_mode
 - xpressnet::CommandStationStatus, 293
- _status0
 - xpressnet::FunctionStatus, 447
- _status1
 - xpressnet::FunctionStatus, 447
- _status10
 - xpressnet::FunctionStatus, 448
- _status11
 - xpressnet::FunctionStatus, 448
- _status12
 - xpressnet::FunctionStatus, 448
- _status2
 - xpressnet::FunctionStatus, 448
- _status3
 - xpressnet::FunctionStatus, 448
- _status4
 - xpressnet::FunctionStatus, 448
- _status5
 - xpressnet::FunctionStatus, 449
- _status6
 - xpressnet::FunctionStatus, 449
- _status7
 - xpressnet::FunctionStatus, 449
- _status8
 - xpressnet::FunctionStatus, 449
- _status9
 - xpressnet::FunctionStatus, 449
- _stop
 - CabWidgets::LocomotiveSpeed, 589, 590
- _stringComboRead
 - lcc::ConfigurationEditor, 330
- _stringComboWrite
 - lcc::ConfigurationEditor, 331
- _stringEntryRead
 - lcc::ConfigurationEditor, 331
- _stringEntryWrite
 - lcc::ConfigurationEditor, 332
- _stringnumber
 - lcc::ConfigurationEditor, 334
- _t1
 - xpressnet::AccessoryDecoderInformation, 160
- _t2
 - xpressnet::AccessoryDecoderInformation, 160
- _tabrow
 - ScrollTabNotebook, 882
- _tabsides
 - ScrollTabNotebook, 882
- _test_page
 - ScrollTabNotebook, 875
- _textid
 - ScrollTabNotebook, 882
- _themeChanged
 - ScrollTabNotebook, 876
- _themeChanged_
 - ScrollTabNotebook, 876
- _time_stamp
 - xpressnet::CommandStationResponse, 290
- _timedout
 - lcc::CANGridConnect, 201
- _timeout
 - cmri::CMri, 276
 - CTIAcela, 58
 - lcc::CANGridConnect, 207
 - lcc::OpenLCBOverTcp, 703
 - nce::NCE, 670

- xpressnet::XPressNet, [1286](#)
- _timeoutFlag
 - lcc::CANGridConnect, [207](#)
- _timeoutevent
 - ncc::NCE, [648](#)
 - xpressnet::XPressNet, [1272](#)
- _transmit
 - cmri::CMri, [274](#)
 - CTIAcela, [43](#)
 - ncc::NCE, [648](#)
 - xpressnet::XPressNet, [1273](#)
- _transportConstructors
 - lcc::OpenLCBNode, [697](#)
- _transportlayerconf
 - lcc::CanTransport, [235](#)
- _trimList
 - CabWidgets::SelectLocomotive, [891](#)
- _up
 - CabWidgets::LocomotiveSpeed, [591](#)
- _up1
 - CabWidgets::LocomotiveSpeed, [589](#)
- _up10
 - CabWidgets::LocomotiveSpeed, [589](#), [591](#)
- _value
 - OvalWidgets::OvalScale, [718](#)
 - OvalWidgets::OvalSlider, [723](#)
- _warrow
 - ScrollTabNotebook, [882](#)
- _wpage
 - ScrollTabNotebook, [882](#)
- _writememory
 - lcc::ConfigMemory, [303](#)
 - lcc::ConfigurationEditor, [332](#)
- _xview
 - ScrollTabNotebook, [876](#)
- ~AnalogClock
 - Instruments::AnalogClock, [162](#)
- ~Azatrax
 - azatrax::Azatrax, [168](#)
- ~BezierBodyElt
 - Parsers::BezierBodyElt, [182](#)
- ~CMri
 - cmri::CMri, [273](#)
- ~CTCLabel
 - CTCPanel::CTCLabel, [361](#)
- ~CTIAcela
 - CTIAcela, [58](#)
- ~Cab
 - TTSupport::Cab, [187](#)
- ~CabSignalLamp
 - Instruments::CabSignalLamp, [191](#)
- ~CarType
 - FCFSupport::CarType, [265](#)
- ~CatalogDictionary
 - FCFSupport::PDFFileStructures::CatalogDictionary, [269](#)
- ~CodeButton
 - CTCPanel::CodeButton, [286](#)
- ~CornuBodyElt
 - Parsers::CornuBodyElt, [343](#)
- ~CrossReferenceTable
 - FCFSupport::PDFFileStructures::CrossReferenceTable, [357](#)
- ~Crossing
 - CTCPanel::Crossing, [349](#)
- ~Crossover
 - CTCPanel::Crossover, [353](#)
- ~CurvedBlock
 - CTCPanel::CurvedBlock, [393](#)
- ~DialInstrument
 - Instruments::DialInstrument, [398](#)
- ~Dictionary
 - FCFSupport::PDFFileStructures::Dictionary, [400](#)
- ~DigitalClock
 - Instruments::DigitalClock, [403](#)
- ~DigitalInstrument
 - Instruments::DigitalInstrument, [405](#)
- ~Division
 - FCFSupport::Division, [408](#)
- ~DoubleSlip
 - CTCPanel::DoubleSlip, [423](#)
- ~EndBumper
 - CTCPanel::EndBumper, [429](#)
- ~FontDictionary
 - FCFSupport::PDFFileStructures::FontDictionary, [442](#)
- ~FreedObject
 - FCFSupport::PDFFileStructures::FreedObject, [444](#)
- ~GpioInputActiveHigh
 - linuxgpio::GpioInputActiveHigh, [451](#)
- ~GpioInputActiveLow
 - linuxgpio::GpioInputActiveLow, [453](#)
- ~GpioOutputSafeHigh
 - linuxgpio::GpioOutputSafeHigh, [455](#)
- ~GpioOutputSafeHighInvert
 - linuxgpio::GpioOutputSafeHighInvert, [457](#)
- ~GpioOutputSafeLow
 - linuxgpio::GpioOutputSafeLow, [460](#)
- ~GpioOutputSafeLowInverted
 - linuxgpio::GpioOutputSafeLowInverted, [462](#)
- ~HiddenBlock
 - CTCPanel::HiddenBlock, [479](#)
- ~IndirectFloatVector
 - FCFSupport::PDFFileStructures::IndirectFloatVector, [512](#)
- ~IndirectObject
 - FCFSupport::PDFFileStructures::IndirectObject, [515](#)
- ~IndirectObjectDictionary

- FCFSupport::PDFFileStructures::IndirectObjectDictionary, 521
- ~InformationDirectory
 - FCFSupport::PDFFileStructures::InformationDirectory, 538
- ~LQ24PrinterDevice
 - FCFSupport::LQ24PrinterDevice, 597
- ~Lamp
 - CTCPanel::Lamp, 546
- ~LayoutFile
 - Parsers::LayoutFile, 551
- ~LinuxGpio
 - linuxgpio::LinuxGpio, 570
- ~LogMessageCallback
 - FCFSupport::LogMessageCallback, 594
- ~MRD
 - azatrax::MRD, 622
- ~MRRXtrkCad
 - Parsers::MRRXtrkCad, 630
 - YY_MRRXtrkCad_INHERIT, 1292
- ~NCE
 - nce::NCE, 647
- ~OvalButton
 - OvalWidgets::OvalButton, 710
- ~OvalLabel
 - OvalWidgets, 133
- ~OvalRoundCornerRectangle
 - OvalWidgets::OvalRoundCornerRectangle, 713
- ~OvalScale
 - OvalWidgets::OvalScale, 716
- ~OvalScrollBar
 - OvalWidgets::OvalScrollBar, 725
- ~Owner
 - FCFSupport::Owner, 732
- ~PDFNameArray
 - FCFSupport::PDFFileStructures::PDFNameArray, 779
- ~PDFPrinterDevice
 - FCFSupport::PDFPrinterDevice, 782
- ~PDFStream
 - FCFSupport::PDFFileStructures::PDFStream, 790
- ~Page
 - FCFSupport::PDFFileStructures::Page, 736
- ~PageLabelDictionary
 - FCFSupport::PDFFileStructures::PageLabelDictionary, 740
- ~PageLabelTree
 - FCFSupport::PDFFileStructures::PageLabelTree, 743
- ~PageTree
 - FCFSupport::PDFFileStructures::PageTree, 748
- ~ParseFile
 - Parsers::ParseFile, 752
- ~PathName
 - FCFSupport::PathName, 762
 - TTSupport::PathName, 771
- ~PauseCallback
 - FCFSupport::PauseCallback, 778
- ~PostScriptPrinterDevice
 - FCFSupport::PostScriptPrinterDevice, 796
- ~PostScriptStandardType1FontDictionary
 - FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary, 804
- ~PrinterDevice
 - FCFSupport::PrinterDevice, 808
- ~PushButton
 - CTCPanel::PushButton, 816
- ~RaildriverClient
 - raildriver::RaildriverClient, 819
- ~RaildriverIO
 - RaildriverIO, 830
- ~Rectangle
 - FCFSupport::PDFFileStructures::Rectangle, 847
- ~ResourceDictionary
 - FCFSupport::PDFFileStructures::ResourceDictionary, 852
- ~SIGPlate
 - CTCPanel::SIGPlate, 907
- ~SL2
 - azatrax::SL2, 924
- ~SR4
 - azatrax::SR4, 939
- ~SWPlate
 - CTCPanel::SWPlate, 1031
- ~Satellite
 - Satellite, 859
- ~SchLabel
 - CTCPanel::SchLabel, 862
- ~ScissorCrossover
 - CTCPanel::ScissorCrossover, 867
- ~ShowBannerCallback
 - FCFSupport::ShowBannerCallback, 898
- ~Signal
 - CTCPanel::Signal, 900
- ~SingleSlip
 - CTCPanel::SingleSlip, 919
- ~Station
 - FCFSupport::Station, 951
 - TTSupport::Station, 957
- ~Stop
 - TTSupport::Stop, 987
- ~StorageTrack
 - TTSupport::StorageTrack, 995
- ~StraightBlock
 - CTCPanel::StraightBlock, 1004
- ~StubYard
 - CTCPanel::StubYard, 1008
- ~Switch

- CTCPanel::Switch, [1012](#)
- ~SwitchList
 - FCFSupport::SwitchList, [1016](#)
- ~System
 - FCFSupport::System, [1047](#)
- ~TextPrinterDevice
 - FCFSupport::TextPrinterDevice, [1122](#)
- ~ThreeWaySW
 - CTCPanel::ThreeWaySW, [1129](#)
- ~ThroughYard
 - CTCPanel::ThroughYard, [1133](#)
- ~TimeTableSystem
 - TTSupport::TimeTableSystem, [1145](#)
- ~Toggle
 - CTCPanel::Toggle, [1169](#)
- ~TrackBody
 - Parsers::TrackBody, [1173](#)
- ~TrackBodyElt
 - Parsers::TrackBodyElt, [1177](#)
- ~TrackGraph
 - Parsers::TrackGraph, [1187](#)
- ~Train
 - FCFSupport::Train, [1213](#)
- ~TrainDisplayCallback
 - FCFSupport::TrainDisplayCallback, [1234](#)
- ~TurnoutBodyElt
 - Parsers::TurnoutBodyElt, [1247](#)
- ~Type1FontDictionary
 - FCFSupport::PDFFileStructures::Type1FontDictionary, [1259](#)
- ~TypedDictionary
 - FCFSupport::PDFFileStructures::TypedDictionary, [1262](#)
- ~WorkInProgressCallback
 - FCFSupport::WorkInProgressCallback, [1265](#)
- ~XPressNet
 - xpressnet::XPressNet, [1270](#)
- ~XpressNetEvent
 - xpressnet::XpressNetEvent, [1288](#)
- A
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- a
 - HTMLHelp::HTMLHelp, [487](#)
 - Parsers::TrackBodyElt, [1178](#)
 - Parsers::TrackGraph::EdgeValues, [426](#)
- A4
 - FCFSupport::PrinterDevice, [806](#)
- AbstractMessage
 - lcc, [118](#)
- AbstractMRMessage
 - lcc, [119](#)
- ACCESSORY_DECODER_INFORMATION
 - xpressnet, [153](#)
- AccessoryDecoderInformation
 - xpressnet::AccessoryDecoderInformation, [156](#)
- AccessoryDecoderInformationRequest
 - xpressnet::XPressNet, [1273](#)
- AccessoryDecoderOperation
 - nce::NCE, [649](#)
 - xpressnet::XPressNet, [1273](#)
- AccessoryNumber
 - nce, [122](#)
- AccessoryType
 - xpressnet::AccessoryDecoderInformation, [156](#)
- Activate
 - CTIAcela, [43](#)
- add
 - ScrollTabNotebook, [876](#)
- AddCab
 - TTSupport::TimeTableSystem, [1146](#)
- AddCar
 - FCFSupport::System, [1047](#)
- addchild
 - SimpleDOMEElement, [912](#)
- AddColorSpace
 - FCFSupport::PDFFileStructures::ResourceDictionary, [852](#)
- AddExternalGraphicsState
 - FCFSupport::PDFFileStructures::ResourceDictionary, [852](#)
- AddFont
 - FCFSupport::PDFFileStructures::ResourceDictionary, [853](#)
- AddIndirectObject
 - FCFSupport::PDFFileStructures::IndirectObjectDictionary, [521](#)
- AddIndirectObjectToTable
 - FCFSupport::PDFFileStructures::CrossReferenceTable, [357](#)
- AddLeadLocomotiveToMultiUnit
 - nce::NCE, [649](#)
- AddLocomotiveToMultiUnit
 - nce::NCE, [650](#)
 - xpressnet::XPressNet, [1274](#)
- AddNewNode
 - Parsers::TrackGraph, [1188](#)
- AddNote
 - TTSupport::Stop, [988](#)
 - TTSupport::TimeTableSystem, [1146](#)
- AddNoteToStop
 - TTSupport::Train, [1225](#)
- AddNoteToTrain
 - TTSupport::Train, [1225](#)
- AddOwner
 - FCFSupport::System, [1048](#)
- AddPage

- FCFSupport::PDFFileStructures::CatalogDictionary, 269
- FCFSupport::PDFFileStructures::PageTree, 748
- AddPageLabelDictionary
 - FCFSupport::PDFFileStructures::CatalogDictionary, 269
 - FCFSupport::PDFFileStructures::PageLabelTree, 743
- AddPageLabelTree
 - FCFSupport::PDFFileStructures::CatalogDictionary, 270
 - FCFSupport::PDFFileStructures::PageLabelTree, 744
- AddPageTree
 - FCFSupport::PDFFileStructures::CatalogDictionary, 270
 - FCFSupport::PDFFileStructures::PageTree, 748
- AddPattern
 - FCFSupport::PDFFileStructures::ResourceDictionary, 853
- AddProcSet
 - FCFSupport::PDFFileStructures::ResourceDictionary, 853
- AddProperties
 - FCFSupport::PDFFileStructures::ResourceDictionary, 854
- AddRearLocomotiveToMultiUnit
 - nce::NCE, 650
- Address
 - xpressnet::AccessoryDecoderInformation, 158
 - xpressnet::DoubleHeaderInformation, 414
 - xpressnet::LI101XPressNetAddress, 567
 - xpressnet::LocomotiveAddress, 573
 - xpressnet::LocomotiveInformation, 581
- address
 - lcc::ConfigMemory, 304
- Address2
 - xpressnet::DoubleHeaderInformation, 414
 - xpressnet::LocomotiveInformation, 581
- AddressCode
 - cmri::CMri, 276
- AddressInquiryNextMU
 - xpressnet::XPressNet, 1274
- AddressInquiryNextMUMember
 - xpressnet::XPressNet, 1274
- AddressInquiryNextStack
 - xpressnet::XPressNet, 1275
- AddressInquiryPreviousMU
 - xpressnet::XPressNet, 1275
- AddressInquiryPreviousMUMember
 - xpressnet::XPressNet, 1275
- AddressInquiryPreviousStack
 - xpressnet::XPressNet, 1275
- ADDRESSP_MASK
 - lcc::MTIDetail, 636
- ADDRESSP_SHIFT
 - lcc::MTIDetail, 637
- AddressType
 - xpressnet::LocomotiveAddress, 573
- adresstype
 - CTIAcela, 41
- AddShading
 - FCFSupport::PDFFileStructures::ResourceDictionary, 854
- AddStation
 - TTSupport::TimeTableSystem, 1146
- AddStorageTrack
 - TTSupport::Station, 957
 - TTSupport::TimeTableSystem, 1147
- AddSwitchListElement
 - FCFSupport::SwitchList, 1016, 1017
- AddTrain
 - TTSupport::TimeTableSystem, 1147
- AddTrainLongVersion
 - TTSupport::TimeTableSystem, 1148
- AddXObject
 - FCFSupport::PDFFileStructures::ResourceDictionary, 854
- ADJUSTABLE
 - YY_MRRXtrkCad_INHERIT, 1292
- aliasMap
 - lcc::CANGridConnect, 207
- ALL
 - FCFSupport::System, 1046
- All
 - FCFSupport::System, 1046
- AllConnectedDevices
 - azatrax::Azatrax, 168
- allowExternalChanges
 - azatrax::MRD::status2_union, 975
- AllowingExternalChanges
 - azatrax::MRD, 622
- AnalogClock
 - Instruments::AnalogClock, 161
- ang0
 - Parsers::BezierBodyElt, 184
 - Parsers::CornuBodyElt, 345
 - Parsers::SegVector, 887
 - Parsers::TurnoutBodyElt, 1251
- ang1
 - Parsers::BezierBodyElt, 184
 - Parsers::CornuBodyElt, 345
 - Parsers::SegVector, 887
 - Parsers::TurnoutBodyElt, 1251
- Angle
 - Parsers::LayoutFile, 551
 - Parsers::TrackGraph, 1188
- angle

- BezierBody.h, [1323](#)
- CornuBody.h, [1325](#)
- Parsers::SegVector, [887](#)
- Parsers::TrackGraph::NodeValues, [673](#)
- TurnoutBody.h, [1328](#)
- AppendIndustry
 - FCFSupport::Station, [951](#)
- AppendStation
 - FCFSupport::Division, [408](#)
- AppendStream
 - FCFSupport::PDFFileStructures::Page, [736](#)
- AppendTrackBodyElt
 - Parsers::TrackBody, [1174](#)
- Apply
 - Parsers::TrackGraph::Transform2D, [1238](#)
- Area
 - FCFSupport::Division, [409](#)
- area
 - FCFSupport::Division, [410](#)
- Arrival
 - TTSupport::StationTimes, [965](#)
- arrival
 - TTSupport::StationTimes, [966](#)
- asctime_r
 - PDFPrinterSupport.h, [1318](#)
- ASPECT
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- aspect
 - CTCPanel::Signal, [903](#)
- AspectBits
 - nce, [123](#)
- aspectlist
 - Parsers::TrackGraph::NodeValues, [674](#)
- AssignLen
 - FCFSupport::Industry, [527](#)
- assignLen
 - FCFSupport::Industry, [532](#)
- AssignLoco
 - nce::NCE, [650](#)
- Assignments
 - FCFSupport::Car, [242](#)
- assignments
 - FCFSupport::Car, [254](#)
- attribute
 - SimpleDOMEElement, [912](#)
- author
 - FCFSupport::PDFFileStructures::InformationDirectory, [538](#)
- AUTOBRAKE
 - raildriver, [137](#)
 - RaildriverIO, [827](#)
- AutoBrake
 - RaildriverIO, [841](#)
- AUTOBRAKE_M
 - RaildriverIO, [828](#)
- Automatic
 - xpressnet, [152](#)
- Available
 - xpressnet::DoubleHeaderInformation, [415](#)
 - xpressnet::LocomotiveInformation, [581](#)
- available
 - lcc::ConfigOptions, [308](#)
- Azatrax, [23](#)
 - azatrax::Azatrax, [168](#)
 - azatrax::MRD, [627](#)
 - azatrax::SL2, [929](#)
 - azatrax::SR4, [945](#)
- azatrax, [67](#)
- Azatrax.h
 - ErrorCode, [1299](#)
 - stopwatchFract, [1300](#)
 - stopwatchSeconds, [1300](#)
- azatrax::Azatrax, [162](#)
 - _GrowSize, [168](#)
 - _InitSize, [168](#)
 - ~Azatrax, [168](#)
 - AllConnectedDevices, [168](#)
 - Azatrax, [168](#)
 - cmd_ClearExternallyChanged, [167](#)
 - cmd_DisableExternal, [167](#)
 - cmd_EnableExternal, [167](#)
 - cmd_GetStateData, [167](#)
 - cmd_Identify_1, [167](#)
 - cmd_Identify_1_2, [167](#)
 - cmd_Identify_2, [167](#)
 - cmd_OutputRelayBlink, [167](#)
 - cmd_OutputRelayInputControl, [167](#)
 - cmd_OutputRelayOff, [167](#)
 - cmd_OutputRelayOn, [167](#)
 - cmd_OutputRelayPulse, [167](#)
 - cmd_Q1negQ2pos, [167](#)
 - cmd_Q1posQ2neg, [167](#)
 - cmd_Q1Q2open, [167](#)
 - cmd_Q3negQ4pos, [167](#)
 - cmd_Q3posQ4neg, [167](#)
 - cmd_Q3Q4open, [167](#)
 - cmd_ResetStopwatch, [167](#)
 - cmd_RestoreLEDFunction, [167](#)
 - cmd_SetChan1, [167](#)
 - cmd_SetChan2, [167](#)
 - commands, [165](#)
 - DeviceConnectionList, [167](#)
 - deviceOpenCount, [174](#)
 - GetProductId, [169](#)
 - GetStateData, [169](#)
 - handle, [174](#)
 - idAzatraxVendor, [165](#)
 - Identify_1, [169](#)

- idMRDProduct, 165
- idSL2Product, 165
- idSR4Product, 165
- IsThisTheAzatraxWeAreLookingFor, 169
- MRD, 174
- MyProduct, 170
- MyProductId, 170
- myProductId, 174
- mySerialNumber, 175
- NumberOfOpenDevices, 170
- OpenDevice, 171
- PacketCount, 171
- ProductIdCode, 171
- RestoreLEDFunction, 172
- send2Bytes, 172
- send3Bytes, 172
- sendByte, 173
- SerialNumber, 173
- SL2, 174
- SR4, 174
- stateDataPacket, 175
- azatrax::Azatrax::StateDataPacket, 945
 - commandEcho, 946
 - endOfData, 946
 - operatingMode, 947
 - packetCount, 947
 - reserved, 947
 - status1, 947
 - status2, 947
 - status3, 948
 - status4, 948
 - stopwatchHours, 948
 - stopwatchMinutes, 948
- azatrax::MRD, 619
 - ~MRD, 622
 - AllowingExternalChanges, 622
 - Azatrax, 627
 - ClearExternallyChanged, 622
 - DisableExternal, 623
 - EnableExternal, 623
 - ExternallyChanged, 623
 - HasRelays, 623
 - Identify_1_2, 624
 - Identify_2, 624
 - Latch_1, 624
 - Latch_2, 624
 - MRD, 622
 - NonTurnoutDirectionSensing, 621
 - NonTurnoutSeparate, 621
 - OperatingMode, 625
 - OperatingMode_Type, 621
 - ResetStatus, 625
 - ResetStopwatch, 625
 - Sense_1, 625
 - Sense_2, 626
 - SetChan1, 626
 - SetChan2, 626
 - Stopwatch, 626
 - StopwatchTicking, 627
 - TurnoutMotor, 621
 - TurnoutSolenoid, 621
- azatrax::MRD::status1_union, 967
 - latch_1, 968
 - latch_2, 968
 - modtype, 968
 - reserved, 969
 - sense_1, 969
 - sense_2, 969
 - theBits, 969
 - theByte, 969
- azatrax::MRD::status2_union, 974
 - allowExternalChanges, 975
 - externallyChanged, 975
 - reserved, 975
 - resetStatus, 975
 - stopwatchTicking, 975
 - theBits, 976
 - theByte, 976
- azatrax::SL2, 921
 - ~SL2, 924
 - Azatrax, 929
 - Input_1_Enabled, 924
 - Input_2_Enabled, 924
 - Input_3_Enabled, 924
 - Input_4_Enabled, 924
 - Motor_1_Direction, 925
 - Motor_1_State, 925
 - Motor_2_Direction, 925
 - Motor_2_State, 925
 - OutputRelayInputControl, 926
 - Sense_1, 926
 - Sense_2, 926
 - Sense_3, 927
 - Sense_4, 927
 - SetQ1negQ2pos, 927
 - SetQ1posQ2neg, 927
 - SetQ1Q2open, 928
 - SetQ3negQ4pos, 928
 - SetQ3posQ4neg, 928
 - SetQ3Q4open, 928
 - SL2, 923
- azatrax::SL2::status1_union, 970
 - motor_1_direction, 970
 - motor_1_state, 971
 - motor_2_direction, 971
 - motor_2_state, 971
 - reserved, 971
 - theBits, 971

- theByte, [972](#)
- azatrax::SL2::status2_union, [976](#)
 - reserved, [977](#)
 - sense_1, [977](#)
 - sense_2, [977](#)
 - sense_3, [977](#)
 - sense_4, [977](#)
 - theBits, [978](#)
 - theByte, [978](#)
- azatrax::SL2::status3_union, [980](#)
 - input_1_enabled, [981](#)
 - input_2_enabled, [981](#)
 - input_3_enabled, [981](#)
 - input_4_enabled, [981](#)
 - reserved, [981](#)
 - theBits, [982](#)
 - theByte, [982](#)
- azatrax::SR4, [936](#)
 - ~SR4, [939](#)
 - Azatrax, [945](#)
 - BlinkRelays, [939](#)
 - Input_1_Enabled, [939](#)
 - Input_2_Enabled, [940](#)
 - Input_3_Enabled, [940](#)
 - Input_4_Enabled, [940](#)
 - OutputRelayInputControl, [940](#)
 - PulseRelays, [941](#)
 - Q1_State, [941](#)
 - Q2_State, [941](#)
 - Q3_State, [942](#)
 - Q4_State, [942](#)
 - RelaysOff, [942](#)
 - RelaysOn, [943](#)
 - Sense_1_Latch, [943](#)
 - Sense_1_Live, [943](#)
 - Sense_2_Latch, [943](#)
 - Sense_2_Live, [944](#)
 - Sense_3_Latch, [944](#)
 - Sense_3_Live, [944](#)
 - Sense_4_Latch, [944](#)
 - Sense_4_Live, [945](#)
 - SR4, [938](#)
- azatrax::SR4::status1_union, [972](#)
 - Q1_state, [973](#)
 - Q2_state, [973](#)
 - Q3_state, [973](#)
 - Q4_state, [973](#)
 - reserved, [973](#)
 - theBits, [974](#)
 - theByte, [974](#)
- azatrax::SR4::status2_union, [978](#)
 - reserved, [979](#)
 - sense_1, [979](#)
 - sense_2, [979](#)

- sense_3, [979](#)
- sense_4, [979](#)
- theBits, [980](#)
- theByte, [980](#)
- azatrax::SR4::status3_union, [982](#)
 - input_1_enabled, [983](#)
 - input_2_enabled, [983](#)
 - input_3_enabled, [983](#)
 - input_4_enabled, [983](#)
 - reserved, [983](#)
 - theBits, [984](#)
 - theByte, [984](#)

B

- Parsers::MRRXtrkCad, [630](#)
- YY_MRRXtrkCad_INHERIT, [1291](#)
- back
 - HTMLHelp::HTMLHelp, [487](#)
- backcurrenttopic
 - HTMLHelp::HTMLHelp, [488](#)
- backpointers
 - Parsers::TrackGraph, [1206](#)
- BALLOFF
 - raildriver, [138](#)
 - RaildriverIO, [827](#)
- BailOff
 - RaildriverIO, [841](#)
- BALLOFF_M
 - RaildriverIO, [828](#)
- bar
 - CabWidgets::LocomotiveSpeed, [591](#)
- base
 - ScrollTabNotebook, [883](#)
- baseFont
 - FCFSupport::PDFFileStructures::Type1FontDictionary, [1259](#)
- basepin
 - linuxgpio::GpioInputActiveHigh, [451](#)
 - linuxgpio::GpioInputActiveLow, [454](#)
 - linuxgpio::GpioOutputSafeHigh, [455](#)
 - linuxgpio::GpioOutputSafeHighInvert, [458](#)
 - linuxgpio::GpioOutputSafeLow, [460](#)
 - linuxgpio::GpioOutputSafeLowInverted, [463](#)
- basicFormatCheck
 - lcc::GridConnectReply, [473](#)
- BEZIER
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- BezierBody
 - Parsers::BezierBody, [177](#)
 - Parsers::BezierBodyElt, [184](#)
- BezierBody.h
 - angle, [1323](#)
 - len0, [1324](#)
 - len1, [1324](#)

- BezierBodyElt
 - Parsers::BezierBody, [178](#)
 - Parsers::BezierBodyElt, [181](#)
- BezierBodyEltType
 - Parsers::BezierBodyElt, [181](#)
- BezierCurvedSegment
 - Parsers::BezierBodyElt, [181](#)
- BezierEnd
 - Parsers::BezierBodyElt, [181](#)
- BezierEnds
 - Parsers::BezierBody, [177](#)
- BezierSegmentCount
 - Parsers::BezierBody, [177](#)
- BezierStraightSegment
 - Parsers::BezierBodyElt, [181](#)
- bind
 - CTCPanel::CTCPanel, [370](#)
 - FileEntry, [88](#)
 - LabelComboBox, [99](#)
 - LabelSpinBox, [109](#)
- BISON_YYLTYPE_ISDECLARED
 - MRRXtrkCad.tab.h, [1302](#)
- bitstype
 - lcc::OpenLCBProtocols, [709](#)
- Blink
 - CTIAcela, [44](#)
- BlinkRelays
 - azatrax::SR4, [939](#)
- BLOCK
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Block
 - Parsers::TrackGraph, [1187](#)
- Bold
 - FCFSupport::PrinterDevice, [807](#)
- BoxMove
 - FCFSupport::Train, [1211](#)
- BufferOverflow
 - xpressnet, [151](#)
- bufferize
 - Parsers::ParseFile, [753](#)
- buildPortandnidDialog
 - lcc::CANGridConnectOverUSBSerial, [222](#)
- buildPortnidandhostDialog
 - lcc::CANGridConnectOverTcp, [217](#)
 - lcc::OpenLCBOverTcp, [701](#)
- buildSocketnamenidDialog
 - lcc::CANGridConnectOverCANSocket, [212](#)
- buttons
 - lcc::ConfigurationEditor, [334](#)
 - mainwindow, [617](#)
- buttons_add
 - mainwindow, [605](#)
- buttons_delete
 - mainwindow, [605](#)
- buttons_hide
 - mainwindow, [606](#)
- buttons_insert
 - mainwindow, [606](#)
- buttons_itemconfigure
 - mainwindow, [606](#)
- buttons_show
 - mainwindow, [608](#)
- byte
 - lcc, [115](#)
- ByteList
 - cmri, [69](#)
- bytelist
 - lcc, [115](#)
- bytelist72
 - lcc, [115](#)
- BZRLIN
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- C
 - Parsers::MRRXtrkCad, [630](#)
 - Parsers::SegVector, [887](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- C++/Azatrax/mrd.h, [1309](#)
- C++/Azatrax/sl2.h, [1310](#)
- C++/Azatrax/sr4.h, [1310](#)
- C++/FCFSupport/CallBack.h, [1311](#)
- C++/FCFSupport/Car.h, [1311](#)
- C++/FCFSupport/CarType.h, [1311](#)
- C++/FCFSupport/Division.h, [1312](#)
- C++/FCFSupport/FCFSupportGroup.h, [1313](#)
- C++/FCFSupport/Industry.h, [1313](#)
- C++/FCFSupport/LQ24Printer.h, [1313](#)
- C++/FCFSupport/Owner.h, [1314](#)
- C++/FCFSupport/PathName.h, [1314](#)
- C++/FCFSupport/PDFPrinter.h, [1315](#)
- C++/FCFSupport/PDFPrinterSupport.h, [1316](#)
- C++/FCFSupport/PostScriptPrinter.h, [1318](#)
- C++/FCFSupport/Printer.h, [1319](#)
- C++/FCFSupport/Station.h, [1319](#)
- C++/FCFSupport/SwitchList.h, [1320](#)
- C++/FCFSupport/TextPrinter.h, [1321](#)
- C++/FCFSupport/Train.h, [1322](#)
- C++/ParserClasses/BezierBody.h, [1323](#)
- C++/ParserClasses/CornuBody.h, [1324](#)
- C++/ParserClasses/IntegerList.h, [1325](#)
- C++/ParserClasses/ParseFile.h, [1325](#)
- C++/ParserClasses/SocketPair.h, [1326](#)
- C++/ParserClasses/TrackBody.h, [1326](#)
- C++/ParserClasses/TrackGraph.h, [1327](#)
- C++/ParserClasses/TurnoutBody.h, [1328](#)
- C++/TclSocketCAN/TclSocketCAN.i, [1329](#)
- C++/TTSupport/Cab.h, [1329](#)

- C++/TTSupport/PathName.h, [1315](#)
- C++/TTSupport/Station.h, [1320](#)
- C++/TTSupport/TimeTableSystem.h, [1330](#)
- C++/TTSupport/TimeTableSystemTcl.h, [1332](#)
- C++/TTSupport/Train.h, [1322](#)
- C++/wiringPi/tclwiringpi.i, [1332](#)
- c_idMap
 - Parsers::TrackGraph, [1206](#)
- c_nodes
 - Parsers::TrackGraph, [1206](#)
- c_roots
 - Parsers::TrackGraph, [1206](#)
- Cab, [34](#)
 - CabNameMap, [35](#)
 - TTSupport::Cab, [187](#)
- cab
 - TTSupport::Stop, [992](#)
- CabNameMap
 - Cab, [35](#)
- CabNumber
 - nce, [123](#)
- cabs
 - TTSupport::TimeTableSystem, [1163](#)
- CabSignalLamp
 - Instruments::CabSignalLamp, [191](#)
- CabWidgets, [68](#)
- CabWidgets::LocomotiveDirection, [574](#)
 - _direction, [577](#)
 - _left, [577](#)
 - _right, [577](#)
 - _setdirection, [576](#)
 - currentDirection, [577](#)
 - direction, [576](#)
 - direction_sense, [576](#)
 - forward, [578](#)
 - invoke, [577](#)
 - LocomotiveDirection, [575](#)
 - reverse, [578](#)
- CabWidgets::LocomotiveSpeed, [586](#)
 - _down, [590](#)
 - _down1, [588](#)
 - _down10, [588](#), [590](#)
 - _setspeed, [588](#)
 - _speed, [590](#)
 - _stop, [589](#), [590](#)
 - _up, [591](#)
 - _up1, [589](#)
 - _up10, [589](#), [591](#)
 - bar, [591](#)
 - down1, [591](#)
 - down10, [591](#)
 - invoke, [589](#)
 - leftbuttons, [591](#)
 - LocomotiveSpeed, [588](#)
 - rightbuttons, [592](#)
 - setspeed, [589](#)
 - speed, [590](#)
 - stop, [592](#)
 - up1, [592](#)
 - up10, [592](#)
- CabWidgets::SelectLocomotive, [889](#)
 - _addnewloco, [891](#)
 - _trimList, [891](#)
 - currentLocomotive, [892](#)
 - invoke, [892](#)
 - lf, [892](#)
 - locoList, [892](#)
 - SelectLocomotive, [891](#)
- CanAlias
 - lcc::CanAlias, [195](#)
- CANGridConnect
 - lcc::CANGridConnect, [199](#)
- CANGridConnectOverCANSocket
 - lcc::CANGridConnectOverCANSocket, [211](#)
- CANGridConnectOverTcp
 - lcc::CANGridConnectOverTcp, [216](#)
- CANGridConnectOverUSBSerial
 - lcc::CANGridConnectOverUSBSerial, [221](#)
- CANHeader
 - lcc::CANHeader, [225](#)
- canheader
 - lcc::CANGridConnect, [207](#)
 - lcc::MTIHeader, [642](#)
- CanMessage
 - lcc::CanMessage, [230](#)
- CantDelete
 - xpressnet, [151](#)
- CanTransport
 - lcc::CanTransport, [235](#)
- canvas
 - CTCPanel::CodeButton, [288](#)
 - CTCPanel::Crossing, [351](#)
 - CTCPanel::Crossover, [355](#)
 - CTCPanel::CTCLabel, [363](#)
 - CTCPanel::CurvedBlock, [395](#)
 - CTCPanel::DoubleSlip, [424](#)
 - CTCPanel::EndBumper, [430](#)
 - CTCPanel::HiddenBlock, [481](#)
 - CTCPanel::Lamp, [548](#)
 - CTCPanel::PushButton, [818](#)
 - CTCPanel::SchLabel, [864](#)
 - CTCPanel::ScissorCrossover, [868](#)
 - CTCPanel::Signal, [903](#)
 - CTCPanel::SIGPlate, [909](#)
 - CTCPanel::SingleSlip, [921](#)
 - CTCPanel::StraightBlock, [1005](#)
 - CTCPanel::StubYard, [1009](#)
 - CTCPanel::Switch, [1014](#)

- CTCPanel::SWPlate, [1033](#)
- CTCPanel::ThreeWaySW, [1130](#)
- CTCPanel::ThroughYard, [1134](#)
- CTCPanel::Toggle, [1172](#)
- Instruments::CabSignalLamp, [193](#)
- OvalWidgets, [133](#)
- OvalWidgets::OvalButton, [711](#)
- OvalWidgets::OvalRoundCornerRectangle, [713](#)
- OvalWidgets::OvalScale, [718](#)
- OvalWidgets::OvalSlider, [723](#)
- OvalWidgets::OvalSrollBar, [729](#)
- CAR
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Car
 - FCFSupport::Car, [240](#), [241](#)
- CarAssignment
 - FCFSupport::System, [1048](#)
- carDest
 - FCFSupport::System, [1108](#)
- CardType
 - cmri, [70](#)
- CardType_Byte
 - cmri::CMri, [277](#)
- CarGroup
 - FCFSupport::CarGroup, [260](#)
- CarGroupConsts
 - FCFSupport::CarGroup, [259](#)
- carGroups
 - FCFSupport::System, [1108](#)
- CarLocationType
 - FCFSupport::System, [1046](#)
- CarMovements
 - FCFSupport::System, [1048](#)
- carMovements
 - FCFSupport::System, [1109](#)
- CarOwner
 - FCFSupport::Car, [242](#)
- cars
 - FCFSupport::Industry, [532](#)
 - FCFSupport::System, [1109](#)
- CarsAtDest
 - FCFSupport::System, [1049](#)
- carsAtDest
 - FCFSupport::System, [1109](#)
- CarsAtDest_CarsInTransit
 - FCFSupport::System, [1049](#)
- carsAtDest_carsInTransit
 - FCFSupport::System, [1109](#)
- CarsAtWorkBench
 - FCFSupport::System, [1049](#)
- carsAtWorkBench
 - FCFSupport::System, [1109](#)
- CarsFile
 - FCFSupport::System, [1049](#)
- carsFile
 - FCFSupport::System, [1110](#)
- CarsInTransit
 - FCFSupport::System, [1049](#)
- carsInTransit
 - FCFSupport::System, [1110](#)
- CarsLen
 - FCFSupport::Industry, [527](#)
- carsLen
 - FCFSupport::Industry, [532](#)
- CarsMoved
 - FCFSupport::System, [1050](#)
- carsMoved
 - FCFSupport::System, [1110](#)
- CarsMovedMore
 - FCFSupport::System, [1050](#)
- carsMovedMore
 - FCFSupport::System, [1110](#)
- CarsMovedOnce
 - FCFSupport::System, [1050](#)
- carsMovedOnce
 - FCFSupport::System, [1110](#)
- CarsMovedThree
 - FCFSupport::System, [1050](#)
- carsMovedThree
 - FCFSupport::System, [1111](#)
- CarsMovedTwice
 - FCFSupport::System, [1050](#)
- carsMovedTwice
 - FCFSupport::System, [1111](#)
- CarsNotMoved
 - FCFSupport::System, [1051](#)
- carsNotMoved
 - FCFSupport::System, [1111](#)
- CarsNum
 - FCFSupport::Industry, [527](#)
- carsNum
 - FCFSupport::Industry, [532](#)
- CarType
 - FCFSupport::CarType, [264](#), [265](#)
- CarTypeConsts
 - FCFSupport::CarType, [264](#)
- CarTypeMap
 - FCFSupport, [78](#)
- CarTypeOrderVector
 - FCFSupport, [78](#)
- CarTypeReport
 - FCFSupport::System, [1046](#)
- CarTypes
 - FCFSupport::Train, [1213](#)
- carTypes
 - FCFSupport::System, [1111](#)
 - FCFSupport::Train, [1219](#)

- CarTypesFile
 - FCFSupport::System, [1051](#)
- carTypesFile
 - FCFSupport::System, [1111](#)
- CarTypesOrder
 - FCFSupport::System, [1051](#)
- carTypesOrder
 - FCFSupport::System, [1112](#)
- CarTypesOrderIndex
 - FCFSupport::System, [1051](#)
- CarVector
 - FCFSupport, [78](#)
- CatalogDictionary
 - FCFSupport::PDFFileStructures::CatalogDictionary, [268](#)
- cdi
 - lcc::ConfigurationEditor, [335](#)
- CENTIMETERSperMM
- MRRXtrkCad.tab.h, [1307](#)
- cget
 - FileEntry, [88](#)
 - LabelComboBox, [99](#)
 - LabelSelectColor, [105](#)
 - LabelSpinBox, [110](#)
- ChangeMomentumLevel
 - nce::NCE, [651](#)
- ChCodes
 - FCFSupport::LQ24PrinterDevice, [596](#)
- CheckColor
 - splash, [933](#)
- CheckForResponse
 - xpressnet::XPressNet, [1276](#)
- CheckImage
 - splash, [933](#)
- checkInitCP
 - CTCPanel::CTCPanel, [370](#)
- children
 - SimpleDOMEElement, [913](#)
- circleLayoutP
 - Parsers::TrackGraph, [1206](#)
- ClassNumber
 - TTSupport::Train, [1226](#)
- classnumber
 - TTSupport::Train, [1231](#)
- Cleanup
 - Parsers::TrackGraph::NodeValues, [673](#)
- CleanupBezierBody
 - Parsers::BezierBody, [177](#)
- CleanupCornuBody
 - Parsers::CornuBody, [338](#)
- CleanupElement
 - Parsers::BezierBody, [178](#)
 - Parsers::CornuBody, [338](#)
 - Parsers::TurnoutBody, [1242](#)
- CleanupIntegerList
 - Parsers::IntegerList, [541](#)
- CleanupTurnoutBody
 - Parsers::TurnoutBody, [1242](#)
- clear
 - raildriver::RaildriverClient, [820](#)
- ClearAssignments
 - FCFSupport::Car, [242](#)
- ClearExternallyChanged
 - azatrax::MRD, [622](#)
- ClearMovementsThisSession
 - FCFSupport::Car, [242](#)
- ClearTrips
 - FCFSupport::Car, [243](#)
- closeport
 - CmriSupport::CmriNode, [282](#)
- ClosePrinter
 - FCFSupport::LQ24PrinterDevice, [597](#)
 - FCFSupport::PDFPrinterDevice, [782](#)
 - FCFSupport::PostScriptPrinterDevice, [797](#)
 - FCFSupport::PrinterDevice, [808](#)
 - FCFSupport::TextPrinterDevice, [1123](#)
- CloseTrainDisplay
 - FCFSupport::TrainDisplayCallback, [1234](#)
- Clr
 - linuxgpio::GpioOutputSafeHighInvert, [457](#)
 - linuxgpio::GpioOutputSafeLowInverted, [462](#)
 - linuxgpio::LinuxGpio, [570](#)
- cmd_ClearExternallyChanged
 - azatrax::Azatrax, [167](#)
- cmd_DisableExternal
 - azatrax::Azatrax, [167](#)
- cmd_EnableExternal
 - azatrax::Azatrax, [167](#)
- cmd_GetStateData
 - azatrax::Azatrax, [167](#)
- cmd_Identify_1
 - azatrax::Azatrax, [167](#)
- cmd_Identify_1_2
 - azatrax::Azatrax, [167](#)
- cmd_Identify_2
 - azatrax::Azatrax, [167](#)
- cmd_OutputRelayBlink
 - azatrax::Azatrax, [167](#)
- cmd_OutputRelayInputControl
 - azatrax::Azatrax, [167](#)
- cmd_OutputRelayOff
 - azatrax::Azatrax, [167](#)
- cmd_OutputRelayOn
 - azatrax::Azatrax, [167](#)
- cmd_OutputRelayPulse
 - azatrax::Azatrax, [167](#)
- cmd_Q1negQ2pos
 - azatrax::Azatrax, [167](#)

- cmd_Q1posQ2neg
 - azatrax::Azatrax, [167](#)
- cmd_Q1Q2open
 - azatrax::Azatrax, [167](#)
- cmd_Q3negQ4pos
 - azatrax::Azatrax, [167](#)
- cmd_Q3posQ4neg
 - azatrax::Azatrax, [167](#)
- cmd_Q3Q4open
 - azatrax::Azatrax, [167](#)
- cmd_ResetStopwatch
 - azatrax::Azatrax, [167](#)
- cmd_RestoreLEDFunction
 - azatrax::Azatrax, [167](#)
- cmd_SetChan1
 - azatrax::Azatrax, [167](#)
- cmd_SetChan2
 - azatrax::Azatrax, [167](#)
- CMri
 - cmri::CMri, [273](#)
- Cmri, [37](#)
- cmri, [68](#)
 - ByteList, [69](#)
 - CardType, [70](#)
 - SMINI, [70](#)
 - SUSIC, [70](#)
 - uatype, [70](#)
 - ubyte, [70](#)
 - USIC, [70](#)
- Cmri Support code, [63](#)
- cmri::CMri, [271](#)
 - _readbyte, [274](#)
 - _readevent, [274](#)
 - _timeout, [276](#)
 - _transmit, [274](#)
 - ~CMri, [273](#)
 - AddressCode, [276](#)
 - CardType_Byte, [277](#)
 - CMri, [273](#)
 - DLE, [277](#)
 - ETX, [277](#)
 - Init, [277](#)
 - InitBoard, [275](#)
 - Inputs, [275](#)
 - Outputs, [276](#)
 - Poll, [277](#)
 - Read, [277](#)
 - STX, [278](#)
 - Transmit, [278](#)
 - ttyfd, [278](#)
- CmriNode
 - CmriSupport::CmriNode, [280](#)
- CmriSupport, [71](#)
- CmriSupport::CmriNode, [278](#)
 - _TypeCodes, [284](#)
 - _ValidateAddress, [280](#)
 - _ValidateByte, [281](#)
 - _ValidateListOfBytes, [281](#)
 - _ValidateSixElementListOfBytes, [281](#)
 - _ValidateType, [282](#)
 - _ValidateWord, [282](#)
 - closeport, [282](#)
 - CmriNode, [280](#)
 - inputs, [282](#)
 - openport, [283](#)
 - outputbuffer, [285](#)
 - outputs, [283](#)
 - portopenp, [283](#)
 - setbitfield, [283](#)
 - setport, [284](#)
 - validate, [284](#)
- CodeButton
 - CTCPanel::CodeButton, [286](#)
- Color
 - TTSupport::Cab, [188](#)
- color
 - HTMLHelp::HTMLHelp, [488](#)
 - TTSupport::Cab, [189](#)
- ColorFillOption
 - OvalWidgets, [131](#)
- ColorOptionMethods
 - OvalWidgets, [131](#)
- ColorOutlineOption
 - OvalWidgets, [131](#)
- ColorPopup
 - LabelSelectColor, [105](#)
- colorSpace
 - FCFSupport::PDFFileStructures::ResourceDictionary, [855](#)
- command
 - HTMLHelp::HTMLHelp, [507](#)
- COMMAND_STATION_BUSY
 - xpressnet, [153](#)
- COMMAND_STATION_STATUS
 - xpressnet, [153](#)
- commandEcho
 - azatrax::Azatrax::StateDataPacket, [946](#)
- commands
 - azatrax::Azatrax, [165](#)
- CommandStationResponse
 - xpressnet::CommandStationResponse, [289](#)
- CommandStationSoftwareVersion
 - xpressnet::XPressNet, [1276](#)
- CommandStationStatus
 - xpressnet::CommandStationStatus, [291](#)
- CommandStationStatusRequest
 - xpressnet::XPressNet, [1276](#)
- CommandStationTypeCode

- xpressnet::SoftwareVersion, [930](#)
- Comment
 - FCFSupport::CarType, [265](#)
 - FCFSupport::Owner, [732](#)
 - FCFSupport::Station, [952](#)
- comment
 - FCFSupport::CarType, [267](#)
 - FCFSupport::Owner, [733](#)
 - FCFSupport::Station, [953](#)
- CommonOptions
 - Instruments, [96](#)
- CommonValidateMethods
 - OvalWidgets, [132](#)
- complete
 - lcc, [118](#)
- Completed
 - xpressnet::AccessoryDecoderInformation, [158](#)
- compressed_edge_exists
 - Parsers::TrackGraph, [1188](#)
- CompressedEdgeCount
 - Parsers::LayoutFile, [552](#)
 - Parsers::TrackGraph, [1188](#)
- CompressedEdgeLength
 - Parsers::LayoutFile, [552](#)
 - Parsers::TrackGraph, [1188](#)
- CompressedEdgeNode
 - Parsers::LayoutFile, [552](#)
 - Parsers::TrackGraph, [1189](#)
- CompressedEdgePair
 - Parsers::TrackGraph, [1185](#)
- CompressedEdgePairVector
 - Parsers::TrackGraph, [1185](#)
- CompressedEdgeValues
 - Parsers::TrackGraph::CompressedEdgeValues, [294](#)
- CompressedGraph
 - Parsers::TrackGraph, [1185](#)
- CompressedGraphCircleLayout
 - Parsers::LayoutFile, [552](#)
 - Parsers::TrackGraph, [1189](#)
- CompressedGraphKamadaKawaiSpring
 - Parsers::LayoutFile, [553](#)
 - Parsers::TrackGraph, [1189](#)
- CompressedGraphKruskalMinimumSpanningTree
 - Parsers::LayoutFile, [553](#)
 - Parsers::TrackGraph, [1189](#)
- CompressedGraphPrimMinimumSpanningTree
 - Parsers::LayoutFile, [553](#)
 - Parsers::TrackGraph, [1190](#)
- CompressedIdNodeMap
 - Parsers::TrackGraph, [1185](#)
- CompressedNode
 - Parsers::TrackGraph, [1186](#)
- CompressedNodePositionX
 - Parsers::LayoutFile, [553](#)
- Parsers::TrackGraph, [1190](#)
- CompressedNodePositionY
 - Parsers::LayoutFile, [554](#)
 - Parsers::TrackGraph, [1190](#)
- CompressedNodeSegments
 - Parsers::LayoutFile, [554](#)
 - Parsers::TrackGraph, [1190](#)
- CompressedNodeValues
 - Parsers::TrackGraph::CompressedNodeValues, [296](#)
- CompressedNodeVector
 - Parsers::TrackGraph, [1186](#)
- compressedP
 - Parsers::TrackGraph, [1207](#)
- CompressGraph
 - Parsers::LayoutFile, [554](#)
 - Parsers::TrackGraph, [1191](#)
- compute_size
 - ScrollTabNotebook, [877](#)
- computeHeads
 - Parsers::TrackGraph, [1191](#)
- ComputeRouteLength
 - Parsers::TrackGraph, [1191](#)
- ComputeTimes
 - TTSupport::TimeTableSystem, [1149](#)
- ConcatCornuBody
 - Parsers::CornuBody, [338](#)
- ConfigMemory
 - lcc::ConfigMemory, [299](#)
- ConfigOptions
 - lcc::ConfigOptions, [307](#)
- ConfigurationEditor
 - lcc::ConfigurationEditor, [313](#)
- ConfigurationType
 - ReadConfiguration, [139](#)
- configure
 - FileEntry, [88](#)
 - LabelComboBox, [100](#)
 - LabelSelectColor, [107](#)
 - LabelSpinBox, [110](#)
- ConfigureSensor
 - CTIAcela, [44](#)
- ConnectedTrackEnd
 - Parsers::TrackBodyElt, [1177](#)
- ConsBezierBody
 - Parsers::BezierBody, [178](#)
- ConsCornuBody
 - Parsers::CornuBody, [339](#)
- ConsistAddress
 - nce, [123](#)
 - xpressnet, [148](#)
- ConsTrackBody
 - Parsers::TrackBody, [1174](#)
- constructorCombo
 - lcc::OpenLCBNode, [697](#)

- ConsTurnoutBody
 - Parsers::TurnoutBody, [1242](#)
- ConsumerIdentified
 - lcc::OpenLCBNode, [690](#)
- ConsumerRangIdentified
 - lcc::OpenLCBNode, [690](#)
- ContainsTime
 - TTSupport::TimeRange, [1137](#)
- contents
 - FCFSupport::PDFFileStructures::Page, [737](#)
- CONTROL
 - YY_MRRXtrkCad_INHERIT, [1292](#)
- Control
 - Parsers::TrackGraph, [1187](#)
- Control16
 - CTIAcela, [44](#)
- Control4
 - CTIAcela, [45](#)
- Control8
 - CTIAcela, [46](#)
- controls
 - CTCPanel::CTCPanel, [386](#)
- controls_crosshair
 - CTCPanel::CTCPanel, [371](#)
- controlsYscroll
 - CTCPanel::CTCPanel, [386](#)
- coords
 - CTCPanel::CTCPanel, [371](#)
- copy
 - lcc::CanMessage, [231](#)
- CopyList
 - Parsers::IntegerList, [542](#)
- CORNU
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- CornuBody
 - Parsers::CornuBody, [338](#)
 - Parsers::CornuBodyElt, [345](#)
- CornuBody.h
 - angle, [1325](#)
 - len0, [1325](#)
 - len1, [1325](#)
- CornuBodyElt
 - Parsers::CornuBody, [340](#)
 - Parsers::CornuBodyElt, [343](#)
- CornuBodyEltType
 - Parsers::CornuBodyElt, [342](#)
- CornuCurvedSegment
 - Parsers::CornuBodyElt, [343](#)
- CornuEnd
 - Parsers::CornuBodyElt, [343](#)
- CornuEnds
 - Parsers::CornuBody, [339](#)
- CornuSegmentCount
 - Parsers::CornuBody, [339](#)
- CornuStraightSegment
 - Parsers::CornuBodyElt, [343](#)
- count
 - lcc::ConfigMemory, [304](#)
- countNUL
 - lcc::CANGridConnect, [201](#)
- CPData
 - CTCPanel::CTCPanel, [386](#)
- CPList
 - CTCPanel::CTCPanel, [387](#)
- cplist
 - CTCPanel::CTCPanel, [371](#)
- create
 - FileEntry, [89](#)
 - LabelComboBox, [100](#)
 - LabelSelectColor, [107](#)
 - LabelSpinBox, [110](#)
- create_CodeButton
 - CTCPanel::CTCPanel, [372](#)
- create_Crossing
 - CTCPanel::CTCPanel, [372](#)
- create_Crossover
 - CTCPanel::CTCPanel, [372](#)
- create_CTCLabel
 - CTCPanel::CTCPanel, [373](#)
- create_CurvedBlock
 - CTCPanel::CTCPanel, [373](#)
- create_DoubleSlip
 - CTCPanel::CTCPanel, [373](#)
- create_EndBumper
 - CTCPanel::CTCPanel, [374](#)
- create_HiddenBlock
 - CTCPanel::CTCPanel, [374](#)
- create_Lamp
 - CTCPanel::CTCPanel, [374](#)
- create_PushButton
 - CTCPanel::CTCPanel, [375](#)
- create_SchLabel
 - CTCPanel::CTCPanel, [375](#)
- create_ScissorCrossover
 - CTCPanel::CTCPanel, [375](#)
- create_Signal
 - CTCPanel::CTCPanel, [376](#)
- create_SIGPlate
 - CTCPanel::CTCPanel, [376](#)
- create_SingleSlip
 - CTCPanel::CTCPanel, [376](#)
- create_StraightBlock
 - CTCPanel::CTCPanel, [377](#)
- create_StubYard
 - CTCPanel::CTCPanel, [377](#)
- create_Switch
 - CTCPanel::CTCPanel, [377](#)
- create_SWPlate

- CTCPanel::CTCPanel, 378
- create_ThreeWaySW
 - CTCPanel::CTCPanel, 378
- create_ThroughYard
 - CTCPanel::CTCPanel, 378
- create_Toggle
 - CTCPanel::CTCPanel, 379
- CreateLaTeXTimetable
 - TTSupport::TimeTableSystem, 1149
- CreateNewPage
 - FCFSupport::PDFPrinterDevice, 783
- CreateNewStream
 - FCFSupport::PDFPrinterDevice, 783
- creator
 - FCFSupport::PDFFileStructures::InformationDirectory, 538
- createReply
 - lcc::GridConnectReply, 474
- creationDate
 - FCFSupport::PDFFileStructures::InformationDirectory, 539
- cropBox
 - FCFSupport::PDFFileStructures::Page, 737
 - FCFSupport::PDFFileStructures::PageTree, 749
- Crossing
 - CTCPanel::Crossing, 349
- Crossover
 - CTCPanel::Crossover, 353
- CrossReferenceTable
 - FCFSupport::PDFFileStructures::CrossReferenceTable, 357
 - FCFSupport::PDFFileStructures::IndirectObject, 518
- crossReferenceTable
 - FCFSupport::PDFPrinterDevice, 786
- CSAddress
 - nce, 123
- CTCLabel
 - CTCPanel::CTCLabel, 361
- CTCPanel, 71
 - CTCPanel::CTCPanel, 367
 - leverMethods, 73
 - standardMethods, 73
 - trackworkmethods, 74
 - verifyBoolMethod, 74
 - verifyColorMethod, 74
 - verifyDoubleMethod, 74
 - verifyOrientation8Method, 74
 - verifyPositionMethod, 74
- ctcpanel
 - CTCPanel::CodeButton, 288
 - CTCPanel::Crossing, 351
 - CTCPanel::Crossover, 355
 - CTCPanel::CTCLabel, 363
 - CTCPanel::CurvedBlock, 395
 - CTCPanel::DoubleSlip, 424
 - CTCPanel::EndBumper, 431
 - CTCPanel::HiddenBlock, 481
 - CTCPanel::Lamp, 548
 - CTCPanel::PushButton, 818
 - CTCPanel::SchLabel, 864
 - CTCPanel::ScissorCrossover, 868
 - CTCPanel::Signal, 903
 - CTCPanel::SIGPlate, 909
 - CTCPanel::SingleSlip, 921
 - CTCPanel::StraightBlock, 1005
 - CTCPanel::StubYard, 1010
 - CTCPanel::Switch, 1014
 - CTCPanel::SWPlate, 1033
 - CTCPanel::ThreeWaySW, 1130
 - CTCPanel::ThroughYard, 1135
 - CTCPanel::Toggle, 1172
 - CTCPanel::CodeButton, 285
 - ~CodeButton, 286
 - canvas, 288
 - CodeButton, 286
 - ctcpanel, 288
 - geti, 287
 - getv, 287
 - invoke, 287
 - seti, 287
 - setv, 287
 - CTCPanel::Crossing, 347
 - _VerifyCrossingType, 349
 - _configureLabel, 349
 - ~Crossing, 349
 - canvas, 351
 - Crossing, 349
 - ctcpanel, 351
 - geti, 350
 - getv, 350
 - invoke, 350
 - seti, 350
 - setv, 350
 - CTCPanel::Crossover, 351
 - _configureLabel, 354
 - ~Crossover, 353
 - canvas, 355
 - Crossover, 353
 - ctcpanel, 355
 - geti, 354
 - getv, 354
 - invoke, 354
 - seti, 354
 - setv, 354
 - state, 355
 - CTCPanel::CTCLabel, 359
 - _configureColor, 361
 - _configureLabel, 361

- ~CTCLabel, 361
- canvas, 363
- CTCLabel, 361
- ctcpanel, 363
- geti, 362
- getv, 362
- invoke, 362
- seti, 362
- setv, 362
- CTCPanel::CTCPanel, 363
- _CtcMainHScroll2, 369
- _CtcMainSyncX, 369
- _PosInteger, 369
- _ch_oldfocus, 386
- _ch_oldgrab, 386
- _crosshairEnd, 367
- _crosshairMove, 368
- _crosshairStart, 368
- bind, 370
- checkInitCP, 370
- controls, 386
- controls_crosshair, 371
- controlsYscroll, 386
- coords, 371
- CPData, 386
- CPList, 387
- cplist, 371
- create_CodeButton, 372
- create_Crossing, 372
- create_Crossover, 372
- create_CTCLLabel, 373
- create_CurvedBlock, 373
- create_DoubleSlip, 373
- create_EndBumper, 374
- create_HiddenBlock, 374
- create_Lamp, 374
- create_PushButton, 375
- create_SchLabel, 375
- create_ScissorCrossover, 375
- create_Signal, 376
- create_SIGPlate, 376
- create_SingleSlip, 376
- create_StraightBlock, 377
- create_StubYard, 377
- create_Switch, 377
- create_SWPlate, 378
- create_ThreeWaySW, 378
- create_ThroughYard, 378
- create_Toggle, 379
- CTCPanel, 367
- delete, 379
- exists, 379
- geti, 379
- getv, 380
- getZoom, 380
- invoke, 380
- itemcget, 381
- itemconfigure, 381
- lappendCP, 381
- lremoveCP, 382
- move, 382
- objectlist, 382
- Objects, 387
- print, 383
- scale, 387
- schematic, 387
- schematic_crosshair, 383
- schematicYscroll, 387
- seti, 384
- setv, 384
- setZoom, 384
- updateAndSyncCP, 385
- updateSR, 385
- xscroll, 387
- zoomBy, 385
- CTCPanel::CurvedBlock, 391
- _PI, 395
- _RadiansToDegrees, 393
- _configureLabel, 393
- _square, 394
- ~CurvedBlock, 393
- canvas, 395
- ctcpanel, 395
- CurvedBlock, 393
- geti, 394
- invoke, 394
- seti, 394
- setv, 394
- CTCPanel::DoubleSlip, 420
- _configureLabel, 423
- ~DoubleSlip, 423
- canvas, 424
- ctcpanel, 424
- DoubleSlip, 422
- geti, 423
- getv, 423
- invoke, 423
- seti, 424
- setv, 424
- state, 425
- CTCPanel::EndBumper, 427
- _configureLabel, 429
- ~EndBumper, 429
- canvas, 430
- ctcpanel, 431
- EndBumper, 429
- geti, 429
- invoke, 430

- seti, 430
- setv, 430
- CTCPanel::HiddenBlock, 477
 - _configureLabel, 479
 - ~HiddenBlock, 479
 - canvas, 481
 - ctcpanel, 481
 - geti, 479
 - getv, 480
 - HiddenBlock, 479
 - invoke, 480
 - seti, 480
 - setv, 480
- CTCPanel::Lamp, 544
 - _configureColor, 546
 - _configureLabel, 546
 - ~Lamp, 546
 - canvas, 548
 - ctcpanel, 548
 - geti, 547
 - getv, 547
 - invoke, 547
 - Lamp, 546
 - seti, 547
 - setv, 547
 - state, 548
- CTCPanel::PushButton, 814
 - _configureLabel, 816
 - ~PushButton, 816
 - canvas, 818
 - ctcpanel, 818
 - geti, 816
 - getv, 817
 - invoke, 817
 - PushButton, 816
 - seti, 817
 - setv, 817
- CTCPanel::SchLabel, 860
 - _configureColor, 862
 - _configureLabel, 863
 - ~SchLabel, 862
 - canvas, 864
 - ctcpanel, 864
 - geti, 863
 - getv, 863
 - invoke, 863
 - SchLabel, 862
 - seti, 863
 - setv, 864
- CTCPanel::ScissorCrossover, 864
 - _configureLabel, 867
 - ~ScissorCrossover, 867
 - canvas, 868
 - ctcpanel, 868
 - geti, 867
 - getv, 867
 - invoke, 867
 - ScissorCrossover, 866
 - seti, 868
 - setv, 868
 - state, 869
- CTCPanel::Signal, 898
 - _SchematicDrawOval, 901
 - _SchematicDrawThinLine, 901
 - _VerifyHeads, 902
 - _configureLabel, 900
 - ~Signal, 900
 - aspect, 903
 - canvas, 903
 - ctcpanel, 903
 - geti, 902
 - getv, 902
 - invoke, 902
 - seti, 902
 - setv, 903
 - Signal, 900
- CTCPanel::SIGPlate, 904
 - _PlatePolygon, 909
 - _configureLabel, 907
 - ~SIGPlate, 907
 - canvas, 909
 - ctcpanel, 909
 - geti, 907
 - getv, 907
 - invoke, 908
 - seti, 908
 - setv, 908
 - SIGPlate, 905
- CTCPanel::SingleSlip, 917
 - _configureLabel, 920
 - ~SingleSlip, 919
 - canvas, 921
 - ctcpanel, 921
 - geti, 920
 - getv, 920
 - invoke, 920
 - seti, 920
 - setv, 920
 - SingleSlip, 919
 - state, 921
- CTCPanel::StraightBlock, 1002
 - _configureLabel, 1004
 - ~StraightBlock, 1004
 - canvas, 1005
 - ctcpanel, 1005
 - geti, 1004
 - getv, 1004
 - invoke, 1004

- seti, [1005](#)
- setv, [1005](#)
- StraightBlock, [1003](#)
- CTCPanel::StubYard, [1006](#)
- _StubYard_Poly, [1009](#)
- _configureLabel, [1008](#)
- ~StubYard, [1008](#)
- canvas, [1009](#)
- ctcpanel, [1010](#)
- geti, [1008](#)
- getv, [1008](#)
- invoke, [1008](#)
- seti, [1009](#)
- setv, [1009](#)
- StubYard, [1007](#)
- CTCPanel::Switch, [1010](#)
- _configureLabel, [1012](#)
- ~Switch, [1012](#)
- canvas, [1014](#)
- ctcpanel, [1014](#)
- geti, [1012](#)
- getv, [1013](#)
- invoke, [1013](#)
- seti, [1013](#)
- setv, [1013](#)
- state, [1014](#)
- Switch, [1012](#)
- CTCPanel::SWPlate, [1028](#)
- _PlatePolygon, [1033](#)
- _configureLabel, [1031](#)
- ~SWPlate, [1031](#)
- canvas, [1033](#)
- ctcpanel, [1033](#)
- geti, [1031](#)
- getv, [1031](#)
- invoke, [1032](#)
- seti, [1032](#)
- setv, [1032](#)
- SWPlate, [1030](#)
- CTCPanel::ThreeWaySW, [1125](#)
- _configureLabel, [1129](#)
- ~ThreeWaySW, [1129](#)
- canvas, [1130](#)
- ctcpanel, [1130](#)
- geti, [1129](#)
- getv, [1129](#)
- invoke, [1129](#)
- seti, [1130](#)
- setv, [1130](#)
- state, [1131](#)
- ThreeWaySW, [1127](#)
- CTCPanel::ThroughYard, [1131](#)
- _ThroughYard_Poly, [1134](#)
- _configureLabel, [1133](#)
- ~ThroughYard, [1133](#)
- canvas, [1134](#)
- ctcpanel, [1135](#)
- geti, [1133](#)
- invoke, [1133](#)
- seti, [1134](#)
- setv, [1134](#)
- ThroughYard, [1132](#)
- CTCPanel::Toggle, [1165](#)
- _AddTLever, [1169](#)
- _MoveTLever, [1170](#)
- _VerifyOrientationHV, [1170](#)
- _configureCenterLabel, [1169](#)
- _configureLeftLabel, [1169](#)
- _configureRightLabel, [1170](#)
- ~Toggle, [1169](#)
- canvas, [1172](#)
- ctcpanel, [1172](#)
- geti, [1170](#)
- getv, [1171](#)
- invoke, [1171](#)
- lever, [1172](#)
- seti, [1171](#)
- setv, [1171](#)
- Toggle, [1167](#)
- CTI_DeviceMap
- CTIAcela, [58](#)
- CTIAcela, [38](#)
- _handleSRQ, [42](#)
- _readbyte, [42](#)
- _readevent, [43](#)
- _timeout, [58](#)
- _transmit, [43](#)
- ~CTIAcela, [58](#)
- Activate, [43](#)
- addresstype, [41](#)
- Blink, [44](#)
- ConfigureSensor, [44](#)
- Control16, [44](#)
- Control4, [45](#)
- Control8, [46](#)
- CTI_DeviceMap, [58](#)
- CTIAcela, [46](#)
- ctiacela, [58](#)
- dataavailable, [59](#)
- Deactive, [47](#)
- EmergencyStop, [47](#)
- FilterSelectBits, [59](#)
- filterthreshtype, [41](#)
- HaveData, [47](#)
- highbyte, [47](#)
- LampBits, [59](#)
- lowbyte, [49](#)
- maxtries, [59](#)

- momtype, [41](#)
- NetworkOffline, [49](#)
- NetworkOnline, [49](#)
- networkonline, [59](#)
- OnlineP, [49](#)
- Opcodes, [59](#)
- pack4, [50](#)
- pack8, [50](#)
- Poll, [51](#)
- PulseOff, [51](#)
- PulseOn, [51](#)
- Query, [52](#)
- Read, [52](#)
- Read16, [52](#)
- Read4, [53](#)
- Read8, [53](#)
- ReadAll, [54](#)
- ReadRevision, [54](#)
- ResetNetwork, [54](#)
- Responses, [60](#)
- ReverseBlink, [54](#)
- Signal2, [55](#)
- Signal3, [55](#)
- Signal4, [56](#)
- SignalBrightness, [56](#)
- SignalSettings, [56](#)
- speedtype, [41](#)
- SRQControl, [57](#)
- Throttle, [57](#)
- ttyfd, [60](#)
- ubyte, [42](#)
- validate, [57](#)
- ctiacela, [75](#)
 - CTIAcela, [58](#)
- ctiacela::CTIAcela, [388](#)
- curDiv
 - FCFSupport::System, [1112](#)
- CURRENT
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- currentColumn
 - FCFSupport::LQ24PrinterDevice, [601](#)
 - FCFSupport::PDFPrinterDevice, [786](#)
 - FCFSupport::TextPrinterDevice, [1125](#)
- currentColumnFraction
 - FCFSupport::LQ24PrinterDevice, [601](#)
 - FCFSupport::PDFPrinterDevice, [786](#)
- currentDirection
 - CabWidgets::LocomotiveDirection, [577](#)
- currentFontName
 - FCFSupport::PDFPrinterDevice, [786](#)
- currentLocomotive
 - CabWidgets::SelectLocomotive, [892](#)
- currentPage
 - FCFSupport::PDFPrinterDevice, [787](#)
- currentProgress
 - splash, [935](#)
- CurrentScale
 - Parsers::MRRXtrkCad, [631](#)
 - YY_MRRXtrkCad_INHERIT, [1293](#)
- currentSlant
 - FCFSupport::LQ24PrinterDevice, [601](#)
- currentSpacing
 - FCFSupport::LQ24PrinterDevice, [601](#)
- currentStream
 - FCFSupport::PDFPrinterDevice, [787](#)
- currentWeight
 - FCFSupport::LQ24PrinterDevice, [601](#)
- curtopicindex
 - HTMLHelp::HTMLHelp, [507](#)
- CURVE
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- CurvedBlock
 - CTCPanel::CurvedBlock, [393](#)
- CV
 - xpressnet::ServiceModeResponse, [896](#)
- D
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Data
 - xpressnet::ServiceModeResponse, [896](#)
- data
 - SimpleDOMEElement, [913](#)
- dataavailable
 - CTIAcela, [59](#)
- databuf
 - lcc, [115](#)
- datagrambuffer
 - lcc::ConfigMemory, [304](#)
 - lcc::ConfigurationEditor, [335](#)
- datagrambuffers
 - lcc::CANGridConnect, [208](#)
 - lcc::OpenLCBOverTcp, [704](#)
- datagramcontent
 - lcc, [118](#)
- DatagramReceivedOK
 - lcc::OpenLCBNode, [690](#)
- DatagramRejected
 - lcc::OpenLCBNode, [691](#)
- dbg
 - ScrollTabNotebook, [883](#)
- DC2
 - FCFSupport::LQ24PrinterDevice, [596](#)
- Deactive
 - CTIAcela, [47](#)
- Decimal

- FCFSupport::PDFFileStructures::PageLabelDictionary, 739
- DecoderLongAddress
 - xpressnet, 148
- defaultHelpDirectory
 - HTMLHelp::HTMLHelp, 507
- defaultHelpWindow
 - HTMLHelp::HTMLHelp, 507
- defaultTableOfContents
 - HTMLHelp::HTMLHelp, 508
- Degrees
 - Parsers::TrackGraph, 1187
- DegreesToRadians
 - GRSupport, 92
- delete
 - CTCPanel::CTCPanel, 379
- DeleteAllExistingCars
 - FCFSupport::System, 1052
- DeleteLocomotiveFromStack
 - xpressnet::XPressNet, 1276
- DeleteTrain
 - TTSupport::TimeTableSystem, 1150
- DeleteTurnoutGraphic
 - Parsers::TrackGraph, 1191
- DeleteTurnoutRouteList
 - Parsers::TrackGraph, 1191
- deliver
 - FCFSupport::System, 1112
- delta
 - OvalWidgets::OvalScrollBar, 727
- Departure
 - TTSupport::StationTimes, 966
 - TTSupport::Stop, 988
 - TTSupport::Train, 1226
- departure
 - TTSupport::StationTimes, 967
 - TTSupport::Train, 1232
- DequeuePacket
 - nce::NCE, 651
- Description
 - FCFSupport::CarGroup, 261
 - FCFSupport::Train, 1213
- description
 - FCFSupport::CarGroup, 262
 - FCFSupport::Train, 1220
- DESTID_MASK
 - lcc::MTIDetail, 637
- DESTID_SHIFT
 - lcc::MTIDetail, 637
- Destination
 - FCFSupport::Car, 243
- destination
 - FCFSupport::Car, 254
- Determinant
 - Parsers::TrackGraph::Transform2D, 1238
- DeviceConnectionList
 - azatrax::Azatrax, 167
- deviceOpenCount
 - azatrax::Azatrax, 174
- DialInstrument
 - Instruments::DialInstrument, 397
- Dictionary
 - FCFSupport::PDFFileStructures::Dictionary, 400
- DIGITAL1
 - raildriver, 138
 - RaildriverIO, 827
- Digital1
 - RaildriverIO, 842
- DIGITAL1_M
 - RaildriverIO, 829
- DIGITAL2
 - raildriver, 138
 - RaildriverIO, 827
- Digital2
 - RaildriverIO, 842
- DIGITAL2_M
 - RaildriverIO, 829
- DIGITAL3
 - raildriver, 138
 - RaildriverIO, 827
- Digital3
 - RaildriverIO, 842
- DIGITAL3_M
 - RaildriverIO, 829
- DIGITAL4
 - raildriver, 138
 - RaildriverIO, 827
- Digital4
 - RaildriverIO, 842
- DIGITAL4_M
 - RaildriverIO, 829
- DIGITAL5
 - raildriver, 138
 - RaildriverIO, 827
- Digital5
 - RaildriverIO, 842
- DIGITAL5_M
 - RaildriverIO, 829
- DIGITAL6
 - raildriver, 138
 - RaildriverIO, 828
- Digital6
 - RaildriverIO, 842
- DIGITAL6_M
 - RaildriverIO, 829
- DigitalClock
 - Instruments::DigitalClock, 402
- DigitalInstrument

- Instruments::DigitalInstrument, [405](#)
- Direction
 - nce, [126](#)
 - xpressnet::DoubleHeaderInformation, [415](#)
 - xpressnet::LocomotiveInformation, [581](#)
- direction
 - CabWidgets::LocomotiveDirection, [576](#)
- direction_sense
 - CabWidgets::LocomotiveDirection, [576](#)
- DirectionCode
 - xpressnet, [150](#)
- DIRECTIONFMT
 - linuxgpio::LinuxGpio, [571](#)
- DirectionName
 - TTSupport::TimeTableSystem, [1163](#)
- DirectModeCVRead
 - xpressnet::XPressNet, [1277](#)
- DirectModeCVWrite
 - xpressnet::XPressNet, [1277](#)
- Dirname
 - FCFSupport::PathName, [762](#)
 - TTSupport::PathName, [772](#)
- DisableExternal
 - azatrax::MRD, [623](#)
- DisableMain
 - nce::NCE, [652](#)
- DiscardSwitchList
 - FCFSupport::SwitchList, [1017](#)
- display
 - SimpleDOMEElement, [913](#)
- displayTree
 - ParseXML, [757](#)
- DissolveDoubleHeader
 - xpressnet::XPressNet, [1277](#)
- DIVISION
 - FCFSupport::System, [1046](#)
- Division
 - FCFSupport::Division, [407](#), [408](#)
- division
 - FCFSupport::Station, [953](#)
- DivisionControlList
 - FCFSupport::Industry, [527](#)
- divisionControlList
 - FCFSupport::Industry, [532](#)
- DivisionList
 - FCFSupport::Train, [1214](#)
- DivisionMap
 - FCFSupport, [79](#)
- Divisions
 - FCFSupport::Car, [243](#)
- divisions
 - FCFSupport::Car, [254](#)
 - FCFSupport::System, [1112](#)
- DivisionSymbolMap
 - FCFSupport, [79](#)
- DivisionVector
 - FCFSupport, [79](#)
- divList
 - FCFSupport::Train, [1220](#)
- DLE
 - cmri::CMri, [277](#)
- Doc/doxygen/titlepage.h, [1333](#)
- Done
 - FCFSupport::Train, [1214](#)
- done
 - FCFSupport::Train, [1220](#)
- doneP
 - FCFSupport::Car, [254](#)
- Double
 - FCFSupport::PrinterDevice, [807](#)
- DOUBLE_HEADER_INFORMATION
 - xpressnet, [153](#)
- DOUBLE_HEADER_MU_ERROR
 - xpressnet, [153](#)
- DoubleHeaderInformation
 - xpressnet::DoubleHeaderInformation, [413](#)
- DoubleHeaderMuError
 - xpressnet::DoubleHeaderMuError, [420](#)
- DoubleSlip
 - CTCPanel::DoubleSlip, [422](#)
- doubleVector
 - TTSupport, [143](#)
- down1
 - CabWidgets::LocomotiveSpeed, [591](#)
- down10
 - CabWidgets::LocomotiveSpeed, [591](#)
- DRAW
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- drawOptionsDialog
 - lcc::CANGridConnectOverCANSocket, [212](#)
 - lcc::CANGridConnectOverTcp, [217](#)
 - lcc::CANGridConnectOverUSBSerial, [222](#)
 - lcc::OpenLCBOverTcp, [701](#)
- dropStop
 - FCFSupport::SwitchListElement, [1027](#)
- DropStopEQ
 - FCFSupport::SwitchListElement, [1024](#)
- DropStopIndustry
 - FCFSupport::SwitchListElement, [1025](#)
- DropStopStation
 - FCFSupport::SwitchListElement, [1025](#)
- dTextX
 - Instruments::DialInstrument, [398](#)
- dTextY
 - Instruments::DialInstrument, [399](#)
- Dummy
 - nce::NCE, [652](#)

- DuplicateStationIndex
 - TTSupport::Station, [957](#)
 - TTSupport::TimeTableSystem, [1150](#)
- duplicateStationIndex
 - TTSupport::Station, [961](#)
- E
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- EchoMode
 - nce, [123](#)
- EdgeA
 - Parsers::LayoutFile, [554](#)
 - Parsers::TrackGraph, [1192](#)
- EdgeIndex
 - Parsers::LayoutFile, [555](#)
 - Parsers::TrackGraph, [1192](#)
- EdgeLength
 - Parsers::LayoutFile, [555](#)
 - Parsers::TrackGraph, [1192](#)
- EdgeValues
 - Parsers::TrackGraph::EdgeValues, [426](#)
- EdgeX
 - Parsers::LayoutFile, [555](#)
 - Parsers::TrackGraph, [1192](#)
- EdgeY
 - Parsers::LayoutFile, [555](#)
 - Parsers::TrackGraph, [1193](#)
- editframe
 - Icc::ConfigurationEditor, [335](#)
- eightbytes
 - Icc, [116](#)
- Element
 - Parsers::BezierBody, [178](#)
 - Parsers::CornuBody, [339](#)
 - Parsers::IntegerList, [542](#)
 - Parsers::TurnoutBody, [1242](#)
- element
 - Parsers::BezierBody, [179](#)
 - Parsers::CornuBody, [340](#)
 - Parsers::TrackBody, [1175](#)
 - Parsers::TurnoutBody, [1244](#)
- ElementAddress
 - xpressnet, [149](#)
- ElementP
 - Parsers::IntegerList, [542](#)
- elements
 - FCFSupport::PDFFileStructures::IndirectObjectDictionary, [522](#)
- EMERGENCY_STOP
 - xpressnet, [153](#)
- EmergencyOff
 - xpressnet::CommandStationStatus, [291](#)
- EmergencyStop
 - CTIAcela, [47](#)
 - xpressnet::CommandStationStatus, [292](#)
- EmergencyStopAllLocomotives
 - xpressnet::XPressNet, [1278](#)
- EmergencyStopALocomotive
 - xpressnet::XPressNet, [1278](#)
- Emit
 - Parsers::LayoutFile, [556](#)
- EmptiesAccepted
 - FCFSupport::Industry, [527](#)
- EmptyP
 - FCFSupport::Car, [243](#)
- emptyTypes
 - FCFSupport::Industry, [533](#)
- enableClickDestroy
 - splash, [934](#)
- EnableExternal
 - azatrax::MRD, [623](#)
- EnableMain
 - nce::NCE, [652](#)
- encodingDictionary
 - FCFSupport::PDFFileStructures::Type1FontDictionary, [1260](#)
- encodingName
 - FCFSupport::PDFFileStructures::Type1FontDictionary, [1260](#)
- END
 - Parsers::MRRXtrkCad, [629](#)
- ENDBLOCK
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- EndBumper
 - CTCPanel::EndBumper, [429](#)
- endOfData
 - azatrax::Azatrax::StateDataPacket, [946](#)
- ENDSEGS
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- ENDSIGNAL
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- ENDTRACKS
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- EOL
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- ePos1
 - Parsers::SegVector, [887](#)
- ePos2
 - Parsers::SegVector, [888](#)
- equals
 - Icc::CanMessage, [231](#)
- Error
 - FCFSupport::LogMessageCallback, [593](#)
 - xpressnet::DoubleHeaderMuError, [420](#)
- ErrorBetweenLI100AndCommandStation
 - xpressnet, [151](#)

- ErrorBetweenLI100AndPC
 - xpressnet, [151](#)
- ErrorCode
 - Azatrax.h, [1299](#)
- ErrorMessage
 - nce, [127](#)
- errorstream
 - Parsers::ParseFile, [753](#)
- ErrorTypeCode
 - xpressnet, [151](#)
- ESC
 - FCFSupport::LQ24PrinterDevice, [596](#)
- EstablishDoubleHeader
 - xpressnet::XPressNet, [1278](#)
- ETX
 - cmri::CMri, [277](#)
- Eventcodes
 - RaildriverIO, [826](#)
- EventID
 - lcc::EventID, [432](#)
- eventid
 - lcc::EventReceived, [440](#)
 - lcc::SendEvent, [894](#)
- EVENTIDFMT
 - lcc::EventID, [434](#)
- eventlist
 - raildriver, [137](#)
- EventLog
 - lcc::EventLog, [436](#)
- Eventmask_bits
 - RaildriverIO, [828](#)
- EVENTP_MASK
 - lcc::MTIDetail, [637](#)
- EVENTP_SHIFT
 - lcc::MTIDetail, [637](#)
- EventReceived
 - lcc::EventReceived, [439](#)
- eventReceived
 - lcc::EventLog, [437](#)
- eventvalidity
 - lcc, [118](#)
- ExecuteMacro
 - nce::NCE, [652](#)
- exists
 - CTCPanel::CTCPanel, [379](#)
- EXPORT
 - linuxgpio::LinuxGpio, [571](#)
- Extension
 - FCFSupport::PathName, [762](#)
 - TTSupport::PathName, [772](#)
- ExternallyChanged
 - azatrax::MRD, [623](#)
- externallyChanged
 - azatrax::MRD::status2_union, [975](#)
- extGState
 - FCFSupport::PDFFileStructures::ResourceDictionary, [855](#)
- F
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- FALSE
 - MRRXtrkCad.tab.h, [1302](#)
- FCFSupport, [65](#), [76](#)
 - CarTypeMap, [78](#)
 - CarTypeOrderVector, [78](#)
 - CarVector, [78](#)
 - DivisionMap, [79](#)
 - DivisionSymbolMap, [79](#)
 - DivisionVector, [79](#)
 - IndustryMap, [79](#)
 - IndustryVector, [79](#)
 - operator<<, [81](#)
 - OwnerMap, [79](#)
 - StationMap, [80](#)
 - StationVector, [80](#)
 - stringVector, [80](#)
 - SwitchListElementVector, [80](#)
 - TrainMap, [80](#)
 - TrainNameMap, [81](#)
- FCFSupport::Car, [236](#)
 - Assignments, [242](#)
 - assignments, [254](#)
 - Car, [240](#), [241](#)
 - CarOwner, [242](#)
 - ClearAssignments, [242](#)
 - ClearMovementsThisSession, [242](#)
 - ClearTrips, [243](#)
 - Destination, [243](#)
 - destination, [254](#)
 - Divisions, [243](#)
 - divisions, [254](#)
 - doneP, [254](#)
 - EmptyP, [243](#)
 - fixedP, [255](#)
 - FixedRouteP, [243](#)
 - IncrementAssignments, [244](#)
 - IncrementTrips, [244](#)
 - IncrmentMovementsThisSession, [244](#)
 - IsDoneP, [244](#)
 - LastTrain, [244](#)
 - lasttrain, [255](#)
 - LdLmt, [245](#)
 - ldlmt, [255](#)
 - Length, [245](#)
 - length, [255](#)
 - Load, [245](#)
 - LoadedP, [245](#)

- loadedP, [255](#)
- Location, [245](#)
- location, [256](#)
- LtWt, [246](#)
- ltwt, [256](#)
- Marks, [246](#)
- marks, [256](#)
- mirrorP, [256](#)
- MovementsThisSession, [246](#)
- moves, [256](#)
- Number, [246](#)
- number, [257](#)
- OkToMirrorP, [246](#)
- operator=, [247](#)
- owner, [257](#)
- Peek, [247](#)
- peek, [257](#)
- Plate, [247](#)
- plate, [257](#)
- PrevTrain, [247](#)
- prevtrain, [257](#)
- SetAssignments, [248](#)
- SetCarOwner, [248](#)
- SetDestination, [248](#)
- SetDivisions, [248](#)
- SetDone, [249](#)
- SetFixedRouteP, [249](#)
- SetLastTrain, [249](#)
- SetLdLmt, [249](#)
- SetLength, [250](#)
- SetLocation, [250](#)
- SetLtWt, [250](#)
- SetMarks, [250](#)
- SetNotDone, [251](#)
- SetNumber, [251](#)
- SetOkToMirrorP, [251](#)
- SetPeek, [251](#)
- SetPlate, [252](#)
- SetPrevTrain, [252](#)
- SetType, [252](#)
- SetWeightClass, [252](#)
- System, [254](#)
- tmpStatus, [258](#)
- Trips, [253](#)
- trips, [258](#)
- Type, [253](#)
- type, [258](#)
- UnLoad, [253](#)
- WeightClass, [253](#)
- weightclass, [258](#)
- FCFSupport::CarGroup, [259](#)
 - CarGroup, [260](#)
 - CarGroupConsts, [259](#)
 - Description, [261](#)
 - description, [262](#)
 - Group, [261](#)
 - group, [262](#)
 - MaxCarGroup, [260](#)
 - operator=, [261](#)
- FCFSupport::CarType, [262](#)
 - ~CarType, [265](#)
 - CarType, [264](#), [265](#)
 - CarTypeConsts, [264](#)
 - Comment, [265](#)
 - comment, [267](#)
 - Group, [265](#)
 - group, [267](#)
 - MaxCarTypes, [264](#)
 - NumberOfCarTypes, [264](#)
 - operator=, [266](#)
 - System, [266](#)
 - Type, [266](#)
 - type, [267](#)
- FCFSupport::Division, [406](#)
 - ~Division, [408](#)
 - AppendStation, [408](#)
 - Area, [409](#)
 - area, [410](#)
 - Division, [407](#), [408](#)
 - Home, [409](#)
 - home, [411](#)
 - Name, [409](#)
 - name, [411](#)
 - NumberOfStations, [409](#)
 - operator=, [409](#)
 - stations, [411](#)
 - Symbol, [410](#)
 - symbol, [411](#)
 - System, [410](#)
 - TheStation, [410](#)
- FCFSupport::Industry, [522](#)
 - AssignLen, [527](#)
 - assignLen, [532](#)
 - cars, [532](#)
 - CarsLen, [527](#)
 - carsLen, [532](#)
 - CarsNum, [527](#)
 - carsNum, [532](#)
 - DivisionControlList, [527](#)
 - divisionControlList, [532](#)
 - EmptiesAccepted, [527](#)
 - emptyTypes, [533](#)
 - Hazard, [528](#)
 - hazard, [533](#)
 - IncrementStatsLen, [528](#)
 - Industry, [525](#), [526](#)
 - LoadsAccepted, [528](#)
 - loadTypes, [533](#)

- MaxCarLen, [528](#)
- maxCarLen, [533](#)
- MaxPlate, [528](#)
- MaxWeightClass, [529](#)
- mirror, [533](#)
- MyMirror, [529](#)
- MyStation, [529](#)
- Name, [529](#)
- name, [534](#)
- NumberOfCars, [529](#)
- operator=, [530](#)
- plate, [534](#)
- Priority, [530](#)
- priority, [534](#)
- Reload, [530](#)
- reload, [534](#)
- remLen, [534](#)
- station, [535](#)
- StatsLen, [530](#)
- statsLen, [535](#)
- System, [531](#)
- TheCar, [531](#)
- TrackLen, [531](#)
- trackLen, [535](#)
- Type, [531](#)
- type, [535](#)
- usedLen, [535](#)
- weightclass, [536](#)
- FCFSupport::LogMessageCallback, [592](#)
 - ~LogMessageCallback, [594](#)
 - Error, [593](#)
 - Infomational, [593](#)
 - LogMessage, [594](#)
 - LogMessageCallback, [594](#)
 - MessageType, [593](#)
 - Warning, [593](#)
- FCFSupport::LQ24PrinterDevice, [595](#)
 - ~LQ24PrinterDevice, [597](#)
 - ChCodes, [596](#)
 - ClosePrinter, [597](#)
 - currentColumn, [601](#)
 - currentColumnFraction, [601](#)
 - currentSlant, [601](#)
 - currentSpacing, [601](#)
 - currentWeight, [601](#)
 - DC2, [596](#)
 - ESC, [596](#)
 - FF, [596](#)
 - LQ24PrinterDevice, [597](#)
 - NewPage, [598](#)
 - oneColumnWidthFraction, [601](#)
 - OpenPrinter, [598](#)
 - printerStream, [602](#)
 - Put, [598](#)
 - PutLine, [599](#)
 - SetTypeSlant, [599](#)
 - SetTypeSpacing, [599](#)
 - SetTypeWeight, [600](#)
 - SI, [596](#)
 - Tab, [600](#)
- FCFSupport::Owner, [730](#)
 - ~Owner, [732](#)
 - Comment, [732](#)
 - comment, [733](#)
 - Initials, [732](#)
 - initials, [733](#)
 - Name, [732](#)
 - name, [733](#)
 - operator=, [733](#)
 - Owner, [731](#)
- FCFSupport::PathName, [759](#)
 - ~PathName, [762](#)
 - Dirname, [762](#)
 - Extension, [762](#)
 - FullPath, [763](#)
 - operator<, [764](#)
 - operator<=, [764](#)
 - operator>, [766](#)
 - operator>=, [766](#)
 - operator+, [763](#)
 - operator+=, [764](#)
 - operator=, [765](#)
 - operator==, [765](#)
 - PathName, [761](#), [762](#)
 - pathname, [767](#)
 - PathSeparator, [766](#)
 - SameDirectory, [767](#)
 - Split, [767](#)
 - Tail, [767](#)
- FCFSupport::PauseCallback, [777](#)
 - ~PauseCallback, [778](#)
 - Pause, [778](#)
 - PauseCallback, [777](#)
- FCFSupport::PDFFileStructures, [82](#)
 - NamedIndirectObjectMap, [83](#)
 - PageLabelDictionaryNumMap, [83](#)
 - PageLabelTreeKidVector, [84](#)
 - PDFStreamVector, [84](#)
 - QuotePDFString, [84](#)
- FCFSupport::PDFFileStructures::CatalogDictionary, [267](#)
 - ~CatalogDictionary, [269](#)
 - AddPage, [269](#)
 - AddPageLabelDictionary, [269](#)
 - AddPageLabelTree, [270](#)
 - AddPageTree, [270](#)
 - CatalogDictionary, [268](#)
 - labels, [271](#)
 - pages, [271](#)

- WriteDictionaryElements, 270
- FCFSupport::PDFFileStructures::CrossReferenceTable, 355
 - ~CrossReferenceTable, 357
 - AddIndirectObjectToTable, 357
 - CrossReferenceTable, 357
 - FreeObject, 358
 - HighestObjectNumber, 358
 - IndirectObject, 359
 - lastObjectNumber, 359
 - objectMap, 357
 - objectTable, 359
 - WriteTable, 358
- FCFSupport::PDFFileStructures::Dictionary, 399
 - ~Dictionary, 400
 - Dictionary, 400
 - WriteDictionaryElements, 401
 - WriteDirect, 401
- FCFSupport::PDFFileStructures::FontDictionary, 440
 - ~FontDictionary, 442
 - FontDictionary, 441
 - subType, 443
 - WriteDictionaryElements, 442
 - WriteFontType, 442
- FCFSupport::PDFFileStructures::FreedObject, 443
 - ~FreedObject, 444
 - FreedObject, 444
 - WriteDirect, 445
- FCFSupport::PDFFileStructures::IndirectFloatVector, 511
 - ~IndirectFloatVector, 512
 - IndirectFloatVector, 512
 - WriteDirect, 513
- FCFSupport::PDFFileStructures::IndirectObject, 513
 - ~IndirectObject, 515
 - CrossReferenceTable, 518
 - FileOffset, 515
 - fileOffset, 518
 - GenerationNumber, 515
 - generationNumber, 518
 - HasOffset, 516
 - IncrementGenerationNumber, 516
 - IndirectObject, 514
 - ObjectNumber, 516
 - objectNumber, 519
 - SetObjectNumber, 516
 - table, 519
 - WriteDirect, 517
 - WriteIndirectReference, 517
 - WriteObjectToFile, 518
- FCFSupport::PDFFileStructures::IndirectObjectDictionary, 519
 - ~IndirectObjectDictionary, 521
 - AddIndirectObject, 521
 - elements, 522
 - IndirectObjectDictionary, 520
 - Size, 521
 - WriteDictionaryElements, 521
- FCFSupport::PDFFileStructures::InformationDirectory, 536
 - ~InformationDirectory, 538
 - author, 538
 - creator, 538
 - creationDate, 539
 - InformationDirectory, 537
 - keywords, 539
 - modificationDate, 539
 - producer, 539
 - subject, 539
 - title, 540
 - WriteDictionaryElements, 538
- FCFSupport::PDFFileStructures::Page, 734
 - ~Page, 736
 - AppendStream, 736
 - contents, 737
 - cropBox, 737
 - mediaBox, 737
 - Page, 735
 - PageTree, 737
 - parent, 737
 - resources, 738
 - WriteDictionaryElements, 736
- FCFSupport::PDFFileStructures::PageLabelDictionary, 738
 - ~PageLabelDictionary, 740
 - Decimal, 739
 - LowerLetters, 739
 - LowerRoman, 739
 - None, 739
 - NumberStyle, 739
 - PageLabelDictionary, 740
 - prefix, 741
 - start, 741
 - style, 741
 - UpperLetters, 739
 - UpperRoman, 739
 - WriteDictionaryElements, 740
- FCFSupport::PDFFileStructures::PageLabelTree, 742
 - ~PageLabelTree, 743
 - AddPageLabelDictionary, 743
 - AddPageLabelTree, 744
 - GetKidLimits, 744
 - isRoot, 745
 - kids, 745
 - nums, 745
 - PageLabelTree, 743
 - Size, 745
 - WriteDictionaryElements, 745
- FCFSupport::PDFFileStructures::PageTree, 746

- ~PageTree, 748
- AddPage, 748
- AddPageTree, 748
- cropBox, 749
- mediaBox, 749
- pagenodes, 749
- PageTree, 747
- parent, 750
- resources, 750
- WriteDictionaryElements, 749
- FCFSupport::PDFFileStructures::PDFNameArray, 778
 - ~PDFNameArray, 779
 - PDFNameArray, 779
- FCFSupport::PDFFileStructures::PDFStream, 789
 - ~PDFStream, 790
 - PDFStream, 789
 - WriteDirect, 790
- FCFSupport::PDFFileStructures::PostScriptStandardType1FontDictionary, 803
 - ~PostScriptStandardType1FontDictionary, 804
 - PostScriptStandardType1FontDictionary, 803
- FCFSupport::PDFFileStructures::Rectangle, 845
 - ~Rectangle, 847
 - Rectangle, 846
 - WriteDirect, 847
 - X1, 848
 - x1, 849
 - X2, 848
 - x2, 849
 - Y1, 848
 - y1, 849
 - Y2, 848
 - y2, 849
- FCFSupport::PDFFileStructures::ResourceDictionary, 850
 - ~ResourceDictionary, 852
 - AddColorSpace, 852
 - AddExternalGraphicsState, 852
 - AddFont, 853
 - AddPattern, 853
 - AddProcSet, 853
 - AddProperties, 854
 - AddShading, 854
 - AddXObject, 854
 - colorSpace, 855
 - extGState, 855
 - font, 856
 - pattern, 856
 - procSets, 856
 - properties, 856
 - ResourceDictionary, 851
 - shading, 856
 - WriteDictionaryElements, 855
 - xObject, 857
- FCFSupport::PDFFileStructures::Type1FontDictionary, 1256
 - ~Type1FontDictionary, 1259
 - baseFont, 1259
 - encodingDictionary, 1260
 - encodingName, 1260
 - firstChar, 1260
 - fontDescriptor, 1260
 - lastChar, 1260
 - Type1FontDictionary, 1257, 1258
 - widths, 1261
 - WriteDictionaryElements, 1259
- FCFSupport::PDFFileStructures::TypedDictionary, 1261
 - ~TypedDictionary, 1262
 - type, 1263
 - TypedDictionary, 1262
 - WriteDictionaryElements, 1263
 - WriteDictionaryType, 1263
- FCFSupport::PDFPrinterDevice, 780
 - ~PDFPrinterDevice, 782
 - ClosePrinter, 782
 - CreateNewPage, 783
 - CreateNewStream, 783
 - crossReferenceTable, 786
 - currentColumn, 786
 - currentColumnFraction, 786
 - currentFontName, 786
 - currentPage, 787
 - currentStream, 787
 - horizontalScaling, 787
 - info, 787
 - lines, 787
 - maxLines, 787
 - needPage, 788
 - NewPage, 783
 - OpenPrinter, 783
 - pageTreeRoot, 788
 - partline, 788
 - PDFPrinterDevice, 782
 - printerStream, 788
 - Put, 784
 - PutLine, 784
 - rootDictionary, 788
 - SetTypeSlant, 784
 - SetTypeSpacing, 785
 - SetTypeWeight, 785
 - Tab, 785
 - title, 788
- FCFSupport::PostScriptPrinterDevice, 794
 - ~PostScriptPrinterDevice, 796
 - ClosePrinter, 797
 - lines, 801
 - maxLines, 801
 - needPageHeader, 801

- NewPage, [797](#)
- OpenPrinter, [797](#)
- pages, [802](#)
- partline, [802](#)
- PostScriptPrinterDevice, [796](#)
- printerStream, [802](#)
- PSQuote, [798](#)
- Put, [798](#)
- PutLine, [798](#)
- PutPageHeader, [800](#)
- SetTypeSlant, [800](#)
- SetTypeSpacing, [800](#)
- SetTypeWeight, [800](#)
- Tab, [801](#)
- title, [802](#)
- FCFSupport::PrinterDevice, [804](#)
 - ~PrinterDevice, [808](#)
 - A4, [806](#)
 - Bold, [807](#)
 - ClosePrinter, [808](#)
 - Double, [807](#)
 - Half, [807](#)
 - IsOpenP, [809](#)
 - isOpenP, [814](#)
 - Italic, [806](#)
 - Letter, [806](#)
 - NewPage, [809](#)
 - Normal, [807](#)
 - One, [807](#)
 - OpenPrinter, [809](#)
 - PageSize, [806](#)
 - pageSize, [814](#)
 - PrinterDevice, [807](#)
 - PrinterPageSize, [810](#)
 - Put, [810](#), [811](#)
 - PutLine, [811](#)
 - Roman, [806](#)
 - SetTypeSlant, [811](#)
 - SetTypeSpacing, [813](#)
 - SetTypeWeight, [813](#)
 - Tab, [813](#)
 - TypeSlant, [806](#)
 - TypeSpacing, [807](#)
 - TypeWeight, [807](#)
- FCFSupport::ShowBannerCallback, [897](#)
 - ~ShowBannerCallback, [898](#)
 - ShowBanner, [898](#)
 - ShowBannerCallback, [897](#)
- FCFSupport::Station, [949](#)
 - ~Station, [951](#)
 - AppendIndustry, [951](#)
 - Comment, [952](#)
 - comment, [953](#)
 - division, [953](#)
 - industries, [954](#)
 - MyDivision, [952](#)
 - Name, [952](#)
 - name, [954](#)
 - NumberOfIndustries, [952](#)
 - operator=, [952](#)
 - Station, [950](#), [951](#)
 - System, [953](#)
 - TheIndustry, [953](#)
- FCFSupport::SwitchList, [1014](#)
 - ~SwitchList, [1016](#)
 - AddSwitchListElement, [1016](#), [1017](#)
 - DiscardSwitchList, [1017](#)
 - lastIndex, [1020](#)
 - LimitCars, [1017](#)
 - limitCars, [1021](#)
 - NextSwitchListForCarAndIndustry, [1017](#)
 - operator<=, [1020](#)
 - operator[], [1018](#)
 - PickCarEq, [1018](#)
 - PickIndex, [1019](#)
 - pickIndex, [1021](#)
 - PickLocationEq, [1019](#)
 - PickTrainEq, [1019](#)
 - ResetLastIndex, [1020](#)
 - ResetSwitchList, [1020](#)
 - SwitchList, [1016](#)
 - theList, [1021](#)
- FCFSupport::SwitchListElement, [1021](#)
 - dropStop, [1027](#)
 - DropStopEQ, [1024](#)
 - DropStopIndustry, [1025](#)
 - DropStopStation, [1025](#)
 - LastTrain, [1025](#)
 - lastTrain, [1027](#)
 - operator=, [1025](#)
 - PickCar, [1026](#)
 - pickCar, [1027](#)
 - pickLoc, [1027](#)
 - PickLocation, [1026](#)
 - PickTrain, [1026](#)
 - pickTrain, [1027](#)
 - SwitchListElement, [1023](#), [1024](#)
 - System, [1026](#)
- FCFSupport::SwitchListElement::StationOrIndustry, [962](#)
 - industry, [962](#)
 - station, [962](#)
- FCFSupport::System, [1033](#)
 - ~System, [1047](#)
 - AddCar, [1047](#)
 - AddOwner, [1048](#)
 - ALL, [1046](#)
 - All, [1046](#)
 - CarAssignment, [1048](#)

carDest, [1108](#)
carGroups, [1108](#)
CarLocationType, [1046](#)
CarMovements, [1048](#)
carMovements, [1109](#)
cars, [1109](#)
CarsAtDest, [1049](#)
carsAtDest, [1109](#)
CarsAtDest_CarsInTransit, [1049](#)
carsAtDest_carsInTransit, [1109](#)
CarsAtWorkBench, [1049](#)
carsAtWorkBench, [1109](#)
CarsFile, [1049](#)
carsFile, [1110](#)
CarsInTransit, [1049](#)
carsInTransit, [1110](#)
CarsMoved, [1050](#)
carsMoved, [1110](#)
CarsMovedMore, [1050](#)
carsMovedMore, [1110](#)
CarsMovedOnce, [1050](#)
carsMovedOnce, [1110](#)
CarsMovedThree, [1050](#)
carsMovedThree, [1111](#)
CarsMovedTwice, [1050](#)
carsMovedTwice, [1111](#)
CarsNotMoved, [1051](#)
carsNotMoved, [1111](#)
CarTypeReport, [1046](#)
carTypes, [1111](#)
CarTypesFile, [1051](#)
carTypesFile, [1111](#)
CarTypesOrder, [1051](#)
carTypesOrder, [1112](#)
CarTypesOrderIndex, [1051](#)
curDiv, [1112](#)
DeleteAllExistingCars, [1052](#)
deliver, [1112](#)
DIVISION, [1046](#)
divisions, [1112](#)
FindCarInCarVector, [1052](#)
FindDivisionByIndex, [1052](#)
FindDivisionBySymbol, [1053](#)
FindDivisionIndex, [1053](#)
FindIndustry, [1053](#)
FindIndustryByIndex, [1054](#)
FindIndustryByName, [1054](#)
FindIndustryIndex, [1054](#)
FindStationByName, [1055](#)
FindStationIndex, [1055](#)
FindTrainByIndex, [1055](#)
FindTrainByName, [1056](#)
FirstCarType, [1056](#)
FirstDivision, [1056](#)
FirstIndustry, [1056](#)
FirstOwner, [1057](#)
FirstStation, [1057](#)
FirstTrain, [1057](#)
FixedRouteMirrorCheck, [1057](#)
FormatDutyTime, [1058](#)
GetCarStatus, [1058](#)
GetIndustryCarCounts, [1058](#)
GlobStringMatch, [1058](#)
GlobStringMatchHelper, [1059](#)
IndRipTrack, [1059](#)
IndRipTrackConst, [1059](#)
IndScrapYard, [1060](#)
indScrapYard, [1112](#)
industries, [1113](#)
IndustriesFile, [1060](#)
industriesFile, [1113](#)
INDUSTRY, [1046](#)
IndustryIndex, [1060](#)
IndustryTakesCar, [1060](#)
InternalRunOneTrain, [1061](#)
LastCarType, [1061](#)
LastDivision, [1061](#)
LastIndustry, [1062](#)
LastOwner, [1062](#)
LastStation, [1062](#)
LastTrain, [1062](#)
LoadCarFile, [1062](#)
LoadStatsFile, [1063](#)
LogCarPickup, [1063](#)
messageBuffer, [1113](#)
NextShift, [1063](#)
numberCars, [1113](#)
NumberOfCars, [1064](#)
NumberOfDivisions, [1064](#)
NumberOfIndustries, [1064](#)
NumberOfStations, [1064](#)
NumberOfTrains, [1064](#)
OrdersFile, [1065](#)
ordersFile, [1113](#)
originYard, [1114](#)
OtherCarOkForTrain, [1065](#)
owners, [1114](#)
OwnersFile, [1065](#)
ownersFile, [1114](#)
PrintAllCarTypes, [1065](#)
PrintAllLists, [1066](#)
PrintAlpha, [1066](#)
printAlpha, [1114](#)
PrintAnalysisHeader, [1066](#)
PrintAttwice, [1067](#)
printAttwice, [1114](#)
PrintCarHeading, [1067](#)
PrintCarTypesHeader, [1067](#)

PrintCarTypesSummaryHeader, 1067
PrintDashedLine, 1068
PrintDispatch, 1068
printDispatch, 1115
PrintDispatcher, 1068
Printem, 1069
printem, 1115
PrintFormFeed, 1069
PrintIndustryHeader, 1069
PrintList, 1069
printList, 1115
PrintLocCommon, 1070
PrintLocOneIndustry, 1070
PrintLtwice, 1070
printLtwice, 1115
PrintOneAnalysis, 1071
PrintOneCarInfo, 1071
PrintOneCarLocation, 1071
PrintOneCarType, 1072
PrintOneIndustry, 1072
PrintSystemBanner, 1073
PrintTrainLoc, 1073
PrintTrainOrderHeader, 1074
PrintTrainOrders, 1074
PrintYards, 1074
printYards, 1115
RanAllTrains, 1074
ranAllTrains, 1116
Random, 1075
Randomize, 1075
ReadCarTypes, 1075
ReadDivisions, 1075
ReadGroupLimit, 1076
ReadIndustries, 1076
ReadOwners, 1077
ReadStations, 1077
ReadTrainOrders, 1077
ReadTrains, 1078
ReLoadCarFile, 1078
ReportAnalysis, 1078
ReportCarLocations, 1079
ReportCarOwners, 1079
ReportCars, 1079
ReportCarsNotMoved, 1080
ReportCarTypes, 1080
ReportIndustries, 1081
ReportLocAll, 1081
ReportLocDivision, 1082
ReportLocIndustry, 1082
ReportLocStation, 1082
ReportTrains, 1083
ResetIndustryStats, 1083
RestartLoop, 1083
RunAllTrains, 1083
RunBoxMoves, 1084
RunOneLocal, 1084
RunOneManifest, 1085
RunOnePassenger, 1085
RunOneTrain, 1086
SaveCars, 1086
SearchForCarIndexesByNumber, 1088
SearchForIndustryPattern, 1088
SearchForTrainPattern, 1088
SessionNumber, 1089
sessionNumber, 1116
SetPrintAlpha, 1089
SetPrintAtwice, 1089
SetPrintDispatch, 1089
SetPrintem, 1090
SetPrintList, 1090
SetPrintLtwice, 1090
SetPrintYards, 1091
ShiftNumber, 1091
shiftNumber, 1116
ShowCarMovements, 1091
ShowCarsInDivision, 1092
ShowCarsNotMoved, 1092
ShowTrainCars, 1092
ShowTrainTotals, 1093
ShowUnassignedCars, 1093
SkipCommentsGets, 1093
split, 1094
STATION, 1046
stations, 1116
StatsFile, 1094
statsFile, 1116
StatsPeriod, 1094
statsPeriod, 1117
StringToInt, 1095
StringToIntRange, 1095
Summary, 1046
switchList, 1117
System, 1046, 1047
SystemFile, 1096
systemFile, 1117
SystemName, 1096
systemName, 1117
TheCar, 1096
TheCarGroup, 1096
TheCarType, 1097
TheDivision, 1097
TheIndustry, 1097
TheOwner, 1099
TheStation, 1099
Today, 1099
TotalCars, 1099
totalLoads, 1117
totalPickups, 1118

- totalRevenueTons, [1118](#)
- TotalShifts, [1100](#)
- totalShifts, [1118](#)
- totalTons, [1118](#)
- TrainByIndex, [1100](#)
- TrainByName, [1100](#)
- TrainCarPickupCheck, [1101](#)
- TrainDropAllCars, [1101](#)
- TrainDropOneCar, [1102](#)
- trainEmpties, [1118](#)
- TrainIndex, [1102](#)
- trainIndex, [1119](#)
- trainLastLocation, [1119](#)
- trainLength, [1119](#)
- trainLoads, [1119](#)
- TrainLocalDrops, [1103](#)
- TrainLocalOriginate, [1103](#)
- TrainLocalPickups, [1104](#)
- trainLongest, [1119](#)
- TrainManifestDrops, [1104](#)
- TrainManifestPickups, [1105](#)
- TrainPickupOneCar, [1105](#)
- TrainPrintConsistSummary, [1106](#)
- TrainPrintFinalSummary, [1106](#)
- trainPrintOK, [1120](#)
- TrainPrintTown, [1107](#)
- trains, [1120](#)
- TrainsFile, [1107](#)
- trainsFile, [1120](#)
- trainTons, [1120](#)
- trim, [1107](#)
- Type, [1046](#)
- UpperCase, [1108](#)
- wayFreight, [1120](#)
- whitespace, [1121](#)
- WriteOneCarToDisk, [1108](#)
- FCFSupport::TextPrinterDevice, [1121](#)
 - ~TextPrinterDevice, [1122](#)
 - ClosePrinter, [1123](#)
 - currentColumn, [1125](#)
 - NewPage, [1123](#)
 - OpenPrinter, [1123](#)
 - printerStream, [1125](#)
 - Put, [1124](#)
 - PutLine, [1124](#)
 - Tab, [1125](#)
 - TextPrinterDevice, [1122](#)
- FCFSupport::Train, [1208](#)
 - ~Train, [1213](#)
 - BoxMove, [1211](#)
 - CarTypes, [1213](#)
 - carTypes, [1219](#)
 - Description, [1213](#)
 - description, [1220](#)
 - DivisionList, [1214](#)
 - divList, [1220](#)
 - Done, [1214](#)
 - done, [1220](#)
 - IndustryStop, [1214](#)
 - Manifest, [1211](#)
 - MaxCars, [1214](#)
 - maxcars, [1220](#)
 - MaxClear, [1215](#)
 - maxclear, [1220](#)
 - MaxLength, [1215](#)
 - maxlength, [1221](#)
 - MaxWeight, [1215](#)
 - maxweight, [1221](#)
 - Name, [1215](#)
 - name, [1221](#)
 - NumberOfOrders, [1215](#)
 - NumberOfStops, [1216](#)
 - OnDuty, [1216](#)
 - onduty, [1221](#)
 - operator=, [1216](#)
 - Order, [1216](#)
 - orders, [1221](#)
 - Passenger, [1211](#)
 - Print, [1217](#)
 - print, [1222](#)
 - SetMaxLength, [1217](#)
 - SetMaxWeight, [1217](#)
 - SetPrint, [1218](#)
 - SetShift, [1218](#)
 - Shift, [1218](#)
 - shift, [1222](#)
 - StationStop, [1218](#)
 - stops, [1222](#)
 - System, [1219](#)
 - Train, [1211](#), [1212](#)
 - TrainType, [1211](#)
 - Type, [1219](#)
 - type, [1222](#)
 - Unknown, [1211](#)
 - Wayfreight, [1211](#)
- FCFSupport::Train::StationOrIndustry, [963](#)
 - industry, [963](#)
 - station, [963](#)
- FCFSupport::TrainDisplayCallback, [1233](#)
 - ~TrainDisplayCallback, [1234](#)
 - CloseTrainDisplay, [1234](#)
 - GrabTrainDisplay, [1234](#)
 - InitializeTrainDisplay, [1235](#)
 - ReleaseTrainDisplay, [1235](#)
 - TrainDisplayCallback, [1234](#)
 - UpdateTrainDisplay, [1235](#)
- FCFSupport::WorkInProgressCallback, [1264](#)
 - ~WorkInProgressCallback, [1265](#)

- ProgressDone, 1265
- ProgressStart, 1265
- ProgressUpdate, 1266
- WorkInProgressCallback, 1264
- FCFSupportModule, 24
- FEETperMM
 - MRRXtrkCad.tab.h, 1307
- FF
 - FCFSupport::LQ24PrinterDevice, 596
- fieldflag
 - Parsers::MRRXtrkCad, 632
 - YY_MRRXtrkCad_INHERIT, 1293
- fifteenbits
 - lcc, 116
- FileEntry, 85
 - _destroy, 87
 - _openFile, 87
 - _path_command, 87
 - bind, 88
 - cget, 88
 - configure, 88
 - create, 89
- Filename
 - TTSupport::TimeTableSystem, 1151
- FileOffset
 - FCFSupport::PDFFileStructures::IndirectObject, 515
- fileOffset
 - FCFSupport::PDFFileStructures::IndirectObject, 518
- filepath
 - TTSupport::TimeTableSystem, 1163
- FilterSelectBits
 - CTIAcela, 59
- filterthreshtype
 - CTIAcela, 41
- findAvailableComPorts
 - lcc::CANGridConnectOverUSBSerial, 223
- FindBlock
 - Parsers::TrackGraph, 1193
- FindCab
 - TTSupport::TimeTableSystem, 1151
- FindCarInCarVector
 - FCFSupport::System, 1052
- FindDivisionByIndex
 - FCFSupport::System, 1052
- FindDivisionBySymbol
 - FCFSupport::System, 1053
- FindDivisionIndex
 - FCFSupport::System, 1053
- FindIndustry
 - FCFSupport::System, 1053
- FindIndustryByIndex
 - FCFSupport::System, 1054
- FindIndustryByName
 - FCFSupport::System, 1054
- FindIndustryIndex
 - FCFSupport::System, 1054
- FindNode
 - Parsers::TrackGraph, 1193
- FindOccupied
 - TTSupport::StorageTrack, 996
- FindSegmentIndex
 - Parsers::TrackGraph::CompressedNodeValues, 296
- FindStationByName
 - FCFSupport::System, 1055
 - TTSupport::TimeTableSystem, 1151
- FindStationIndex
 - FCFSupport::System, 1055
- FindStorageTrack
 - TTSupport::Station, 957
 - TTSupport::TimeTableSystem, 1151
- findtopicintoc
 - HTMLHelp::HTMLHelp, 488
- FindTrackTrainsStoredOn
 - TTSupport::Station, 958
- FindTrainByIndex
 - FCFSupport::System, 1055
- FindTrainByName
 - FCFSupport::System, 1056
 - TTSupport::TimeTableSystem, 1152
- FindTrainByNumber
 - TTSupport::TimeTableSystem, 1152
- first
 - lcc, 118
- first_column
 - yytype, 1297
- first_line
 - yytype, 1297
- FirstCab
 - TTSupport::TimeTableSystem, 1153
- FirstCarType
 - FCFSupport::System, 1056
- firstChar
 - FCFSupport::PDFFileStructures::Type1FontDictionary, 1260
- FirstDivision
 - FCFSupport::System, 1056
- FirstIndustry
 - FCFSupport::System, 1056
- FirstOccupied
 - TTSupport::StorageTrack, 996
- FirstOwner
 - FCFSupport::System, 1057
- FirstPrintOption
 - TTSupport::TimeTableSystem, 1153
- FirstStation
 - FCFSupport::System, 1057
- FirstStorageTrack
 - TTSupport::Station, 958

- FirstTrain
 - FCFSupport::System, [1057](#)
 - TTSupport::TimeTableSystem, [1153](#)
- fivebits
 - lcc, [116](#)
- fixedP
 - FCFSupport::Car, [255](#)
- FixedRouteMirrorCheck
 - FCFSupport::System, [1057](#)
- FixedRouteP
 - FCFSupport::Car, [243](#)
- Flag
 - TTSupport::StationTimes, [966](#)
 - TTSupport::Stop, [988](#)
- flag
 - TTSupport::StationTimes, [967](#)
 - TTSupport::Stop, [992](#)
- FlagType
 - TTSupport::Stop, [986](#)
- FLOAT
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- font
 - FCFSupport::PDFFileStructures::ResourceDictionary, [856](#)
 - HTMLHelp::HTMLHelp, [488](#)
- fontDescriptor
 - FCFSupport::PDFFileStructures::Type1FontDictionary, [1260](#)
- FontDictionary
 - FCFSupport::PDFFileStructures::FontDictionary, [441](#)
- FontFamily
 - OvalWidgets, [132](#)
- Fonts
 - HTMLHelp::HTMLHelp, [508](#)
- ForEveryCab
 - TimeTableSystemTcl, [27](#)
- ForEveryNote
 - TimeTableSystemTcl, [27](#)
- ForEveryPrintOption
 - TimeTableSystemTcl, [28](#)
- ForEveryStation
 - TimeTableSystemTcl, [28](#)
- ForEveryTrain
 - TimeTableSystemTcl, [29](#)
- forget
 - ScrollTabNotebook, [877](#)
- form
 - HTMLHelp::HTMLHelp, [488](#)
- FormatDutyTime
 - FCFSupport::System, [1058](#)
- Forward
 - nce, [127](#)
 - xpressnet, [151](#)
- forward
 - CabWidgets::LocomotiveDirection, [578](#)
 - HTMLHelp::HTMLHelp, [489](#)
- forwardcurrenttopic
 - HTMLHelp::HTMLHelp, [489](#)
- fp
 - Parsers::ParseFile, [753](#)
- fraction
 - OvalWidgets::OvalScrollBar, [727](#)
- FRAMETYPE_MASK
 - lcc::MTIHeader, [642](#)
- FRAMETYPE_SHIFT
 - lcc::MTIHeader, [642](#)
- FreedObject
 - FCFSupport::PDFFileStructures::FreedObject, [444](#)
- FreeObject
 - FCFSupport::PDFFileStructures::CrossReferenceTable, [358](#)
- From
 - TTSupport::Occupied, [679](#)
 - TTSupport::TimeRange, [1137](#)
- from
 - TTSupport::Occupied, [681](#)
 - TTSupport::TimeRange, [1140](#)
- FullPath
 - FCFSupport::PathName, [763](#)
 - TTSupport::PathName, [772](#)
- Function
 - xpressnet::DoubleHeaderInformation, [415](#)
 - xpressnet::LocomotiveInformation, [581](#)
- FUNCTION_STATUS
 - xpressnet, [153](#)
- FunctionStatus
 - xpressnet::FunctionStatus, [446](#)
- FunctionStatusRequest
 - xpressnet::XPressNet, [1278](#)
- FUZZ
 - Parsers::TrackGraph::Transform2D, [1240](#)
- fval
 - yy_MRRXtrkCad_type, [1295](#)
- G
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- gccomponent
 - lcc::CANGridConnectOverCANSocket, [213](#)
 - lcc::CANGridConnectOverTcp, [218](#)
 - lcc::CANGridConnectOverUSBSerial, [223](#)
- gcmessage
 - lcc::CANGridConnect, [208](#)
- gcreply
 - lcc::CANGridConnect, [208](#)
- GenerationNumber
 - FCFSupport::PDFFileStructures::IndirectObject, [515](#)

- generationNumber
 - FCFSupport::PDFFileStructures::IndirectObject, [518](#)
- Get
 - linuxgpio::GpioInputActiveLow, [453](#)
 - linuxgpio::GpioOutputSafeHighInvert, [458](#)
 - linuxgpio::GpioOutputSafeLowInverted, [462](#)
 - linuxgpio::LinuxGpio, [570](#)
- get
 - LabelComboBox, [100](#)
 - OvalWidgets::OvalScale, [717](#)
 - OvalWidgets::OvalSlider, [722](#)
 - OvalWidgets::OvalScrollBar, [728](#)
- get3dcolor
 - ScrollTabNotebook, [878](#)
- get_html
 - HTMLHelp::HTMLHelp, [489](#)
- GetAlert
 - RaildriverIO, [830](#)
- getAliasOfNID
 - lcc::CANGridConnect, [202](#)
- getAllAliases
 - lcc::CANGridConnect, [202](#)
- getAllNIDs
 - lcc::CANGridConnect, [202](#)
- GetAutoBrake
 - RaildriverIO, [830](#)
- GetBailOff
 - RaildriverIO, [830](#)
- GetBell
 - RaildriverIO, [831](#)
- getBits
 - lcc::CANGridConnect, [203](#)
- GetBlueButton1
 - RaildriverIO, [831](#)
- GetBlueButton10
 - RaildriverIO, [831](#)
- GetBlueButton11
 - RaildriverIO, [831](#)
- GetBlueButton12
 - RaildriverIO, [831](#)
- GetBlueButton13
 - RaildriverIO, [832](#)
- GetBlueButton14
 - RaildriverIO, [832](#)
- GetBlueButton15
 - RaildriverIO, [832](#)
- GetBlueButton16
 - RaildriverIO, [832](#)
- GetBlueButton17
 - RaildriverIO, [832](#)
- GetBlueButton18
 - RaildriverIO, [833](#)
- GetBlueButton19
 - RaildriverIO, [833](#)
- GetBlueButton2
 - RaildriverIO, [833](#)
- GetBlueButton20
 - RaildriverIO, [833](#)
- GetBlueButton21
 - RaildriverIO, [833](#)
- GetBlueButton22
 - RaildriverIO, [834](#)
- GetBlueButton23
 - RaildriverIO, [834](#)
- GetBlueButton24
 - RaildriverIO, [834](#)
- GetBlueButton25
 - RaildriverIO, [834](#)
- GetBlueButton26
 - RaildriverIO, [834](#)
- GetBlueButton27
 - RaildriverIO, [835](#)
- GetBlueButton28
 - RaildriverIO, [835](#)
- GetBlueButton3
 - RaildriverIO, [835](#)
- GetBlueButton4
 - RaildriverIO, [835](#)
- GetBlueButton5
 - RaildriverIO, [835](#)
- GetBlueButton6
 - RaildriverIO, [836](#)
- GetBlueButton7
 - RaildriverIO, [836](#)
- GetBlueButton8
 - RaildriverIO, [836](#)
- GetBlueButton9
 - RaildriverIO, [836](#)
- getBytes
 - lcc::GridConnectReply, [474](#)
- GetCarStatus
 - FCFSupport::System, [1058](#)
- GetCurveSegment
 - Parsers::BezierBodyElt, [182](#)
 - Parsers::CornuBodyElt, [343](#)
- getData
 - lcc::CanMessage, [231](#)
- GetEBrakeDown
 - RaildriverIO, [836](#)
- GetEBrakeUp
 - RaildriverIO, [837](#)
- getElementsById
 - SimpleDOMElt, [914](#)
- getElementsByTagName
 - SimpleDOMElt, [914](#)
- getHeader
 - lcc::CANHeader, [226](#)
 - lcc::CanMessage, [232](#)

- lcc::GridConnectReply, [474](#)
- lcc::MTIDetail, [635](#)
- lcc::MTIHeader, [641](#)
- GetHeadlight
 - RaildriverIO, [837](#)
- getHexDigit
 - lcc::GridConnectReply, [475](#)
- geti
 - CTCPanel::CodeButton, [287](#)
 - CTCPanel::Crossing, [350](#)
 - CTCPanel::Crossover, [354](#)
 - CTCPanel::CTCLabel, [362](#)
 - CTCPanel::CTCPanel, [379](#)
 - CTCPanel::CurvedBlock, [394](#)
 - CTCPanel::DoubleSlip, [423](#)
 - CTCPanel::EndBumper, [429](#)
 - CTCPanel::HiddenBlock, [479](#)
 - CTCPanel::Lamp, [547](#)
 - CTCPanel::PushButton, [816](#)
 - CTCPanel::SchLabel, [863](#)
 - CTCPanel::ScissorCrossover, [867](#)
 - CTCPanel::Signal, [902](#)
 - CTCPanel::SIGPlate, [907](#)
 - CTCPanel::SingleSlip, [920](#)
 - CTCPanel::StraightBlock, [1004](#)
 - CTCPanel::StubYard, [1008](#)
 - CTCPanel::Switch, [1012](#)
 - CTCPanel::SWPlate, [1031](#)
 - CTCPanel::ThreeWaySW, [1129](#)
 - CTCPanel::ThroughYard, [1133](#)
 - CTCPanel::Toggle, [1170](#)
- GetIndependBrake
 - RaildriverIO, [837](#)
- GetIndustryCarCounts
 - FCFSupport::System, [1058](#)
- GetInstance
 - HTMLHelp::HTMLHelp, [489](#)
- GetKidLimits
 - FCFSupport::PDFFileStructures::PageLabelTree, [744](#)
- GetLI100VersionNumbers
 - xpressnet::XPressNet, [1279](#)
- getlistbox
 - LabelComboBox, [101](#)
- getMyAlias
 - lcc::CanAlias, [195](#)
- getMyNIDList
 - lcc::CanAlias, [195](#)
- getNextAlias
 - lcc::CanAlias, [196](#)
- GetNextCommandStationResponse
 - xpressnet::XPressNet, [1279](#)
- getNIDofAlias
 - lcc::CANGridConnect, [203](#)
- getNumBytes
 - lcc::GridConnectReply, [475](#)
- GetPanDown
 - RaildriverIO, [837](#)
- GetPanLeft
 - RaildriverIO, [837](#)
- GetPanRight
 - RaildriverIO, [838](#)
- GetPantograph
 - RaildriverIO, [838](#)
- GetPanUp
 - RaildriverIO, [838](#)
- getParent
 - SimpleDOMEElement, [914](#)
- GetPrintOption
 - TTSupport::TimeTableSystem, [1153](#)
- GetProductCodeId
 - RaildriverIO, [838](#)
- GetProductId
 - azatrax::Azatrax, [169](#)
- GetProtocolNames
 - lcc::OpenLCBProtocols, [706](#)
- GetRangeDown
 - RaildriverIO, [838](#)
- GetRangeUp
 - RaildriverIO, [839](#)
- GetReverser
 - RaildriverIO, [839](#)
- GetSand
 - RaildriverIO, [839](#)
- GetStateData
 - azatrax::Azatrax, [169](#)
- GetStraightSegment
 - Parsers::BezierBodyElt, [182](#)
 - Parsers::CornuBodyElt, [343](#)
- gettext, [89](#)
 - _, [90](#)
 - _m, [90](#)
 - _mx, [90](#)
- GetThrottle
 - RaildriverIO, [839](#)
- GetTurnoutCurveSegment
 - Parsers::TurnoutBodyElt, [1247](#)
- GetTurnoutJointSegment
 - Parsers::TurnoutBodyElt, [1247](#)
- GetTurnoutRoute
 - Parsers::TurnoutBodyElt, [1248](#)
- GetTurnoutStraightSegment
 - Parsers::TurnoutBodyElt, [1248](#)
- getv
 - CTCPanel::CodeButton, [287](#)
 - CTCPanel::Crossing, [350](#)
 - CTCPanel::Crossover, [354](#)
 - CTCPanel::CTCLabel, [362](#)

- CTCPanel::CTCPanel, [380](#)
- CTCPanel::DoubleSlip, [423](#)
- CTCPanel::HiddenBlock, [480](#)
- CTCPanel::Lamp, [547](#)
- CTCPanel::PushButton, [817](#)
- CTCPanel::SchLabel, [863](#)
- CTCPanel::ScissorCrossover, [867](#)
- CTCPanel::Signal, [902](#)
- CTCPanel::SIGPlate, [907](#)
- CTCPanel::SingleSlip, [920](#)
- CTCPanel::StraightBlock, [1004](#)
- CTCPanel::StubYard, [1008](#)
- CTCPanel::Switch, [1013](#)
- CTCPanel::SWPlate, [1031](#)
- CTCPanel::ThreeWaySW, [1129](#)
- CTCPanel::Toggle, [1171](#)
- getvalue
 - LabelComboBox, [101](#)
 - LabelSpinBox, [111](#)
- GetWhistleDown
 - RaildriverIO, [839](#)
- GetWhistleUp
 - RaildriverIO, [840](#)
- GetWiper
 - RaildriverIO, [840](#)
- getZoom
 - CTCPanel::CTCPanel, [380](#)
- GetZoomUp
 - RaildriverIO, [840](#)
- GetZoopDown
 - RaildriverIO, [840](#)
- GlobStringMatch
 - FCFSupport::System, [1058](#)
- GlobStringMatchHelper
 - FCFSupport::System, [1059](#)
- GpioInputActiveHigh
 - linuxgpio::GpioInputActiveHigh, [450](#)
- GpioInputActiveLow
 - linuxgpio::GpioInputActiveLow, [452](#)
- GpioOutputSafeHigh
 - linuxgpio::GpioOutputSafeHigh, [455](#)
- GpioOutputSafeHighInvert
 - linuxgpio::GpioOutputSafeHighInvert, [457](#)
- GpioOutputSafeLow
 - linuxgpio::GpioOutputSafeLow, [459](#)
- GpioOutputSafeLowInverted
 - linuxgpio::GpioOutputSafeLowInverted, [461](#)
- gPos1
 - Parsers::SegVector, [888](#)
- gPos2
 - Parsers::SegVector, [888](#)
- GrabTrainDisplay
 - FCFSupport::TrainDisplayCallback, [1234](#)
- Graph
 - Parsers::TrackGraph, [1186](#)
- Graphics Support Code, [64](#)
- GridConnectMessage
 - lcc::GridConnectMessage, [465](#)
- GridConnectReply
 - lcc::GridConnectReply, [472](#)
- Group
 - FCFSupport::CarGroup, [261](#)
 - FCFSupport::CarType, [265](#)
- group
 - FCFSupport::CarGroup, [262](#)
 - FCFSupport::CarType, [267](#)
- GRSupport, [91](#)
 - _ROPI, [92](#)
 - _ROI2, [92](#)
 - DegreesToRadians, [92](#)
 - PI, [94](#)
 - PI2, [94](#)
 - RadiansToDegrees, [93](#)
 - VerifyBooleanMethod, [93](#)
 - VerifyColorMethod, [93](#)
 - VerifyDoubleMethod, [93](#)
 - VerifyIntegerMethod, [93](#)
 - VerifyOrientationHVMMethod, [94](#)
- GRSupportModule, [64](#)
- GrType
 - Parsers::SegVector, [887](#)
- GScale
 - MRRXtrkCad.tab.h, [1307](#)
- H
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Half
 - FCFSupport::PrinterDevice, [807](#)
- handle
 - azatrax::Azatrax, [174](#)
- HardReset
 - ncc::NCE, [653](#)
- HardwareVersion
 - xpressnet::LI100VersionNumbers, [566](#)
- hashCode
 - lcc::CanMessage, [232](#)
- HasOffset
 - FCFSupport::PDFFileStructures::IndirectObject, [516](#)
- HasRelays
 - azatrax::MRD, [623](#)
- HaveData
 - CTIAcela, [47](#)
- Hazard
 - FCFSupport::Industry, [528](#)
- hazard
 - FCFSupport::Industry, [533](#)
- HBar
 - OvalWidgets, [133](#)

- header
 - splash, [935](#)
- headerword
 - lcc, [116](#)
- HEADLIGHT
 - raildriver, [138](#)
 - RaildriverIO, [827](#)
- Headlight
 - RaildriverIO, [843](#)
- HEADLIGHT_M
 - RaildriverIO, [829](#)
- Heads
 - Parsers::LayoutFile, [556](#)
 - Parsers::TrackGraph, [1193](#)
- heads
 - Parsers::TrackGraph, [1207](#)
- help
 - HTMLHelp::HTMLHelp, [489](#)
- helptext
 - HTMLHelp::HTMLHelp, [508](#)
- helptext_css
 - HTMLHelp::HTMLHelp, [508](#)
- helpTopic
 - HTMLHelp::HTMLHelp, [490](#)
- HiddenBlock
 - CTCPanel::HiddenBlock, [479](#)
- hide
 - splash, [934](#)
- high
 - linuxgpio, [120](#)
- highbyte
 - CTIAcela, [47](#)
- highest
 - lcc::ConfigOptions, [308](#)
- HighestNode
 - Parsers::LayoutFile, [556](#)
 - Parsers::TrackGraph, [1194](#)
- HighestObjectNumber
 - FCFSupport::PDFFileStructures::CrossReferenceTable, [358](#)
- HMalphanumeric
 - HTMLHelp::HTMLHelp, [508](#)
- HMappend_css
 - HTMLHelp::HTMLHelp, [490](#)
- HMcgiDecode
 - HTMLHelp::HTMLHelp, [490](#)
- HMcgiMap
 - HTMLHelp::HTMLHelp, [490](#)
- HMcheck_tocRelative
 - HTMLHelp::HTMLHelp, [490](#)
- HMcurrent_tags
 - HTMLHelp::HTMLHelp, [491](#)
- HMdo_map
 - HTMLHelp::HTMLHelp, [491](#)
- HMesc_map
 - HTMLHelp::HTMLHelp, [508](#)
- HMevents
 - HTMLHelp::HTMLHelp, [509](#)
- HMextract_param
 - HTMLHelp::HTMLHelp, [491](#)
- HMform_map
 - HTMLHelp::HTMLHelp, [509](#)
- HMgot_image
 - HTMLHelp::HTMLHelp, [491](#)
- HMgoto
 - HTMLHelp::HTMLHelp, [491](#)
- HMininit_state
 - HTMLHelp::HTMLHelp, [492](#)
- HMininit_win
 - HTMLHelp::HTMLHelp, [492](#)
- HMinput_checkbox
 - HTMLHelp::HTMLHelp, [492](#)
- HMinput_hidden
 - HTMLHelp::HTMLHelp, [492](#)
- HMinput_image
 - HTMLHelp::HTMLHelp, [492](#)
- HMinput_password
 - HTMLHelp::HTMLHelp, [493](#)
- HMinput_radio
 - HTMLHelp::HTMLHelp, [493](#)
- HMinput_reset
 - HTMLHelp::HTMLHelp, [493](#)
- HMinput_submit
 - HTMLHelp::HTMLHelp, [493](#)
- HMinput_text
 - HTMLHelp::HTMLHelp, [493](#)
- HMininsert_map
 - HTMLHelp::HTMLHelp, [509](#)
- Hmlink_callback
 - HTMLHelp::HTMLHelp, [494](#)
- Hmlink_hit
 - HTMLHelp::HTMLHelp, [494](#)
- Hmlink_setup
 - HTMLHelp::HTMLHelp, [494](#)
- HMlist_elements
 - HTMLHelp::HTMLHelp, [509](#)
- HMload_css
 - HTMLHelp::HTMLHelp, [494](#)
- HMmap_esc
 - HTMLHelp::HTMLHelp, [495](#)
- HMmap_reply
 - HTMLHelp::HTMLHelp, [495](#)
- HMOptimize
 - HTMLHelp::HTMLHelp, [495](#)
- HMparam_map
 - HTMLHelp::HTMLHelp, [509](#)
- HMparse_html
 - HTMLHelp::HTMLHelp, [495](#)

- HMrender
 - [HTMLHelp::HTMLHelp](#), 495
- HMreset_win
 - [HTMLHelp::HTMLHelp](#), 496
- HMset_font
 - [HTMLHelp::HTMLHelp](#), 496
- HMset_image
 - [HTMLHelp::HTMLHelp](#), 496
- HMset_indent
 - [HTMLHelp::HTMLHelp](#), 496
- HMset_state
 - [HTMLHelp::HTMLHelp](#), 497
- HMstack
 - [HTMLHelp::HTMLHelp](#), 497
- hmstart
 - [HTMLHelp::HTMLHelp](#), 497
- HMsubmit_button
 - [HTMLHelp::HTMLHelp](#), 497
- HMsubmit_form
 - [HTMLHelp::HTMLHelp](#), 498
- HMsubmit_index
 - [HTMLHelp::HTMLHelp](#), 498
- HMtag_a
 - [HTMLHelp::HTMLHelp](#), 498
- HMtag_color
 - [HTMLHelp::HTMLHelp](#), 499
- HMtag_dt
 - [HTMLHelp::HTMLHelp](#), 499
- HMtag_font
 - [HTMLHelp::HTMLHelp](#), 499
- HMtag_form
 - [HTMLHelp::HTMLHelp](#), 500
- HMtag_hmstart
 - [HTMLHelp::HTMLHelp](#), 500
- HMtag_hr
 - [HTMLHelp::HTMLHelp](#), 500
- HMtag_img
 - [HTMLHelp::HTMLHelp](#), 500
- HMtag_input
 - [HTMLHelp::HTMLHelp](#), 501
- HMtag_isindex
 - [HTMLHelp::HTMLHelp](#), 501
- HMtag_li
 - [HTMLHelp::HTMLHelp](#), 501
- HMtag_link
 - [HTMLHelp::HTMLHelp](#), 502
- HMtag_map
 - [HTMLHelp::HTMLHelp](#), 509
- HMtag_menu
 - [HTMLHelp::HTMLHelp](#), 502
- HMtag_ol
 - [HTMLHelp::HTMLHelp](#), 502
- HMtag_option
 - [HTMLHelp::HTMLHelp](#), 502
- HMtag_select
 - [HTMLHelp::HTMLHelp](#), 502
- HMtag_textarea
 - [HTMLHelp::HTMLHelp](#), 503
- HMtag_title
 - [HTMLHelp::HTMLHelp](#), 503
- HMtag_ul
 - [HTMLHelp::HTMLHelp](#), 503
- HMtest_parse
 - [HTMLHelp::HTMLHelp](#), 503
- HMwent_to
 - [HTMLHelp::HTMLHelp](#), 504
- HMwin_install
 - [HTMLHelp::HTMLHelp](#), 504
- HMx_font
 - [HTMLHelp::HTMLHelp](#), 504
- HMzap_white
 - [HTMLHelp::HTMLHelp](#), 504
- HO
 - [Parsers::MRRXtrkCad](#), 629
 - [YY_MRRXtrkCad_INHERIT](#), 1291
- Home
 - [FCFSupport::Division](#), 409
- home
 - [FCFSupport::Division](#), 411
- horizontalScaling
 - [FCFSupport::PDFPrinterDevice](#), 787
- HOScale
 - [MRRXtrkCad.tab.h](#), 1307
- hostLEntry
 - [lcc::CANGridConnectOverTcp](#), 218
 - [lcc::OpenLCBOverTcp](#), 704
- Hours
 - [nce](#), 124
- HTMLHelp, 94
 - [HTMLHelp::HTMLHelp](#), 486
- HTMLHelp::HTMLHelp, 481
 - [_Close](#), 487
 - [_SBackward](#), 487
 - [_SForward](#), 487
 - [_WidgetMap](#), 507
 - [a](#), 487
 - [back](#), 487
 - [backcurrenttopic](#), 488
 - [color](#), 488
 - [command](#), 507
 - [curtopicindex](#), 507
 - [defaultHelpDirectory](#), 507
 - [defaultHelpWindow](#), 507
 - [defaultTableOfContents](#), 508
 - [findtopicintoc](#), 488
 - [font](#), 488
 - [Fonts](#), 508
 - [form](#), 488

- forward, [489](#)
- forwardcurrenttopic, [489](#)
- get_html, [489](#)
- GetInstance, [489](#)
- help, [489](#)
- helptext, [508](#)
- helptext_css, [508](#)
- helpTopic, [490](#)
- HMalphnumeric, [508](#)
- HMappend_css, [490](#)
- HMcgiDecode, [490](#)
- HMcgiMap, [490](#)
- HMcheck_tocRelative, [490](#)
- HMcurrent_tags, [491](#)
- HMdo_map, [491](#)
- HMesc_map, [508](#)
- HMevents, [509](#)
- HMextract_param, [491](#)
- HMform_map, [509](#)
- HMgot_image, [491](#)
- HMgoto, [491](#)
- HMininit_state, [492](#)
- HMininit_win, [492](#)
- HMinput_checkbox, [492](#)
- HMinput_hidden, [492](#)
- HMinput_image, [492](#)
- HMinput_password, [493](#)
- HMinput_radio, [493](#)
- HMinput_reset, [493](#)
- HMinput_submit, [493](#)
- HMinput_text, [493](#)
- HMinsert_map, [509](#)
- Hmlink_callback, [494](#)
- Hmlink_hit, [494](#)
- Hmlink_setup, [494](#)
- HMlist_elements, [509](#)
- HMload_css, [494](#)
- HMmap_esc, [495](#)
- HMmap_reply, [495](#)
- HMOptimize, [495](#)
- HMparam_map, [509](#)
- HMparse_html, [495](#)
- HMrender, [495](#)
- HMreset_win, [496](#)
- HMset_font, [496](#)
- HMset_image, [496](#)
- HMset_indent, [496](#)
- HMset_state, [497](#)
- HMstack, [497](#)
- hmstart, [497](#)
- HMsubmit_button, [497](#)
- HMsubmit_form, [498](#)
- HMsubmit_index, [498](#)
- HMtag_a, [498](#)
- HMtag_color, [499](#)
- HMtag_dt, [499](#)
- HMtag_font, [499](#)
- HMtag_form, [500](#)
- HMtag_hmstart, [500](#)
- HMtag_hr, [500](#)
- HMtag_img, [500](#)
- HMtag_input, [501](#)
- HMtag_isindex, [501](#)
- HMtag_li, [501](#)
- HMtag_link, [502](#)
- HMtag_map, [509](#)
- HMtag_menu, [502](#)
- HMtag_ol, [502](#)
- HMtag_option, [502](#)
- HMtag_select, [502](#)
- HMtag_textarea, [503](#)
- HMtag_title, [503](#)
- HMtag_ul, [503](#)
- HMtest_parse, [503](#)
- HMwent_to, [504](#)
- HMwin_install, [504](#)
- HMx_font, [504](#)
- HMzap_white, [504](#)
- HTMLHelp, [486](#)
- lastsearch, [509](#)
- menu, [505](#)
- nextlink, [505](#)
- panes, [510](#)
- prevlink, [505](#)
- pushcurrenttopic, [505](#)
- render, [505](#)
- searchbackward, [506](#)
- searchforward, [506](#)
- select, [506](#)
- setDefault, [506](#)
- status, [510](#)
- textscroll, [510](#)
- toc, [510](#)
- toc_css, [510](#)
- tocscroll, [511](#)
- topicstack, [511](#)
- Url, [511](#)
- i
 - TclSocketCANModule, [36](#)
- icon
 - splash, [935](#)
- icursor
 - LabelComboBox, [101](#)
- id
 - Parsers::TrackGraph::CompressedNodeValues, [296](#)
 - Parsers::TrackGraph::NodeValues, [674](#)
- idAzatraxVendor

- azatrax::Azatrax, [165](#)
- identify
 - OvalWidgets::OvalScrollBar, [728](#)
- Identify_1
 - azatrax::Azatrax, [169](#)
- Identify_1_2
 - azatrax::MRD, [624](#)
- Identify_2
 - azatrax::MRD, [624](#)
- IdentifyConsumer
 - lcc::OpenLCBNode, [691](#)
- IdentifyEvents
 - lcc::OpenLCBNode, [691](#)
- IdentifyProducer
 - lcc::OpenLCBNode, [691](#)
- idheaders
 - lcc::ConfigurationEditor, [335](#)
- idMap
 - Parsers::TrackGraph, [1207](#)
- idMRDProduct
 - azatrax::Azatrax, [165](#)
- IdNodeMap
 - Parsers::TrackGraph, [1186](#)
- idSL2Product
 - azatrax::Azatrax, [165](#)
- idSR4Product
 - azatrax::Azatrax, [165](#)
- iElt
 - Parsers::IntegerList, [544](#)
- il
 - yy_MRRXtrkCad_stype, [1295](#)
- image
 - splash, [935](#)
- in
 - linuxgpio, [120](#)
- INCHESperMM
 - MRRXtrkCad.tab.h, [1307](#)
- IncludesTime
 - TTSupport::StorageTrack, [996](#)
- IncrementAssignments
 - FCFSupport::Car, [244](#)
- IncrementGenerationNumber
 - FCFSupport::PDFFileStructures::IndirectObject, [516](#)
- IncrementStatsLen
 - FCFSupport::Industry, [528](#)
- IncrementTrips
 - FCFSupport::Car, [244](#)
- IncrmentMovementsThisSession
 - FCFSupport::Car, [244](#)
- IndependBrake
 - RaildriverIO, [843](#)
- INDEPENDBRK
 - raildriver, [137](#)
 - RaildriverIO, [827](#)
- INDEPENDBRK_M
 - RaildriverIO, [828](#)
- index
 - Parsers::TrackBodyElt, [1178](#)
 - Parsers::TrackGraph::EdgeValues, [426](#)
 - ScrollTabNotebook, [878](#)
- IndirectFloatVector
 - FCFSupport::PDFFileStructures::IndirectFloatVector, [512](#)
- IndirectObject
 - FCFSupport::PDFFileStructures::CrossReferenceTable, [359](#)
 - FCFSupport::PDFFileStructures::IndirectObject, [514](#)
- IndirectObjectDictionary
 - FCFSupport::PDFFileStructures::IndirectObjectDictionary, [520](#)
- IndRipTrack
 - FCFSupport::System, [1059](#)
- IndRipTrackConst
 - FCFSupport::System, [1059](#)
- IndScrapYard
 - FCFSupport::System, [1060](#)
- indScrapYard
 - FCFSupport::System, [1112](#)
- industries
 - FCFSupport::Station, [954](#)
 - FCFSupport::System, [1113](#)
- IndustriesFile
 - FCFSupport::System, [1060](#)
- industriesFile
 - FCFSupport::System, [1113](#)
- INDUSTRY
 - FCFSupport::System, [1046](#)
- Industry
 - FCFSupport::Industry, [525](#), [526](#)
- industry
 - FCFSupport::SwitchListElement::StationOrIndustry, [962](#)
 - FCFSupport::Train::StationOrIndustry, [963](#)
- IndustryIndex
 - FCFSupport::System, [1060](#)
- IndustryMap
 - FCFSupport, [79](#)
- IndustryStop
 - FCFSupport::Train, [1214](#)
- IndustryTakesCar
 - FCFSupport::System, [1060](#)
- IndustryVector
 - FCFSupport, [79](#)
- info
 - FCFSupport::PDFPrinterDevice, [787](#)
- Infomational
 - FCFSupport::LogMessageCallback, [593](#)
- InformationDirectory

- FCFSupport::PDFFileStructures::InformationDirectory, [537](#)
- Init
 - cmri::CMri, [277](#)
- InitBoard
 - cmri::CMri, [275](#)
- InitializeTrainDisplay
 - FCFSupport::TrainDisplayCallback, [1235](#)
- Initials
 - FCFSupport::Owner, [732](#)
- initials
 - FCFSupport::Owner, [733](#)
- InitTSegId
 - Parsers::BezierBodyElt, [182](#)
 - Parsers::CornuBodyElt, [344](#)
 - Parsers::TurnoutBodyElt, [1248](#)
- Input_1_Enabled
 - azatrax::SL2, [924](#)
 - azatrax::SR4, [939](#)
- input_1_enabled
 - azatrax::SL2::status3_union, [981](#)
 - azatrax::SR4::status3_union, [983](#)
- Input_2_Enabled
 - azatrax::SL2, [924](#)
 - azatrax::SR4, [940](#)
- input_2_enabled
 - azatrax::SL2::status3_union, [981](#)
 - azatrax::SR4::status3_union, [983](#)
- Input_3_Enabled
 - azatrax::SL2, [924](#)
 - azatrax::SR4, [940](#)
- input_3_enabled
 - azatrax::SL2::status3_union, [981](#)
 - azatrax::SR4::status3_union, [983](#)
- Input_4_Enabled
 - azatrax::SL2, [924](#)
 - azatrax::SR4, [940](#)
- input_4_enabled
 - azatrax::SL2::status3_union, [981](#)
 - azatrax::SR4::status3_union, [983](#)
- Inputs
 - cmri::CMri, [275](#)
- inputs
 - CmriSupport::CmriNode, [282](#)
- insert
 - ScrollTabNotebook, [878](#)
- InsertBezierTrack
 - Parsers::TrackGraph, [1194](#)
- InsertBlock
 - Parsers::TrackGraph, [1194](#)
- insertCompressedNode
 - Parsers::TrackGraph, [1194](#)
- InsertControl
 - Parsers::TrackGraph, [1195](#)
- InsertCornuTrack
 - Parsers::TrackGraph, [1195](#)
- InsertCurveTrack
 - Parsers::TrackGraph, [1195](#)
- InsertJointTrack
 - Parsers::TrackGraph, [1196](#)
- InsertProtocolBit
 - lcc::OpenLCBProtocols, [707](#)
- InsertSensor
 - Parsers::TrackGraph, [1196](#)
- InsertSignal
 - Parsers::TrackGraph, [1196](#)
- InsertStraightTrack
 - Parsers::TrackGraph, [1196](#)
- InsertSwitchMotor
 - Parsers::TrackGraph, [1197](#)
- InsertTurnOut
 - Parsers::TrackGraph, [1197](#)
- InsertTurnTable
 - Parsers::TrackGraph, [1197](#)
- INSTRUCTION_NOT_SUPPORTED
 - xpressnet, [153](#)
- Instruments, [95](#)
 - CommonOptions, [96](#)
- Instruments::AnalogClock, [160](#)
 - ~AnalogClock, [162](#)
 - AnalogClock, [161](#)
 - settime, [162](#)
- Instruments::CabSignalLamp, [190](#)
 - _ConfigureFillColor, [192](#)
 - _ConfigureOutlineColor, [192](#)
 - _ConfigureSize, [192](#)
 - _ConfigureXY, [193](#)
 - ~CabSignalLamp, [191](#)
 - CabSignalLamp, [191](#)
 - canvas, [193](#)
 - sx, [193](#)
 - sy, [193](#)
- Instruments::DialInstrument, [395](#)
 - ~DialInstrument, [398](#)
 - DialInstrument, [397](#)
 - dTextX, [398](#)
 - dTextY, [399](#)
 - setvalue, [398](#)
 - ValueRange, [399](#)
- Instruments::DigitalClock, [401](#)
 - ~DigitalClock, [403](#)
 - DigitalClock, [402](#)
 - settime, [403](#)
- Instruments::DigitalInstrument, [403](#)
 - ~DigitalInstrument, [405](#)
 - DigitalInstrument, [405](#)
 - setvalue, [405](#)
- IntAppend

- Parsers::IntegerList, [542](#)
- INTEGER
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- IntegerList
 - Parsers::IntegerList, [541](#)
- InternalRunOneTrain
 - FCFSupport::System, [1061](#)
- invalid
 - lcc, [118](#)
- Inverse
 - Parsers::TrackGraph::Transform2D, [1239](#)
- invoke
 - CabWidgets::LocomotiveDirection, [577](#)
 - CabWidgets::LocomotiveSpeed, [589](#)
 - CabWidgets::SelectLocomotive, [892](#)
 - CTCPanel::CodeButton, [287](#)
 - CTCPanel::Crossing, [350](#)
 - CTCPanel::Crossover, [354](#)
 - CTCPanel::CTCLabel, [362](#)
 - CTCPanel::CTCPanel, [380](#)
 - CTCPanel::CurvedBlock, [394](#)
 - CTCPanel::DoubleSlip, [423](#)
 - CTCPanel::EndBumper, [430](#)
 - CTCPanel::HiddenBlock, [480](#)
 - CTCPanel::Lamp, [547](#)
 - CTCPanel::PushButton, [817](#)
 - CTCPanel::SchLabel, [863](#)
 - CTCPanel::ScissorCrossover, [867](#)
 - CTCPanel::Signal, [902](#)
 - CTCPanel::SIGPlate, [908](#)
 - CTCPanel::SingleSlip, [920](#)
 - CTCPanel::StraightBlock, [1004](#)
 - CTCPanel::StubYard, [1008](#)
 - CTCPanel::Switch, [1013](#)
 - CTCPanel::SWPlate, [1032](#)
 - CTCPanel::ThreeWaySW, [1129](#)
 - CTCPanel::ThroughYard, [1133](#)
 - CTCPanel::Toggle, [1171](#)
 - OvalWidgets::OvalButton, [711](#)
- is_output
 - linuxgpio::LinuxGpio, [570](#)
- IScale
 - MRRXtrkCad.tab.h, [1307](#)
- isChild
 - SimpleDOMEElement, [915](#)
- IsCompressed
 - Parsers::LayoutFile, [556](#)
 - Parsers::TrackGraph, [1197](#)
- IsCompressedNode
 - Parsers::LayoutFile, [557](#)
 - Parsers::TrackGraph, [1198](#)
- IsDoneP
 - FCFSupport::Car, [244](#)

- IsEven
 - ReadConfiguration, [139](#)
- IsNodeP
 - Parsers::LayoutFile, [557](#)
 - Parsers::TrackGraph, [1198](#)
- IsNone
 - Parsers::TrackGraph, [1198](#)
- IsOpenP
 - FCFSupport::PrinterDevice, [809](#)
- isOpenP
 - FCFSupport::PrinterDevice, [814](#)
- isRoot
 - FCFSupport::PDFFileStructures::PageLabelTree, [745](#)
- IsThisTheAzatraxWeAreLookingFor
 - azatrax::Azatrax, [169](#)
- Italic
 - FCFSupport::PrinterDevice, [806](#)
- itemcget
 - CTCPanel::CTCPanel, [381](#)
- itemconfigure
 - CTCPanel::CTCPanel, [381](#)
- lthStation
 - TTSupport::TimeTableSystem, [1154](#)
- ival
 - yy_MRRXtrkCad_stype, [1295](#)
- J
 - Parsers::MRRXtrkCad, [630](#)
 - Parsers::SegVector, [887](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- JOINT
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- KamadaKawaiSpringLayoutP
 - Parsers::TrackGraph, [1207](#)
- keywords
 - FCFSupport::PDFFileStructures::InformationDirectory, [539](#)
- kids
 - FCFSupport::PDFFileStructures::PageLabelTree, [745](#)
- L
 - Parsers::MRRXtrkCad, [630](#)
 - Parsers::SegVector, [888](#)
 - Parsers::TurnoutBodyElt, [1251](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- LabelComboBox, [96](#)
 - _destroy, [98](#)
 - _path_command, [99](#)
 - bind, [99](#)
 - cget, [99](#)
 - configure, [100](#)

- create, [100](#)
- get, [100](#)
- getlistbox, [101](#)
- getvalue, [101](#)
- icursor, [101](#)
- post, [102](#)
- setvalue, [102](#)
- unpost, [102](#)
- labels
 - FCFSupport::PDFFileStructures::CatalogDictionary, [271](#)
- LabelSelectColor, [103](#)
 - _destroy, [104](#)
 - _path_command, [105](#)
 - cget, [105](#)
 - ColorPopup, [105](#)
 - configure, [107](#)
 - create, [107](#)
- LabelSpinBox, [107](#)
 - _destroy, [109](#)
 - _path_command, [109](#)
 - bind, [109](#)
 - cget, [110](#)
 - configure, [110](#)
 - create, [110](#)
 - getvalue, [111](#)
 - setvalue, [111](#)
- Lamp
 - CTCPanel::Lamp, [546](#)
- LampBits
 - CTIAcela, [59](#)
- lappendCP
 - CTCPanel::CTCPanel, [381](#)
- last
 - lcc, [118](#)
- last_column
 - yyltype, [1297](#)
- last_line
 - yyltype, [1298](#)
- LastCab
 - TTSupport::TimeTableSystem, [1154](#)
- LastCarType
 - FCFSupport::System, [1061](#)
- lastChar
 - FCFSupport::PDFFileStructures::Type1FontDictionary, [1260](#)
- LastDivision
 - FCFSupport::System, [1061](#)
- lastIndex
 - FCFSupport::SwitchList, [1020](#)
- LastIndustry
 - FCFSupport::System, [1062](#)
- lastObjectNumber
 - FCFSupport::PDFFileStructures::CrossReferenceTable, [359](#)
- LastOccupied
 - TTSupport::StorageTrack, [997](#)
- LastOwner
 - FCFSupport::System, [1062](#)
- LastPrintOption
 - TTSupport::TimeTableSystem, [1154](#)
- lastsearch
 - HTMLHelp::HTMLHelp, [509](#)
- LastStation
 - FCFSupport::System, [1062](#)
- LastStorageTrack
 - TTSupport::Station, [958](#)
- LastTrain
 - FCFSupport::Car, [244](#)
 - FCFSupport::SwitchListElement, [1025](#)
 - FCFSupport::System, [1062](#)
 - TTSupport::TimeTableSystem, [1154](#)
- lastTrain
 - FCFSupport::SwitchListElement, [1027](#)
- lasttrain
 - FCFSupport::Car, [255](#)
- Latch_1
 - azatrax::MRD, [624](#)
- latch_1
 - azatrax::MRD::status1_union, [968](#)
- Latch_2
 - azatrax::MRD, [624](#)
- latch_2
 - azatrax::MRD::status1_union, [968](#)
- LAYERS
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- LayoutFile
 - Parsers::LayoutFile, [551](#)
- Layover
 - TTSupport::Stop, [988](#)
- layover
 - TTSupport::Stop, [993](#)
- lbg
 - ScrollTabNotebook, [883](#)
- LCARS, [112](#)
- lcc, [112](#)
 - AbstractMessage, [118](#)
 - AbstractMRMessage, [119](#)
 - byte, [115](#)
 - bytelist, [115](#)
 - bytelist72, [115](#)
 - complete, [118](#)
 - databuf, [115](#)
 - datagramcontent, [118](#)
 - eightbytes, [116](#)
 - eventvalidity, [118](#)

- fifteenbits, 116
- first, 118
- fivebits, 116
- headerword, 116
- invalid, 118
- last, 118
- length, 116
- middle, 118
- nid, 116
- sixbits, 117
- sixteenbits, 117
- stream, 118
- threebits, 117
- twelvebits, 117
- twobits, 117
- uint32, 117
- unknown, 118
- valid, 118
- lcc::CanAlias, 194
 - _peelnid, 195
 - CanAlias, 195
 - getMyAlias, 195
 - getMyNIDList, 195
 - getNextAlias, 196
 - lfsr1, 196
 - lfsr2, 196
 - myalias, 197
 - nidlist, 197
 - validate, 196
- lcc::CANGridConnect, 197
 - _flags0, 200
 - _messageReader, 200
 - _reserveMyAlias, 200
 - _sendDatagram, 201
 - _sendmessage, 201
 - _timedout, 201
 - _timeout, 207
 - _timeoutFlag, 207
 - aliasMap, 207
 - CANGridConnect, 199
 - canheader, 207
 - countNUL, 201
 - datagrambuffers, 208
 - gcmessage, 208
 - gcreply, 208
 - getAliasOfNID, 202
 - getAllAliases, 202
 - getAllNIDs, 202
 - getBits, 203
 - getNIDofAlias, 203
 - listeq, 204
 - messagebuffers, 208
 - messagehandler, 208
 - mtidetail, 208
 - mtiheader, 209
 - mycanalias, 209
 - nidMap, 209
 - NIDPATTERN, 209
 - parent, 209
 - populateAliasMap, 204
 - reserveAlias, 205
 - sendMessage, 205
 - sendOpenLCBMessage, 205
 - sentMessageHandler, 209
 - setMessageHandler, 206
 - setSentMessageHandler, 206
 - simplenodeflags, 210
 - updateAliasMap, 206
- lcc::CANGridConnectOverCANSocket, 210
 - _CancelOpenTransport, 212
 - _OpenTransport, 212
 - buildSocketnamenidDialog, 212
 - CANGridConnectOverCANSocket, 211
 - drawOptionsDialog, 212
 - gccomponent, 213
 - nidLEntry, 213
 - requiredOpts, 213
 - socket, 214
 - socketnameLEntry, 214
 - socketnamenidDialog, 214
- lcc::CANGridConnectOverTcp, 214
 - _CancelOpenTransport, 216
 - _OpenTransport, 216
 - buildPortnidandhostDialog, 217
 - CANGridConnectOverTcp, 216
 - drawOptionsDialog, 217
 - gccomponent, 218
 - hostLEntry, 218
 - nidLEntry, 218
 - portLSpin, 219
 - portnidandhostDialog, 219
 - requiredOpts, 218
 - socket, 219
- lcc::CANGridConnectOverUSBSerial, 219
 - _CancelOpenTransport, 221
 - _OpenTransport, 221
 - buildPortandnidDialog, 222
 - CANGridConnectOverUSBSerial, 221
 - drawOptionsDialog, 222
 - findAvailableComPorts, 223
 - gccomponent, 223
 - nidLEntry, 223
 - portandnidDialog, 224
 - portLCombo, 224
 - requiredOpts, 223
 - ttyfd, 224
- lcc::CANHeader, 224
 - CANHeader, 225

- getHeader, [226](#)
- OPENLCBFRAME_MASK, [226](#)
- OPENLCBFRAME_SHIFT, [226](#)
- RESERVED_SHIFT, [227](#)
- setHeader, [226](#)
- SRCID_MASK, [227](#)
- SRCID_SHIFT, [227](#)
- VARIABLEFIELD_MASK, [227](#)
- VARIABLEFIELD_SHIFT, [227](#)
- lcc::CanMessage, [228](#)
 - _header, [234](#)
 - CanMessage, [230](#)
 - copy, [231](#)
 - equals, [231](#)
 - getData, [231](#)
 - getHeader, [232](#)
 - hashCode, [232](#)
 - replyExpected, [232](#)
 - setData, [232](#)
 - setHeader, [233](#)
 - setNumDataElements, [233](#)
 - toString, [233](#)
 - validate, [233](#)
- lcc::CanTransport, [234](#)
 - _transportlayerconf, [235](#)
 - CanTransport, [235](#)
 - transport, [236](#)
- lcc::ConfigMemory, [297](#)
 - _Close, [299](#)
 - _Dump, [300](#)
 - _Read, [302](#)
 - _Restore, [302](#)
 - _Write, [302](#)
 - _datagramhandler, [300](#)
 - _datagramrejecterror, [303](#)
 - _dumpAsHex, [300](#)
 - _dumpAsText, [301](#)
 - _getAddressRange, [301](#)
 - _ioComplete, [304](#)
 - _messagehandler, [301](#)
 - _readmemory, [302](#)
 - _spaces, [304](#)
 - _writememory, [303](#)
 - address, [304](#)
 - ConfigMemory, [299](#)
 - count, [304](#)
 - datagrambuffer, [304](#)
 - olddatagramhandler, [304](#)
 - oldgeneralmessagehandler, [305](#)
 - putdebug, [303](#)
 - readlist, [305](#)
 - space, [305](#)
 - writelist, [305](#)
 - writeReplyCheck, [305](#)
- lcc::ConfigOptions, [306](#)
 - _Close, [307](#)
 - available, [308](#)
 - ConfigOptions, [307](#)
 - highest, [308](#)
 - lowest, [308](#)
 - name, [308](#)
 - nodeid, [308](#)
 - putdebug, [307](#)
 - writelengths, [309](#)
- lcc::ConfigurationEditor, [309](#)
 - _actionWrite, [314](#)
 - _close, [315](#)
 - _datagramhandler, [315](#)
 - _datagramrejecterror, [333](#)
 - _eventidComboRead, [315](#)
 - _eventidComboWrite, [316](#)
 - _eventidEntryRead, [316](#)
 - _eventidEntryWrite, [317](#)
 - _eventidnumber, [333](#)
 - _groupnumber, [333](#)
 - _intCBRead, [317](#)
 - _intCBWrite, [317](#)
 - _intComboRead, [318](#)
 - _intComboWrite, [318](#)
 - _intRBRead, [319](#)
 - _intRBWrite, [319](#)
 - _intScaleRead, [320](#)
 - _intScaleWrite, [320](#)
 - _intSpinRead, [321](#)
 - _intSpinWrite, [321](#)
 - _innumber, [333](#)
 - _ioComplete, [333](#)
 - _menu, [334](#)
 - _mkbuttons, [334](#)
 - _printexport, [322](#)
 - _printexport_csv, [322](#)
 - _printexport_csv_frame, [323](#)
 - _printexport_csv_frameAcross, [323](#)
 - _printexport_csv_framesAcross, [323](#)
 - _printexport_csv_vframe, [324](#)
 - _printexport_csv_vframeAcross, [324](#)
 - _printexport_pdf, [324](#)
 - _printexport_pdf_frame, [325](#)
 - _printexport_pdf_newpage, [325](#)
 - _printexport_pdf_vframe, [326](#)
 - _printexport_txt, [326](#)
 - _printexport_txt_frame, [327](#)
 - _printexport_txt_vframe, [327](#)
 - _printexport_xml, [328](#)
 - _printexport_xml_frame, [328](#)
 - _printexport_xml_vframe, [328](#)
 - _processXMLnode, [329](#)
 - _readall, [329](#), [334](#)

- [_readmemory, 330](#)
- [_segmentnumber, 334](#)
- [_stringComboRead, 330](#)
- [_stringComboWrite, 331](#)
- [_stringEntryRead, 331](#)
- [_stringEntryWrite, 332](#)
- [_stringnumber, 334](#)
- [_writememory, 332](#)
- [buttons, 334](#)
- [cdi, 335](#)
- [ConfigurationEditor, 313](#)
- [datagrambuffer, 335](#)
- [editframe, 335](#)
- [idheaders, 335](#)
- [main, 335](#)
- [olddatagramhandler, 335](#)
- [printexportfiletypes, 336](#)
- [putdebug, 332](#)
- [scroll, 336](#)
- [statusline, 336](#)
- [writeReplyCheck, 336](#)
- [lcc::EventID, 431](#)
 - [_eventID, 434](#)
 - [_getEventID, 433](#)
 - [_setEventID, 433](#)
 - [EventID, 432](#)
 - [EVENTIDFMT, 434](#)
 - [validate, 434](#)
- [lcc::EventID_or_null, 435](#)
 - [validate, 435](#)
- [lcc::EventLog, 435](#)
 - [_clear, 437](#)
 - [_close, 437](#)
 - [_sendtheevent, 437](#)
 - [EventLog, 436](#)
 - [eventReceived, 437](#)
 - [logscroll, 438](#)
 - [logtext, 438](#)
 - [open, 438](#)
 - [sendevent, 438](#)
- [lcc::EventReceived, 438](#)
 - [_Close, 440](#)
 - [eventid, 440](#)
 - [EventReceived, 439](#)
- [lcc::GridConnectMessage, 463](#)
 - [_copyCM, 466](#)
 - [_get_extended, 466](#)
 - [_get_rtr, 467](#)
 - [_set_extended, 467](#)
 - [_set_rtr, 467](#)
 - [GridConnectMessage, 465](#)
 - [setByte, 468](#)
 - [setHeader, 468](#)
 - [setHexDigit, 469](#)
- [lcc::GridConnectReply, 469](#)
 - [_RTRoffset, 476](#)
 - [_copyGCM, 472](#)
 - [_get_extended, 472](#)
 - [_get_rtr, 473](#)
 - [basicFormatCheck, 473](#)
 - [createReply, 474](#)
 - [getByte, 474](#)
 - [getHeader, 474](#)
 - [getHexDigit, 475](#)
 - [getNumBytes, 475](#)
 - [GridConnectReply, 472](#)
 - [MAXLEN, 476](#)
 - [maxSize, 475](#)
 - [setData, 475](#)
 - [setElement, 476](#)
- [lcc::MTIDetail, 633](#)
 - [ADDRESSP_MASK, 636](#)
 - [ADDRESSP_SHIFT, 637](#)
 - [DESTID_MASK, 637](#)
 - [DESTID_SHIFT, 637](#)
 - [EVENTP_MASK, 637](#)
 - [EVENTP_SHIFT, 637](#)
 - [getHeader, 635](#)
 - [MODIFIER_MASK, 637](#)
 - [MODIFIER_SHIFT, 638](#)
 - [MTIDetail, 635](#)
 - [mtiheader, 638](#)
 - [PRIORITY_MASK, 638](#)
 - [PRIORITY_SHIFT, 638](#)
 - [setHeader, 636](#)
 - [SIMPLE_MASK, 638](#)
 - [SIMPLE_SHIFT, 638](#)
 - [SPECIAL_MASK, 639](#)
 - [STREAMDG_MASK, 639](#)
 - [TYPEWITHIN_MASK, 639](#)
 - [TYPEWITHIN_SHIFT, 639](#)
- [lcc::MTIHeader, 639](#)
 - [canheader, 642](#)
 - [FRAMETYPE_MASK, 642](#)
 - [FRAMETYPE_SHIFT, 642](#)
 - [getHeader, 641](#)
 - [MTI_CAN_MASK, 642](#)
 - [MTI_CAN_SHIFT, 642](#)
 - [MTIHeader, 640](#)
 - [setHeader, 641](#)
- [lcc::nid_or_null, 670](#)
 - [validate, 671](#)
- [lcc::OpenLCBMessage, 682](#)
 - [_cgetdata, 684](#)
 - [_configuredata, 684](#)
 - [OpenLCBMessage, 683](#)
 - [toString, 684](#)
 - [validate, 685](#)

- lcc::OpenLCBNode, 685
 - _CancelSelectTransport, 689
 - _SelectTransport, 689
 - _buildSelectTransportConstructorDialog, 688
 - _messageHandler, 689
 - _transportConstructors, 697
 - constructorCombo, 697
 - ConsumerIdentified, 690
 - ConsumerRangeIdentified, 690
 - DatagramReceivedOK, 690
 - DatagramRejected, 691
 - IdentifyConsumer, 691
 - IdentifyEvents, 691
 - IdentifyProducer, 691
 - LearnEvent, 692
 - nidlist, 692
 - OpenLCBNode, 688
 - ProduceEvent, 692
 - ProducerIdentified, 693
 - ProducerRangeIdentified, 693
 - protocolsupport, 697
 - ProtocolSupportRequest, 693
 - ReturnMySimpleNodeInfo, 694
 - ReturnMySupportedProtocols, 694
 - selectTransportConstructor, 694
 - selectTransportConstructorDialog, 698
 - SendDatagram, 695
 - SendInitComplete, 695
 - SendMyNodeVerification, 695
 - SendMySimpleNodeInfo, 695
 - SendMySupportedProtocols, 696
 - SendSimpleNodeInfoRequest, 696
 - SendSupportedProtocolsRequest, 696
 - SendVerifyNodeID, 697
 - simplenodeinfo, 698
 - transport, 698
 - transportConstructors, 697
- lcc::OpenLCBOverTcp, 698
 - _CancelOpenTransport, 701
 - _OpenTransport, 701
 - _timeout, 703
 - buildPortnidandhostDialog, 701
 - datagrambuffers, 704
 - drawOptionsDialog, 701
 - hostLEntry, 704
 - messagebuffers, 704
 - messagehandler, 704
 - mtidetail, 704
 - nidLEntry, 704
 - NIDPATTERN, 705
 - OpenLCBOverTcp, 700
 - portLSpin, 705
 - portnidandhostDialog, 705
 - requiredOpts, 702
 - sendMessage, 702
 - sentMessageHandler, 705
 - setMessageHandler, 703
 - setSentMessageHandler, 703
 - sock, 705
- lcc::OpenLCBProtocols, 706
 - bitstype, 709
 - GetProtocolNames, 706
 - InsertProtocolBit, 707
 - ProtocolLabelString, 707
 - protocolstrings, 709
 - validate, 707
- lcc::SendEvent, 893
 - _Close, 894
 - _Send, 894
 - eventid, 894
 - SendEvent, 893
- LCCModule, 60
- LCDMessage16
 - nce, 124
- LCDMessage8
 - nce, 124
- LdLmt
 - FCFSupport::Car, 245
- Idlmt
 - FCFSupport::Car, 255
- LearnEvent
 - lcc::OpenLCBNode, 692
- LEDCommand
 - RaildriverIO, 843
- leds
 - raildriver::RaildriverClient, 820
- left
 - ScrollTabNotebook, 883
- leftbuttons
 - CabWidgets::LocomotiveSpeed, 591
- len0
 - BezierBody.h, 1324
 - CornuBody.h, 1325
 - Parsers::SegVector, 888
 - TurnoutBody.h, 1328
- len1
 - BezierBody.h, 1324
 - CornuBody.h, 1325
 - Parsers::SegVector, 888
 - TurnoutBody.h, 1328
- Length
 - FCFSupport::Car, 245
- length
 - FCFSupport::Car, 255
 - lcc, 116
 - Parsers::SegVector, 889
 - Parsers::TrackGraph::CompressedEdgeValues, 294
 - Parsers::TrackGraph::EdgeValues, 426

- Parsers::TrackGraph::NodeValues, 674
 - SimpleDOMElement, 915
- LengthOfCurve
 - Parsers::TrackGraph, 1198
- LengthOfJoint
 - Parsers::TrackGraph, 1199
- LengthOfNode
 - Parsers::LayoutFile, 557
 - Parsers::TrackGraph, 1199
- LengthOfStraight
 - Parsers::TrackGraph, 1199
- Letter
 - FCFSupport::PrinterDevice, 806
- lever
 - CTCPanel::Toggle, 1172
- leverMethods
 - CTCPanel, 73
- If
 - CabWidgets::SelectLocomotive, 892
- lfsr1
 - lcc::CanAlias, 196
- lfsr2
 - lcc::CanAlias, 196
- LI100_MESSAGE
 - xpressnet, 153
- LI100_VERSION
 - xpressnet, 153
- LI100Message
 - xpressnet::LI100Message, 564
- LI100VersionNumbers
 - xpressnet::LI100VersionNumbers, 565
- LI101_XPRESSNET_ADDRESS
 - xpressnet, 153
- LI101XPressNetAddress
 - xpressnet::LI101XPressNetAddress, 567
- LimitCars
 - FCFSupport::SwitchList, 1017
- limitCars
 - FCFSupport::SwitchList, 1021
- line_buffer
 - Parsers::ParseFile, 753
- lines
 - FCFSupport::PDFPrinterDevice, 787
 - FCFSupport::PostScriptPrinterDevice, 801
- LinuxGpio, 63
 - linuxgpio::LinuxGpio, 569
- linuxgpio, 119
 - high, 120
 - in, 120
 - low, 120
 - out, 120
 - pindirection, 120
 - pinnotype, 120
- linuxgpio::GpioInputActiveHigh, 450
 - ~GpioInputActiveHigh, 451
 - basepin, 451
 - GpioInputActiveHigh, 450
- linuxgpio::GpioInputActiveLow, 452
 - ~GpioInputActiveLow, 453
 - basepin, 454
 - Get, 453
 - GpioInputActiveLow, 452
- linuxgpio::GpioOutputSafeHigh, 454
 - ~GpioOutputSafeHigh, 455
 - basepin, 455
 - GpioOutputSafeHigh, 455
- linuxgpio::GpioOutputSafeHighInvert, 456
 - ~GpioOutputSafeHighInvert, 457
 - basepin, 458
 - Clr, 457
 - Get, 458
 - GpioOutputSafeHighInvert, 457
 - Set, 458
- linuxgpio::GpioOutputSafeLow, 458
 - ~GpioOutputSafeLow, 460
 - basepin, 460
 - GpioOutputSafeLow, 459
- linuxgpio::GpioOutputSafeLowInverted, 460
 - ~GpioOutputSafeLowInverted, 462
 - basepin, 463
 - Clr, 462
 - Get, 462
 - GpioOutputSafeLowInverted, 461
 - Set, 463
- linuxgpio::LinuxGpio, 568
 - ~LinuxGpio, 570
 - Clr, 570
 - DIRECTIONFMT, 571
 - EXPORT, 571
 - Get, 570
 - is_output, 570
 - LinuxGpio, 569
 - read, 570
 - Set, 571
 - UNEXPORT, 572
 - VALUEFMT, 572
 - write, 571
- listeq
 - lcc::CANGridConnect, 204
- Load
 - FCFSupport::Car, 245
- LoadCarFile
 - FCFSupport::System, 1062
- LoadedP
 - FCFSupport::Car, 245
- loadedP
 - FCFSupport::Car, 255
- LoadsAccepted

- FCFSupport::Industry, [528](#)
- LoadStatsFile
 - FCFSupport::System, [1063](#)
- loadTypes
 - FCFSupport::Industry, [533](#)
- localtime_r
 - PDFPrinterSupport.h, [1318](#)
- Location
 - FCFSupport::Car, [245](#)
- location
 - FCFSupport::Car, [256](#)
- LocoAddress
 - nce, [124](#)
- locoList
 - CabWidgets::SelectLocomotive, [892](#)
- LOCOMOTIVE_ADDRESS
 - xpressnet, [153](#)
- LOCOMOTIVE_INFORMATION
 - xpressnet, [153](#)
- LocomotiveAddress
 - xpressnet::LocomotiveAddress, [573](#)
- LocomotiveDirection
 - CabWidgets::LocomotiveDirection, [575](#)
- LocomotiveInformation
 - xpressnet::LocomotiveInformation, [580](#)
- LocomotiveInformationRequest
 - xpressnet::XPressNet, [1279](#)
- LocomotiveSpeed
 - CabWidgets::LocomotiveSpeed, [588](#)
- LogCarPickup
 - FCFSupport::System, [1063](#)
- LogMessage
 - FCFSupport::LogMessageCallback, [594](#)
- LogMessageCallback
 - FCFSupport::LogMessageCallback, [594](#)
- logscroll
 - lcc::EventLog, [438](#)
- logtext
 - lcc::EventLog, [438](#)
- lookup_word
 - Parsers::MRRXtrkCad, [631](#)
 - YY_MRRXtrkCad_INHERIT, [1292](#)
- low
 - linuxgpio, [120](#)
- lowbyte
 - CTIAcela, [49](#)
- Lower
 - xpressnet, [152](#)
- LowerLetters
 - FCFSupport::PDFFileStructures::PageLabelDictionary, [739](#)
- LowerRoman
 - FCFSupport::PDFFileStructures::PageLabelDictionary, [739](#)
- lowest
 - lcc::ConfigOptions, [308](#)
- LowestNode
 - Parsers::LayoutFile, [557](#)
 - Parsers::TrackGraph, [1199](#)
- lp
 - Parsers::ParseFile, [754](#)
- LQ24PrinterDevice
 - FCFSupport::LQ24PrinterDevice, [597](#)
- IremoveCP
 - CTCPanel::CTCPanel, [382](#)
- LtWt
 - FCFSupport::Car, [246](#)
- ltwt
 - FCFSupport::Car, [256](#)
- M
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- MacroCommand
 - nce::NCE, [653](#)
- MacroNumber
 - nce, [124](#)
- MAIN
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- main
 - lcc::ConfigurationEditor, [335](#)
- mainwindow, [602](#)
 - buttons, [617](#)
 - buttons_add, [605](#)
 - buttons_delete, [605](#)
 - buttons_hide, [606](#)
 - buttons_insert, [606](#)
 - buttons_itemconfigure, [606](#)
 - buttons_show, [608](#)
 - mainwindow, [605](#)
 - menu_activate, [608](#)
 - menu_add, [608](#)
 - menu_delete, [609](#)
 - menu_entrycget, [609](#)
 - menu_entryconfigure, [609](#)
 - menu_index, [610](#)
 - menu_insert, [610](#)
 - menu_invoke, [610](#)
 - menu_sethelpvar, [611](#)
 - menu_type, [611](#)
 - numtoolbars, [618](#)
 - panewindow, [618](#)
 - progress, [618](#)
 - scrollwindow, [618](#)
 - setprogress, [611](#)
 - setstatus, [613](#)
 - showit, [613](#)

- slideout_add, [613](#)
- slideout_getframe, [614](#)
- slideout_hide, [614](#)
- slideout_issownp, [614](#)
- slideout_list, [614](#)
- slideout_reqwidth, [615](#)
- slideout_show, [615](#)
- slideouts, [618](#)
- status, [618](#)
- toolbar_add, [615](#)
- toolbar_addbutton, [615](#)
- toolbar_buttonget, [616](#)
- toolbar_buttonconfigure, [616](#)
- toolbar_hide, [617](#)
- toolbar_setbuttonstate, [617](#)
- toolbar_show, [617](#)
- toolbars, [619](#)
- wipmessage, [619](#)
- Major
 - xpressnet::SoftwareVersion, [930](#)
- MakeCurveSegment
 - Parsers::BezierBodyElt, [183](#)
 - Parsers::CornuBodyElt, [344](#)
- MakeStraightSegment
 - Parsers::BezierBodyElt, [183](#)
 - Parsers::CornuBodyElt, [344](#)
- MakeTimeTableGroupByClass
 - TTSupport::TimeTableSystem, [1155](#)
- MakeTimeTableGroupManually
 - TTSupport::TimeTableSystem, [1155](#)
- MakeTimeTableOneTable
 - TTSupport::TimeTableSystem, [1156](#)
- MakeTimeTableOneTableStationsCenter
 - TTSupport::TimeTableSystem, [1156](#)
- MakeTimeTableOneTableStationsLeft
 - TTSupport::TimeTableSystem, [1157](#)
- MakeTrackEnd
 - Parsers::BezierBodyElt, [183](#)
 - Parsers::CornuBodyElt, [344](#)
- MakeTurnoutCurveSegment
 - Parsers::TurnoutBodyElt, [1248](#)
- MakeTurnoutEnd
 - Parsers::TurnoutBodyElt, [1249](#)
- MakeTurnoutGraphic
 - Parsers::TrackGraph, [1200](#)
- MakeTurnoutJointSegment
 - Parsers::TurnoutBodyElt, [1249](#)
- MakeTurnoutRoute
 - Parsers::TurnoutBodyElt, [1249](#)
- MakeTurnoutRouteList
 - Parsers::TrackGraph, [1200](#)
- MakeTurnoutStraightSegment
 - Parsers::TurnoutBodyElt, [1250](#)
- Manifest
 - FCFSupport::Train, [1211](#)
- Manual
 - xpressnet, [152](#)
- MAPSCALE
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- Marks
 - FCFSupport::Car, [246](#)
- marks
 - FCFSupport::Car, [256](#)
- mask
 - raildriver::RaildriverClient, [820](#)
- matrix
 - Parsers::TrackGraph::Transform2D, [1240](#)
- MaxCarGroup
 - FCFSupport::CarGroup, [260](#)
- MaxCarLen
 - FCFSupport::Industry, [528](#)
- maxCarLen
 - FCFSupport::Industry, [533](#)
- MaxCars
 - FCFSupport::Train, [1214](#)
- maxcars
 - FCFSupport::Train, [1220](#)
- MaxCarTypes
 - FCFSupport::CarType, [264](#)
- MaxClear
 - FCFSupport::Train, [1215](#)
- maxclear
 - FCFSupport::Train, [1220](#)
- MAXLEN
 - lcc::GridConnectReply, [476](#)
- MaxLength
 - FCFSupport::Train, [1215](#)
- maxlength
 - FCFSupport::Train, [1221](#)
- maxLines
 - FCFSupport::PDFPrinterDevice, [787](#)
 - FCFSupport::PostScriptPrinterDevice, [801](#)
- MaxPlate
 - FCFSupport::Industry, [528](#)
- maxSize
 - lcc::GridConnectReply, [475](#)
- maxtries
 - CTIAcela, [59](#)
- MaxWeight
 - FCFSupport::Train, [1215](#)
- maxweight
 - FCFSupport::Train, [1221](#)
- MaxWeightClass
 - FCFSupport::Industry, [529](#)
- maxX
 - Parsers::TurnoutGraphic, [1254](#)
- maxY

- Parsers::TurnoutGraphic, [1254](#)
- mediaBox
 - FCFSupport::PDFFileStructures::Page, [737](#)
 - FCFSupport::PDFFileStructures::PageTree, [749](#)
- menu
 - HTMLHelp::HTMLHelp, [505](#)
- menu_activate
 - mainwindow, [608](#)
- menu_add
 - mainwindow, [608](#)
- menu_delete
 - mainwindow, [609](#)
- menu_entrycget
 - mainwindow, [609](#)
- menu_entryconfigure
 - mainwindow, [609](#)
- menu_index
 - mainwindow, [610](#)
- menu_insert
 - mainwindow, [610](#)
- menu_invoke
 - mainwindow, [610](#)
- menu_sethelpvar
 - mainwindow, [611](#)
- menu_type
 - mainwindow, [611](#)
- messageBuffer
 - FCFSupport::System, [1113](#)
- messagebuffers
 - lcc::CANGridConnect, [208](#)
 - lcc::OpenLCBOverTcp, [704](#)
- messagehandler
 - lcc::CANGridConnect, [208](#)
 - lcc::OpenLCBOverTcp, [704](#)
- MessageType
 - FCFSupport::LogMessageCallback, [593](#)
 - xpressnet::LI100Message, [564](#)
- MessageTypeCode
 - xpressnet, [151](#)
- METERSperMM
 - MRRXtrkCad.tab.h, [1308](#)
- middle
 - lcc, [118](#)
- Minor
 - Parsers::TrackGraph::Transform2D, [1239](#)
 - xpressnet::SoftwareVersion, [930](#)
- Minutes
 - nce, [125](#)
- minX
 - Parsers::TurnoutGraphic, [1254](#)
- minY
 - Parsers::TurnoutGraphic, [1255](#)
- mirror
 - FCFSupport::Industry, [533](#)
- mirrorP
 - FCFSupport::Car, [256](#)
- modificationDate
 - FCFSupport::PDFFileStructures::InformationDirectory, [539](#)
- MODIFIER_MASK
 - lcc::MTIDetail, [637](#)
- MODIFIER_SHIFT
 - lcc::MTIDetail, [638](#)
- modtype
 - azatrax::MRD::status1_union, [968](#)
- MomentumLevel
 - nce, [125](#)
- momtype
 - CTIAcela, [41](#)
- Motor_1_Direction
 - azatrax::SL2, [925](#)
- motor_1_direction
 - azatrax::SL2::status1_union, [970](#)
- Motor_1_State
 - azatrax::SL2, [925](#)
- motor_1_state
 - azatrax::SL2::status1_union, [971](#)
- Motor_2_Direction
 - azatrax::SL2, [925](#)
- motor_2_direction
 - azatrax::SL2::status1_union, [971](#)
- Motor_2_State
 - azatrax::SL2, [925](#)
- motor_2_state
 - azatrax::SL2::status1_union, [971](#)
- move
 - CTCPanel::CTCPanel, [382](#)
- MovementsThisSession
 - FCFSupport::Car, [246](#)
- moves
 - FCFSupport::Car, [256](#)
- MRD
 - azatrax::Azatrax, [174](#)
 - azatrax::MRD, [622](#)
- MRRXtrkCad
 - Parsers::MRRXtrkCad, [630](#)
- MRRXtrkCad.tab.h
 - BISON_YYLTYPE_ISDECLARED, [1302](#)
 - CENTIMETERSperMM, [1307](#)
 - FALSE, [1302](#)
 - FEETperMM, [1307](#)
 - GScale, [1307](#)
 - HOScale, [1307](#)
 - INCHESperMM, [1307](#)
 - IScale, [1307](#)
 - METERSperMM, [1308](#)
 - NScale, [1308](#)
 - OScale, [1308](#)

- RADIANS, [1302](#)
- TRUE, [1302](#)
- YARDSperMM, [1308](#)
- YY_MRRXtrkCad_CHAR, [1302](#)
- YY_MRRXtrkCad_CLASS, [1303](#)
- YY_MRRXtrkCad_COMPATIBILITY, [1303](#)
- YY_MRRXtrkCad_CONSTRUCTOR_CODE, [1303](#)
- YY_MRRXtrkCad_CONSTRUCTOR_INIT, [1303](#)
- YY_MRRXtrkCad_CONSTRUCTOR_PARAM, [1303](#)
- YY_MRRXtrkCad_DEBUG, [1303](#)
- YY_MRRXtrkCad_DEBUG_FLAG, [1304](#)
- YY_MRRXtrkCad_ERROR, [1304](#)
- YY_MRRXtrkCad_ERROR_BODY, [1304](#)
- YY_MRRXtrkCad_ERROR_VERBOSE, [1304](#)
- YY_MRRXtrkCad_INHERIT, [1304](#)
- YY_MRRXtrkCad_LEX, [1304](#)
- YY_MRRXtrkCad_LEX_BODY, [1304](#)
- YY_MRRXtrkCad_LLOC, [1305](#)
- YY_MRRXtrkCad_LSP_NEEDED, [1305](#)
- YY_MRRXtrkCad_LTYPE, [1305](#)
- YY_MRRXtrkCad_LVAL, [1305](#)
- YY_MRRXtrkCad_MEMBERS, [1305](#)
- YY_MRRXtrkCad_NERRS, [1305](#)
- YY_MRRXtrkCad_PARSE, [1306](#)
- YY_MRRXtrkCad_PARSE_PARAM, [1306](#)
- YY_MRRXtrkCad_STYPE, [1306](#)
- YY_MRRXtrkCad_USE_CONST_TOKEN, [1306](#)
- YY_MRRXtrkCad_USE_GOTO, [1306](#)
- YY_USE_CLASS, [1306](#)
- yyItype, [1307](#)
- MTI_CAN_MASK
 - lcc::MTIHeader, [642](#)
- MTI_CAN_SHIFT
 - lcc::MTIHeader, [642](#)
- MTIDetail
 - lcc::MTIDetail, [635](#)
- mtidetail
 - lcc::CANGridConnect, [208](#)
 - lcc::OpenLCBOverTcp, [704](#)
- MTIHeader
 - lcc::MTIHeader, [640](#)
- mtiheader
 - lcc::CANGridConnect, [209](#)
 - lcc::MTIDetail, [638](#)
- MTR
 - xpressnet::LocomotiveInformation, [582](#)
- MULTILINE
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- myalias
 - lcc::CanAlias, [197](#)
- mycanalias
 - lcc::CANGridConnect, [209](#)
- MyDivision
 - FCFSupport::Station, [952](#)
- MyMirror
 - FCFSupport::Industry, [529](#)
- MyProduct
 - azatrax::Azatrax, [170](#)
- MyProductId
 - azatrax::Azatrax, [170](#)
- myProductId
 - azatrax::Azatrax, [174](#)
- mySerialNumber
 - azatrax::Azatrax, [175](#)
- MyStation
 - FCFSupport::Industry, [529](#)
- N
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Name
 - FCFSupport::Division, [409](#)
 - FCFSupport::Industry, [529](#)
 - FCFSupport::Owner, [732](#)
 - FCFSupport::Station, [952](#)
 - FCFSupport::Train, [1215](#)
 - TTSupport::Cab, [188](#)
 - TTSupport::Station, [958](#)
 - TTSupport::StorageTrack, [997](#)
 - TTSupport::TimeTableSystem, [1157](#)
 - TTSupport::Train, [1226](#)
- name
 - FCFSupport::Division, [411](#)
 - FCFSupport::Industry, [534](#)
 - FCFSupport::Owner, [733](#)
 - FCFSupport::Station, [954](#)
 - FCFSupport::Train, [1221](#)
 - lcc::ConfigOptions, [308](#)
 - Parsers::TrackGraph::NodeValues, [674](#)
 - TTSupport::Cab, [189](#)
 - TTSupport::Station, [961](#)
 - TTSupport::StorageTrack, [1001](#)
 - TTSupport::TimeTableSystem, [1164](#)
 - TTSupport::Train, [1232](#)
- NamedIndirectObjectMap
 - FCFSupport::PDFFileStructures, [83](#)
- NameOfNode
 - Parsers::LayoutFile, [557](#)
 - Parsers::TrackGraph, [1200](#)
- NCE
 - ncc::NCE, [646](#)
- ncc, [121](#)
 - AccessoryNumber, [122](#)
 - AspectBits, [123](#)
 - CabNumber, [123](#)
 - ConsistAddress, [123](#)
 - CSAddress, [123](#)

- Direction, [126](#)
- EchoMode, [123](#)
- ErrorMessage, [127](#)
- Forward, [127](#)
- Hours, [124](#)
- LCDMessage16, [124](#)
- LCDMessage8, [124](#)
- LocoAddress, [124](#)
- MacroNumber, [124](#)
- Minutes, [125](#)
- MomentumLevel, [125](#)
- RAMData, [125](#)
- RAMData8, [125](#)
- RawPacket, [125](#)
- RawTrackPacket, [125](#)
- Reverse, [127](#)
- S128, [127](#)
- S14, [127](#)
- S28, [127](#)
- ScaleClockRatio, [126](#)
- Speed128, [126](#)
- Speed28, [126](#)
- SpeedMode, [127](#)
- UByte, [126](#)
- ncc::NCE, [643](#)
 - _explodechars, [647](#)
 - _readbyte, [647](#)
 - _readevent, [648](#)
 - _readresponse, [648](#)
 - _sendMessageAndReturnResponse, [648](#)
 - _timeout, [670](#)
 - _timeoutevent, [648](#)
 - _transmit, [648](#)
 - ~NCE, [647](#)
- AccessoryDecoderOperation, [649](#)
- AddLeadLocomotiveToMultiUnit, [649](#)
- AddLocomotiveToMultiUnit, [650](#)
- AddRearLocomotiveToMultiUnit, [650](#)
- AssignLoco, [650](#)
- ChangeMomentumLevel, [651](#)
- DequeuePacket, [651](#)
- DisableMain, [652](#)
- Dummy, [652](#)
- EnableMain, [652](#)
- ExecuteMacro, [652](#)
- HardReset, [653](#)
- MacroCommand, [653](#)
- NCE, [646](#)
- NOP, [653](#)
- NormalMode, [653](#)
- NumberOfBytesReturned, [670](#)
- OperatingModeAccessoryProgrammingByteModeWrite, [654](#)
- OperatingModeProgrammingByteModeWrite, [654](#)
- ProgramMode, [655](#)
- ReadCVInDirectMode, [655](#)
- ReadCVInPagedMode, [655](#)
- ReadFromRAM, [656](#)
- ReadOneByteFromRAM, [656](#)
- ReadRegister, [656](#)
- RemoveLocomotiveFromMultiUnit, [657](#)
- ReturnAuxiliaryInputUnit, [657](#)
- ReturnAuxiliaryInputUnitShortForm, [658](#)
- ReturnClock, [658](#)
- SetBinaryCommandEchoMode, [658](#)
- SetCabBusAddressOfUSBBoard, [659](#)
- SetClock, [659](#)
- SetClockFormat, [659](#)
- SetClockRatio, [660](#)
- SetLocomotiveFunctionsGroup1, [660](#)
- SetLocomotiveFunctionsGroup2, [661](#)
- SetLocomotiveFunctionsGroup3, [661](#)
- SetLocomotiveSpeedAndDirection, [662](#)
- SetLocoSpeedMode, [662](#)
- SetSignalAspect, [663](#)
- SoftReset, [663](#)
- SoftwareVersion, [663](#)
- StartClock, [663](#)
- StopClock, [664](#)
- ttyfd, [670](#)
- Write4BytesToRAM, [664](#)
- Write8BytesToRAM, [664](#)
- WriteCVInDirectMode, [665](#)
- WriteCVInPagedMode, [665](#)
- WriteLCDLine3, [666](#)
- WriteLCDLine4, [666](#)
- WriteLCDRightLine2, [667](#)
- WriteOneByteToRAM, [667](#)
- WriteRAWPacket, [667](#)
- WriteRAWTrackPacket, [668](#)
- WriteRegister, [668](#)
- WriteToRAM, [669](#)
- WriteTwoBytesToRAM, [669](#)
- NCEModule, [61](#)
- needPage
 - FCFSupport::PDFPrinterDevice, [788](#)
- needPageHeader
 - FCFSupport::PostScriptPrinterDevice, [801](#)
- NetworkOffline
 - CTIAcela, [49](#)
- NetworkOnline
 - CTIAcela, [49](#)
- networkonline
 - CTIAcela, [59](#)
- NewCreateTimeTable
 - TimeTableSystemTcl, [29](#)
- NewPage
 - FCFSupport::LQ24PrinterDevice, [598](#)

- FCFSupport::PDFPrinterDevice, [783](#)
- FCFSupport::PostScriptPrinterDevice, [797](#)
- FCFSupport::PrinterDevice, [809](#)
- FCFSupport::TextPrinterDevice, [1123](#)
- Next
 - Parsers::IntegerList, [543](#)
- next
 - Parsers::BezierBody, [179](#)
 - Parsers::CornuBody, [340](#)
 - Parsers::IntegerList, [544](#)
 - Parsers::TrackBody, [1175](#)
 - Parsers::TurnoutBody, [1244](#)
- nextlink
 - HTMLHelp::HTMLHelp, [505](#)
- NextShift
 - FCFSupport::System, [1063](#)
- NextSwitchListForCarAndIndustry
 - FCFSupport::SwitchList, [1017](#)
- Nibble
 - xpressnet::AccessoryDecoderInformation, [158](#)
- nibble
 - xpressnet, [149](#)
- NibbleCode
 - xpressnet, [152](#)
- nid
 - lcc, [116](#)
- nidLEntry
 - lcc::CANGridConnectOverCANSocket, [213](#)
 - lcc::CANGridConnectOverTcp, [218](#)
 - lcc::CANGridConnectOverUSBSerial, [223](#)
 - lcc::OpenLCBOverTcp, [704](#)
- nidlist
 - lcc::CanAlias, [197](#)
 - lcc::OpenLCBNode, [692](#)
- nidMap
 - lcc::CANGridConnect, [209](#)
- NIDPATTERN
 - lcc::CANGridConnect, [209](#)
 - lcc::OpenLCBOverTcp, [705](#)
- NO_RESPONSE_AVAILABLE
 - xpressnet, [153](#)
- Node
 - Parsers::TrackGraph, [1186](#)
- nodeid
 - lcc::ConfigOptions, [308](#)
- nodes
 - Parsers::TrackGraph, [1207](#)
- nodeStack
 - ParseXML, [759](#)
- NodeTurnoutGraphic
 - Parsers::LayoutFile, [558](#)
 - Parsers::TrackGraph, [1200](#)
- NodeTurnoutRoutelist
 - Parsers::LayoutFile, [558](#)
- Parsers::TrackGraph, [1201](#)
- NodeType
 - Parsers::TrackGraph, [1186](#)
- NodeValues
 - Parsers::TrackGraph::NodeValues, [672](#)
- NONE
 - RaildriverIO, [826](#)
- None
 - FCFSupport::PDFFileStructures::PageLabelDictionary, [739](#)
 - Parsers::BezierBodyElt, [181](#)
 - Parsers::CornuBodyElt, [343](#)
 - Parsers::TurnoutBodyElt, [1247](#)
- none
 - Parsers::TrackGraph, [1208](#)
- NONE_M
 - RaildriverIO, [828](#)
- NonTurnoutDirectionSensing
 - azatrax::MRD, [621](#)
- NonTurnoutSeparate
 - azatrax::MRD, [621](#)
- NOP
 - nce::NCE, [653](#)
- Normal
 - FCFSupport::PrinterDevice, [807](#)
- NORMAL_OPERATION_RESUMED
 - xpressnet, [153](#)
- NormalActionScript
 - Parsers::LayoutFile, [558](#)
 - Parsers::TrackGraph, [1201](#)
- normalactionsript
 - Parsers::TrackGraph::NodeValues, [674](#)
- NormalMode
 - nce::NCE, [653](#)
- NOTE
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Note
 - TTSupport::Stop, [989](#)
 - TTSupport::TimeTableSystem, [1157](#)
 - TTSupport::Train, [1226](#)
- notes
 - TTSupport::Stop, [993](#)
 - TTSupport::TimeTableSystem, [1164](#)
 - TTSupport::Train, [1232](#)
- NoTimeslot
 - xpressnet, [151](#)
- NotMU
 - xpressnet, [151](#)
- NotMUBaseAddress
 - xpressnet, [151](#)
- NotOperatedOr0
 - xpressnet, [151](#)
- NOTWORD

- Parsers::MRRXtrkCad, [629](#)
- YY_MRRXtrkCad_INHERIT, [1290](#)
- NScale
 - MRRXtrkCad.tab.h, [1308](#)
- Number
 - FCFSupport::Car, [246](#)
 - TTSupport::Train, [1227](#)
- number
 - FCFSupport::Car, [257](#)
 - TTSupport::Train, [1232](#)
- numberCars
 - FCFSupport::System, [1113](#)
- NumberOfBytesReturned
 - nce::NCE, [670](#)
- NumberOfCabs
 - TTSupport::TimeTableSystem, [1158](#)
- NumberOfCars
 - FCFSupport::Industry, [529](#)
 - FCFSupport::System, [1064](#)
- NumberOfCarTypes
 - FCFSupport::CarType, [264](#)
- NumberOfDivisions
 - FCFSupport::System, [1064](#)
- NumberOfFeedbackElements
 - xpressnet::AccessoryDecoderInformation, [158](#)
- NumberOfHeads
 - Parsers::LayoutFile, [558](#)
 - Parsers::TrackGraph, [1201](#)
- NumberOfIndustries
 - FCFSupport::Station, [952](#)
 - FCFSupport::System, [1064](#)
- NumberOfNotes
 - TTSupport::Stop, [989](#)
 - TTSupport::TimeTableSystem, [1158](#)
 - TTSupport::Train, [1227](#)
- NumberOfOpenDevices
 - azatrax::Azatrax, [170](#)
- NumberOfOrders
 - FCFSupport::Train, [1215](#)
- NumberOfStations
 - FCFSupport::Division, [409](#)
 - FCFSupport::System, [1064](#)
 - TTSupport::TimeTableSystem, [1158](#)
- NumberOfStops
 - FCFSupport::Train, [1216](#)
 - TTSupport::Train, [1227](#)
- NumberOfStorageTracks
 - TTSupport::Station, [959](#)
- NumberOfTrains
 - FCFSupport::System, [1064](#)
 - TTSupport::TimeTableSystem, [1158](#)
- NumberStyle
 - FCFSupport::PDFFileStructures::PageLabelDictionary, [739](#)
- NumEdges
 - Parsers::LayoutFile, [559](#)
 - Parsers::TrackGraph, [1201](#)
- numheads
 - Parsers::TrackGraph::NodeValues, [675](#)
- numRoutelists
 - Parsers::TurnoutRoutelist, [1256](#)
- nums
 - FCFSupport::PDFFileStructures::PageLabelTree, [745](#)
- numSegments
 - Parsers::TurnoutGraphic, [1255](#)
- numtoolbars
 - mainwindow, [618](#)
- O
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- objectlist
 - CTCPanel::CTCPanel, [382](#)
- objectMap
 - FCFSupport::PDFFileStructures::CrossReferenceTable, [357](#)
- ObjectNumber
 - FCFSupport::PDFFileStructures::IndirectObject, [516](#)
- objectNumber
 - FCFSupport::PDFFileStructures::IndirectObject, [519](#)
- Objects
 - CTCPanel::CTCPanel, [387](#)
- objectTable
 - FCFSupport::PDFFileStructures::CrossReferenceTable, [359](#)
- occupations
 - TTSupport::StorageTrack, [1001](#)
- Occupied
 - TTSupport::Occupied, [678](#), [679](#)
- OccupiedMap
 - Station
, [32](#)
- OffScript
 - Parsers::LayoutFile, [559](#)
 - Parsers::TrackGraph, [1201](#)
- offscript
 - Parsers::TrackGraph::NodeValues, [675](#)
- OkToMirrorP
 - FCFSupport::Car, [246](#)
- OldCreateTimeTable
 - TimeTableSystemTcl, [30](#)
- olddatagramhandler
 - lcc::ConfigMemory, [304](#)
 - lcc::ConfigurationEditor, [335](#)
- oldgeneralmessagehandler
 - lcc::ConfigMemory, [305](#)
- OnDuty
 - FCFSupport::Train, [1216](#)

- onduty
 - FCFSupport::Train, [1221](#)
- One
 - FCFSupport::PrinterDevice, [807](#)
- oneColumnWidthFraction
 - FCFSupport::LQ24PrinterDevice, [601](#)
 - PDFPrinter.h, [1316](#)
- OnlineP
 - CTIAcela, [49](#)
- OnScript
 - Parsers::LayoutFile, [559](#)
 - Parsers::TrackGraph, [1202](#)
- onscript
 - Parsers::TrackGraph::NodeValues, [675](#)
- Opcodes
 - CTIAcela, [59](#)
- open
 - lcc::EventLog, [438](#)
- OpenDevice
 - azatrax::Azatrax, [171](#)
- OPENLCBFRAME_MASK
 - lcc::CANHeader, [226](#)
- OPENLCBFRAME_SHIFT
 - lcc::CANHeader, [226](#)
- OpenLCBMessage
 - lcc::OpenLCBMessage, [683](#)
- OpenLCBNode
 - lcc::OpenLCBNode, [688](#)
- OpenLCBOverTcp
 - lcc::OpenLCBOverTcp, [700](#)
- openport
 - CmriSupport::CmriNode, [283](#)
- OpenPrinter
 - FCFSupport::LQ24PrinterDevice, [598](#)
 - FCFSupport::PDFPrinterDevice, [783](#)
 - FCFSupport::PostScriptPrinterDevice, [797](#)
 - FCFSupport::PrinterDevice, [809](#)
 - FCFSupport::TextPrinterDevice, [1123](#)
- OperatingMode
 - azatrax::MRD, [625](#)
- operatingMode
 - azatrax::Azatrax::StateDataPacket, [947](#)
- OperatingMode_Type
 - azatrax::MRD, [621](#)
- OperatingModeAccessoryProgrammingByteModeWrite
 - nce::NCE, [654](#)
- OperatingModeProgrammingBitModeWrite
 - xpressnet::XPressNet, [1279](#)
- OperatingModeProgrammingByteModeWrite
 - nce::NCE, [654](#)
 - xpressnet::XPressNet, [1280](#)
- operator!=
 - Parsers::TrackGraph::Transform2D, [1239](#)
- operator<
 - FCFSupport::PathName, [764](#)
 - TTSupport::PathName, [773](#)
 - TTSupport::TimeRange, [1137](#)
- operator<<
 - FCFSupport, [81](#)
 - FCFSupport::SwitchList, [1020](#)
 - Parsers::IntegerList, [543](#)
 - Parsers::TrackBody, [1174](#)
 - Parsers::TrackBodyElt, [1178](#)
 - Parsers::TrackGraph, [1205](#)
- operator<=
 - FCFSupport::PathName, [764](#)
 - TTSupport::PathName, [774](#)
 - TTSupport::TimeRange, [1138](#)
- operator>
 - FCFSupport::PathName, [766](#)
 - TTSupport::PathName, [775](#)
 - TTSupport::TimeRange, [1139](#)
- operator>=
 - FCFSupport::PathName, [766](#)
 - TTSupport::PathName, [775](#)
 - TTSupport::TimeRange, [1139](#)
- operator*
 - Parsers::TrackGraph::Transform2D, [1239](#)
- operator()
 - TTSupport::eqstr, [431](#)
 - TTSupport::hash, [477](#)
- operator+
 - FCFSupport::PathName, [763](#)
 - TTSupport::PathName, [772](#), [773](#)
- operator+=
 - FCFSupport::PathName, [764](#)
 - TTSupport::PathName, [773](#)
- operator=
 - FCFSupport::Car, [247](#)
 - FCFSupport::CarGroup, [261](#)
 - FCFSupport::CarType, [266](#)
 - FCFSupport::Division, [409](#)
 - FCFSupport::Industry, [530](#)
 - FCFSupport::Owner, [733](#)
 - FCFSupport::PathName, [765](#)
 - FCFSupport::Station, [952](#)
 - FCFSupport::SwitchListElement, [1025](#)
 - FCFSupport::Train, [1216](#)
 - TTSupport::Cab, [188](#)
 - TTSupport::Occupied, [679](#)
 - TTSupport::PathName, [774](#)
 - TTSupport::Station, [959](#)
 - TTSupport::StationTimes, [966](#)
 - TTSupport::Stop, [989](#)
 - TTSupport::StorageTrack, [997](#)
 - TTSupport::TimeRange, [1138](#)
- operator==
 - FCFSupport::PathName, [765](#)

- Parsers::TrackGraph::Transform2D, [1239](#)
- TTSupport::PathName, [775](#)
- TTSupport::TimeRange, [1138](#)
- operator[]
 - FCFSupport::SwitchList, [1018](#)
- OptionHashMap
 - TTSupport, [143](#)
- Order
 - FCFSupport::Train, [1216](#)
- orders
 - FCFSupport::Train, [1221](#)
- OrdersFile
 - FCFSupport::System, [1065](#)
- ordersFile
 - FCFSupport::System, [1113](#)
- Origin
 - TTSupport::Stop, [986](#)
- originYard
 - FCFSupport::System, [1114](#)
- OrigX
 - Parsers::LayoutFile, [560](#)
 - Parsers::TrackGraph, [1202](#)
- origx
 - Parsers::TrackGraph::NodeValues, [675](#)
- OrigY
 - Parsers::LayoutFile, [560](#)
 - Parsers::TrackGraph, [1202](#)
- origy
 - Parsers::TrackGraph::NodeValues, [675](#)
- OScale
 - MRRXtrkCad.tab.h, [1308](#)
- Other
 - xpressnet, [151](#)
- OtherCarOkForTrain
 - FCFSupport::System, [1065](#)
- out
 - linuxgpio, [120](#)
- outputbuffer
 - CmriSupport::CmriNode, [285](#)
- OutputRelayInputControl
 - azatrax::SL2, [926](#)
 - azatrax::SR4, [940](#)
- Outputs
 - cmri::CMri, [276](#)
- outputs
 - CmriSupport::CmriNode, [283](#)
- OvalButton
 - OvalWidgets::OvalButton, [710](#)
- OvalLabel
 - OvalWidgets, [132](#)
- OvalRoundCornerRectangle
 - OvalWidgets::OvalRoundCornerRectangle, [712](#)
- OvalScale
 - OvalWidgets::OvalScale, [715](#)
- OvalSlider
 - OvalWidgets::OvalSlider, [720](#)
- OvalScrollBar
 - OvalWidgets::OvalScrollBar, [725](#)
- OvalWidgets, [128](#)
 - _ConfigureFont, [129](#)
 - _ConfigureText, [129](#)
 - _UnderSplit, [130](#)
 - _VerifyFont, [130](#)
 - _VerifyIntegerOrEmpty, [130](#)
 - ~OvalLabel, [133](#)
 - canvas, [133](#)
 - ColorFillOption, [131](#)
 - ColorOptionMethods, [131](#)
 - ColorOutlineOption, [131](#)
 - CommonValidateMethods, [132](#)
 - FontFamily, [132](#)
 - HBar, [133](#)
 - OvalLabel, [132](#)
 - SquareEndOptions, [132](#)
 - VBar, [134](#)
 - XYWH, [133](#)
- OvalWidgets::OvalButton, [709](#)
 - _ConfigureText, [711](#)
 - ~OvalButton, [710](#)
 - canvas, [711](#)
 - invoke, [711](#)
 - OvalButton, [710](#)
- OvalWidgets::OvalRoundCornerRectangle, [712](#)
 - ~OvalRoundCornerRectangle, [713](#)
 - canvas, [713](#)
 - OvalRoundCornerRectangle, [712](#)
- OvalWidgets::OvalScale, [713](#)
 - _BaseRect, [716](#)
 - _ConfigureText, [716](#)
 - _ConfigureWL, [716](#)
 - _ConfigureXY, [717](#)
 - _MoveThumb, [717](#)
 - _value, [718](#)
 - ~OvalScale, [716](#)
 - canvas, [718](#)
 - get, [717](#)
 - OvalScale, [715](#)
 - set, [718](#)
- OvalWidgets::OvalSlider, [718](#)
 - _ConfigureL, [721](#)
 - _ConfigureText, [721](#)
 - _MoveThumb, [721](#)
 - _VerifyBitmap, [722](#)
 - _value, [723](#)
 - canvas, [723](#)
 - get, [722](#)
 - OvalSlider, [720](#)
 - set, [722](#)

- OvalWidgets::OvalScrollBar, 723
 - _BaseRect, 725
 - _Command, 726
 - _ConfigureWL, 726
 - _ConfigureXY, 726
 - _MoveThumb, 727
 - _lastSet, 729
 - ~OvalScrollBar, 725
 - canvas, 729
 - delta, 727
 - fraction, 727
 - get, 728
 - identify, 728
 - OvalScrollBar, 725
 - resize, 728
 - set, 729
- Owner
 - FCFSupport::Owner, 731
- owner
 - FCFSupport::Car, 257
- OwnerMap
 - FCFSupport, 79
- owners
 - FCFSupport::System, 1114
- OwnersFile
 - FCFSupport::System, 1065
- ownersFile
 - FCFSupport::System, 1114
- P
 - Parsers::MRRXtrkCad, 630
 - YY_MRRXtrkCad_INHERIT, 1291
- pack4
 - CTIAcela, 50
- pack8
 - CTIAcela, 50
- PacketCount
 - azatrax::Azatrax, 171
- packetCount
 - azatrax::Azatrax::StateDataPacket, 947
- Page
 - FCFSupport::PDFFileStructures::Page, 735
- PagedModeCVRead
 - xpressnet::XPressNet, 1280
- PagedModeCVWrite
 - xpressnet::XPressNet, 1280
- PageLabelDictionary
 - FCFSupport::PDFFileStructures::PageLabelDictionary, 740
- PageLabelDictionaryNumMap
 - FCFSupport::PDFFileStructures, 83
- PageLabelTree
 - FCFSupport::PDFFileStructures::PageLabelTree, 743
- PageLabelTreeKidVector
 - FCFSupport::PDFFileStructures, 84
- pagenodes
 - FCFSupport::PDFFileStructures::PageTree, 749
- pages
 - FCFSupport::PDFFileStructures::CatalogDictionary, 271
 - FCFSupport::PostScriptPrinterDevice, 802
 - ScrollTabNotebook, 883
- pages_opts
 - ScrollTabNotebook, 883
- PageSize
 - FCFSupport::PrinterDevice, 806
- pageSize
 - FCFSupport::PrinterDevice, 814
- PageTree
 - FCFSupport::PDFFileStructures::Page, 737
 - FCFSupport::PDFFileStructures::PageTree, 747
- pageTreeRoot
 - FCFSupport::PDFPrinterDevice, 788
- PanedWindow, 134
- panes
 - HTMLHelp::HTMLHelp, 510
- panewindow
 - mainwindow, 618
- parent
 - FCFSupport::PDFFileStructures::Page, 737
 - FCFSupport::PDFFileStructures::PageTree, 750
 - lcc::CANGridConnect, 209
- Parse
 - Parsers::LayoutFile, 560
 - Parsers::ParseFile, 752
- ParseError
 - Parsers::LayoutFile, 560
 - Parsers::ParseFile, 752
- ParseFile
 - Parsers::ParseFile, 752
- parser
 - Parsers::LayoutFile, 562
- ParserClasses, 24
 - tcl_socketpair, 25
- Parsers, 134
 - Parsers::BezierBody, 175
 - BezierBody, 177
 - BezierBodyElt, 178
 - BezierEnds, 177
 - BezierSegmentCount, 177
 - CleanUpBezierBody, 177
 - CleanUpElement, 178
 - ConsBezierBody, 178
 - Element, 178
 - element, 179
 - next, 179
 - TrackGraph, 179

- Parsers::BezierBodyElt, 179
 - ~BezierBodyElt, 182
 - ang0, 184
 - ang1, 184
 - BezierBody, 184
 - BezierBodyElt, 181
 - BezierBodyEltType, 181
 - BezierCurvedSegment, 181
 - BezierEnd, 181
 - BezierStraightSegment, 181
 - GetCurveSegment, 182
 - GetStraightSegment, 182
 - InitTSegId, 182
 - MakeCurveSegment, 183
 - MakeStraightSegment, 183
 - MakeTrackEnd, 183
 - None, 181
 - pos1, 184
 - pos2, 185
 - radius, 185
 - segCount, 185
 - segmentId, 185
 - theEnd, 185
 - TheType, 183
 - theType, 186
 - TrackGraph, 184
- Parsers::BezierBodyElt::Pos, 791
 - x, 792
 - y, 792
- Parsers::CornuBody, 336
 - CleanUpCornuBody, 338
 - CleanUpElement, 338
 - ConcatCornuBody, 338
 - ConsCornuBody, 339
 - CornuBody, 338
 - CornuBodyElt, 340
 - CornuEnds, 339
 - CornuSegmentCount, 339
 - Element, 339
 - element, 340
 - next, 340
 - TrackGraph, 340
- Parsers::CornuBodyElt, 341
 - ~CornuBodyElt, 343
 - ang0, 345
 - ang1, 345
 - CornuBody, 345
 - CornuBodyElt, 343
 - CornuBodyEltType, 342
 - CornuCurvedSegment, 343
 - CornuEnd, 343
 - CornuStraightSegment, 343
 - GetCurveSegment, 343
 - GetStraightSegment, 343
 - InitTSegId, 344
 - MakeCurveSegment, 344
 - MakeStraightSegment, 344
 - MakeTrackEnd, 344
 - None, 343
 - pos1, 346
 - pos2, 346
 - radius, 346
 - segCount, 346
 - segmentId, 346
 - theEnd, 347
 - TheType, 345
 - theType, 347
 - TrackGraph, 345
- Parsers::CornuBodyElt::Pos, 792
 - x, 793
 - y, 793
- Parsers::IntegerList, 540
 - CleanUpIntegerList, 541
 - CopyList, 542
 - Element, 542
 - ElementP, 542
 - iElt, 544
 - IntAppend, 542
 - IntegerList, 541
 - Next, 543
 - next, 544
 - operator<<, 543
 - TurnoutBodyElt, 543
- Parsers::LayoutFile, 548
 - ~LayoutFile, 551
 - Angle, 551
 - CompressedEdgeCount, 552
 - CompressedEdgeLength, 552
 - CompressedEdgeNode, 552
 - CompressedGraphCircleLayout, 552
 - CompressedGraphKamadaKawaiSpring, 553
 - CompressedGraphKruskalMinimumSpanningTree, 553
 - CompressedGraphPrimMinimumSpanningTree, 553
 - CompressedNodePositionX, 553
 - CompressedNodePositionY, 554
 - CompressedNodeSegments, 554
 - CompressGraph, 554
 - EdgeA, 554
 - EdgeIndex, 555
 - EdgeLength, 555
 - EdgeX, 555
 - EdgeY, 555
 - Emit, 556
 - Heads, 556
 - HighestNode, 556
 - IsCompressed, 556
 - IsCompressedNode, 557

- IsNodeP, [557](#)
- LayoutFile, [551](#)
- LengthOfNode, [557](#)
- LowestNode, [557](#)
- NameOfNode, [557](#)
- NodeTurnoutGraphic, [558](#)
- NodeTurnoutRoutelist, [558](#)
- NormalActionScript, [558](#)
- NumberOfHeads, [558](#)
- NumEdges, [559](#)
- OffScript, [559](#)
- OnScript, [559](#)
- OrigX, [560](#)
- OrigY, [560](#)
- Parse, [560](#)
- ParseError, [560](#)
- parser, [562](#)
- ReverseActionScript, [561](#)
- Roots, [561](#)
- SenseScript, [561](#)
- SignalAspects, [561](#)
- trackGraph, [563](#)
- TrackList, [562](#)
- TurnoutNumber, [562](#)
- TypeOfNode, [562](#)
- Parsers::MRRXtrkCad, [627](#)
 - _VERSION, [629](#)
 - ~MRRXtrkCad, [630](#)
 - A, [630](#)
 - B, [630](#)
 - BLOCK, [630](#)
 - C, [630](#)
 - CAR, [630](#)
 - CURRENT, [629](#)
 - CurrentScale, [631](#)
 - CURVE, [629](#)
 - D, [630](#)
 - DRAW, [629](#)
 - E, [630](#)
 - END, [629](#)
 - EOL, [629](#)
 - F, [630](#)
 - fieldflag, [632](#)
 - FLOAT, [629](#)
 - G, [630](#)
 - HO, [629](#)
 - INTEGER, [629](#)
 - J, [630](#)
 - JOINT, [630](#)
 - L, [630](#)
 - LAYERS, [629](#)
 - lookup_word, [631](#)
 - M, [630](#)
 - MAIN, [630](#)
 - MAPSCALE, [629](#)
 - MRRXtrkCad, [630](#)
 - MULTILINE, [629](#)
 - N, [629](#)
 - NOTE, [630](#)
 - NOTWORD, [629](#)
 - O, [629](#)
 - P, [630](#)
 - Q, [630](#)
 - RESTOFLINE, [629](#)
 - ROOMSIZE, [629](#)
 - S, [630](#)
 - SCALE, [629](#)
 - scanEol, [632](#)
 - scanToEND, [632](#)
 - STRAIGHT, [630](#)
 - STRING, [629](#)
 - STRUCTURE, [629](#)
 - SWITCHMOTOR, [630](#)
 - T, [630](#)
 - TEXT, [630](#)
 - TITLE, [629](#)
 - TRK, [630](#)
 - TURNOUT, [629](#)
 - TURNTABLE, [629](#)
 - UNTERMSTRING, [629](#)
 - X, [630](#)
 - Y, [630](#)
 - YY_MRRXtrkCad_ENUM_TOKEN, [629](#)
 - YY_MRRXtrkCad_NULL_TOKEN, [629](#)
 - ychar, [632](#)
 - yydebug, [632](#)
 - yyerror, [631](#)
 - yyerror1, [631](#)
 - yylex, [631](#)
 - yylloc, [632](#)
 - yylval, [632](#)
 - yynerrs, [633](#)
 - yyparse, [631](#)
- Parsers::ParseFile, [750](#)
 - ~ParseFile, [752](#)
 - bufferize, [753](#)
 - errorstream, [753](#)
 - fp, [753](#)
 - line_buffer, [753](#)
 - lp, [754](#)
 - Parse, [752](#)
 - ParseError, [752](#)
 - ParseFile, [752](#)
 - ProcessFile, [752](#)
 - source_file, [754](#)
 - source_line, [754](#)
 - SourceFile, [753](#)
- Parsers::RouteVec, [857](#)

- positionName, [857](#)
- posList, [858](#)
- routeLength, [858](#)
- Parsers::SegPos, [885](#)
 - x, [885](#)
 - y, [885](#)
- Parsers::SegVector, [885](#)
 - ang0, [887](#)
 - ang1, [887](#)
 - angle, [887](#)
 - C, [887](#)
 - ePos1, [887](#)
 - ePos2, [888](#)
 - gPos1, [888](#)
 - gPos2, [888](#)
 - GrType, [887](#)
 - J, [887](#)
 - L, [888](#)
 - len0, [888](#)
 - len1, [888](#)
 - length, [889](#)
 - R, [889](#)
 - radius, [889](#)
 - S, [887](#)
 - tgType, [889](#)
- Parsers::TrackBody, [1172](#)
 - ~TrackBody, [1173](#)
 - AppendTrackBodyElt, [1174](#)
 - ConsTrackBody, [1174](#)
 - element, [1175](#)
 - next, [1175](#)
 - operator<<, [1174](#)
 - TrackBody, [1173](#)
 - TrackBodyLength, [1174](#)
 - TrackGraph, [1175](#)
- Parsers::TrackBodyElt, [1175](#)
 - ~TrackBodyElt, [1177](#)
 - a, [1178](#)
 - ConnectedTrackEnd, [1177](#)
 - index, [1178](#)
 - operator<<, [1178](#)
 - TrackBodyElt, [1176](#)
 - TrackGraph, [1178](#)
 - UnConnectedTrackEnd, [1177](#)
 - x, [1178](#)
 - y, [1179](#)
- Parsers::TrackGraph, [1179](#)
 - ~TrackGraph, [1187](#)
 - AddNewNode, [1188](#)
 - Angle, [1188](#)
 - backpointers, [1206](#)
 - Block, [1187](#)
 - c_idMap, [1206](#)
 - c_nodes, [1206](#)
 - c_roots, [1206](#)
 - circleLayoutP, [1206](#)
 - compressed_edge_exists, [1188](#)
 - CompressedEdgeCount, [1188](#)
 - CompressedEdgeLength, [1188](#)
 - CompressedEdgeNode, [1189](#)
 - CompressedEdgePair, [1185](#)
 - CompressedEdgePairVector, [1185](#)
 - CompressedGraph, [1185](#)
 - CompressedGraphCircleLayout, [1189](#)
 - CompressedGraphKamadaKawaiSpring, [1189](#)
 - CompressedGraphKruskalMinimumSpanningTree, [1189](#)
 - CompressedGraphPrimMinimumSpanningTree, [1190](#)
 - CompressedIdNodeMap, [1185](#)
 - CompressedNode, [1186](#)
 - CompressedNodePositionX, [1190](#)
 - CompressedNodePositionY, [1190](#)
 - CompressedNodeSegments, [1190](#)
 - CompressedNodeVector, [1186](#)
 - compressedP, [1207](#)
 - CompressGraph, [1191](#)
 - computeHeads, [1191](#)
 - ComputeRouteLength, [1191](#)
 - Control, [1187](#)
 - Degrees, [1187](#)
 - DeleteTurnoutGraphic, [1191](#)
 - DeleteTurnoutRouteList, [1191](#)
 - EdgeA, [1192](#)
 - EdgeIndex, [1192](#)
 - EdgeLength, [1192](#)
 - EdgeX, [1192](#)
 - EdgeY, [1193](#)
 - FindBlock, [1193](#)
 - FindNode, [1193](#)
 - Graph, [1186](#)
 - Heads, [1193](#)
 - heads, [1207](#)
 - HighestNode, [1194](#)
 - idMap, [1207](#)
 - IdNodeMap, [1186](#)
 - InsertBezierTrack, [1194](#)
 - InsertBlock, [1194](#)
 - insertCompressedNode, [1194](#)
 - InsertControl, [1195](#)
 - InsertCornuTrack, [1195](#)
 - InsertCurveTrack, [1195](#)
 - InsertJointTrack, [1196](#)
 - InsertSensor, [1196](#)
 - InsertSignal, [1196](#)
 - InsertStraightTrack, [1196](#)
 - InsertSwitchMotor, [1197](#)
 - InsertTurnOut, [1197](#)
 - InsertTurnTable, [1197](#)

- IsCompressed, 1197
- IsCompressedNode, 1198
- IsNodeP, 1198
- IsNone, 1198
- KamadaKawaiSpringLayoutP, 1207
- LengthOfCurve, 1198
- LengthOfJoint, 1199
- LengthOfNode, 1199
- LengthOfStraight, 1199
- LowestNode, 1199
- MakeTurnoutGraphic, 1200
- MakeTurnoutRouteList, 1200
- NameOfNode, 1200
- Node, 1186
- nodes, 1207
- NodeTurnoutGraphic, 1200
- NodeTurnoutRoutelist, 1201
- NodeType, 1186
- none, 1208
- NormalActionScript, 1201
- NumberOfHeads, 1201
- NumEdges, 1201
- OffScript, 1201
- OnScript, 1202
- operator<, 1205
- OrigX, 1202
- OrigY, 1202
- Radians, 1187
- ReverseActionScript, 1203
- Roots, 1203
- RotationUnit, 1187
- SenseScript, 1203
- Sensor, 1187
- Signal, 1187
- SignalAspects, 1203
- SwitchMotor, 1187
- tr_rotate, 1204
- tr_scale, 1204
- tr_translate, 1204
- Track, 1187
- TrackGraph, 1187
- TrackList, 1204
- traversePrimMST, 1205
- Turnout, 1187
- TurnoutNumber, 1205
- Turntable, 1187
- TypeOfNode, 1205
- Undefined, 1187
- valid_heads, 1208
- Parsers::TrackGraph::CompressedEdgeValues, 294
 - CompressedEdgeValues, 294
 - length, 294
- Parsers::TrackGraph::CompressedNodeValues, 295
 - CompressedNodeValues, 296
 - FindSegmentIndex, 296
 - id, 296
 - position, 296
 - rawnode, 296
 - segments, 297
- Parsers::TrackGraph::EdgeValues, 425
 - a, 426
 - EdgeValues, 426
 - index, 426
 - length, 426
 - x, 427
 - y, 427
- Parsers::TrackGraph::NodeValues, 671
 - angle, 673
 - aspectlist, 674
 - Cleanup, 673
 - id, 674
 - length, 674
 - name, 674
 - NodeValues, 672
 - normalactionscrip, 674
 - numheads, 675
 - offscript, 675
 - onscript, 675
 - origx, 675
 - origy, 675
 - reverseactionscrip, 676
 - sensescript, 676
 - tgr, 676
 - tpo, 676
 - tracklist, 676
 - turnoutnumber, 677
 - type, 677
- Parsers::TrackGraph::Point, 790
 - x, 791
 - y, 791
- Parsers::TrackGraph::Transform2D, 1236
 - Apply, 1238
 - Determinant, 1238
 - FUZZ, 1240
 - Inverse, 1239
 - matrix, 1240
 - Minor, 1239
 - operator!=, 1239
 - operator*, 1239
 - operator==, 1239
 - Transform2D, 1237, 1238
- Parsers::TurnoutBody, 1240
 - CleanUpElement, 1242
 - CleanUpTurnoutBody, 1242
 - ConsTurnoutBody, 1242
 - Element, 1242
 - element, 1244
 - next, 1244

- TrackGraph, [1243](#)
- TurnoutBody, [1241](#)
- TurnoutBodyElt, [1243](#)
- TurnoutEnds, [1242](#)
- TurnoutRouteCount, [1243](#)
- TurnoutSegmentCount, [1243](#)
- Parsers::TurnoutBodyElt, [1244](#)
 - ~TurnoutBodyElt, [1247](#)
 - ang0, [1251](#)
 - ang1, [1251](#)
 - GetTurnoutCurveSegment, [1247](#)
 - GetTurnoutJointSegment, [1247](#)
 - GetTurnoutRoute, [1248](#)
 - GetTurnoutStraightSegment, [1248](#)
 - InitTSegId, [1248](#)
 - L, [1251](#)
 - MakeTurnoutCurveSegment, [1248](#)
 - MakeTurnoutEnd, [1249](#)
 - MakeTurnoutJointSegment, [1249](#)
 - MakeTurnoutRoute, [1249](#)
 - MakeTurnoutStraightSegment, [1250](#)
 - None, [1247](#)
 - pos1, [1251](#)
 - pos2, [1251](#)
 - R, [1252](#)
 - radius, [1252](#)
 - routeList, [1252](#)
 - RouteName, [1252](#)
 - segCount, [1252](#)
 - segmentId, [1253](#)
 - theEnd, [1253](#)
 - TheType, [1250](#)
 - theType, [1253](#)
 - TrackGraph, [1250](#)
 - TurnoutBody, [1250](#)
 - TurnoutBodyElt, [1247](#)
 - TurnoutBodyEltType, [1246](#)
 - TurnoutCurveSegment, [1247](#)
 - TurnoutEnd, [1247](#)
 - TurnoutJointSegment, [1247](#)
 - TurnoutRoute, [1247](#)
 - TurnoutStraightSegment, [1247](#)
- Parsers::TurnoutBodyElt::Pos, [793](#)
 - x, [794](#)
 - y, [794](#)
- Parsers::TurnoutGraphic, [1253](#)
 - maxX, [1254](#)
 - maxY, [1254](#)
 - minX, [1254](#)
 - minY, [1255](#)
 - numSegments, [1255](#)
 - segments, [1255](#)
- Parsers::TurnoutRoutelist, [1255](#)
 - numRoutelists, [1256](#)
 - routes, [1256](#)
- ParseXML, [754](#)
 - _characterdata, [756](#)
 - _elementend, [756](#)
 - _elementstart, [757](#)
 - displayTree, [757](#)
 - nodeStack, [759](#)
 - ParseXML, [756](#)
 - rootnode, [759](#)
 - validate, [757](#)
- partline
 - FCFSupport::PDFPrinterDevice, [788](#)
 - FCFSupport::PostScriptPrinterDevice, [802](#)
- Passenger
 - FCFSupport::Train, [1211](#)
- PathName
 - FCFSupport::PathName, [761](#), [762](#)
 - TTSupport::PathName, [769](#), [771](#)
- pathname
 - FCFSupport::PathName, [767](#)
 - TTSupport::PathName, [777](#)
- PathSeparator
 - FCFSupport::PathName, [766](#)
 - TTSupport::PathName, [776](#)
- pattern
 - FCFSupport::PDFFileStructures::ResourceDictionary, [856](#)
- Pause
 - FCFSupport::PauseCallback, [778](#)
- PauseCallback
 - FCFSupport::PauseCallback, [777](#)
- PDFNameArray
 - FCFSupport::PDFFileStructures::PDFNameArray, [779](#)
- PDFPrinter.h
 - oneColumnWidthFraction, [1316](#)
- PDFPrinterDevice
 - FCFSupport::PDFPrinterDevice, [782](#)
- PDFPrinterSupport.h
 - asctime_r, [1318](#)
 - localtime_r, [1318](#)
- PDFStream
 - FCFSupport::PDFFileStructures::PDFStream, [789](#)
- PDFStreamVector
 - FCFSupport::PDFFileStructures, [84](#)
- Peek
 - FCFSupport::Car, [247](#)
- peek
 - FCFSupport::Car, [257](#)
- PI
 - GRSupport, [94](#)
- PI2
 - GRSupport, [94](#)
- PickCar

- FCFSupport::SwitchListElement, [1026](#)
- pickCar
 - FCFSupport::SwitchListElement, [1027](#)
- PickCarEq
 - FCFSupport::SwitchList, [1018](#)
- PickIndex
 - FCFSupport::SwitchList, [1019](#)
- pickIndex
 - FCFSupport::SwitchList, [1021](#)
- pickLoc
 - FCFSupport::SwitchListElement, [1027](#)
- PickLocation
 - FCFSupport::SwitchListElement, [1026](#)
- PickLocationEq
 - FCFSupport::SwitchList, [1019](#)
- PickTrain
 - FCFSupport::SwitchListElement, [1026](#)
- pickTrain
 - FCFSupport::SwitchListElement, [1027](#)
- PickTrainEq
 - FCFSupport::SwitchList, [1019](#)
- PIEngineering
 - RaildriverIO, [843](#)
- PIER
 - YY_MRRXtrkCad_INHERIT, [1292](#)
- pindirection
 - linuxgpio, [120](#)
- pinnotype
 - linuxgpio, [120](#)
- Plate
 - FCFSupport::Car, [247](#)
- plate
 - FCFSupport::Car, [257](#)
 - FCFSupport::Industry, [534](#)
- Poll
 - cmri::CMri, [277](#)
 - CTIAcela, [51](#)
- pollid
 - raildriver::RaildriverClient, [821](#)
- populateAliasMap
 - lcc::CANGridConnect, [204](#)
- portandnidDialog
 - lcc::CANGridConnectOverUSBSerial, [224](#)
- portLCombo
 - lcc::CANGridConnectOverUSBSerial, [224](#)
- portLSpin
 - lcc::CANGridConnectOverTcp, [219](#)
 - lcc::OpenLCBOverTcp, [705](#)
- portnidandhostDialog
 - lcc::CANGridConnectOverTcp, [219](#)
 - lcc::OpenLCBOverTcp, [705](#)
- portopenp
 - CmriSupport::CmriNode, [283](#)
- pos1
 - Parsers::BezierBodyElt, [184](#)
 - Parsers::CornuBodyElt, [346](#)
 - Parsers::TurnoutBodyElt, [1251](#)
- pos2
 - Parsers::BezierBodyElt, [185](#)
 - Parsers::CornuBodyElt, [346](#)
 - Parsers::TurnoutBodyElt, [1251](#)
- position
 - Parsers::TrackGraph::CompressedNodeValues, [296](#)
- positionName
 - Parsers::RouteVec, [857](#)
- posList
 - Parsers::RouteVec, [858](#)
- post
 - LabelComboBox, [102](#)
- PostScriptPrinterDevice
 - FCFSupport::PostScriptPrinterDevice, [796](#)
- PostScriptStandardType1FontDictionary
 - FCFSupport::PDFFFileStructures::PostScriptStandardType1FontDictiona
 [803](#)
- PoweringUp
 - xpressnet::CommandStationStatus, [292](#)
- PowerUpMode
 - xpressnet, [152](#)
- prefix
 - FCFSupport::PDFFFileStructures::PageLabelDictionary,
 [741](#)
- prevlink
 - HTMLHelp::HTMLHelp, [505](#)
- PrevTrain
 - FCFSupport::Car, [247](#)
- prevtrain
 - FCFSupport::Car, [257](#)
- Print
 - FCFSupport::Train, [1217](#)
- print
 - CTCPanel::CTCPanel, [383](#)
 - FCFSupport::Train, [1222](#)
- PrintAllCarTypes
 - FCFSupport::System, [1065](#)
- PrintAllLists
 - FCFSupport::System, [1066](#)
- PrintAlpha
 - FCFSupport::System, [1066](#)
- printAlpha
 - FCFSupport::System, [1114](#)
- PrintAnalysisHeader
 - FCFSupport::System, [1066](#)
- PrintAtwice
 - FCFSupport::System, [1067](#)
- printAtwice
 - FCFSupport::System, [1114](#)
- PrintCarHeading
 - FCFSupport::System, [1067](#)

- PrintCarTypesHeader
 - FCFSupport::System, [1067](#)
- PrintCarTypesSummaryHeader
 - FCFSupport::System, [1067](#)
- PrintDashedLine
 - FCFSupport::System, [1068](#)
- PrintDispatch
 - FCFSupport::System, [1068](#)
- printDispatch
 - FCFSupport::System, [1115](#)
- PrintDispatcher
 - FCFSupport::System, [1068](#)
- Printem
 - FCFSupport::System, [1069](#)
- printem
 - FCFSupport::System, [1115](#)
- PrinterDevice
 - FCFSupport::PrinterDevice, [807](#)
- PrinterPageSize
 - FCFSupport::PrinterDevice, [810](#)
- printerStream
 - FCFSupport::LQ24PrinterDevice, [602](#)
 - FCFSupport::PDFPrinterDevice, [788](#)
 - FCFSupport::PostScriptPrinterDevice, [802](#)
 - FCFSupport::TextPrinterDevice, [1125](#)
- printexportfiletypes
 - lcc::ConfigurationEditor, [336](#)
- PrintFormFeed
 - FCFSupport::System, [1069](#)
- PrintIndustryHeader
 - FCFSupport::System, [1069](#)
- PrintList
 - FCFSupport::System, [1069](#)
- printList
 - FCFSupport::System, [1115](#)
- PrintLocCommon
 - FCFSupport::System, [1070](#)
- PrintLocOneIndustry
 - FCFSupport::System, [1070](#)
- PrintLtwice
 - FCFSupport::System, [1070](#)
- printLtwice
 - FCFSupport::System, [1115](#)
- PrintOneAnalysis
 - FCFSupport::System, [1071](#)
- PrintOneCarInfo
 - FCFSupport::System, [1071](#)
- PrintOneCarLocation
 - FCFSupport::System, [1071](#)
- PrintOneCarType
 - FCFSupport::System, [1072](#)
- PrintOneIndustry
 - FCFSupport::System, [1072](#)
- printOptions
 - TTSupport::TimeTableSystem, [1164](#)
- PrintSystemBanner
 - FCFSupport::System, [1073](#)
- PrintTrainLoc
 - FCFSupport::System, [1073](#)
- PrintTrainOrderHeader
 - FCFSupport::System, [1074](#)
- PrintTrainOrders
 - FCFSupport::System, [1074](#)
- PrintYards
 - FCFSupport::System, [1074](#)
- printYards
 - FCFSupport::System, [1115](#)
- Priority
 - FCFSupport::Industry, [530](#)
- priority
 - FCFSupport::Industry, [534](#)
- PRIORITY_MASK
 - lcc::MTIDetail, [638](#)
- PRIORITY_SHIFT
 - lcc::MTIDetail, [638](#)
- ProcessFile
 - Parsers::ParseFile, [752](#)
- procSets
 - FCFSupport::PDFFileStructures::ResourceDictionary, [856](#)
- ProduceEvent
 - lcc::OpenLCBNode, [692](#)
- producer
 - FCFSupport::PDFFileStructures::InformationDirectory, [539](#)
- ProducerIdentified
 - lcc::OpenLCBNode, [693](#)
- ProducerRangeIdentified
 - lcc::OpenLCBNode, [693](#)
- ProductCodeId
 - RaildriverIO, [843](#)
- ProductIdCode
 - azatrax::Azatrax, [171](#)
- PROGRAMMING_INFO_COMMAND_STATION_BUSY
 - xpressnet, [153](#)
- PROGRAMMING_INFO_COMMAND_STATION_READY
 - xpressnet, [153](#)
- PROGRAMMING_INFO_DATA_BYTE_NOT_FOUND
 - xpressnet, [153](#)
- PROGRAMMING_INFO_SHORT_CIRCUIT
 - xpressnet, [153](#)
- ProgramMode
 - ncc::NCE, [655](#)
- progress
 - mainwindow, [618](#)
- progressBar
 - splash, [935](#)
- ProgressDone

- FCFSupport::WorkInProgressCallback, [1265](#)
- ProgressStart
 - FCFSupport::WorkInProgressCallback, [1265](#)
- ProgressUpdate
 - FCFSupport::WorkInProgressCallback, [1266](#)
- properties
 - FCFSupport::PDFFileStructures::ResourceDictionary, [856](#)
- ProtocolLabelString
 - lcc::OpenLCBProtocols, [707](#)
- protocolstrings
 - lcc::OpenLCBProtocols, [709](#)
- protocolsupport
 - lcc::OpenLCBNode, [697](#)
- ProtocolSupportRequest
 - lcc::OpenLCBNode, [693](#)
- PSQuote
 - FCFSupport::PostScriptPrinterDevice, [798](#)
- PulseOff
 - CTIAcela, [51](#)
- PulseOn
 - CTIAcela, [51](#)
- PulseRelays
 - azatrax::SR4, [941](#)
- PushButton
 - CTCPanel::PushButton, [816](#)
- pushcurrenttopic
 - HTMLHelp::HTMLHelp, [505](#)
- Put
 - FCFSupport::LQ24PrinterDevice, [598](#)
 - FCFSupport::PDFPrinterDevice, [784](#)
 - FCFSupport::PostScriptPrinterDevice, [798](#)
 - FCFSupport::PrinterDevice, [810](#), [811](#)
 - FCFSupport::TextPrinterDevice, [1124](#)
- putdebug
 - lcc::ConfigMemory, [303](#)
 - lcc::ConfigOptions, [307](#)
 - lcc::ConfigurationEditor, [332](#)
- PutLine
 - FCFSupport::LQ24PrinterDevice, [599](#)
 - FCFSupport::PDFPrinterDevice, [784](#)
 - FCFSupport::PostScriptPrinterDevice, [798](#)
 - FCFSupport::PrinterDevice, [811](#)
 - FCFSupport::TextPrinterDevice, [1124](#)
- PutPageHeader
 - FCFSupport::PostScriptPrinterDevice, [800](#)
- Q
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Q1_State
 - azatrax::SR4, [941](#)
- Q1_state
 - azatrax::SR4::status1_union, [973](#)
- Q2_State
 - azatrax::SR4, [941](#)
- Q2_state
 - azatrax::SR4::status1_union, [973](#)
- Q3_State
 - azatrax::SR4, [942](#)
- Q3_state
 - azatrax::SR4::status1_union, [973](#)
- Q4_State
 - azatrax::SR4, [942](#)
- Q4_state
 - azatrax::SR4::status1_union, [973](#)
- Query
 - CTIAcela, [52](#)
- QuotePDFString
 - FCFSupport::PDFFileStructures, [84](#)
- R
 - Parsers::SegVector, [889](#)
 - Parsers::TurnoutBodyElt, [1252](#)
- RADIANS
 - MRRXtrkCad.tab.h, [1302](#)
- Radians
 - Parsers::TrackGraph, [1187](#)
- RadiansToDegrees
 - GRSupport, [93](#)
- radius
 - Parsers::BezierBodyElt, [185](#)
 - Parsers::CornuBodyElt, [346](#)
 - Parsers::SegVector, [889](#)
 - Parsers::TurnoutBodyElt, [1252](#)
- raildriver, [136](#)
 - AUTOBRAKE, [137](#)
 - BAILOFF, [138](#)
 - DIGITAL1, [138](#)
 - DIGITAL2, [138](#)
 - DIGITAL3, [138](#)
 - DIGITAL4, [138](#)
 - DIGITAL5, [138](#)
 - DIGITAL6, [138](#)
 - eventlist, [137](#)
 - HEADLIGHT, [138](#)
 - INDEPENDBRK, [137](#)
 - RaildriverEvents, [137](#)
 - REVERSER, [137](#)
 - THROTTLE, [137](#)
 - WIPER, [138](#)
- raildriver::RaildriverClient, [818](#)
 - _poller, [820](#)
 - _readevent, [820](#)
 - ~RaildriverClient, [819](#)
 - clear, [820](#)
 - leds, [820](#)
 - mask, [820](#)

- pollid, [821](#)
- RaildriverClient, [819](#)
- socket, [821](#)
- speaker, [821](#)
- RaildriverClient
 - raildriver::RaildriverClient, [819](#)
- RaildriverClientModule, [63](#)
- RaildriverEvents
 - raildriver, [137](#)
- RaildriverIO, [821](#)
 - ~RaildriverIO, [830](#)
 - AUTOBRAKE, [827](#)
 - AutoBrake, [841](#)
 - AUTOBRAKE_M, [828](#)
 - BALLOFF, [827](#)
 - BailOff, [841](#)
 - BALLOFF_M, [828](#)
 - DIGITAL1, [827](#)
 - Digital1, [842](#)
 - DIGITAL1_M, [829](#)
 - DIGITAL2, [827](#)
 - Digital2, [842](#)
 - DIGITAL2_M, [829](#)
 - DIGITAL3, [827](#)
 - Digital3, [842](#)
 - DIGITAL3_M, [829](#)
 - DIGITAL4, [827](#)
 - Digital4, [842](#)
 - DIGITAL4_M, [829](#)
 - DIGITAL5, [827](#)
 - Digital5, [842](#)
 - DIGITAL5_M, [829](#)
 - DIGITAL6, [828](#)
 - Digital6, [842](#)
 - DIGITAL6_M, [829](#)
 - Eventcodes, [826](#)
 - Eventmask_bits, [828](#)
 - GetAlert, [830](#)
 - GetAutoBrake, [830](#)
 - GetBailOff, [830](#)
 - GetBell, [831](#)
 - GetBlueButton1, [831](#)
 - GetBlueButton10, [831](#)
 - GetBlueButton11, [831](#)
 - GetBlueButton12, [831](#)
 - GetBlueButton13, [832](#)
 - GetBlueButton14, [832](#)
 - GetBlueButton15, [832](#)
 - GetBlueButton16, [832](#)
 - GetBlueButton17, [832](#)
 - GetBlueButton18, [833](#)
 - GetBlueButton19, [833](#)
 - GetBlueButton2, [833](#)
 - GetBlueButton20, [833](#)
 - GetBlueButton21, [833](#)
 - GetBlueButton22, [834](#)
 - GetBlueButton23, [834](#)
 - GetBlueButton24, [834](#)
 - GetBlueButton25, [834](#)
 - GetBlueButton26, [834](#)
 - GetBlueButton27, [835](#)
 - GetBlueButton28, [835](#)
 - GetBlueButton3, [835](#)
 - GetBlueButton4, [835](#)
 - GetBlueButton5, [835](#)
 - GetBlueButton6, [836](#)
 - GetBlueButton7, [836](#)
 - GetBlueButton8, [836](#)
 - GetBlueButton9, [836](#)
 - GetEBrakeDown, [836](#)
 - GetEBrakeUp, [837](#)
 - GetHeadlight, [837](#)
 - GetIndependBrake, [837](#)
 - GetPanDown, [837](#)
 - GetPanLeft, [837](#)
 - GetPanRight, [838](#)
 - GetPantograph, [838](#)
 - GetPanUp, [838](#)
 - GetProductCodeId, [838](#)
 - GetRangeDown, [838](#)
 - GetRangeUp, [839](#)
 - GetReverser, [839](#)
 - GetSand, [839](#)
 - GetThrottle, [839](#)
 - GetWhistleDown, [839](#)
 - GetWhistleUp, [840](#)
 - GetWiper, [840](#)
 - GetZoomUp, [840](#)
 - GetZoopDown, [840](#)
 - HEADLIGHT, [827](#)
 - Headlight, [843](#)
 - HEADLIGHT_M, [829](#)
 - IndependBrake, [843](#)
 - INDEPENDBRK, [827](#)
 - INDEPENDBRK_M, [828](#)
 - LEDCommand, [843](#)
 - NONE, [826](#)
 - NONE_M, [828](#)
 - PIEngineering, [843](#)
 - ProductCodeId, [843](#)
 - RaildriverIO, [829](#), [830](#)
 - RailDriverModernDesktop, [843](#)
 - RDInput, [844](#)
 - rdriverdev, [844](#)
 - ReadInputs, [840](#)
 - ReportBuffer, [844](#)
 - REVERSER, [826](#)
 - Reverser, [844](#)

- REVERSER_M, [828](#)
- SetLEDS, [841](#)
- SpeakerCommand, [845](#)
- SpeakerOff, [841](#)
- SpeakerOn, [841](#)
- theBytes, [845](#)
- THROTTLE, [827](#)
- Throttle, [845](#)
- THROTTLE_M, [828](#)
- WIPER, [827](#)
- Wiper, [845](#)
- WIPER_M, [828](#)
- RailDriverModernDesktop
 - RaildriverIO, [843](#)
- RAMCheckError
 - xpressnet::CommandStationStatus, [292](#)
- RAMData
 - nce, [125](#)
- RAMData8
 - nce, [125](#)
- RanAllTrains
 - FCFSupport::System, [1074](#)
- ranAllTrains
 - FCFSupport::System, [1116](#)
- Random
 - FCFSupport::System, [1075](#)
- Randomize
 - FCFSupport::System, [1075](#)
- rawnode
 - Parsers::TrackGraph::CompressedNodeValues, [296](#)
- RawPacket
 - nce, [125](#)
- RawTrackPacket
 - nce, [125](#)
- RDInput
 - RaildriverIO, [844](#)
- rdriverdev
 - RaildriverIO, [844](#)
- Read
 - cmri::CMri, [277](#)
 - CTIAcela, [52](#)
 - TTSupport::Cab, [189](#)
 - TTSupport::Occupied, [680](#)
 - TTSupport::Station, [959](#)
 - TTSupport::Stop, [990](#)
 - TTSupport::StorageTrack, [998](#)
 - TTSupport::TimeRange, [1139](#)
 - TTSupport::Train, [1227](#)
- read
 - linuxgpio::LinuxGpio, [570](#)
- Read16
 - CTIAcela, [52](#)
- Read4
 - CTIAcela, [53](#)
- Read8
 - CTIAcela, [53](#)
- ReadAll
 - CTIAcela, [54](#)
- ReadCarTypes
 - FCFSupport::System, [1075](#)
- ReadConfiguration, [138](#)
 - ConfigurationType, [139](#)
 - IsEven, [139](#)
 - ReadConfiguration, [140](#)
 - WriteConfiguration, [140](#)
- ReadCVInDirectMode
 - nce::NCE, [655](#)
- ReadCVInPagedMode
 - nce::NCE, [655](#)
- ReadDivisions
 - FCFSupport::System, [1075](#)
- readevent
 - xpressnet::XPressNet, [1281](#)
- ReadFromRAM
 - nce::NCE, [656](#)
- ReadGroupLimit
 - FCFSupport::System, [1076](#)
- ReadIndustries
 - FCFSupport::System, [1076](#)
- ReadInputs
 - RaildriverIO, [840](#)
- readlist
 - lcc::ConfigMemory, [305](#)
- ReadNote
 - TTSupport::TimeTableSystem, [1159](#)
- ReadOneByteFromRAM
 - nce::NCE, [656](#)
- ReadOwners
 - FCFSupport::System, [1077](#)
- ReadRegister
 - nce::NCE, [656](#)
- ReadRevision
 - CTIAcela, [54](#)
- ReadStations
 - FCFSupport::System, [1077](#)
- ReadTrainOrders
 - FCFSupport::System, [1077](#)
- ReadTrains
 - FCFSupport::System, [1078](#)
- realized
 - ScrollTabNotebook, [884](#)
- Rectangle
 - FCFSupport::PDFFileStructures::Rectangle, [846](#)
- RegisterModeRead
 - xpressnet::XPressNet, [1281](#)
- RegisterModeWrite
 - xpressnet::XPressNet, [1281](#)
- RelaysOff

- azatrax::SR4, [942](#)
- RelaysOn
 - azatrax::SR4, [943](#)
- ReleaseTrainDisplay
 - FCFSupport::TrainDisplayCallback, [1235](#)
- Reload
 - FCFSupport::Industry, [530](#)
- reload
 - FCFSupport::Industry, [534](#)
- ReLoadCarFile
 - FCFSupport::System, [1078](#)
- remLen
 - FCFSupport::Industry, [534](#)
- remoteeval
 - Satellite, [860](#)
- removeChild
 - SimpleDOMEElement, [915](#)
- RemovedStoredTrain
 - TTSupport::StorageTrack, [998](#)
- RemoveLocomotiveFromMultiUnit
 - ncc::NCE, [657](#)
 - xpressnet::XPressNet, [1282](#)
- RemoveNote
 - TTSupport::Stop, [990](#)
- RemoveNoteFromStop
 - TTSupport::Train, [1228](#)
- RemoveNoteFromTrain
 - TTSupport::Train, [1228](#)
- render
 - HTMLHelp::HTMLHelp, [505](#)
- replyExpected
 - lcc::CanMessage, [232](#)
- ReportAnalysis
 - FCFSupport::System, [1078](#)
- ReportBuffer
 - RaildriverIO, [844](#)
- ReportCarLocations
 - FCFSupport::System, [1079](#)
- ReportCarOwners
 - FCFSupport::System, [1079](#)
- ReportCars
 - FCFSupport::System, [1079](#)
- ReportCarsNotMoved
 - FCFSupport::System, [1080](#)
- ReportCarTypes
 - FCFSupport::System, [1080](#)
- ReportIndustries
 - FCFSupport::System, [1081](#)
- ReportLocAll
 - FCFSupport::System, [1081](#)
- ReportLocDivision
 - FCFSupport::System, [1082](#)
- ReportLocIndustry
 - FCFSupport::System, [1082](#)
- ReportLocStation
 - FCFSupport::System, [1082](#)
- ReportTrains
 - FCFSupport::System, [1083](#)
- RequestForServiceModeResults
 - xpressnet::XPressNet, [1282](#)
- requiredOpts
 - lcc::CANGridConnectOverCANSocket, [213](#)
 - lcc::CANGridConnectOverTcp, [218](#)
 - lcc::CANGridConnectOverUSBSerial, [223](#)
 - lcc::OpenLCBOverTcp, [702](#)
- reserveAlias
 - lcc::CANGridConnect, [205](#)
- reserved
 - azatrax::Azatrax::StateDataPacket, [947](#)
 - azatrax::MRD::status1_union, [969](#)
 - azatrax::MRD::status2_union, [975](#)
 - azatrax::SL2::status3_union, [981](#)
 - azatrax::SR4::status2_union, [979](#)
 - azatrax::SR4::status3_union, [983](#)
- RESERVED_SHIFT
 - lcc::CANHeader, [227](#)
- reserved
 - azatrax::SL2::status1_union, [971](#)
 - azatrax::SL2::status2_union, [977](#)
 - azatrax::SR4::status1_union, [973](#)
- ResetIndustryStats
 - FCFSupport::System, [1083](#)
- ResetLastIndex
 - FCFSupport::SwitchList, [1020](#)
- ResetNetwork
 - CTIAcela, [54](#)
- ResetStatus
 - azatrax::MRD, [625](#)
- resetStatus
 - azatrax::MRD::status2_union, [975](#)
- ResetStopwatch
 - azatrax::MRD, [625](#)
- ResetSwitchList
 - FCFSupport::SwitchList, [1020](#)
- resize
 - OvalWidgets::OvalScrollBar, [728](#)
- ResourceDictionary
 - FCFSupport::PDFFileStructures::ResourceDictionary, [851](#)
- resources
 - FCFSupport::PDFFileStructures::Page, [738](#)
 - FCFSupport::PDFFileStructures::PageTree, [750](#)
- responseList
 - xpressnet::XPressNet, [1286](#)
- Responses
 - CTIAcela, [60](#)
- ResponseType
 - xpressnet::CommandStationResponse, [289](#)

- RestartLoop
 - FCFSupport::System, [1083](#)
- RESTOFLINE
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- RestoreLEDFunction
 - azatrax::Azatrax, [172](#)
- ResumeOperations
 - xpressnet::XPressNet, [1282](#)
- ReturnAuxiliaryInputUnit
 - nce::NCE, [657](#)
- ReturnAuxiliaryInputUnitShortForm
 - nce::NCE, [658](#)
- ReturnClock
 - nce::NCE, [658](#)
- ReturnMySimpleNodeInfo
 - lcc::OpenLCBNode, [694](#)
- ReturnMySupportedProtocols
 - lcc::OpenLCBNode, [694](#)
- Reverse
 - nce, [127](#)
 - xpressnet, [151](#)
- reverse
 - CabWidgets::LocomotiveDirection, [578](#)
- ReverseActionScript
 - Parsers::LayoutFile, [561](#)
 - Parsers::TrackGraph, [1203](#)
- reverseactionscrip
 - Parsers::TrackGraph::NodeValues, [676](#)
- ReverseBlink
 - CTIAcela, [54](#)
- REVERSER
 - raildriver, [137](#)
 - RaildriverIO, [826](#)
- Reverser
 - RaildriverIO, [844](#)
- REVERSER_M
 - RaildriverIO, [828](#)
- right
 - ScrollTabNotebook, [884](#)
- rightbuttons
 - CabWidgets::LocomotiveSpeed, [592](#)
- Roman
 - FCFSupport::PrinterDevice, [806](#)
- ROOMSIZE
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- rootDictionary
 - FCFSupport::PDFPrinterDevice, [788](#)
- rootnode
 - ParseXML, [759](#)
- Roots
 - Parsers::LayoutFile, [561](#)
 - Parsers::TrackGraph, [1203](#)
- RotationUnit
 - Parsers::TrackGraph, [1187](#)
- routeLength
 - Parsers::RouteVec, [858](#)
- routeList
 - Parsers::TurnoutBodyElt, [1252](#)
- RouteName
 - Parsers::TurnoutBodyElt, [1252](#)
- routes
 - Parsers::TurnoutRoutelist, [1256](#)
- RunAllTrains
 - FCFSupport::System, [1083](#)
- RunBoxMoves
 - FCFSupport::System, [1084](#)
- RunOneLocal
 - FCFSupport::System, [1084](#)
- RunOneManifest
 - FCFSupport::System, [1085](#)
- RunOnePassenger
 - FCFSupport::System, [1085](#)
- RunOneTrain
 - FCFSupport::System, [1086](#)
- S
 - Parsers::MRRXtrkCad, [630](#)
 - Parsers::SegVector, [887](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- S128
 - nce, [127](#)
 - xpressnet, [152](#)
- S14
 - nce, [127](#)
 - xpressnet, [152](#)
- S27
 - xpressnet, [152](#)
- S28
 - nce, [127](#)
 - xpressnet, [152](#)
- S_128
 - xpressnet, [149](#)
- S_14
 - xpressnet, [149](#)
- S_27
 - xpressnet, [149](#)
- S_28
 - xpressnet, [149](#)
- SameDirectory
 - FCFSupport::PathName, [767](#)
 - TTSupport::PathName, [776](#)
- Satellite, [858](#)
 - ~Satellite, [859](#)
 - remoteeval, [860](#)
 - Satellite, [859](#)
 - socket, [860](#)

- SatelliteModule, [65](#)
- SaveCars
 - FCFSupport::System, [1086](#)
- SCALE
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- scale
 - CTCPanel::CTCPanel, [387](#)
- ScaleClockRatio
 - nce, [126](#)
- scanEol
 - Parsers::MRRXtrkCad, [632](#)
 - YY_MRRXtrkCad_INHERIT, [1293](#)
- scanToEND
 - Parsers::MRRXtrkCad, [632](#)
 - YY_MRRXtrkCad_INHERIT, [1293](#)
- schematic
 - CTCPanel::CTCPanel, [387](#)
- schematic_crosshair
 - CTCPanel::CTCPanel, [383](#)
- schematicYscroll
 - CTCPanel::CTCPanel, [387](#)
- SchLabel
 - CTCPanel::SchLabel, [862](#)
- ScissorCrossover
 - CTCPanel::ScissorCrossover, [866](#)
- Scripts/CMri/cmri.tcl, [1333](#)
- Scripts/Common/CabWidgets.tcl, [1334](#)
- Scripts/Common/CommonTclGroup.h, [1334](#)
- Scripts/Common/CTCPanel2.tcl, [1334](#)
- Scripts/Common/fileentry.tcl, [1336](#)
- Scripts/Common/gettext.tcl, [1337](#)
- Scripts/Common/HTMLHelp.tcl, [1337](#)
- Scripts/Common/labelcombobox.tcl, [1337](#)
- Scripts/Common/labelselectcolor.tcl, [1338](#)
- Scripts/Common/labelspinbox.tcl, [1339](#)
- Scripts/Common/mainwindow.tcl, [1339](#)
- Scripts/Common/panedw.tcl, [1339](#)
- Scripts/Common/ParseXML.tcl, [1340](#)
- Scripts/Common/ReadConfiguration.tcl, [1340](#)
- Scripts/Common/snitScrollNotebook.tcl, [1340](#)
- Scripts/Common/splash.tcl, [1341](#)
- Scripts/ControlSupport/CmriSupport.tcl, [1341](#)
- Scripts/CTIAcela/CTIAcela.tcl, [1341](#)
- Scripts/GRSupport/grsupport2.tcl, [1342](#)
- Scripts/GRSupport/GRSupportTclGroup.h, [1343](#)
- Scripts/GRSupport/Instruments2.tcl, [1343](#)
- Scripts/GRSupport/LCARSWidgets2.tcl, [1343](#)
- Scripts/GRSupport/OvalWidgets2.tcl, [1343](#)
- Scripts/LCC/ConfigDialogs.tcl, [1345](#)
- Scripts/LCC/ConfigurationEditor.tcl, [1345](#)
- Scripts/LCC/eventDialogs.tcl, [1345](#)
- Scripts/LCC/lcc.tcl, [1346](#)
- Scripts/LinuxGpio/LinuxGpio.tcl, [1348](#)
- Scripts/NCE/nce.tcl, [1349](#)
- Scripts/RailDriverSupport/raildriver_client.tcl, [1350](#)
- Scripts/Satellite/Satellite.tcl, [1351](#)
- Scripts/XPressNet/xpressnet.tcl, [1351](#)
- scroll
 - lcc::ConfigurationEditor, [336](#)
- ScrollTabNotebook, [869](#)
 - _Configure, [873](#)
 - _clientRow, [881](#)
 - _compute_height, [873](#)
 - _compute_width, [873](#)
 - _draw_arrows, [873](#)
 - _draw_page, [874](#)
 - _get_x_page, [874](#)
 - _highlight, [874](#)
 - _hpage, [881](#)
 - _left, [881](#)
 - _paddingtype, [881](#)
 - _radiustype, [881](#)
 - _redraw, [875](#)
 - _resize, [875](#)
 - _right, [882](#)
 - _select, [875](#)
 - _tabrow, [882](#)
 - _tabsides, [882](#)
 - _test_page, [875](#)
 - _textid, [882](#)
 - _themeChanged, [876](#)
 - _themeChanged_, [876](#)
 - _warrow, [882](#)
 - _wpage, [882](#)
 - _xview, [876](#)
 - add, [876](#)
 - base, [883](#)
 - compute_size, [877](#)
 - dbg, [883](#)
 - forget, [877](#)
 - get3dcolor, [878](#)
 - index, [878](#)
 - insert, [878](#)
 - lbg, [883](#)
 - left, [883](#)
 - pages, [883](#)
 - pages_opts, [883](#)
 - realized, [884](#)
 - right, [884](#)
 - ScrollTabNotebook, [872](#)
 - see, [879](#)
 - select, [879](#), [884](#)
 - tab, [880](#)
 - tabrow, [884](#)
 - tabs, [881](#), [884](#)
- scrollwindow
 - mainwindow, [618](#)

- searchbackward
 - HTMLHelp::HTMLHelp, [506](#)
- SearchForCarIndexesByNumber
 - FCFSupport::System, [1088](#)
- SearchForIndustryPattern
 - FCFSupport::System, [1088](#)
- SearchForTrainPattern
 - FCFSupport::System, [1088](#)
- searchforward
 - HTMLHelp::HTMLHelp, [506](#)
- see
 - ScrollTabNotebook, [879](#)
- segCount
 - Parsers::BezierBodyElt, [185](#)
 - Parsers::CornuBodyElt, [346](#)
 - Parsers::TurnoutBodyElt, [1252](#)
- segmentId
 - Parsers::BezierBodyElt, [185](#)
 - Parsers::CornuBodyElt, [346](#)
 - Parsers::TurnoutBodyElt, [1253](#)
- segments
 - Parsers::TrackGraph::CompressedNodeValues, [297](#)
 - Parsers::TurnoutGraphic, [1255](#)
- select
 - HTMLHelp::HTMLHelp, [506](#)
 - ScrollTabNotebook, [879](#), [884](#)
- SelectLocomotive
 - CabWidgets::SelectLocomotive, [891](#)
- selectTransportConstructor
 - lcc::OpenLCBNode, [694](#)
- selectTransportConstructorDialog
 - lcc::OpenLCBNode, [698](#)
- send2Bytes
 - azatrax::Azatrax, [172](#)
- send3Bytes
 - azatrax::Azatrax, [172](#)
- sendByte
 - azatrax::Azatrax, [173](#)
- SendDatagram
 - lcc::OpenLCBNode, [695](#)
- SendEvent
 - lcc::SendEvent, [893](#)
- sendevent
 - lcc::EventLog, [438](#)
- SendInitComplete
 - lcc::OpenLCBNode, [695](#)
- sendMessage
 - lcc::CANGridConnect, [205](#)
 - lcc::OpenLCBOverTcp, [702](#)
- SendMyNodeVerification
 - lcc::OpenLCBNode, [695](#)
- SendMySimpleNodeInfo
 - lcc::OpenLCBNode, [695](#)
- SendMySupportedProtocols
 - lcc::OpenLCBNode, [696](#)
- sendOpenLCBMessage
 - lcc::CANGridConnect, [205](#)
- SendSimpleNodeInfoRequest
 - lcc::OpenLCBNode, [696](#)
- SendSupportedProtocolsRequest
 - lcc::OpenLCBNode, [696](#)
- SendVerifyNodeID
 - lcc::OpenLCBNode, [697](#)
- Sense_1
 - azatrax::MRD, [625](#)
 - azatrax::SL2, [926](#)
- sense_1
 - azatrax::MRD::status1_union, [969](#)
 - azatrax::SL2::status2_union, [977](#)
 - azatrax::SR4::status2_union, [979](#)
- Sense_1_Latch
 - azatrax::SR4, [943](#)
- Sense_1_Live
 - azatrax::SR4, [943](#)
- Sense_2
 - azatrax::MRD, [626](#)
 - azatrax::SL2, [926](#)
- sense_2
 - azatrax::MRD::status1_union, [969](#)
 - azatrax::SL2::status2_union, [977](#)
 - azatrax::SR4::status2_union, [979](#)
- Sense_2_Latch
 - azatrax::SR4, [943](#)
- Sense_2_Live
 - azatrax::SR4, [944](#)
- Sense_3
 - azatrax::SL2, [927](#)
- sense_3
 - azatrax::SL2::status2_union, [977](#)
 - azatrax::SR4::status2_union, [979](#)
- Sense_3_Latch
 - azatrax::SR4, [944](#)
- Sense_3_Live
 - azatrax::SR4, [944](#)
- Sense_4
 - azatrax::SL2, [927](#)
- sense_4
 - azatrax::SL2::status2_union, [977](#)
 - azatrax::SR4::status2_union, [979](#)
- Sense_4_Latch
 - azatrax::SR4, [944](#)
- Sense_4_Live
 - azatrax::SR4, [945](#)
- SenseScript
 - Parsers::LayoutFile, [561](#)
 - Parsers::TrackGraph, [1203](#)
- sensescript
 - Parsers::TrackGraph::NodeValues, [676](#)

- SENSOR
 - YY_MRRXtrkCad_INHERIT, [1292](#)
- Sensor
 - Parsers::TrackGraph, [1187](#)
- sentMessageHandler
 - lcc::CAGGridConnect, [209](#)
 - lcc::OpenLCBOverTcp, [705](#)
- SerialNumber
 - azatrax::Azatrax, [173](#)
- SERVICE_MODE_ENTRY
 - xpressnet, [153](#)
- SERVICE_MODE_RESPONSE
 - xpressnet, [153](#)
- ServiceMode
 - xpressnet::CommandStationStatus, [292](#)
 - xpressnet::ServiceModeResponse, [896](#)
- ServiceModeResponse
 - xpressnet::ServiceModeResponse, [895](#)
- SessionNumber
 - FCFSupport::System, [1089](#)
- sessionNumber
 - FCFSupport::System, [1116](#)
- Set
 - linuxgpio::GpioOutputSafeHighInvert, [458](#)
 - linuxgpio::GpioOutputSafeLowInverted, [463](#)
 - linuxgpio::LinuxGpio, [571](#)
- set
 - OvalWidgets::OvalScale, [718](#)
 - OvalWidgets::OvalSlider, [722](#)
 - OvalWidgets::OvalScrollBar, [729](#)
- SetAssignments
 - FCFSupport::Car, [248](#)
- setAttribute
 - SimpleDOMEElement, [916](#)
- SetBinaryCommandEchoMode
 - nce::NCE, [658](#)
- setbitfield
 - CmriSupport::CmriNode, [283](#)
- setByte
 - lcc::GridConnectMessage, [468](#)
- SetCab
 - TTSupport::Stop, [990](#)
- SetCabBusAddressOfUSBBoard
 - nce::NCE, [659](#)
- SetCarOwner
 - FCFSupport::Car, [248](#)
- SetChan1
 - azatrax::MRD, [626](#)
- SetChan2
 - azatrax::MRD, [626](#)
- SetClock
 - nce::NCE, [659](#)
- SetClockFormat
 - nce::NCE, [659](#)
- SetClockRatio
 - nce::NCE, [660](#)
- SetCommandStationPowerUpMode
 - xpressnet::XPressNet, [1282](#)
- setData
 - lcc::CanMessage, [232](#)
 - lcc::GridConnectReply, [475](#)
- setdata
 - SimpleDOMEElement, [916](#)
- setDefault
 - HTMLHelp::HTMLHelp, [506](#)
- SetDeparture
 - TTSupport::Train, [1228](#)
- SetDestination
 - FCFSupport::Car, [248](#)
- SetDestinationStorageTrack
 - TTSupport::Train, [1229](#)
- SetDivisions
 - FCFSupport::Car, [248](#)
- SetDone
 - FCFSupport::Car, [249](#)
- SetDuplicateStationIndex
 - TTSupport::Station, [960](#)
 - TTSupport::TimeTableSystem, [1159](#)
- setElement
 - lcc::GridConnectReply, [476](#)
- SetFixedRouteP
 - FCFSupport::Car, [249](#)
- SetFunctionStateGroup1
 - xpressnet::XPressNet, [1283](#)
- SetFunctionStateGroup2
 - xpressnet::XPressNet, [1283](#)
- SetFunctionStateGroup3
 - xpressnet::XPressNet, [1284](#)
- setHeader
 - lcc::CANHeader, [226](#)
 - lcc::CanMessage, [233](#)
 - lcc::GridConnectMessage, [468](#)
 - lcc::MTIDetail, [636](#)
 - lcc::MTIHeader, [641](#)
- setHexDigit
 - lcc::GridConnectMessage, [469](#)
- seti
 - CTCPanel::CodeButton, [287](#)
 - CTCPanel::Crossing, [350](#)
 - CTCPanel::Crossover, [354](#)
 - CTCPanel::CTCLabel, [362](#)
 - CTCPanel::CTCPanel, [384](#)
 - CTCPanel::CurvedBlock, [394](#)
 - CTCPanel::DoubleSlip, [424](#)
 - CTCPanel::EndBumper, [430](#)
 - CTCPanel::HiddenBlock, [480](#)
 - CTCPanel::Lamp, [547](#)
 - CTCPanel::PushButton, [817](#)

- CTCPanel::SchLabel, [863](#)
- CTCPanel::ScissorCrossover, [868](#)
- CTCPanel::Signal, [902](#)
- CTCPanel::SIGPlate, [908](#)
- CTCPanel::SingleSlip, [920](#)
- CTCPanel::StraightBlock, [1005](#)
- CTCPanel::StubYard, [1009](#)
- CTCPanel::Switch, [1013](#)
- CTCPanel::SWPlate, [1032](#)
- CTCPanel::ThreeWaySW, [1130](#)
- CTCPanel::ThroughYard, [1134](#)
- CTCPanel::Toggle, [1171](#)
- SetLastTrain
 - FCFSupport::Car, [249](#)
- SetLayover
 - TTSupport::Stop, [991](#)
- SetLdLmt
 - FCFSupport::Car, [249](#)
- SetLEDS
 - RaildriverIO, [841](#)
- SetLength
 - FCFSupport::Car, [250](#)
- SetLI101Address
 - xpressnet::XPressNet, [1284](#)
- SetLocation
 - FCFSupport::Car, [250](#)
- SetLocomotiveFunctionsGroup1
 - nce::NCE, [660](#)
 - xpressnet::XPressNet, [1284](#)
- SetLocomotiveFunctionsGroup2
 - nce::NCE, [661](#)
 - xpressnet::XPressNet, [1285](#)
- SetLocomotiveFunctionsGroup3
 - nce::NCE, [661](#)
 - xpressnet::XPressNet, [1285](#)
- SetLocomotiveSpeedAndDirection
 - nce::NCE, [662](#)
 - xpressnet::XPressNet, [1285](#)
- SetLocoSpeedMode
 - nce::NCE, [662](#)
- SetLtWt
 - FCFSupport::Car, [250](#)
- SetMarks
 - FCFSupport::Car, [250](#)
- SetMaxLength
 - FCFSupport::Train, [1217](#)
- SetMaxWeight
 - FCFSupport::Train, [1217](#)
- setMessageHandler
 - lcc::CANGridConnect, [206](#)
 - lcc::OpenLCBOverTcp, [703](#)
- SetName
 - TTSupport::StorageTrack, [998](#)
- SetNotDone
 - FCFSupport::Car, [251](#)
- SetNote
 - TTSupport::TimeTableSystem, [1159](#)
- SetNumber
 - FCFSupport::Car, [251](#)
- setNumDataElements
 - lcc::CanMessage, [233](#)
- SetObjectNumber
 - FCFSupport::PDFFileStructures::IndirectObject, [516](#)
- SetOkToMirrorP
 - FCFSupport::Car, [251](#)
- SetOriginStorageTrack
 - TTSupport::Train, [1229](#)
- SetPeek
 - FCFSupport::Car, [251](#)
- SetPlate
 - FCFSupport::Car, [252](#)
- setport
 - CmriSupport::CmriNode, [284](#)
- SetPrevTrain
 - FCFSupport::Car, [252](#)
- SetPrint
 - FCFSupport::Train, [1218](#)
- SetPrintAlpha
 - FCFSupport::System, [1089](#)
- SetPrintAtwice
 - FCFSupport::System, [1089](#)
- SetPrintDispatch
 - FCFSupport::System, [1089](#)
- SetPrintem
 - FCFSupport::System, [1090](#)
- SetPrintList
 - FCFSupport::System, [1090](#)
- SetPrintLtwice
 - FCFSupport::System, [1090](#)
- SetPrintOption
 - TTSupport::TimeTableSystem, [1160](#)
- SetPrintYards
 - FCFSupport::System, [1091](#)
- setprogress
 - mainwindow, [611](#)
- SetQ1negQ2pos
 - azatrax::SL2, [927](#)
- SetQ1posQ2neg
 - azatrax::SL2, [927](#)
- SetQ1Q2open
 - azatrax::SL2, [928](#)
- SetQ3negQ4pos
 - azatrax::SL2, [928](#)
- SetQ3posQ4neg
 - azatrax::SL2, [928](#)
- SetQ3Q4open
 - azatrax::SL2, [928](#)
- setSentMessageHandler

- lcc::CANGridConnect, [206](#)
- lcc::OpenLCBOverTcp, [703](#)
- SetShift
 - FCFSupport::Train, [1218](#)
- SetSignalAspect
 - nce::NCE, [663](#)
- setspeed
 - CabWidgets::LocomotiveSpeed, [589](#)
- setstatus
 - mainwindow, [613](#)
- SetStorageTrackName
 - TTSupport::Stop, [991](#)
- settime
 - Instruments::AnalogClock, [162](#)
 - Instruments::DigitalClock, [403](#)
- SetTransitStorageTrack
 - TTSupport::Train, [1229](#)
- SetType
 - FCFSupport::Car, [252](#)
- SetTypeSlant
 - FCFSupport::LQ24PrinterDevice, [599](#)
 - FCFSupport::PDFPrinterDevice, [784](#)
 - FCFSupport::PostScriptPrinterDevice, [800](#)
 - FCFSupport::PrinterDevice, [811](#)
- SetTypeSpacing
 - FCFSupport::LQ24PrinterDevice, [599](#)
 - FCFSupport::PDFPrinterDevice, [785](#)
 - FCFSupport::PostScriptPrinterDevice, [800](#)
 - FCFSupport::PrinterDevice, [813](#)
- SetTypeWeight
 - FCFSupport::LQ24PrinterDevice, [600](#)
 - FCFSupport::PDFPrinterDevice, [785](#)
 - FCFSupport::PostScriptPrinterDevice, [800](#)
 - FCFSupport::PrinterDevice, [813](#)
- setv
 - CTCPanel::CodeButton, [287](#)
 - CTCPanel::Crossing, [350](#)
 - CTCPanel::Crossover, [354](#)
 - CTCPanel::CTCLabel, [362](#)
 - CTCPanel::CTCPanel, [384](#)
 - CTCPanel::CurvedBlock, [394](#)
 - CTCPanel::DoubleSlip, [424](#)
 - CTCPanel::EndBumper, [430](#)
 - CTCPanel::HiddenBlock, [480](#)
 - CTCPanel::Lamp, [547](#)
 - CTCPanel::PushButton, [817](#)
 - CTCPanel::SchLabel, [864](#)
 - CTCPanel::ScissorCrossover, [868](#)
 - CTCPanel::Signal, [903](#)
 - CTCPanel::SIGPlate, [908](#)
 - CTCPanel::SingleSlip, [920](#)
 - CTCPanel::StraightBlock, [1005](#)
 - CTCPanel::StubYard, [1009](#)
 - CTCPanel::Switch, [1013](#)
 - CTCPanel::SWPlate, [1032](#)
 - CTCPanel::ThreeWaySW, [1130](#)
 - CTCPanel::ThroughYard, [1134](#)
 - CTCPanel::Toggle, [1171](#)
- setvalue
 - Instruments::DialInstrument, [398](#)
 - Instruments::DigitalInstrument, [405](#)
 - LabelComboBox, [102](#)
 - LabelSpinBox, [111](#)
- SetWeightClass
 - FCFSupport::Car, [252](#)
- setZoom
 - CTCPanel::CTCPanel, [384](#)
- shading
 - FCFSupport::PDFFileStructures::ResourceDictionary, [856](#)
- Shift
 - FCFSupport::Train, [1218](#)
- shift
 - FCFSupport::Train, [1222](#)
- ShiftNumber
 - FCFSupport::System, [1091](#)
- shiftNumber
 - FCFSupport::System, [1116](#)
- show
 - splash, [934](#)
- ShowBanner
 - FCFSupport::ShowBannerCallback, [898](#)
- ShowBannerCallback
 - FCFSupport::ShowBannerCallback, [897](#)
- ShowCarMovements
 - FCFSupport::System, [1091](#)
- ShowCarsInDivision
 - FCFSupport::System, [1092](#)
- ShowCarsNotMoved
 - FCFSupport::System, [1092](#)
- showit
 - mainwindow, [613](#)
- ShowTrainCars
 - FCFSupport::System, [1092](#)
- ShowTrainTotals
 - FCFSupport::System, [1093](#)
- ShowUnassignedCars
 - FCFSupport::System, [1093](#)
- SI
 - FCFSupport::LQ24PrinterDevice, [596](#)
- SIGNAL
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Signal
 - CTCPanel::Signal, [900](#)
 - Parsers::TrackGraph, [1187](#)
- Signal2
 - CTIAcela, [55](#)
- Signal3

- CTIAcela, [55](#)
- Signal4
 - CTIAcela, [56](#)
- SignalAspects
 - Parsers::LayoutFile, [561](#)
 - Parsers::TrackGraph, [1203](#)
- SignalBrightness
 - CTIAcela, [56](#)
- SignalSettings
 - CTIAcela, [56](#)
- SIGPlate
 - CTCPanel::SIGPlate, [905](#)
- SIMPLE_MASK
 - lcc::MTIDetail, [638](#)
- SIMPLE_SHIFT
 - lcc::MTIDetail, [638](#)
- SimpleDOMEElement, [909](#)
 - _children, [917](#)
 - _data, [917](#)
 - _formatrlist, [911](#)
 - _quoteXML, [912](#)
 - addchild, [912](#)
 - attribute, [912](#)
 - children, [913](#)
 - data, [913](#)
 - display, [913](#)
 - getElementsById, [914](#)
 - getElementsByTagName, [914](#)
 - getParent, [914](#)
 - isChild, [915](#)
 - length, [915](#)
 - removeChild, [915](#)
 - setAttribute, [916](#)
 - setdata, [916](#)
 - SimpleDOMEElement, [911](#)
 - validate, [916](#)
- simplenodeflags
 - lcc::CANGridConnect, [210](#)
- simplenodeinfo
 - lcc::OpenLCBNode, [698](#)
- SingleSlip
 - CTCPanel::SingleSlip, [919](#)
- sixbits
 - lcc, [117](#)
- sixteenbits
 - lcc, [117](#)
- Size
 - FCFSupport::PDFFileStructures::IndirectObjectDictionary, [521](#)
 - FCFSupport::PDFFileStructures::PageLabelTree, [745](#)
- SkipCommentsGets
 - FCFSupport::System, [1093](#)
- SL2
 - azatrax::Azatrax, [174](#)
 - azatrax::SL2, [923](#)
- slideout_add
 - mainwindow, [613](#)
- slideout_getframe
 - mainwindow, [614](#)
- slideout_hide
 - mainwindow, [614](#)
- slideout_isshownp
 - mainwindow, [614](#)
- slideout_list
 - mainwindow, [614](#)
- slideout_reqwidth
 - mainwindow, [615](#)
- slideout_show
 - mainwindow, [615](#)
- slideouts
 - mainwindow, [618](#)
- SMile
 - TTSupport::Station, [960](#)
 - TTSupport::TimeTableSystem, [1160](#)
- smile
 - TTSupport::Station, [961](#)
- SMINI
 - cmri, [70](#)
- sock
 - lcc::OpenLCBOverTcp, [705](#)
- socket
 - lcc::CANGridConnectOverCANSocket, [214](#)
 - lcc::CANGridConnectOverTcp, [219](#)
 - raildriver::RaildriverClient, [821](#)
 - Satellite, [860](#)
- SocketCAN
 - TclSocketCANModule, [35](#)
- socketnameLEntry
 - lcc::CANGridConnectOverCANSocket, [214](#)
- socketnamenidDialog
 - lcc::CANGridConnectOverCANSocket, [214](#)
- SoftReset
 - ncc::NCE, [663](#)
- SOFTWARE_VERSION
 - xpressnet, [153](#)
- SoftwareVersion
 - ncc::NCE, [663](#)
 - xpressnet::LI100VersionNumbers, [566](#)
 - xpressnet::SoftwareVersion, [930](#)
- source_file
 - Parsers::ParseFile, [754](#)
- source_line
 - Parsers::ParseFile, [754](#)
- SourceFile
 - Parsers::ParseFile, [753](#)
- space
 - lcc::ConfigMemory, [305](#)

- speaker
 - raildriver::RaildriverClient, [821](#)
- SpeakerCommand
 - RaildriverIO, [845](#)
- SpeakerOff
 - RaildriverIO, [841](#)
- SpeakerOn
 - RaildriverIO, [841](#)
- SPECIAL_MASK
 - lcc::MTIDetail, [639](#)
- Speed
 - TTSupport::Train, [1230](#)
 - xpressnet::DoubleHeaderInformation, [415](#)
 - xpressnet::LocomotiveInformation, [582](#)
- speed
 - CabWidgets::LocomotiveSpeed, [590](#)
 - TTSupport::Train, [1232](#)
- Speed128
 - nce, [126](#)
- Speed28
 - nce, [126](#)
- SpeedMode
 - nce, [127](#)
- SpeedNotZero
 - xpressnet, [151](#)
- SpeedStepMode
 - xpressnet::DoubleHeaderInformation, [415](#)
 - xpressnet::LocomotiveInformation, [582](#)
- SpeedStepModeCode
 - xpressnet, [152](#)
- speedtype
 - CTIAcela, [41](#)
- spl
 - yy_MRRXtrkCad_stype, [1295](#)
- splash, [931](#)
 - CheckColor, [933](#)
 - CheckImage, [933](#)
 - currentProgress, [935](#)
 - enableClickDestroy, [934](#)
 - header, [935](#)
 - hide, [934](#)
 - icon, [935](#)
 - image, [935](#)
 - progressBar, [935](#)
 - show, [934](#)
 - splash, [933](#)
 - status, [936](#)
 - title, [936](#)
 - update, [934](#)
- Split
 - FCFSupport::PathName, [767](#)
 - TTSupport::PathName, [776](#)
- split
 - FCFSupport::System, [1094](#)
- SquareEndOptions
 - OvalWidgets, [132](#)
- SR4
 - azatrax::Azatrax, [174](#)
 - azatrax::SR4, [938](#)
- SRCID_MASK
 - lcc::CANHeader, [227](#)
- SRCID_SHIFT
 - lcc::CANHeader, [227](#)
- SRQControl
 - CTIAcela, [57](#)
- StackFull
 - xpressnet, [151](#)
- standardMethods
 - CTCPanel, [73](#)
- start
 - FCFSupport::PDFFileStructures::PageLabelDictionary, [741](#)
- StartClock
 - nce::NCE, [663](#)
- StartMode
 - xpressnet::CommandStationStatus, [292](#)
- StartSMile
 - TTSupport::Train, [1230](#)
- startSMile
 - TTSupport::Train, [1233](#)
- state
 - CTCPanel::Crossover, [355](#)
 - CTCPanel::DoubleSlip, [425](#)
 - CTCPanel::Lamp, [548](#)
 - CTCPanel::ScissorCrossover, [869](#)
 - CTCPanel::SingleSlip, [921](#)
 - CTCPanel::Switch, [1014](#)
 - CTCPanel::ThreeWaySW, [1131](#)
- stateDataPacket
 - azatrax::Azatrax, [175](#)
- STATION
 - FCFSupport::System, [1046](#)
- Station
 - FCFSupport::Station, [950](#), [951](#)
 - TTSupport::Station, [956](#)
- station
 - FCFSupport::Industry, [535](#)
 - FCFSupport::SwitchListElement::StationOrIndustry, [962](#)
 - FCFSupport::Train::StationOrIndustry, [963](#)
- Station
, [31](#)
 - OccupiedMap, [32](#)
 - StationVector, [32](#)
 - StorageTrackMap, [33](#)
- StationIndex
 - TTSupport::Stop, [991](#)
- stationindex
 - TTSupport::Stop, [993](#)

- StationMap
 - FCFSupport, [80](#)
- StationName
 - TTSupport::TimeTableSystem, [1161](#)
- stations
 - FCFSupport::Division, [411](#)
 - FCFSupport::System, [1116](#)
 - TTSupport::TimeTableSystem, [1164](#)
- StationStop
 - FCFSupport::Train, [1218](#)
- StationTimes
 - TTSupport::StationTimes, [965](#)
- StationVector
 - FCFSupport, [80](#)
 - Station
, [32](#)
- StatsFile
 - FCFSupport::System, [1094](#)
- statsFile
 - FCFSupport::System, [1116](#)
- StatsLen
 - FCFSupport::Industry, [530](#)
- statsLen
 - FCFSupport::Industry, [535](#)
- StatsPeriod
 - FCFSupport::System, [1094](#)
- statsPeriod
 - FCFSupport::System, [1117](#)
- Status
 - xpressnet::FunctionStatus, [447](#)
- status
 - HTMLHelp::HTMLHelp, [510](#)
 - mainwindow, [618](#)
 - splash, [936](#)
- status1
 - azatrax::Azatrax::StateDataPacket, [947](#)
- status2
 - azatrax::Azatrax::StateDataPacket, [947](#)
- status3
 - azatrax::Azatrax::StateDataPacket, [948](#)
- status4
 - azatrax::Azatrax::StateDataPacket, [948](#)
- statusline
 - lcc::ConfigurationEditor, [336](#)
- Stop
 - TTSupport::Stop, [987](#)
- stop
 - CabWidgets::LocomotiveSpeed, [592](#)
- StopClock
 - nce::NCE, [664](#)
- Stopl
 - TTSupport::Train, [1230](#)
- StopOperations
 - xpressnet::XPressNet, [1286](#)
- stops
 - FCFSupport::Train, [1222](#)
 - TTSupport::Train, [1233](#)
- StopVector
 - Train and support classes., [34](#)
- Stopwatch
 - azatrax::MRD, [626](#)
- stopwatchFract
 - Azatrax.h, [1300](#)
- stopwatchHours
 - azatrax::Azatrax::StateDataPacket, [948](#)
- stopwatchMinutes
 - azatrax::Azatrax::StateDataPacket, [948](#)
- stopwatchSeconds
 - Azatrax.h, [1300](#)
- StopwatchTicking
 - azatrax::MRD, [627](#)
- stopwatchTicking
 - azatrax::MRD::status2_union, [975](#)
- StorageTrack
 - TTSupport::StorageTrack, [995](#), [996](#)
- StorageTrackMap
 - Station
, [33](#)
- StorageTrackName
 - TTSupport::Stop, [991](#)
- storageTrackName
 - TTSupport::Stop, [993](#)
- storageTracks
 - TTSupport::Station, [961](#)
- StoreTrain
 - TTSupport::StorageTrack, [999](#)
- STRAIGHT
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- StraightBlock
 - CTCPanel::StraightBlock, [1003](#)
- stream
 - lcc, [118](#)
- STREAMDG_MASK
 - lcc::MTIDetail, [639](#)
- STRING
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- StringList
 - TTSupport, [143](#)
- StringListFromString
 - TTSupport, [145](#)
- StringListToString
 - TTSupport, [145](#)
- StringToInt
 - FCFSupport::System, [1095](#)
- StringToIntRange
 - FCFSupport::System, [1095](#)
- stringVector
 - FCFSupport, [80](#)

- TTSupport, [143](#)
- STRUCTURE
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- StubYard
 - CTCPanel::StubYard, [1007](#)
- STX
 - cmri::CMri, [278](#)
- style
 - FCFSupport::PDFFileStructures::PageLabelDictionary, [741](#)
- subject
 - FCFSupport::PDFFileStructures::InformationDirectory, [539](#)
- SUBSEGS
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- SUBSEND
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- subType
 - FCFSupport::PDFFileStructures::FontDictionary, [443](#)
- Success
 - xpressnet, [151](#)
- Summary
 - FCFSupport::System, [1046](#)
- SUSIC
 - cmri, [70](#)
- sval
 - yy_MRRXtrkCad_stype, [1295](#)
- SWIG_name
 - TclSocketCAN.i, [1329](#)
 - tclwiringpi.i, [1333](#)
- SWIG_version
 - TclSocketCAN.i, [1329](#)
 - tclwiringpi.i, [1333](#)
- Switch
 - CTCPanel::Switch, [1012](#)
- SwitchList
 - FCFSupport::SwitchList, [1016](#)
- switchList
 - FCFSupport::System, [1117](#)
- SwitchListElement
 - FCFSupport::SwitchListElement, [1023](#), [1024](#)
- SwitchListElementVector
 - FCFSupport, [80](#)
- SWITCHMOTOR
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- SwitchMotor
 - Parsers::TrackGraph, [1187](#)
- SWPlate
 - CTCPanel::SWPlate, [1030](#)
- sx
 - Instruments::CabSignalLamp, [193](#)
- sy
 - Instruments::CabSignalLamp, [193](#)
- Symbol
 - FCFSupport::Division, [410](#)
- symbol
 - FCFSupport::Division, [411](#)
- System
 - FCFSupport::Car, [254](#)
 - FCFSupport::CarType, [266](#)
 - FCFSupport::Division, [410](#)
 - FCFSupport::Industry, [531](#)
 - FCFSupport::Station, [953](#)
 - FCFSupport::SwitchListElement, [1026](#)
 - FCFSupport::System, [1046](#), [1047](#)
 - FCFSupport::Train, [1219](#)
- SystemFile
 - FCFSupport::System, [1096](#)
- systemFile
 - FCFSupport::System, [1117](#)
- SystemName
 - FCFSupport::System, [1096](#)
- systemName
 - FCFSupport::System, [1117](#)
- T
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Tab
 - FCFSupport::LQ24PrinterDevice, [600](#)
 - FCFSupport::PDFPrinterDevice, [785](#)
 - FCFSupport::PostScriptPrinterDevice, [801](#)
 - FCFSupport::PrinterDevice, [813](#)
 - FCFSupport::TextPrinterDevice, [1125](#)
- tab
 - ScrollTabNotebook, [880](#)
- table
 - FCFSupport::PDFFileStructures::IndirectObject, [519](#)
- tabrow
 - ScrollTabNotebook, [884](#)
- tabs
 - ScrollTabNotebook, [881](#), [884](#)
- Tail
 - FCFSupport::PathName, [767](#)
 - TTSupport::PathName, [776](#)
- tb
 - yy_MRRXtrkCad_stype, [1296](#)
- tbb
 - yy_MRRXtrkCad_stype, [1296](#)
- tbbe
 - yy_MRRXtrkCad_stype, [1296](#)
- tbe
 - yy_MRRXtrkCad_stype, [1296](#)
- tcb
 - yy_MRRXtrkCad_stype, [1296](#)
- tcbe

- yy_MRRXtrkCad_type, [1296](#)
- Tcl_Result
 - TimeTableSystemTcl, [31](#)
- tcl_socketpair
 - ParserClasses, [25](#)
- TclCommon, [62](#)
- TclSocketCAN
 - TclSocketCANModule, [36](#)
- TclSocketCAN.i
 - SWIG_name, [1329](#)
 - SWIG_version, [1329](#)
- Tclsocketcan_SafeInit
 - TclSocketCANModule, [36](#)
- TclSocketCANModule, [35](#)
 - i, [36](#)
 - SocketCAN, [35](#)
 - TclSocketCAN, [36](#)
 - Tclsocketcan_SafeInit, [36](#)
- Tclwiringpi
 - tclwiringpi.i, [1333](#)
- tclwiringpi.i
 - SWIG_name, [1333](#)
 - SWIG_version, [1333](#)
 - Tclwiringpi, [1333](#)
- TclwiringpiModule, [37](#)
- Terminate
 - TTSupport::Stop, [986](#)
- TEXT
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- text
 - yyltype, [1298](#)
- TextPrinterDevice
 - FCFSupport::TextPrinterDevice, [1122](#)
- textscroll
 - HTMLHelp::HTMLHelp, [510](#)
- tgr
 - Parsers::TrackGraph::NodeValues, [676](#)
- tgType
 - Parsers::SegVector, [889](#)
- theBits
 - azatrax::MRD::status1_union, [969](#)
 - azatrax::MRD::status2_union, [976](#)
 - azatrax::SL2::status1_union, [971](#)
 - azatrax::SL2::status2_union, [978](#)
 - azatrax::SL2::status3_union, [982](#)
 - azatrax::SR4::status1_union, [974](#)
 - azatrax::SR4::status2_union, [980](#)
 - azatrax::SR4::status3_union, [984](#)
- theByte
 - azatrax::MRD::status1_union, [969](#)
 - azatrax::MRD::status2_union, [976](#)
 - azatrax::SL2::status1_union, [972](#)
 - azatrax::SL2::status2_union, [978](#)
- azatrax::SL2::status3_union, [982](#)
- azatrax::SR4::status1_union, [974](#)
- azatrax::SR4::status2_union, [980](#)
- azatrax::SR4::status3_union, [984](#)
- theBytes
 - RaildriverIO, [845](#)
- TheCab
 - TTSupport::Stop, [992](#)
- TheCar
 - FCFSupport::Industry, [531](#)
 - FCFSupport::System, [1096](#)
- TheCarGroup
 - FCFSupport::System, [1096](#)
- TheCarType
 - FCFSupport::System, [1097](#)
- TheDivision
 - FCFSupport::System, [1097](#)
- theEnd
 - Parsers::BezierBodyElt, [185](#)
 - Parsers::CornuBodyElt, [347](#)
 - Parsers::TurnoutBodyElt, [1253](#)
- TheIndustry
 - FCFSupport::Station, [953](#)
 - FCFSupport::System, [1097](#)
- theList
 - FCFSupport::SwitchList, [1021](#)
- TheOwner
 - FCFSupport::System, [1099](#)
- TheStation
 - FCFSupport::Division, [410](#)
 - FCFSupport::System, [1099](#)
- TheType
 - Parsers::BezierBodyElt, [183](#)
 - Parsers::CornuBodyElt, [345](#)
 - Parsers::TurnoutBodyElt, [1250](#)
- theType
 - Parsers::BezierBodyElt, [186](#)
 - Parsers::CornuBodyElt, [347](#)
 - Parsers::TurnoutBodyElt, [1253](#)
- threebits
 - lcc, [117](#)
- ThreeWaySW
 - CTCPanel::ThreeWaySW, [1127](#)
- THROTTLE
 - raildriver, [137](#)
 - RaildriverIO, [827](#)
- Throttle
 - CTIAcela, [57](#)
 - RaildriverIO, [845](#)
- THROTTLE_M
 - RaildriverIO, [828](#)
- ThroughYard
 - CTCPanel::ThroughYard, [1132](#)
- TimeInterval

- TTSupport::TimeTableSystem, [1161](#)
- timeinterval
 - TTSupport::TimeTableSystem, [1164](#)
- TimeRange
 - TTSupport::TimeRange, [1136](#)
- TimeScale
 - TTSupport::TimeTableSystem, [1161](#)
- timescale
 - TTSupport::TimeTableSystem, [1165](#)
- TimeStamp
 - xpressnet::CommandStationResponse, [289](#)
- timestamp
 - yytype, [1298](#)
- TimeTableSystem, [25](#)
 - TTSupport::Occupied, [681](#)
 - TTSupport::TimeTableSystem, [1144](#), [1145](#)
- TimeTableSystem.h
 - USE_UNORDERED_MAP, [1331](#)
- TimeTableSystemTcl, [26](#)
 - ForEveryCab, [27](#)
 - ForEveryNote, [27](#)
 - ForEveryPrintOption, [28](#)
 - ForEveryStation, [28](#)
 - ForEveryTrain, [29](#)
 - NewCreateTimeTable, [29](#)
 - OldCreateTimeTable, [30](#)
 - Tcl_Result, [31](#)
 - TT_ListToStringListString, [30](#)
 - TT_StringListToList, [31](#)
- TITLE
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- title
 - FCFSupport::PDFFileStructures::InformationDirectory, [540](#)
 - FCFSupport::PDFPrinterDevice, [788](#)
 - FCFSupport::PostScriptPrinterDevice, [802](#)
 - splash, [936](#)
- tmpStatus
 - FCFSupport::Car, [258](#)
- To
 - TTSupport::TimeRange, [1140](#)
- to
 - TTSupport::TimeRange, [1140](#)
- toc
 - HTMLHelp::HTMLHelp, [510](#)
- toc_css
 - HTMLHelp::HTMLHelp, [510](#)
- TOCP
 - TTSupport::TimeTableSystem, [1165](#)
- tocscroll
 - HTMLHelp::HTMLHelp, [511](#)
- Today
 - FCFSupport::System, [1099](#)
- Toggle
 - CTCPanel::Toggle, [1167](#)
- toolbar_add
 - mainwindow, [615](#)
- toolbar_addbutton
 - mainwindow, [615](#)
- toolbar_buttoncget
 - mainwindow, [616](#)
- toolbar_buttonconfigure
 - mainwindow, [616](#)
- toolbar_hide
 - mainwindow, [617](#)
- toolbar_setbuttonstate
 - mainwindow, [617](#)
- toolbar_show
 - mainwindow, [617](#)
- toolbars
 - mainwindow, [619](#)
- topicstack
 - HTMLHelp::HTMLHelp, [511](#)
- toString
 - lcc::CanMessage, [233](#)
 - lcc::OpenLCBMessage, [684](#)
- TotalCars
 - FCFSupport::System, [1099](#)
- TotalLength
 - TTSupport::TimeTableSystem, [1161](#)
- totalLoads
 - FCFSupport::System, [1117](#)
- totalPickups
 - FCFSupport::System, [1118](#)
- totalRevenueTons
 - FCFSupport::System, [1118](#)
- TotalShifts
 - FCFSupport::System, [1100](#)
- totalShifts
 - FCFSupport::System, [1118](#)
- totalTons
 - FCFSupport::System, [1118](#)
- tpo
 - Parsers::TrackGraph::NodeValues, [676](#)
- tr_rotate
 - Parsers::TrackGraph, [1204](#)
- tr_scale
 - Parsers::TrackGraph, [1204](#)
- tr_translate
 - Parsers::TrackGraph, [1204](#)
- Track
 - Parsers::TrackGraph, [1187](#)
- TRACK_POWER_OFF
 - xpressnet, [153](#)
- TrackBody
 - Parsers::TrackBody, [1173](#)
- TrackBodyElt

- Parsers::TrackBodyElt, [1176](#)
- TrackBodyLength
 - Parsers::TrackBody, [1174](#)
- TrackGraph
 - Parsers::BezierBody, [179](#)
 - Parsers::BezierBodyElt, [184](#)
 - Parsers::CornuBody, [340](#)
 - Parsers::CornuBodyElt, [345](#)
 - Parsers::TrackBody, [1175](#)
 - Parsers::TrackBodyElt, [1178](#)
 - Parsers::TrackGraph, [1187](#)
 - Parsers::TurnoutBody, [1243](#)
 - Parsers::TurnoutBodyElt, [1250](#)
- trackGraph
 - Parsers::LayoutFile, [563](#)
- TrackLen
 - FCFSupport::Industry, [531](#)
- trackLen
 - FCFSupport::Industry, [535](#)
- TrackList
 - Parsers::LayoutFile, [562](#)
 - Parsers::TrackGraph, [1204](#)
- tracklist
 - Parsers::TrackGraph::NodeValues, [676](#)
- trackworkmethods
 - CTCPanel, [74](#)
- Train
 - FCFSupport::Train, [1211](#), [1212](#)
 - TTSupport::Train, [1224](#)
- Train and support classes., [33](#)
 - StopVector, [34](#)
 - TrainNumberMap, [34](#)
- TrainByIndex
 - FCFSupport::System, [1100](#)
- TrainByName
 - FCFSupport::System, [1100](#)
- TrainCarPickupCheck
 - FCFSupport::System, [1101](#)
- TrainDisplayCallback
 - FCFSupport::TrainDisplayCallback, [1234](#)
- TrainDropAllCars
 - FCFSupport::System, [1101](#)
- TrainDropOneCar
 - FCFSupport::System, [1102](#)
- trainEmpties
 - FCFSupport::System, [1118](#)
- TrainIndex
 - FCFSupport::System, [1102](#)
- trainIndex
 - FCFSupport::System, [1119](#)
- trainLastLocation
 - FCFSupport::System, [1119](#)
- trainLength
 - FCFSupport::System, [1119](#)
- TrainList
 - TTSupport, [144](#)
- trainLoads
 - FCFSupport::System, [1119](#)
- TrainLocalDrops
 - FCFSupport::System, [1103](#)
- TrainLocalOriginate
 - FCFSupport::System, [1103](#)
- TrainLocalPickups
 - FCFSupport::System, [1104](#)
- trainLongest
 - FCFSupport::System, [1119](#)
- TrainManifestDrops
 - FCFSupport::System, [1104](#)
- TrainManifestPickups
 - FCFSupport::System, [1105](#)
- TrainMap
 - FCFSupport, [80](#)
- TrainNameMap
 - FCFSupport, [81](#)
- TrainNum
 - TTSupport::Occupied, [680](#)
- trainnum
 - TTSupport::Occupied, [681](#)
- TrainNum2
 - TTSupport::Occupied, [680](#)
- trainnum2
 - TTSupport::Occupied, [681](#)
- TrainNumberMap
 - Train and support classes., [34](#)
- TrainPickupOneCar
 - FCFSupport::System, [1105](#)
- TrainPrintConsistSummary
 - FCFSupport::System, [1106](#)
- TrainPrintFinalSummary
 - FCFSupport::System, [1106](#)
- trainPrintOK
 - FCFSupport::System, [1120](#)
- TrainPrintTown
 - FCFSupport::System, [1107](#)
- trains
 - FCFSupport::System, [1120](#)
 - TTSupport::TimeTableSystem, [1165](#)
- TrainsFile
 - FCFSupport::System, [1107](#)
- trainsFile
 - FCFSupport::System, [1120](#)
- TrainStationTimes
 - TTSupport, [144](#)
- TrainTimesAtStation
 - TTSupport, [144](#)
- trainTons
 - FCFSupport::System, [1120](#)
- TrainType

- FCFSupport::Train, [1211](#)
- TRANSFER_ERRORS
 - xpressnet, [153](#)
- Transform2D
 - Parsers::TrackGraph::Transform2D, [1237](#), [1238](#)
- Transit
 - TTSupport::Stop, [986](#)
- Transmit
 - cmri::CMri, [278](#)
- transport
 - lcc::CanTransport, [236](#)
 - lcc::OpenLCBNode, [698](#)
- transportConstructors
 - lcc::OpenLCBNode, [697](#)
- traversePrimMST
 - Parsers::TrackGraph, [1205](#)
- trb
 - yy_MRRXtrkCad_stype, [1296](#)
- trbe
 - yy_MRRXtrkCad_stype, [1297](#)
- trim
 - FCFSupport::System, [1107](#)
- Trips
 - FCFSupport::Car, [253](#)
- trips
 - FCFSupport::Car, [258](#)
- TRK
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- TRUE
 - MRRXtrkCad.tab.h, [1302](#)
- TT_ListToStringListString
 - TimeTableSystemTcl, [30](#)
- TT_StringListToList
 - TimeTableSystemTcl, [31](#)
- TTSupport, [141](#)
 - doubleVector, [143](#)
 - OptionHashMap, [143](#)
 - StringList, [143](#)
 - StringListFromString, [145](#)
 - StringListToString, [145](#)
 - stringVector, [143](#)
 - TrainList, [144](#)
 - TrainStationTimes, [144](#)
 - TrainTimesAtStation, [144](#)
- TTSupport::Cab, [186](#)
 - ~Cab, [187](#)
 - Cab, [187](#)
 - Color, [188](#)
 - color, [189](#)
 - Name, [188](#)
 - name, [189](#)
 - operator=, [188](#)
 - Read, [189](#)
 - Write, [189](#)
- TTSupport::eqstr, [431](#)
 - operator(), [431](#)
- TTSupport::hash, [476](#)
 - operator(), [477](#)
- TTSupport::Occupied, [677](#)
 - From, [679](#)
 - from, [681](#)
 - Occupied, [678](#), [679](#)
 - operator=, [679](#)
 - Read, [680](#)
 - TimeTableSystem, [681](#)
 - TrainNum, [680](#)
 - trainnum, [681](#)
 - TrainNum2, [680](#)
 - trainnum2, [681](#)
 - Until, [680](#)
 - until, [682](#)
 - Write, [680](#)
- TTSupport::PathName, [768](#)
 - ~PathName, [771](#)
 - Dirname, [772](#)
 - Extension, [772](#)
 - FullPath, [772](#)
 - operator<, [773](#)
 - operator<=, [774](#)
 - operator>, [775](#)
 - operator>=, [775](#)
 - operator+, [772](#), [773](#)
 - operator+=, [773](#)
 - operator=, [774](#)
 - operator==, [775](#)
 - PathName, [769](#), [771](#)
 - pathname, [777](#)
 - PathSeparator, [776](#)
 - SameDirectory, [776](#)
 - Split, [776](#)
 - Tail, [776](#)
- TTSupport::Station, [954](#)
 - ~Station, [957](#)
 - AddStorageTrack, [957](#)
 - DuplicateStationIndex, [957](#)
 - duplicateStationIndex, [961](#)
 - FindStorageTrack, [957](#)
 - FindTrackTrainsStoredOn, [958](#)
 - FirstStorageTrack, [958](#)
 - LastStorageTrack, [958](#)
 - Name, [958](#)
 - name, [961](#)
 - NumberOfStorageTracks, [959](#)
 - operator=, [959](#)
 - Read, [959](#)
 - SetDuplicateStationIndex, [960](#)
 - SMile, [960](#)

- smile, [961](#)
- Station, [956](#)
- storageTracks, [961](#)
- Write, [960](#)
- TTSupport::StationTimes, [963](#)
 - Arrival, [965](#)
 - arrival, [966](#)
 - Departure, [966](#)
 - departure, [967](#)
 - Flag, [966](#)
 - flag, [967](#)
 - operator=, [966](#)
 - StationTimes, [965](#)
- TTSupport::Stop, [984](#)
 - ~Stop, [987](#)
 - AddNote, [988](#)
 - cab, [992](#)
 - Departure, [988](#)
 - Flag, [988](#)
 - flag, [992](#)
 - FlagType, [986](#)
 - Layover, [988](#)
 - layover, [993](#)
 - Note, [989](#)
 - notes, [993](#)
 - NumberOfNotes, [989](#)
 - operator=, [989](#)
 - Origin, [986](#)
 - Read, [990](#)
 - RemoveNote, [990](#)
 - SetCab, [990](#)
 - SetLayover, [991](#)
 - SetStorageTrackName, [991](#)
 - StationIndex, [991](#)
 - stationindex, [993](#)
 - Stop, [987](#)
 - StorageTrackName, [991](#)
 - storageTrackName, [993](#)
 - Terminate, [986](#)
 - TheCab, [992](#)
 - Transit, [986](#)
 - Write, [992](#)
- TTSupport::StorageTrack, [994](#)
 - ~StorageTrack, [995](#)
 - FindOccupied, [996](#)
 - FirstOccupied, [996](#)
 - IncludesTime, [996](#)
 - LastOccupied, [997](#)
 - Name, [997](#)
 - name, [1001](#)
 - occupations, [1001](#)
 - operator=, [997](#)
 - Read, [998](#)
 - RemovedStoredTrain, [998](#)
 - SetName, [998](#)
 - StorageTrack, [995](#), [996](#)
 - StoreTrain, [999](#)
 - UpdateStoredTrain, [999](#)
 - UpdateStoredTrain2, [999](#)
 - UpdateStoredTrainArrival, [1000](#)
 - UpdateStoredTrainDeparture, [1000](#)
 - UsedTimeRange, [1000](#)
 - Write, [1001](#)
- TTSupport::TimeRange, [1135](#)
 - ContainsTime, [1137](#)
 - From, [1137](#)
 - from, [1140](#)
 - operator<, [1137](#)
 - operator<=, [1138](#)
 - operator>, [1139](#)
 - operator>=, [1139](#)
 - operator=, [1138](#)
 - operator==, [1138](#)
 - Read, [1139](#)
 - TimeRange, [1136](#)
 - To, [1140](#)
 - to, [1140](#)
 - Write, [1140](#)
- TTSupport::TimeTableSystem, [1141](#)
 - ~TimeTableSystem, [1145](#)
 - AddCab, [1146](#)
 - AddNote, [1146](#)
 - AddStation, [1146](#)
 - AddStorageTrack, [1147](#)
 - AddTrain, [1147](#)
 - AddTrainLongVersion, [1148](#)
 - cabs, [1163](#)
 - ComputeTimes, [1149](#)
 - CreateLaTeXTimetable, [1149](#)
 - DeleteTrain, [1150](#)
 - DirectionName, [1163](#)
 - DuplicateStationIndex, [1150](#)
 - Filename, [1151](#)
 - filepath, [1163](#)
 - FindCab, [1151](#)
 - FindStationByName, [1151](#)
 - FindStorageTrack, [1151](#)
 - FindTrainByName, [1152](#)
 - FindTrainByNumber, [1152](#)
 - FirstCab, [1153](#)
 - FirstPrintOption, [1153](#)
 - FirstTrain, [1153](#)
 - GetPrintOption, [1153](#)
 - lthStation, [1154](#)
 - LastCab, [1154](#)
 - LastPrintOption, [1154](#)
 - LastTrain, [1154](#)
 - MakeTimeTableGroupByClass, [1155](#)

- MakeTimeTableGroupManually, [1155](#)
- MakeTimeTableOneTable, [1156](#)
- MakeTimeTableOneTableStationsCenter, [1156](#)
- MakeTimeTableOneTableStationsLeft, [1157](#)
- Name, [1157](#)
- name, [1164](#)
- Note, [1157](#)
- notes, [1164](#)
- NumberOfCabs, [1158](#)
- NumberOfNotes, [1158](#)
- NumberOfStations, [1158](#)
- NumberOfTrains, [1158](#)
- printOptions, [1164](#)
- ReadNote, [1159](#)
- SetDuplicateStationIndex, [1159](#)
- SetNote, [1159](#)
- SetPrintOption, [1160](#)
- SMile, [1160](#)
- StationName, [1161](#)
- stations, [1164](#)
- TimeInterval, [1161](#)
- timeinterval, [1164](#)
- TimeScale, [1161](#)
- timescale, [1165](#)
- TimeTableSystem, [1144](#), [1145](#)
- TOCP, [1165](#)
- TotalLength, [1161](#)
- trains, [1165](#)
- WriteNewTimeTableFile, [1162](#)
- WriteNote, [1162](#)
- WriteOldTimeTableFile, [1163](#)
- TTSupport::Train, [1223](#)
 - AddNoteToStop, [1225](#)
 - AddNoteToTrain, [1225](#)
 - ClassNumber, [1226](#)
 - classnumber, [1231](#)
 - Departure, [1226](#)
 - departure, [1232](#)
 - Name, [1226](#)
 - name, [1232](#)
 - Note, [1226](#)
 - notes, [1232](#)
 - Number, [1227](#)
 - number, [1232](#)
 - NumberOfNotes, [1227](#)
 - NumberOfStops, [1227](#)
 - Read, [1227](#)
 - RemoveNoteFromStop, [1228](#)
 - RemoveNoteFromTrain, [1228](#)
 - SetDeparture, [1228](#)
 - SetDestinationStorageTrack, [1229](#)
 - SetOriginStorageTrack, [1229](#)
 - SetTransitStorageTrack, [1229](#)
 - Speed, [1230](#)
 - speed, [1232](#)
 - StartSMile, [1230](#)
 - startSMile, [1233](#)
 - StopI, [1230](#)
 - stops, [1233](#)
 - Train, [1224](#)
 - UpdateStopCab, [1230](#)
 - UpdateStopLayover, [1231](#)
 - Write, [1231](#)
- ttyfd
 - cmri::CMri, [278](#)
 - CTIAcela, [60](#)
 - lcc::CANGridConnectOverUSBSerial, [224](#)
 - nce::NCE, [670](#)
 - xpressnet::XPressNet, [1286](#)
- TURNOUT
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Turnout
 - Parsers::TrackGraph, [1187](#)
- TurnoutBody
 - Parsers::TurnoutBody, [1241](#)
 - Parsers::TurnoutBodyElt, [1250](#)
- TurnoutBody.h
 - angle, [1328](#)
 - len0, [1328](#)
 - len1, [1328](#)
- TurnoutBodyElt
 - Parsers::IntegerList, [543](#)
 - Parsers::TurnoutBody, [1243](#)
 - Parsers::TurnoutBodyElt, [1247](#)
- TurnoutBodyEltType
 - Parsers::TurnoutBodyElt, [1246](#)
- TurnoutCurveSegment
 - Parsers::TurnoutBodyElt, [1247](#)
- TurnoutEnd
 - Parsers::TurnoutBodyElt, [1247](#)
- TurnoutEnds
 - Parsers::TurnoutBody, [1242](#)
- TurnoutJointSegment
 - Parsers::TurnoutBodyElt, [1247](#)
- TurnoutMotor
 - azatrax::MRD, [621](#)
- TurnoutNumber
 - Parsers::LayoutFile, [562](#)
 - Parsers::TrackGraph, [1205](#)
- turnoutnumber
 - Parsers::TrackGraph::NodeValues, [677](#)
- TurnoutRoute
 - Parsers::TurnoutBodyElt, [1247](#)
- TurnoutRouteCount
 - Parsers::TurnoutBody, [1243](#)
- TurnoutSegmentCount
 - Parsers::TurnoutBody, [1243](#)

- TurnoutSolenoid
 - azatrax::MRD, [621](#)
- TurnoutStatus
 - xpressnet::AccessoryDecoderInformation, [159](#)
- TurnoutStraightSegment
 - Parsers::TurnoutBodyElt, [1247](#)
- TURNTABLE
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Turntable
 - Parsers::TrackGraph, [1187](#)
- twelvebits
 - lcc, [117](#)
- twobits
 - lcc, [117](#)
- Type
 - FCFSupport::Car, [253](#)
 - FCFSupport::CarType, [266](#)
 - FCFSupport::Industry, [531](#)
 - FCFSupport::System, [1046](#)
 - FCFSupport::Train, [1219](#)
- type
 - FCFSupport::Car, [258](#)
 - FCFSupport::CarType, [267](#)
 - FCFSupport::Industry, [535](#)
 - FCFSupport::PDFFileStructures::TypedDictionary, [1263](#)
 - FCFSupport::Train, [1222](#)
 - Parsers::TrackGraph::NodeValues, [677](#)
- Type1FontDictionary
 - FCFSupport::PDFFileStructures::Type1FontDictionary, [1257](#), [1258](#)
- TypeCode
 - xpressnet, [152](#)
- TypedDictionary
 - FCFSupport::PDFFileStructures::TypedDictionary, [1262](#)
- TypeOfNode
 - Parsers::LayoutFile, [562](#)
 - Parsers::TrackGraph, [1205](#)
- TypeSlant
 - FCFSupport::PrinterDevice, [806](#)
- TypeSpacing
 - FCFSupport::PrinterDevice, [807](#)
- TypeWeight
 - FCFSupport::PrinterDevice, [807](#)
- TYPEWITHIN_MASK
 - lcc::MTIDetail, [639](#)
- TYPEWITHIN_SHIFT
 - lcc::MTIDetail, [639](#)
- u10
 - xpressnet, [150](#)
- u3
 - xpressnet, [150](#)
- u7
 - xpressnet, [150](#)
- uatype
 - cmri, [70](#)
- UByte
 - nce, [126](#)
- ubyte
 - cmri, [70](#)
 - CTIAcela, [42](#)
 - xpressnet, [150](#)
- uint32
 - lcc, [117](#)
- UnConnectedTrackEnd
 - Parsers::TrackBodyElt, [1177](#)
- Undefined
 - Parsers::TrackGraph, [1187](#)
- UNEXPORT
 - linuxgpio::LinuxGpio, [572](#)
- Unknown
 - FCFSupport::Train, [1211](#)
- unknown
 - lcc, [118](#)
- UnknownCommunicationsError
 - xpressnet, [151](#)
- UnLoad
 - FCFSupport::Car, [253](#)
- unpost
 - LabelComboBox, [102](#)
- UNTERMSTRING
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- Until
 - TTSupport::Occupied, [680](#)
- until
 - TTSupport::Occupied, [682](#)
- up1
 - CabWidgets::LocomotiveSpeed, [592](#)
- up10
 - CabWidgets::LocomotiveSpeed, [592](#)
- update
 - splash, [934](#)
- updateAliasMap
 - lcc::CANGridConnect, [206](#)
- updateAndSyncCP
 - CTCPanel::CTCPanel, [385](#)
- updateSR
 - CTCPanel::CTCPanel, [385](#)
- UpdateStopCab
 - TTSupport::Train, [1230](#)
- UpdateStopLayover
 - TTSupport::Train, [1231](#)
- UpdateStoredTrain
 - TTSupport::StorageTrack, [999](#)

- UpdateStoredTrain2
 - TTSupport::StorageTrack, [999](#)
- UpdateStoredTrainArrival
 - TTSupport::StorageTrack, [1000](#)
- UpdateStoredTrainDeparture
 - TTSupport::StorageTrack, [1000](#)
- UpdateTrainDisplay
 - FCFSupport::TrainDisplayCallback, [1235](#)
- Upper
 - xpressnet, [152](#)
- UpperCase
 - FCFSupport::System, [1108](#)
- UpperLetters
 - FCFSupport::PDFFileStructures::PageLabelDictionary, [739](#)
- UpperRoman
 - FCFSupport::PDFFileStructures::PageLabelDictionary, [739](#)
- Url
 - HTMLHelp::HTMLHelp, [511](#)
- USE_UNORDERED_MAP
 - TimeTableSystem.h, [1331](#)
- UsedByAnotherDevice
 - xpressnet, [151](#)
- UsedInANotherDHMU
 - xpressnet, [151](#)
- usedLen
 - FCFSupport::Industry, [535](#)
- UsedTimeRange
 - TTSupport::StorageTrack, [1000](#)
- USIC
 - cmri, [70](#)
- valid
 - lcc, [118](#)
- valid_heads
 - Parsers::TrackGraph, [1208](#)
- validate
 - CmriSupport::CmriNode, [284](#)
 - CTIAcela, [57](#)
 - lcc::CanAlias, [196](#)
 - lcc::CanMessage, [233](#)
 - lcc::EventID, [434](#)
 - lcc::EventID_or_null, [435](#)
 - lcc::nid_or_null, [671](#)
 - lcc::OpenLCBMessage, [685](#)
 - lcc::OpenLCBProtocols, [707](#)
 - ParseXML, [757](#)
 - SimpleDOMEElement, [916](#)
- VALUEFMT
 - linuxgpio::LinuxGpio, [572](#)
- ValueRange
 - Instruments::DialInstrument, [399](#)
- VARIABLEFIELD_MASK
 - lcc::CANHeader, [227](#)
- VARIABLEFIELD_SHIFT
 - lcc::CANHeader, [227](#)
- VBar
 - OvalWidgets, [134](#)
- VerifyBooleanMethod
 - GRSupport, [93](#)
- verifyBoolMethod
 - CTCPanel, [74](#)
- VerifyColorMethod
 - GRSupport, [93](#)
- verifyColorMethod
 - CTCPanel, [74](#)
- VerifyDoubleMethod
 - GRSupport, [93](#)
- verifyDoubleMethod
 - CTCPanel, [74](#)
- VerifyIntegerMethod
 - GRSupport, [93](#)
- verifyOrientation8Method
 - CTCPanel, [74](#)
- VerifyOrientationHVMMethod
 - GRSupport, [94](#)
- verifyPositionMethod
 - CTCPanel, [74](#)
- W
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- Warning
 - FCFSupport::LogMessageCallback, [593](#)
- Wayfreight
 - FCFSupport::Train, [1211](#)
- wayFreight
 - FCFSupport::System, [1120](#)
- WeightClass
 - FCFSupport::Car, [253](#)
- weightclass
 - FCFSupport::Car, [258](#)
 - FCFSupport::Industry, [536](#)
- whitespace
 - FCFSupport::System, [1121](#)
- widths
 - FCFSupport::PDFFileStructures::Type1FontDictionary, [1261](#)
- WIPER
 - raildriver, [138](#)
 - RaildriverIO, [827](#)
- Wiper
 - RaildriverIO, [845](#)
- WIPER_M
 - RaildriverIO, [828](#)
- wipmessage
 - mainwindow, [619](#)
- WorkInProgressCallback

- FCFSupport::WorkInProgressCallback, [1264](#)
- Write
 - TTSupport::Cab, [189](#)
 - TTSupport::Occupied, [680](#)
 - TTSupport::Station, [960](#)
 - TTSupport::Stop, [992](#)
 - TTSupport::StorageTrack, [1001](#)
 - TTSupport::TimeRange, [1140](#)
 - TTSupport::Train, [1231](#)
- write
 - linuxgpio::LinuxGpio, [571](#)
- Write4BytesToRAM
 - nce::NCE, [664](#)
- Write8BytesToRAM
 - nce::NCE, [664](#)
- WriteConfiguration
 - ReadConfiguration, [140](#)
- WriteCVInDirectMode
 - nce::NCE, [665](#)
- WriteCVInPagedMode
 - nce::NCE, [665](#)
- WriteDictionaryElements
 - FCFSupport::PDFFileStructures::CatalogDictionary, [270](#)
 - FCFSupport::PDFFileStructures::Dictionary, [401](#)
 - FCFSupport::PDFFileStructures::FontDictionary, [442](#)
 - FCFSupport::PDFFileStructures::IndirectObjectDictionary, [521](#)
 - FCFSupport::PDFFileStructures::InformationDirectory, [538](#)
 - FCFSupport::PDFFileStructures::Page, [736](#)
 - FCFSupport::PDFFileStructures::PageLabelDictionary, [740](#)
 - FCFSupport::PDFFileStructures::PageLabelTree, [745](#)
 - FCFSupport::PDFFileStructures::PageTree, [749](#)
 - FCFSupport::PDFFileStructures::ResourceDictionary, [855](#)
 - FCFSupport::PDFFileStructures::Type1FontDictionary, [1259](#)
 - FCFSupport::PDFFileStructures::TypedDictionary, [1263](#)
- WriteDictionaryType
 - FCFSupport::PDFFileStructures::TypedDictionary, [1263](#)
- WriteDirect
 - FCFSupport::PDFFileStructures::Dictionary, [401](#)
 - FCFSupport::PDFFileStructures::FreedObject, [445](#)
 - FCFSupport::PDFFileStructures::IndirectFloatVector, [513](#)
 - FCFSupport::PDFFileStructures::IndirectObject, [517](#)
 - FCFSupport::PDFFileStructures::PDFStream, [790](#)
 - FCFSupport::PDFFileStructures::Rectangle, [847](#)
- WriteFontType
 - FCFSupport::PDFFileStructures::FontDictionary, [442](#)
- WriteIndirectReference
 - FCFSupport::PDFFileStructures::IndirectObject, [517](#)
- WriteLCDLine3
 - nce::NCE, [666](#)
- WriteLCDLine4
 - nce::NCE, [666](#)
- WriteLCDRightLine2
 - nce::NCE, [667](#)
- writelengths
 - lcc::ConfigOptions, [309](#)
- writelists
 - lcc::ConfigMemory, [305](#)
- WriteNewTimeTableFile
 - TTSupport::TimeTableSystem, [1162](#)
- WriteNote
 - TTSupport::TimeTableSystem, [1162](#)
- WriteObjectToFile
 - FCFSupport::PDFFileStructures::IndirectObject, [518](#)
- WriteOldTimeTableFile
 - TTSupport::TimeTableSystem, [1163](#)
- WriteOneByteToRAM
 - nce::NCE, [667](#)
- WriteOneCarToDisk
 - FCFSupport::System, [1108](#)
- WriteRAWPacket
 - nce::NCE, [667](#)
- WriteRAWTrackPacket
 - nce::NCE, [668](#)
- WriteRegister
 - nce::NCE, [668](#)
- writeReplyCheck
 - lcc::ConfigMemory, [305](#)
 - lcc::ConfigurationEditor, [336](#)
- WriteTable
 - FCFSupport::PDFFileStructures::CrossReferenceTable, [358](#)
- WriteToRAM
 - nce::NCE, [669](#)
- WriteTwoBytesToRAM
 - nce::NCE, [669](#)
- X
 - Parsers::MRRXtrkCad, [630](#)
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- x
 - Parsers::BezierBodyElt::Pos, [792](#)
 - Parsers::CornuBodyElt::Pos, [793](#)
 - Parsers::SegPos, [885](#)
 - Parsers::TrackBodyElt, [1178](#)
 - Parsers::TrackGraph::EdgeValues, [427](#)
 - Parsers::TrackGraph::Point, [791](#)
 - Parsers::TurnoutBodyElt::Pos, [794](#)
- X1

- FCFSupport::PDFFileStructures::Rectangle, [848](#)
- x1
 - FCFSupport::PDFFileStructures::Rectangle, [849](#)
- X2
 - FCFSupport::PDFFileStructures::Rectangle, [848](#)
- x2
 - FCFSupport::PDFFileStructures::Rectangle, [849](#)
- xObject
 - FCFSupport::PDFFileStructures::ResourceDictionary, [857](#)
- XPressNet
 - xpressnet::XPressNet, [1269](#)
- xpressnet, [146](#)
 - ACCESSORY_DECODER_INFORMATION, [153](#)
 - Automatic, [152](#)
 - BufferOverflow, [151](#)
 - CantDelete, [151](#)
 - COMMAND_STATION_BUSY, [153](#)
 - COMMAND_STATION_STATUS, [153](#)
 - ConsistAddress, [148](#)
 - DecoderLongAddress, [148](#)
 - DirectionCode, [150](#)
 - DOUBLE_HEADER_INFORMATION, [153](#)
 - DOUBLE_HEADER_MU_ERROR, [153](#)
 - ElementAddress, [149](#)
 - EMERGENCY_STOP, [153](#)
 - ErrorBetweenLI100AndCommandStation, [151](#)
 - ErrorBetweenLI100AndPC, [151](#)
 - ErrorTypeCode, [151](#)
 - Forward, [151](#)
 - FUNCTION_STATUS, [153](#)
 - INSTRUCTION_NOT_SUPPORTED, [153](#)
 - LI100_MESSAGE, [153](#)
 - LI100_VERSION, [153](#)
 - LI101_XPRESSNET_ADDRESS, [153](#)
 - LOCOMOTIVE_ADDRESS, [153](#)
 - LOCOMOTIVE_INFORMATION, [153](#)
 - Lower, [152](#)
 - Manual, [152](#)
 - MessageTypeCode, [151](#)
 - nibble, [149](#)
 - NibbleCode, [152](#)
 - NO_RESPONSE_AVAILABLE, [153](#)
 - NORMAL_OPERATION_RESUMED, [153](#)
 - NoTimeslot, [151](#)
 - NotMU, [151](#)
 - NotMUBaseAddress, [151](#)
 - NotOperatedOr0, [151](#)
 - Other, [151](#)
 - PowerUpMode, [152](#)
 - PROGRAMMING_INFO_COMMAND_STATION_BUSY, [153](#)
 - PROGRAMMING_INFO_COMMAND_STATION_READY, [153](#)
 - PROGRAMMING_INFO_DATA_BYTE_NOT_FOUND, [153](#)
 - PROGRAMMING_INFO_SHORT_CIRCUIT, [153](#)
 - Reverse, [151](#)
 - S128, [152](#)
 - S14, [152](#)
 - S27, [152](#)
 - S28, [152](#)
 - S_128, [149](#)
 - S_14, [149](#)
 - S_27, [149](#)
 - S_28, [149](#)
 - SERVICE_MODE_ENTRY, [153](#)
 - SERVICE_MODE_RESPONSE, [153](#)
 - SOFTWARE_VERSION, [153](#)
 - SpeedNotZero, [151](#)
 - SpeedStepModeCode, [152](#)
 - StackFull, [151](#)
 - Success, [151](#)
 - TRACK_POWER_OFF, [153](#)
 - TRANSFER_ERRORS, [153](#)
 - TypeCode, [152](#)
 - u10, [150](#)
 - u3, [150](#)
 - u7, [150](#)
 - ubyte, [150](#)
 - UnknownCommunicationsError, [151](#)
 - Upper, [152](#)
 - UsedByAnotherDevice, [151](#)
 - UsedInANotherDHMU, [151](#)
 - xpressnet::XpressNetEvent, [1289](#)
 - xpressnet::AccessoryDecoderInformation, [155](#)
 - _accessory_type, [159](#)
 - _address, [159](#)
 - _completed, [159](#)
 - _nibble, [160](#)
 - _numberOfFeedbackElements, [160](#)
 - _t1, [160](#)
 - _t2, [160](#)
 - AccessoryDecoderInformation, [156](#)
 - AccessoryType, [156](#)
 - Address, [158](#)
 - Completed, [158](#)
 - Nibble, [158](#)
 - NumberOfFeedbackElements, [158](#)
 - TurnoutStatus, [159](#)
 - xpressnet::CommandStationResponse, [288](#)
 - _time_stamp, [290](#)
 - CommandStationResponse, [289](#)
 - ResponseType, [289](#)
 - TimeStamp, [289](#)
 - xpressnet::CommandStationStatus, [290](#)
 - _RAM_check_error, [293](#)
 - _emergency_off, [293](#)

- [_emergency_stop, 293](#)
- [_poweringup, 293](#)
- [_service_mode, 293](#)
- [_start_mode, 293](#)
- [CommandStationStatus, 291](#)
- [EmergencyOff, 291](#)
- [EmergencyStop, 292](#)
- [PoweringUp, 292](#)
- [RAMCheckError, 292](#)
- [ServiceMode, 292](#)
- [StartMode, 292](#)
- [xpressnet::DoubleHeaderInformation, 412](#)
 - [_address, 416](#)
 - [_address2, 416](#)
 - [_available, 416](#)
 - [_direction, 416](#)
 - [_function0, 416](#)
 - [_function1, 417](#)
 - [_function10, 417](#)
 - [_function11, 417](#)
 - [_function12, 417](#)
 - [_function2, 417](#)
 - [_function3, 417](#)
 - [_function4, 418](#)
 - [_function5, 418](#)
 - [_function6, 418](#)
 - [_function7, 418](#)
 - [_function8, 418](#)
 - [_function9, 418](#)
 - [_speed, 419](#)
 - [_speedstep, 419](#)
 - [Address, 414](#)
 - [Address2, 414](#)
 - [Available, 415](#)
 - [Direction, 415](#)
 - [DoubleHeaderInformation, 413](#)
 - [Function, 415](#)
 - [Speed, 415](#)
 - [SpeedStepMode, 415](#)
- [xpressnet::DoubleHeaderMuError, 419](#)
 - [_error, 420](#)
 - [DoubleHeaderMuError, 420](#)
 - [Error, 420](#)
- [xpressnet::FunctionStatus, 445](#)
 - [_status0, 447](#)
 - [_status1, 447](#)
 - [_status10, 448](#)
 - [_status11, 448](#)
 - [_status12, 448](#)
 - [_status2, 448](#)
 - [_status3, 448](#)
 - [_status4, 448](#)
 - [_status5, 449](#)
 - [_status6, 449](#)
 - [_status7, 449](#)
 - [_status8, 449](#)
 - [_status9, 449](#)
 - [FunctionStatus, 446](#)
 - [Status, 447](#)
- [xpressnet::LI100Message, 563](#)
 - [_message_type, 564](#)
 - [LI100Message, 564](#)
 - [MessageType, 564](#)
- [xpressnet::LI100VersionNumbers, 564](#)
 - [_hardware_version, 566](#)
 - [_software_version, 566](#)
 - [HardwareVersion, 566](#)
 - [LI100VersionNumbers, 565](#)
 - [SoftwareVersion, 566](#)
- [xpressnet::LI101XPressNetAddress, 566](#)
 - [_address, 568](#)
 - [Address, 567](#)
 - [LI101XPressNetAddress, 567](#)
- [xpressnet::LocomotiveAddress, 572](#)
 - [_address, 574](#)
 - [_addressType, 574](#)
 - [Address, 573](#)
 - [AddressType, 573](#)
 - [LocomotiveAddress, 573](#)
- [xpressnet::LocomotiveInformation, 578](#)
 - [_address, 582](#)
 - [_address2, 582](#)
 - [_available, 583](#)
 - [_direction, 583](#)
 - [_function0, 583](#)
 - [_function1, 583](#)
 - [_function10, 583](#)
 - [_function11, 583](#)
 - [_function12, 584](#)
 - [_function2, 584](#)
 - [_function3, 584](#)
 - [_function4, 584](#)
 - [_function5, 584](#)
 - [_function6, 584](#)
 - [_function7, 585](#)
 - [_function8, 585](#)
 - [_function9, 585](#)
 - [_mtraddress, 585](#)
 - [_speed, 585](#)
 - [_speedstep, 585](#)
 - [Address, 581](#)
 - [Address2, 581](#)
 - [Available, 581](#)
 - [Direction, 581](#)
 - [Function, 581](#)
 - [LocomotiveInformation, 580](#)
 - [MTR, 582](#)
 - [Speed, 582](#)

- SpeedStepMode, 582
- xpressnet::ServiceModeResponse, 895
 - _cv, 896
 - _data, 896
 - _service_mode, 897
 - CV, 896
 - Data, 896
 - ServiceMode, 896
 - ServiceModeResponse, 895
- xpressnet::SoftwareVersion, 929
 - _command_station_type, 931
 - _major, 931
 - _minor, 931
 - CommandStationTypeCode, 930
 - Major, 930
 - Minor, 930
 - SoftwareVersion, 930
- xpressnet::XPressNet, 1266
 - _ADDRESS, 1270
 - _CheckForResponse_0x00, 1271
 - _CheckForResponse_0x40, 1271
 - _CheckForResponse_0x60, 1271
 - _CheckForResponse_0x80, 1271
 - _CheckForResponse_0xa0, 1271
 - _CheckForResponse_0xc0, 1271
 - _CheckForResponse_0xe0, 1272
 - _appendXORByte, 1270
 - _readbyte, 1272
 - _readevent, 1272
 - _timeout, 1286
 - _timeoutevent, 1272
 - _transmit, 1273
 - ~XPressNet, 1270
 - AccessoryDecoderInformationRequest, 1273
 - AccessoryDecoderOperation, 1273
 - AddLocomotiveToMultiUnit, 1274
 - AddressInquiryNextMU, 1274
 - AddressInquiryNextMUMember, 1274
 - AddressInquiryNextStack, 1275
 - AddressInquiryPreviousMU, 1275
 - AddressInquiryPreviousMUMember, 1275
 - AddressInquiryPreviousStack, 1275
 - CheckForResponse, 1276
 - CommandStationSoftwareVersion, 1276
 - CommandStationStatusRequest, 1276
 - DeleteLocomotiveFromStack, 1276
 - DirectModeCVRead, 1277
 - DirectModeCVWrite, 1277
 - DissolveDoubleHeader, 1277
 - EmergencyStopAllLocomotives, 1278
 - EmergencyStopALocomotive, 1278
 - EstablishDoubleHeader, 1278
 - FunctionStatusRequest, 1278
 - GetLI100VersionNumbers, 1279
 - GetNextCommandStationResponse, 1279
 - LocomotiveInformationRequest, 1279
 - OperatingModeProgrammingBitModeWrite, 1279
 - OperatingModeProgrammingByteModeWrite, 1280
 - PagedModeCVRead, 1280
 - PagedModeCVWrite, 1280
 - readevent, 1281
 - RegisterModeRead, 1281
 - RegisterModeWrite, 1281
 - RemoveLocomotiveFromMultiUnit, 1282
 - RequestForServiceModeResults, 1282
 - responseList, 1286
 - ResumeOperations, 1282
 - SetCommandStationPowerUpMode, 1282
 - SetFunctionStateGroup1, 1283
 - SetFunctionStateGroup2, 1283
 - SetFunctionStateGroup3, 1284
 - SetLI101Address, 1284
 - SetLocomotiveFunctionsGroup1, 1284
 - SetLocomotiveFunctionsGroup2, 1285
 - SetLocomotiveFunctionsGroup3, 1285
 - SetLocomotiveSpeedAndDirection, 1285
 - StopOperations, 1286
 - ttyfd, 1286
 - XPressNet, 1269
- xpressnet::XpressNetEvent, 1287
 - _eventhandler, 1288
 - _script, 1288
 - ~XpressNetEvent, 1288
 - xpressnet, 1289
 - XpressNetEvent, 1287
- XpressNetEvent
 - xpressnet::XpressNetEvent, 1287
- XPressNetModule, 61
- xscroll
 - CTCPanel::CTCPanel, 387
- XYWH
 - OvalWidgets, 133
- Y
 - Parsers::MRRXtrkCad, 630
 - YY_MRRXtrkCad_INHERIT, 1291
- y
 - Parsers::BezierBodyElt::Pos, 792
 - Parsers::CornuBodyElt::Pos, 793
 - Parsers::SegPos, 885
 - Parsers::TrackBodyElt, 1179
 - Parsers::TrackGraph::EdgeValues, 427
 - Parsers::TrackGraph::Point, 791
 - Parsers::TurnoutBodyElt::Pos, 794
- Y1
 - FCFSupport::PDFFileStructures::Rectangle, 848
- y1
 - FCFSupport::PDFFileStructures::Rectangle, 849

Y2
 FCFSupport::PDFFileStructures::Rectangle, 848
 y2
 FCFSupport::PDFFileStructures::Rectangle, 849
 YARDSperMM
 MRRXtrkCad.tab.h, 1308
 YY_MRRXtrkCad_CHAR
 MRRXtrkCad.tab.h, 1302
 YY_MRRXtrkCad_INHERIT, 1294
 YY_MRRXtrkCad_CLASS
 MRRXtrkCad.tab.h, 1303
 YY_MRRXtrkCad_INHERIT, 1292
 YY_MRRXtrkCad_COMPATIBILITY
 MRRXtrkCad.tab.h, 1303
 YY_MRRXtrkCad_CONSTRUCTOR_CODE
 MRRXtrkCad.tab.h, 1303
 YY_MRRXtrkCad_CONSTRUCTOR_INIT
 MRRXtrkCad.tab.h, 1303
 YY_MRRXtrkCad_CONSTRUCTOR_PARAM
 MRRXtrkCad.tab.h, 1303
 YY_MRRXtrkCad_DEBUG
 MRRXtrkCad.tab.h, 1303
 YY_MRRXtrkCad_DEBUG_FLAG
 MRRXtrkCad.tab.h, 1304
 YY_MRRXtrkCad_INHERIT, 1294
 YY_MRRXtrkCad_ENUM_TOKEN
 Parsers::MRRXtrkCad, 629
 YY_MRRXtrkCad_INHERIT, 1290
 YY_MRRXtrkCad_ERROR
 MRRXtrkCad.tab.h, 1304
 YY_MRRXtrkCad_INHERIT, 1292
 YY_MRRXtrkCad_ERROR_BODY
 MRRXtrkCad.tab.h, 1304
 YY_MRRXtrkCad_ERROR_VERBOSE
 MRRXtrkCad.tab.h, 1304
 YY_MRRXtrkCad_INHERIT, 1289
 _VERSION, 1290
 ~MRRXtrkCad, 1292
 A, 1291
 ADJUSTABLE, 1292
 ASPECT, 1291
 B, 1291
 BEZIER, 1291
 BLOCK, 1291
 BZRLIN, 1291
 C, 1291
 CAR, 1291
 CONTROL, 1292
 CORNU, 1291
 CURRENT, 1291
 CurrentScale, 1293
 CURVE, 1291
 D, 1291
 DRAW, 1291
 E, 1291
 ENDBLOCK, 1290
 ENDSEGS, 1290
 ENDSIGNAL, 1290
 ENDTRACKS, 1290
 EOL, 1290
 F, 1291
 fieldflag, 1293
 FLOAT, 1290
 G, 1291
 H, 1291
 HO, 1291
 INTEGER, 1290
 J, 1291
 JOINT, 1291
 L, 1291
 LAYERS, 1291
 lookup_word, 1292
 M, 1291
 MAIN, 1291
 MAPSCALE, 1290
 MRRXtrkCad.tab.h, 1304
 MULTILINE, 1290
 N, 1291
 NOTE, 1291
 NOTWORD, 1290
 O, 1291
 P, 1291
 PIER, 1292
 Q, 1291
 RESTOFLINE, 1290
 ROOMSIZE, 1291
 S, 1291
 SCALE, 1291
 scanEol, 1293
 scanToEND, 1293
 SENSOR, 1292
 SIGNAL, 1291
 STRAIGHT, 1291
 STRING, 1290
 STRUCTURE, 1291
 SUBSEGS, 1291
 SUBSEND, 1291
 SWITCHMOTOR, 1291
 T, 1291
 TEXT, 1291
 TITLE, 1290
 TRK, 1291
 TURNOUT, 1291
 TURNTABLE, 1291
 UNTERMSTRING, 1290
 W, 1291
 X, 1291
 Y, 1291

- YY_MRRXtrkCad_CHAR, [1294](#)
- YY_MRRXtrkCad_CLASS, [1292](#)
- YY_MRRXtrkCad_DEBUG_FLAG, [1294](#)
- YY_MRRXtrkCad_ENUM_TOKEN, [1290](#)
- YY_MRRXtrkCad_ERROR, [1292](#)
- YY_MRRXtrkCad_LEX, [1292](#)
- YY_MRRXtrkCad_LLOC, [1294](#)
- YY_MRRXtrkCad_LVAL, [1294](#)
- YY_MRRXtrkCad_NERRS, [1294](#)
- YY_MRRXtrkCad_NULL_TOKEN, [1290](#)
- YY_MRRXtrkCad_PARSE, [1293](#)
- yyerror1, [1293](#)
- Z, [1291](#)
- YY_MRRXtrkCad_LEX
 - MRRXtrkCad.tab.h, [1304](#)
 - YY_MRRXtrkCad_INHERIT, [1292](#)
- YY_MRRXtrkCad_LEX_BODY
 - MRRXtrkCad.tab.h, [1304](#)
- YY_MRRXtrkCad_LLOC
 - MRRXtrkCad.tab.h, [1305](#)
 - YY_MRRXtrkCad_INHERIT, [1294](#)
- YY_MRRXtrkCad_LSP_NEEDED
 - MRRXtrkCad.tab.h, [1305](#)
- YY_MRRXtrkCad_LTYPE
 - MRRXtrkCad.tab.h, [1305](#)
- YY_MRRXtrkCad_LVAL
 - MRRXtrkCad.tab.h, [1305](#)
 - YY_MRRXtrkCad_INHERIT, [1294](#)
- YY_MRRXtrkCad_MEMBERS
 - MRRXtrkCad.tab.h, [1305](#)
- YY_MRRXtrkCad_NERRS
 - MRRXtrkCad.tab.h, [1305](#)
 - YY_MRRXtrkCad_INHERIT, [1294](#)
- YY_MRRXtrkCad_NULL_TOKEN
 - Parsers::MRRXtrkCad, [629](#)
 - YY_MRRXtrkCad_INHERIT, [1290](#)
- YY_MRRXtrkCad_PARSE
 - MRRXtrkCad.tab.h, [1306](#)
 - YY_MRRXtrkCad_INHERIT, [1293](#)
- YY_MRRXtrkCad_PARSE_PARAM
 - MRRXtrkCad.tab.h, [1306](#)
- YY_MRRXtrkCad_STYPE
 - MRRXtrkCad.tab.h, [1306](#)
- yy_MRRXtrkCad_stype, [1294](#)
 - fval, [1295](#)
 - il, [1295](#)
 - ival, [1295](#)
 - spl, [1295](#)
 - sval, [1295](#)
 - tb, [1296](#)
 - tbb, [1296](#)
 - tbbe, [1296](#)
 - tbe, [1296](#)
 - tcb, [1296](#)
 - tcbe, [1296](#)
 - trb, [1296](#)
 - trbe, [1297](#)
- YY_MRRXtrkCad_USE_CONST_TOKEN
 - MRRXtrkCad.tab.h, [1306](#)
- YY_MRRXtrkCad_USE_GOTO
 - MRRXtrkCad.tab.h, [1306](#)
- YY_USE_CLASS
 - MRRXtrkCad.tab.h, [1306](#)
- yychar
 - Parsers::MRRXtrkCad, [632](#)
- yydebug
 - Parsers::MRRXtrkCad, [632](#)
- yyerror
 - Parsers::MRRXtrkCad, [631](#)
- yyerror1
 - Parsers::MRRXtrkCad, [631](#)
 - YY_MRRXtrkCad_INHERIT, [1293](#)
- yylex
 - Parsers::MRRXtrkCad, [631](#)
- yyllloc
 - Parsers::MRRXtrkCad, [632](#)
- yylytype, [1297](#)
 - first_column, [1297](#)
 - first_line, [1297](#)
 - last_column, [1297](#)
 - last_line, [1298](#)
 - MRRXtrkCad.tab.h, [1307](#)
 - text, [1298](#)
 - timestamp, [1298](#)
- yylval
 - Parsers::MRRXtrkCad, [632](#)
- yynerres
 - Parsers::MRRXtrkCad, [633](#)
- yyparse
 - Parsers::MRRXtrkCad, [631](#)
- Z
 - YY_MRRXtrkCad_INHERIT, [1291](#)
- zoomBy
 - CTCPanel::CTCPanel, [385](#)