

User Manual



MTM400 MPEG Transport Stream Monitor 071-1224-01

This document supports software versions:
MTM400 Transport Stream Processor – 2.0 and above
WebMSM / Remote User Interface software – 2.0 and above.

www.tektronix.com

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The MTM400 MPEG Transport Stream Monitor is the subject of the following GB patent application numbers:

Title	Patent Application Number
Analyzing a transport stream	0221072.2
Monitoring program map tables of a compressed transport stream	0221073.0
Monitoring service description tables of a compressed transport stream	0221074.8
Monitoring event information tables of a compressed transport stream	0221071.4

Tektronix, Inc., P.O. Box 500, Beaverton, OR 97077

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TS Processor Board software version: 2.0
WebMSM/Remote User Interface software version: 2.0

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Ground the Product. This product is grounded through the grounding conductor of the mainframe power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Ground Equipment Connected to the Product. Ensure that any equipment connected to this product is grounded and at the same potential.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the manual for further ratings information before making connections to the product.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the installation instructions for details on installing the product so it has proper ventilation.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product. These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. The following symbols may appear on the product:



CAUTION
Refer to Manual



Protective Ground
(Earth) Terminal

Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

Do Not Service Alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect Power. To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

Use only Tektronix approved components when servicing the unit.

Preface

This manual describes the functions and use of the Tektronix MTM400 MPEG Transport Stream Monitor. The manual is organized into the following sections:

- *Getting Started*
An overview of the MTM400, installation instructions and starting the unit and the remote user interface.
- *Operating Basics*
A basic guide to the MTM400 user interface(s).
- *Reference*
A complete reference to all of the MTM400 features as accessed through the user interface.
- *Appendices*
This section contains the following appendices:
 - Appendix A: MTM400 Specifications. This appendix lists the electrical, physical and environmental specifications of the MTM400.
 - Appendix B: Networking. This appendix describes in detail the networking aspects of the MTM400.
 - Appendix C: Test Parameters. This appendix describes the tests performed by the MTM400; it also describes the associated parameters.
 - Appendix D: Configuration File Structure. This appendix describes the structure and composition of the MTM400 configuration file.
 - Appendix E: Hardware Maintenance. This appendix describes cleaning the unit and the installation of interface boards and batteries.
- Glossary
- Index

Related Material

Additional documentation, such as ReadMe files, may be included on the installation disks.

The following URLs access the Web sites for the standards organizations listed (the URLs listed were valid at the time of writing):

- MPEG-2 standards (International Organization for Standards)
<http://www.iso.ch/>
- DVB standards (European Technical Standards Institute)
<http://www.etsi.org/>
- ATSC standards (Advanced Television Systems Committee)
<http://www.atsc.org/>

Manual Conventions

Naming conventions for the interface elements are based on standard Windows naming conventions. Naming conventions for MPEG-2, ATSC, and DVB structures follow the conventions derived from the standards documents listed above. In addition, the following formatting conventions apply to this manual:

- **Bold** text refers to specific interface elements that you are instructed to select, click, or clear.
Example: Select **Settings** from the Configuration menu.
- **Boxed text** represents buttons on the user interface.
Example: Select **Trigger** on the Setup dialog.
- **Mono-spaced text** can indicate the following:
 - Text you enter from a keyboard
Example: Enter the network identity (`http://TSMonitor01`)
 - Characters you press on your keyboard
Example: Press CTRL+C to copy the selected text.
 - Paths to components on your hard drive
Example: The program files are installed at the following location:
`C:\Program Files\Tektronix\`

Contacting Tektronix

Phone	1-800-833-9200*
Address	Tektronix, Inc. Department or name (if known) 14200 SW Karl Braun Drive P.O. Box 500 Beaverton, OR 97077 USA
Web site	www.tektronix.com

Support - N & S America

Sales support	1-800-833-9200, select option 1*
Service support	1-800-833-9200, select option 2*
Technical support	Email: techsupport@tektronix.com

1-800-833-9200, select option 3*

* - toll free in North America.

6:00 a.m. -- 5:00 p.m. Pacific time

After office hours, please leave a voice mail message.

Support - Europe & the Rest of the World

Sales Support +44 (0)1344 392000

Service & Technical Support

Telephone +44 (0)1223 200700

Fax +44 (0)1223 200701



Getting Started

Getting Started

This section provides details of installing and powering up the Tektronix MTM400 MPEG Transport Stream Monitor

Overview

The MTM400 is a single-stream, extended-confidence, MPEG-2 protocol, rack-mounted monitoring device. It is used to monitor a single transport stream in MPEG-2, DVB and ATSC environments.

The basic MTM400 provides confidence monitoring by making key measurements and comparing them with pre-set parameters; inconsistencies can be reported as varying levels of error. Integrated flexibility allows the software to be upgraded with diagnostic capabilities and to supply detailed information to enable fault identification and analysis.

The user interface is accessed through a Remote User Interface (RUI). The RUI allows the status of MTM400 to be determined from anywhere in the world and provides remote control of the measurements and configuration to the administrator. The RUI is accessed through Microsoft Internet Explorer (Version 5); the Microsoft Virtual Machine (Version 5) must also be installed.

The user interface can also be accessed by the Web Monitoring Systems Manager (WebMSM) also available from Tektronix. The WebMSM is a Java application that is installed on any personal computer; as for the RUI, Microsoft Virtual Machine (Version 5) must be available. The installation, configuration and operation of the WebMSM is described in the WebMSM User Manual (071-1239-01 (Draft)).

The RUI and the WebMSM communicate with the MTM400 through the open standard Simple Network Management Protocol (SNMP) and Hypertext Transfer Protocol (HTTP).

ASI (Asynchronous Serial Interface) and SMPTE 310M (Society of Motion Picture and Television Engineers) interfaces are provided as standard; optional QAM (Quadrature Amplitude Modulation) and QPSK (Quaternary Phase Shift Keying) (L-Band) interfaces are available as options.

Accessories

The tables in this section list the standard and optional accessories available for the MTM400 MPEG Transport Stream Monitor.

Standard

Table 1-1 lists the standard accessories that are shipped with the MTM400.

Table 1-1: Standard MTM400 Deliverables

Nomenclature	Description	Deliverables
MTM400	Single stream MPEG Transport Stream Monitor packaged in 1RU chassis	1RU Chassis fitted with Transport Stream Processor Card. User Manual. Slides. License Key Certificate. LTC Connector

Options

Tables 1-2 and 1-3 list the options that are available for the MTM400.

Table 1-2: MTM400 Options

Nomenclature	Description	Deliverables
Opt. 01	Recording Capability	Enabled using license key
Opt. 02	Transport Stream Service Information Analysis (PSI/SI/PSIP/ISDB structure view and repetition graphs)	Enabled using license key
Opt. 03	Template Testing with Template Scheduling (for user defined service plan testing)	Enabled using license key
Opt. 04	PCR Analysis with Graphical Results views	Enabled using license key
Opt. 05	Bit rate testing including PID groups and PID variability	Enabled using license key
Opt. 06	Service logging	Enabled using license key
Opt. QA	QAM Annex A Interface	QAM (Annex A) Interface Card with associated cabling
Opt. QB	QAM Annex B Interface	QAM (Annex B) Interface Card with associated cabling
Opt. QC	QAM Annex C Interface	QAM (Annex C) Interface Card with associated cabling
Opt. QP	QPSK (L-Band) Interface	QPSK Interface Card with associated cabling
Opt. R3	3 year extended warranty	-
Opt. R5	5 year extended warranty	-

Table 1-3: MTM400 Power Cord Options

Nomenclature	Description
A0	North America Power
A1	Universal Euro Power
A2	United Kingdom Power
A3	Australia Power
A4	240 V North America Power
A5	Switzerland Power
A6	Japan Power
A10	China Power
A99	No Power Cord

Field Upgrade Kits

Field Upgrade kits contain hardware and software that can be installed by a user. Table 1-4 lists the Field Upgrade kits that are available for the MTM400.

Table 1-4: MTM400 Field Upgrade Kits

Product	Option	Description
MTM4UP		
	01	Field upgrade kit to add Recording Capability
	02	Field upgrade kit to add Transport Stream Service Information Analysis (PSI/SI/PSIP/ISDB structure view and repetition graphs)
	03	Field upgrade kit to add Template Testing With Template Scheduling (for user-defined service plan testing)
	04	Field upgrade kit to add PCR Analysis with Graphical Results views
	05	Field upgrade kit to add Bit rate testing including PID groups and PID variability
	06	Field upgrade kit to add Service Logging
MTM4FQA	-	Field upgrade kit to add QAM Annex A Interface
MTM4FQB	-	Field upgrade kit to add QAM Annex B Interface
MTM4FQC	-	Field upgrade kit to add QAM Annex C Interface
MTM4FQP	-	Field upgrade kit to add QPSK (L-Band) Interface

Licensing

Options and upgrades are enabled using a License Key. A License Key is an encrypted code that unlocks and enables functions that have been installed on the Real-Time Monitoring (RTM) device. Using this method, upgrading an RTM device may simply require the entry of a new License Key.

For new RTM devices, the appropriate License Key is applied during production. However, it is also supplied as part of the product documentation.

When field upgrade options are installed, you must apply a new license key; this will be supplied as part of the field upgrade kit documentation.

This user manual describes all available options including field upgrades. The basic product (with no licensed options) includes the following transport stream features:

- Test monitoring (DVB and ATSC)
- Custom classification of tests
- Basic program and PID analysis and monitoring
- Basic PCR analysis
- SFN and TMCC monitoring (where present in the stream)
- Stream Log

Table 1-5 summarizes the available Streams options:

Table 1-5: MTM400 Options Summary

Feature	Default *	Opt. 01 Recording Capability	Opt. 02 SI Analysis	Opt. 03 Template Testing	Opt. 04 PCR Analysis	Opt. 05 Bit rate Testing	Opt. 06 Service Logging
SFN	✓						
TMCC	✓						
PCR OJ, DR and FO testing	✓						
SI View			✓				
SI Graphs			✓				
PID and program bit rate limit testing						✓	
PID Groups						✓	
PID variability						✓	
Templates				✓			
Template tree view				✓			
Scheduling				✓			
Recording		✓					
PCR graphs					✓		
Service log							✓
RF Confidence Measurement **	✓						

* confidence or no option license key required.

** Only available if QAM card installed.

The Device application does not change with licensing.

(An overview of the Streams and Device applications is given in the *Operating Basics* section.)

Installing the MTM400

This section describes how to install the MTM400 unit. It includes the following instructions:

- Installing the unit in a rack
- Making the electrical connections necessary to begin monitoring transport streams
- Integrating the unit into a network

Operation is described in the following chapters.

Hardware Installation

The MTM400 is designed for rack-mounted operation. The rack-mounting kit is shipped as a standard accessory with each MTM400. Installing the rack-mounting kit is described in *Appendix E: Hardware Maintenance, Rack Mounting*.



WARNING. *To avoid fire hazard, the MTM400 must be installed in the rack only as specified and proper ventilation must be maintained at all times.*

Electrical Installation

The electrical operating requirements of the MTM400 are summarized in Table 1-6; see *Appendix A: MTM400 Specifications* for more detailed electrical characteristics.

Table 1-6: Electrical Operating Requirements

Requirement	Specification
Source Voltage	100 VAC to 240 VAC, 50 Hz/60 Hz
Power Consumption (maximum)	1 Amp maximum

Use the following procedure to make electrical, signal and network connections:

1. After the MTM400 has been mounted in the rack, connect the power cord (provided with the unit) to the power connector on the rear panel. Connect the power cord plug to a properly grounded outlet.

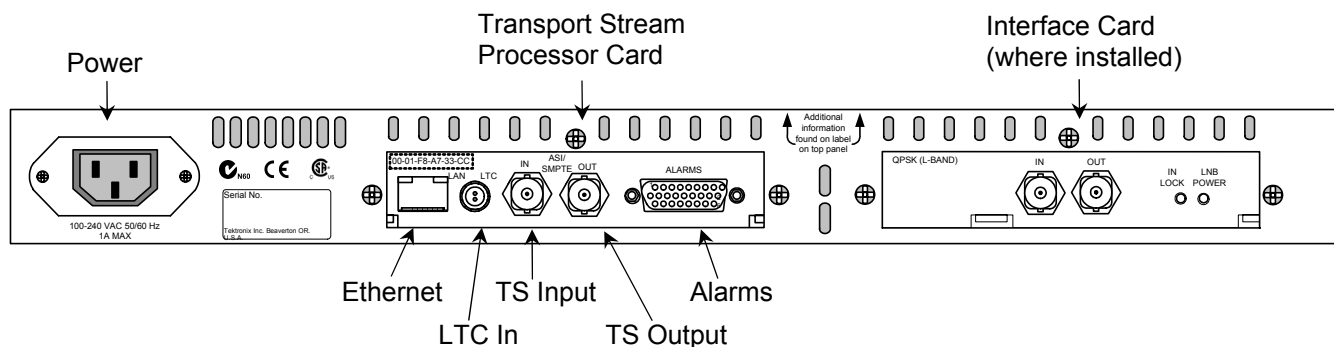


Figure 1-1: MTM400 Connectors

2. Make the transport stream, network and peripheral device connections necessary using the connectors at the rear of the unit.

Table 1-7 summarizes the transport stream, network and peripheral device connectors; (see *Appendix A: MTM400 Specifications* for more detailed information about each connector and the associated signals).

Table 1-7: Transport Stream Processor Card Connectors

Connector	Description
Ethernet	10/100Base-T; RJ-45
LTC In	Longitudinal time code input
Transport Stream input / output ASI input ASI output SMPTE310M input SMPTE310M output	75 Ω , transformer coupled, BNC connectors for the following signal formats: <ul style="list-style-type: none"> • Accepts both Burst and Packet mode ASI formats and M2S • An active loop-through of the corresponding input • Compliant with SMPTE310M (19.392 Mbps only) • An active loop-through of the corresponding input
Alarms	(Digital input/output) 26-pin D-type connector for alarm relays and TTL outputs; also recording trigger input

The Alarms connector provides connections for five relays. Each relay is configured through the user interface (see *Tests and Custom Screens*, pages 3-19 and 3-25); the three TTL outputs are configured in a similar manner.

Network Installation

The MTM400 is designed to operate in a networked (TCP/IP) environment. The network or system administrator may already have already configured the TCP/IP parameters (including the network identity) for the MTM400. If this is not the case, refer to *Appendix D: Networking* for procedures to configure the TCP/IP parameters.

Powering Up the MTM400

After the correct connections have been made to the unit, all that is required to power up the MTM400 is to apply power. Connect the power cord to a properly grounded outlet. Connect the other end of the cord to the product's power input (See *Figure 1-1*).

There is no mains disconnect switch. Initialization will begin as soon as power is connected to the power input. The LEDs on the front panel will indicate activity (see *Local Indicators*, page 2-1). Initialization can take up to 60 seconds.

Disconnect the power cord to remove power.

To view the configuration and monitoring features, the MTM400 can be accessed using the Remote User Interface (RUI) in a Web browser over a network.

The MTM400 user interface can also be accessed by the Web Monitoring Systems Manager (WebMSM). This is described in the WebMSM User Manual (071-1239-01 (Draft)).

The Remote User Interface

The Remote User Interface (RUI) provides a means of accessing the MTM400 configuration and monitoring features. The RUI can be run on any personal computer (Client PC) which meets the minimum specification and has network access to the MTM400 unit. The full specification is given in *Appendix A: MTM400 Specifications*.

Logging on

To access the configuration and monitoring features of the MTM400, use the following procedure:

1. At a networked PC, launch Microsoft Internet Explorer.
2. In the browser address bar, enter the network identity or IP address of the MTM400 unit, for example:

`http://TSMonitor01` or `http://192.201.121.231`.

When the Enter key is pressed, a Java applet is downloaded from the MTM400 unit and launched. The file size is approximately 1.5MB; the download time will depend on the network speed and traffic.



WARNING. *The Java applet will not run unless a 'temp' directory is properly configured on the PC.*

The MTM400 splash screen is displayed, overlaid shortly thereafter by the **Login Details** dialog:

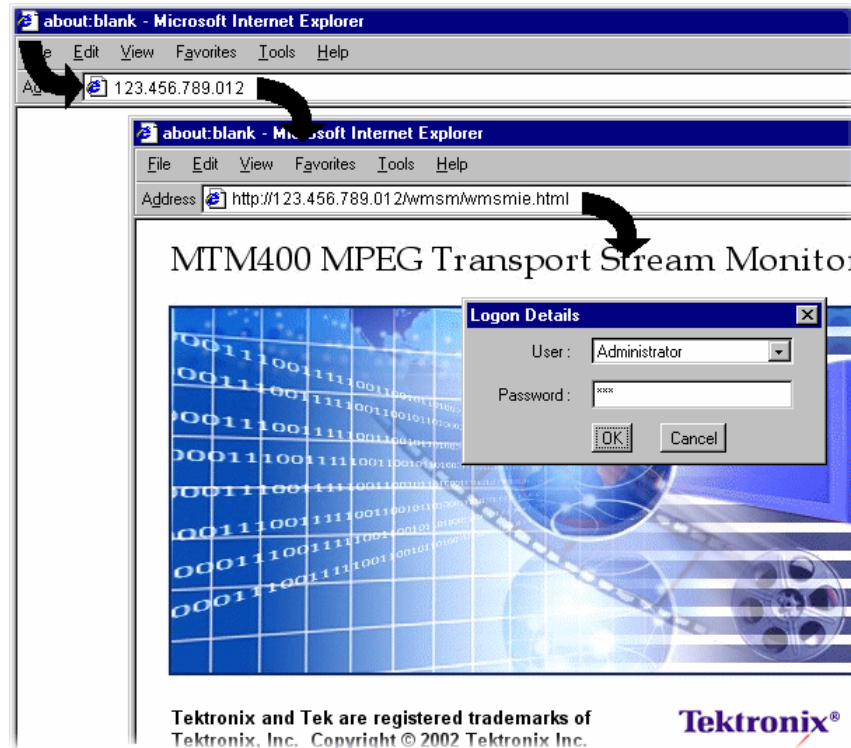


Figure 1-2: Logging On

3. Select the User name (Administrator or User from the drop-down list).

Two User Names are available at installation: Administrator and User.

Administrator: Gives full read/write access to all views and settings, including options where installed.

User: Gives read only access to all views and settings, including options where installed.

4. Enter the password. The default password for the Administrator is tek; no password is allocated to the User. The password can be modified using the Device Configuration screen (see page 3-13).

Select **OK** to accept the details. Select **Cancel** to close the dialog.

(To redisplay the **Login Details** dialog, either reenter the network identity of the MTM400 or select the **Refresh** button in the browser.)

5. The Hotspot view is displayed.

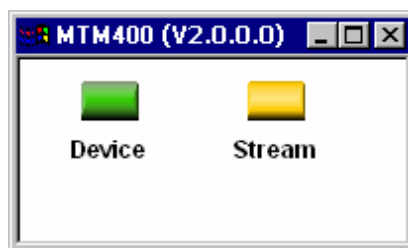


Figure 1-3: Hotspot View

The Hotspot view provides access to the device and stream monitoring views of the MTM400 being accessed.

High Level Monitoring

The Hot Spot view allows the overall state of the MTM400 device and the stream to be viewed; each hotspot is appropriately labeled.

The color of the Hot Spot button indicates the error status of the item to which it is linked (see *Color Coding*, page 2-10).

In the Hot Spot view the error state of the linked item is as follows:

- Device - the highest error state of the MTM400 device.
- Stream - the highest error state of the stream.

When you left-click a hot spot, the appropriate view opens: Device or Stream.

A detailed description of the user interface is provided in the Reference section of this manual.

Closing the Remote User Interface

Closing the original Internet Explorer window closes the RUI; the application windows close simultaneously.



Operating Basics

Operating Basics

This section provides an overview of the basic operation of the system; details and background material will be found in the Reference section.

The monitoring activity of the MTM400 can be observed in three ways:

- Local indicators
- Remote User Interface (RUI)
- WebMSM

Options are available to the RUI and the WebMSM to upgrade the monitoring from simple conformance checking to full diagnostic capability using license keys. The following sections describe all options available; your MTM400 may not have all options enabled.

Local Indicators

The MTM400 is an MPEG monitor for use in remote situations and does not have a local graphical user interface display. However, a local interface, consisting of four front-panel LEDs, can assure you that the MTM400 unit is functioning.

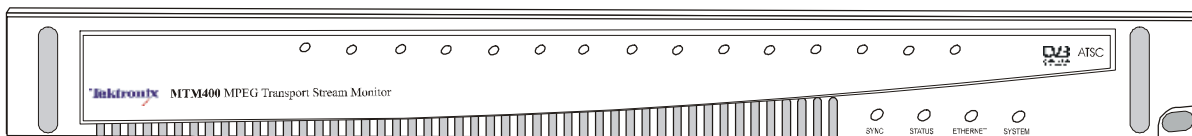


Figure 2-1: Front Panel

These LED's indicate the following:

- | | |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SYNC | Indicates that a valid MPEG transport stream is connected to the unit. |
| STATUS | Indicates the combined state of the tests currently being performed on the stream. The test reported by the STATUS LED corresponds to the Any Stream Error in the RUI (see <i>Device Status</i> , page 3-2). |
| ETHERNET | Indicates the state of the Ethernet physical link. |

Hot Spot View

The Hot Spot view lets you see the overall state of the MTM400 and the stream; each hotspot is appropriately labeled.

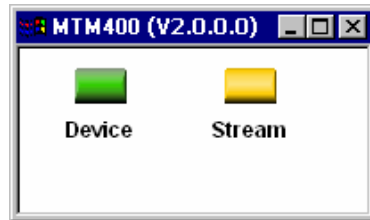


Figure 2-3: Hotspot View

The color of the Hot Spot button indicates the error status of the item to which it is linked (see *Color Coding*, page 2-10).

For example, in the screen shot (Figure 2-3), the **Device** button is green and the **Stream** button is yellow. This indicates that no errors have occurred on the device; an error has been noted on the stream, but it is currently OK.

The color (or state) of the Device and Stream hot spots corresponds to the Any Box Error and Any Stream Error tests in Device and Stream views.

If you click on a hot spot, the appropriate MTM400 view will open.

Device View

The Device view allows you to monitor and set parameters specific to the MTM400 device itself. The view contains a menu bar with various buttons, and an information view. You can choose the information that appears in the view by pressing the appropriate button. The button color indicates the overall state of the information in the corresponding view (see *Color Coding*, page 2-10).

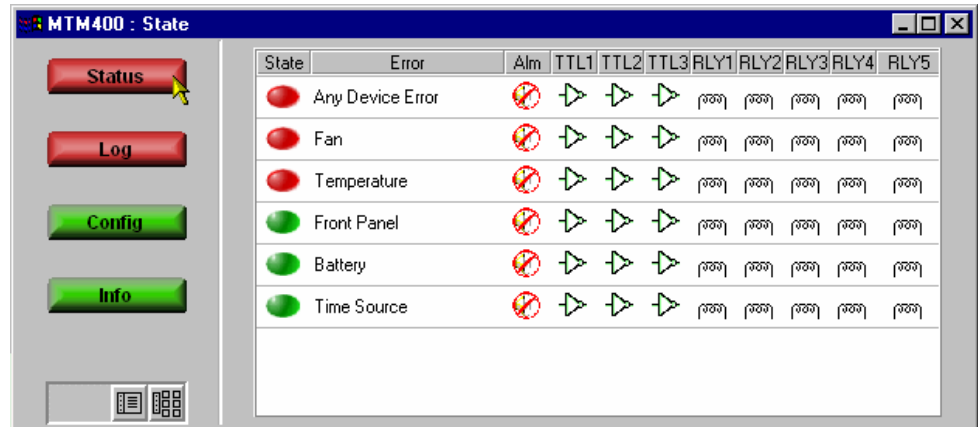


Figure 2-4: Device View

The title bar displays the name of the device to which you are connected (the name you set in the Device Configuration view) and the current view type. The screens provided are:

- Status** Displays the state of hardware items on the MTM400. It also allows administrators to configure alarms and relays and parameters associated with each item.
- Log** Displays the MTM400 device log, which includes non-stream events such as 'Device Start'.
- Config** Displays general configuration parameters for the MTM400. Administrators can modify certain parameters.
- Info** The Information view details the software and hardware build state of the MTM400.

Stream View

The Stream view allows you to monitor and set parameters specific to the stream being monitored.

As with the Device view, the screen consists of a menu bar with various buttons, and an information view. You can choose the information that appears in the view by pressing the appropriate button. The color of the button shows the overall state of the information that will be shown in the corresponding view (see *Color Coding*, page 2-10).

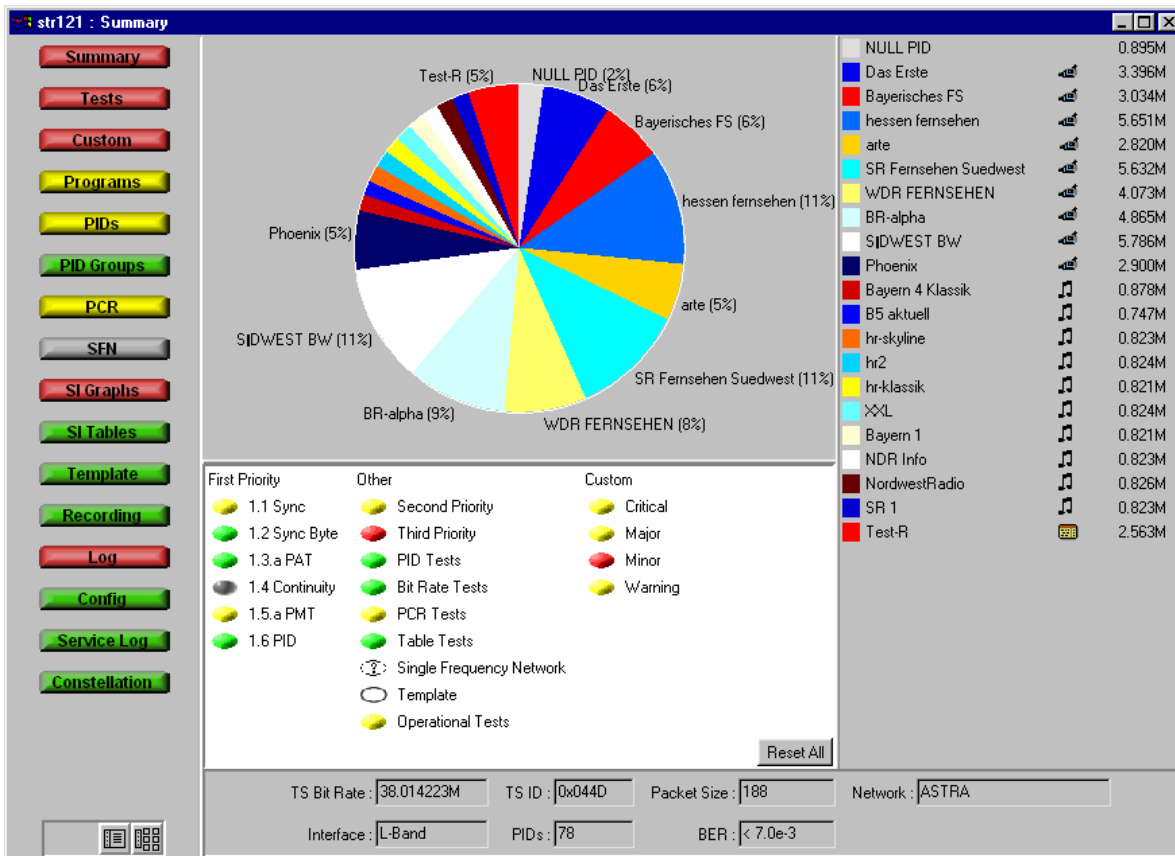


Figure 2-5: Stream View

The title bar displays the name of the device to which you are connected (the name you set in the Device Configuration view) and the current view type.

The information takes the form of a series of screens; a brief summary of each follows:

Summary

Provides a dynamic visual overview of the stream and monitoring status. The information is updated at regular intervals.
(See page 3-19).

Tests

Displays the state of the tests applied to the stream. It also allows administrators to configure alarms and relays and parameters associated with each test.
(See page 3-19).

Custom

Displays the state of the tests in the same way as the Tests view, but organized into Critical, Major, Minor and Warning categories.

The allocation of tests to categories is pre-configured, but you can override the settings at run time. However, the settings will not be saved when the unit is switched off.
(See page 3-25.)

Programs

Displays the programs that are being transmitted on the stream along with bit rate and the minimum and maximum bit rates observed. Administrators can set bit rate limits for each program if bit rate limits are licensed.
(See page 3-27.)

PIDs

Displays the PIDs that are being transmitted on the stream along with bit rate and the minimum and maximum bit rates observed. Administrators can set bit rate limits for each PID if bit rate limits are licensed.
(See page 3-31.)

PID Groups *

Displays the PID groups that have been created by the user. The information displayed includes the error state and the bit rate.
(See page 3-37.)

PCR *

Displays the following PCR graphs: Inaccuracy, Arrival, Overall Jitter, Frequency Offset and Drift Rate.
(See page 3-43.)

SFN

Displays the Single Frequency Network (SFN) information when available.
(See page 3-50.)

TMCC	Displays the Transmission and Multiplexing Configuration Control (TMCC) information when available. (See page 3-51.)
SI Graphs *	Displays information about repetition rates of SI tables and subtables in graphical format. (See page 3-52.)
SI Tables *	Displays the SI Information for the stream. (See page 3-56.)
Template *	Displays the structure and status of templates applied to the stream. (See page 3-59.)
Recording *	Displays the Triggered Recording setup screen. (See page 3-87.)
Log	Displays the stream log. (See page 3-63.)
Config	Displays general configuration parameters for the stream. Administrators can modify certain parameters. Scheduling, triggered recording and interface setup are configured here. (See page 3-67.)
Service Log	Displays the Service Log. Service logging allows packet counts for specified PIDs (range: 0 to 100) to be collected at a user-definable interval. (See page 3-70.)
Constellation	Provides a visual and numerical indication of the integrity of the signals received by either a QPSK (Quaternary Phase-Shift Keying) interface board or one of the QAM interface boards (Annex A, Annex B or Annex C). (See page 3-73.)

* - licensed options (see Table 1-5: MTM400 Options Summary).

Device and Stream View Manipulation

The manipulation of the Device and Streams views is similar. Each view comprises a Button bar and an information window. The two view elements can be displayed either combined (a single window with the Button bar on the left) or as separate elements (the Button Bar and the information window are displayed separately). When displayed as separate windows, multiple information windows can be opened. The choice is made by selecting one of the two buttons at the bottom of the Button bar.

Combined View. Figure 2-6 illustrates the combined Device view; the Streams view is similar. Each time a button is selected, the adjoining view changes.

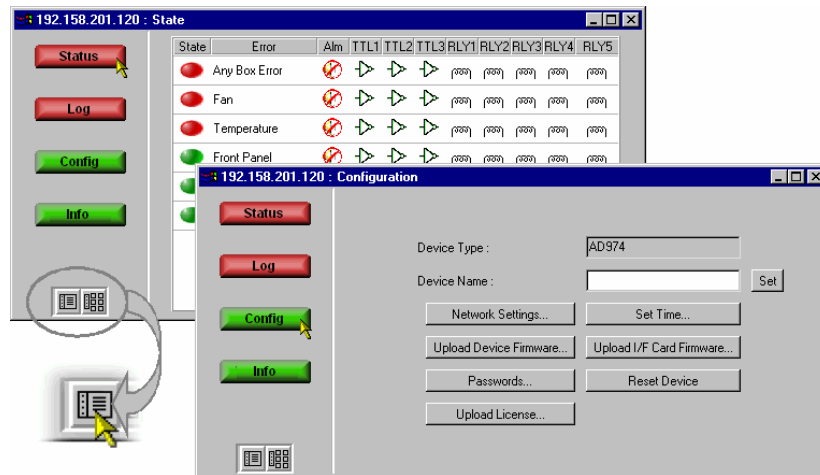


Figure 2-6: Combined View

Multiple View. Figure 2-7 illustrates the multiple Device view; the Streams view is similar. Each time a function button is selected, a new window is opened.

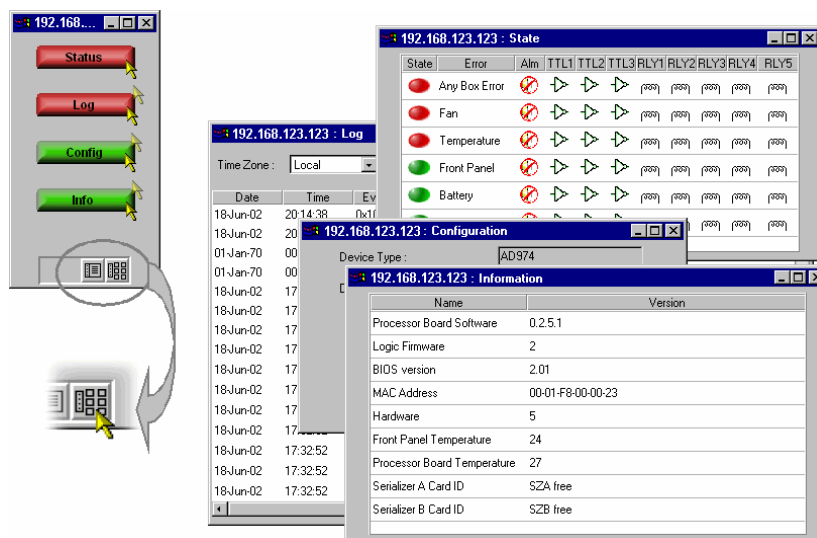
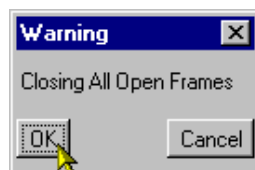


Figure 2-7: Multiple View

When switching from multiple view to combined view, you will be asked to acknowledge that all the function windows will be closed before the combined view window can be displayed.







The individual Device and Streams function windows are described in the following *Reference* section.

Color Coding








In the RUI Hot Spot View, the Device and Stream buttons use the color scheme shown in Table 2-8.

Table 2-8: Button Colors - Hot Spot Views

Icon	Button Color	Meaning
 Device	Green	Operation normal — no error detected.
 Device	Red	Error detected and still present.
 Device	Yellow	Transient error, which has now corrected itself.
 Device	Grey	The corresponding test has been disabled (or is unavailable). All buttons gray indicates that connection to a device has been lost.

In the Stream and Device views, the buttons and icons use the color-coded error scheme shown in Table 2-9.

Table 2-9: Button Colors - Device and Stream Views

Icon	Color	Meaning
	Green	Operation normal — no error detected.
	Red	Error detected and still present.
	Yellow	Transient error, which has now corrected itself.
	Grey	The corresponding test has been disabled (or is unavailable). All buttons are gray indicates that connection to a device has been lost.
	White	Test not applicable.
	Clear / ?	Test unknown or incomplete.
	Black	Maintenance mode

Where buttons represent a collection of elements (for example, for the Status button), the color indicates the highest error state of the elements.

WebMSM

The WebMSM is effectively an installed version of the RUI. The WebMSM provides additional functionality by allowing you to create hierarchical network views of your systems using the WebMSM Configuration Editor, and monitor and control multiple devices. The WebMSM user interface is similar to the RUI.

For further information concerning installing and configuring the WebMSM, refer to the WebMSM User Manual, 071-1239-01 (Draft).

User Interface Version

The software version of the user interface (RUI or WebMSM) is shown on all screens.

Time Zones

An inevitable consequence of allowing the RTM device user interface to be accessed across networks is the crossing of time zones. Various features of the user interface display timing information, including the Log files. The user needs to know the time source being used to record events. Also, when scheduling the loading of configuration files, time zones must be taken into account (see *Scheduling*, page 3-81).

Figure 2-8 shows a typical setup in which an MTM400 is located in Denver and is monitored from Portland. In local time, Portland is one hour behind Denver. In this example Universal Coordinated Time (UTC) is 10 p.m. Therefore the local times in Portland and Denver are 2 p.m. and 3 p.m. respectively.

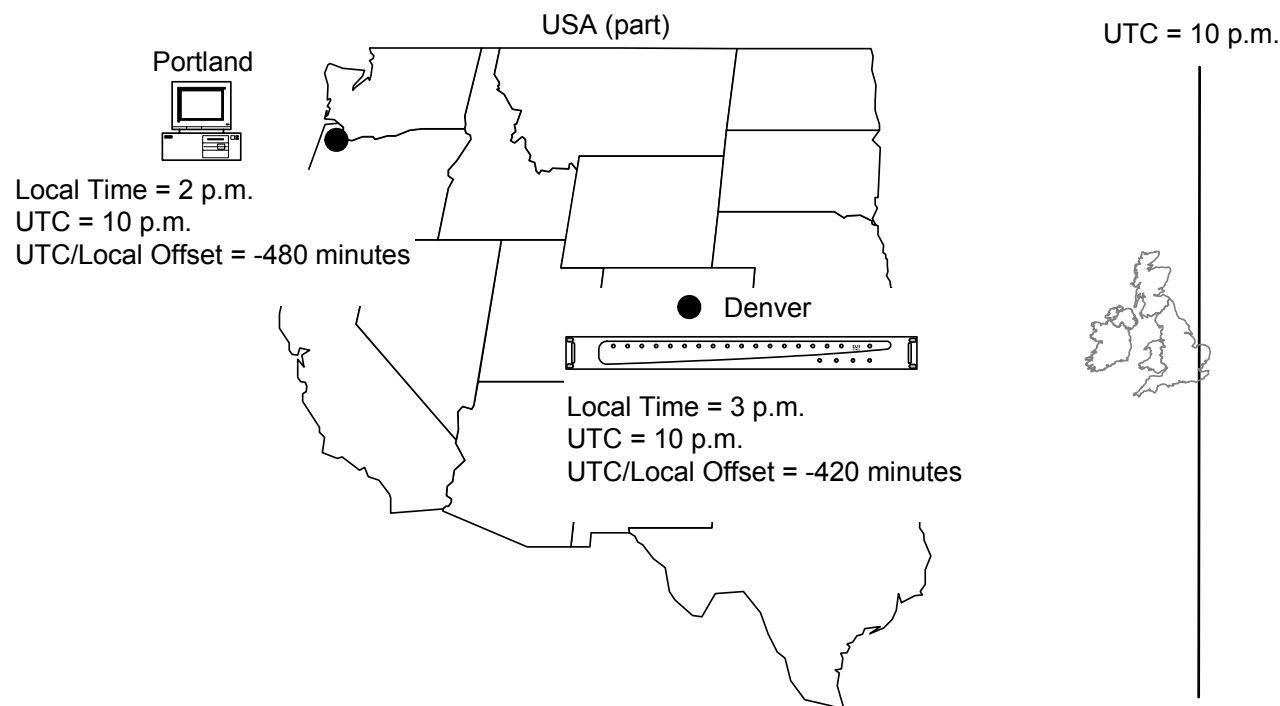


Figure 2-8: Time Zones - Illustration

The MTM400 user interface allows you to coordinate times of the system elements and to choose the local reference time zone; UTC, local time at the Client PC or local time at the RTM device. All times are calculated with respect to Universal Coordinated Time.

(See *Device Configuration - Set Time*, page 3-8.)



Reference

Reference

This section provides a detailed description of each of the views available in the RUI. The descriptions are given in the order that they appear in the two primary views: Device and Streams.

Device View

The Device view allows you to monitor and set parameters specific to the MTM400 unit itself. The view comprises a menu bar with various buttons, and an information view. You can choose the information that appears in the view by pressing the appropriate button. The color coding of buttons is explained in the previous section.

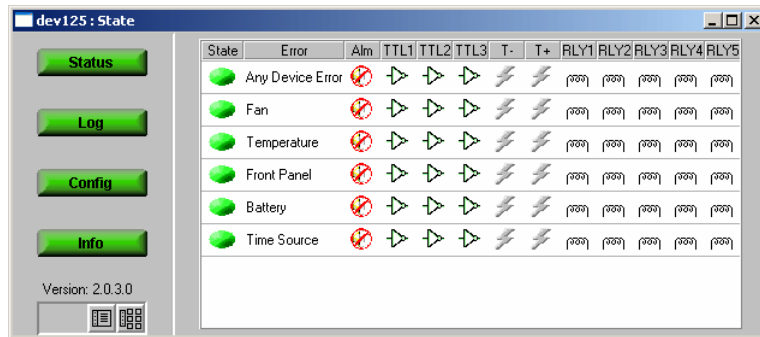


Figure 3-1: Device View

The title bar displays the Device Name and the current view type.

NOTE. *The software version number shown in the screen shots in this manual may not correspond to those displayed by your user interface.*

The screens provided are:

- Status** Displays the state of hardware items on the MTM400. It also allows Administrators to configure alarms and relays and parameters associated with each item.
(See page 3-2.)

- Log** Displays the MTM400 device log.
(See page 3-4.)

- Config** Displays general configuration parameters for the MTM400. Administrators can modify certain parameters. (See page 3-6.)

- Info** The Information view details the software and hardware build state of the MTM400. (See page 3-14.)

Device Status

The Device Status option displays a screen that shows the status of MTM400 device events (as opposed to stream events).

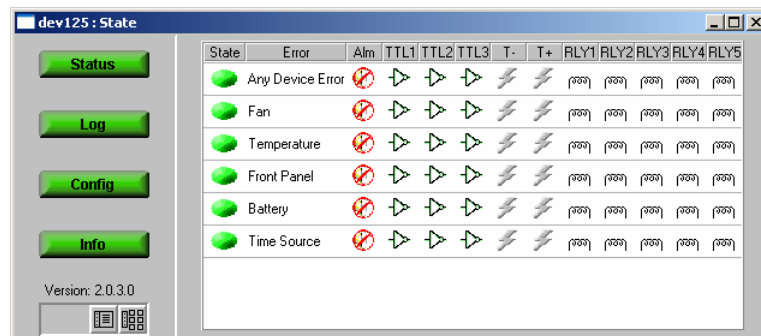


Figure 3-2: Device View - Status

The events displayed will depend on the RTM device type; those currently shown for the MTM400 are as follows:

- Any Device Error** Provides an overview of the device error state, which includes the events shown in this panel.

- Fan** When active, indicates cooling fan failure.

- Temperature** When active, indicates that the maximum temperature monitored at the front panel and the processor board has exceeded the safe operating limit.

- Front Panel** When active, indicates that either the temperature at the front panel has exceeded the safe operating limit, one or more of the LEDs has failed or the audible alarm is faulty.

- Battery** When active, indicates that the configuration backup battery on the TS Processor board has failed. In this case, all configuration settings will be lost when power is removed from the unit.

Time Source When active, indicates that the time source selected in the **Set Time...** section of the Device Configuration (see page 3-8) has failed.

Typical display elements are described in the following paragraphs:

State A button showing the **State** of the event.
(See *Color Coding*, page 2-10.)



A right-click on the button will open a popup menu that allows you to reset the error or enable/disable the event monitoring. Double-clicking the button will toggle event monitoring between enabled and disabled.



Error Name of the **Error** event (for example, Fan)

Alm An icon indicating whether an audible alarm (**Alm**) will sound when an error of the type occurs. Double-clicking the icon will toggle its state: enabled or disabled.

 - Disabled;  - Enabled



(See also *Reference* section, *Table A-9: TS Processor - Alarms - Connector*.)

TTLn An icon indicating whether the TTL (**TTLn**) will activate when an error occurs. Double-clicking the icon will toggle its state: enabled or disabled.



 - Disabled;  - Enabled

(See also *Reference* section, *Table A-9: TS Processor - Alarms - Connector*.)

SNMP (**T-** and **T+**) Indicates whether SNMP trap messages should be sent when a specific event starts and finishes.

 - Off (grey);  - On (yellow)

RLYn An icon indicating whether the relay (**RLYn**) will activate when an error occurs. Double-clicking the icon will toggle its state: enabled or disabled.

 - Disabled;  - Enabled

(See also *Reference* section, *Table A-9: TS Processor - Alarms - Connector*.)

View Device Log

The Device Log records device-specific events associated with the selected MTM400. Logged events are displayed in a scrolling list. The Date, Time, Event ID and a description of each event is displayed.

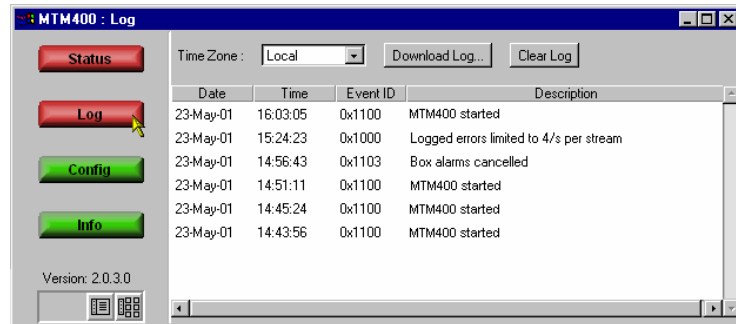
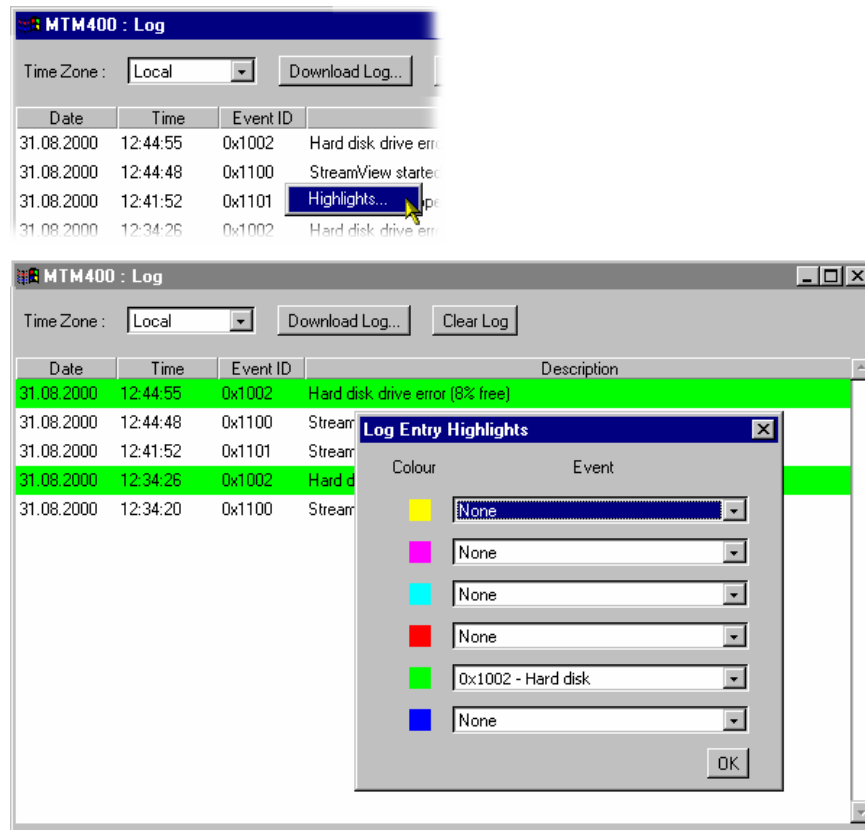


Figure 3-3: Device View - Log

Highlighting Log Entries. A pop-up menu is available from which log entry highlight coloring can be initiated; right click anywhere within the listing.



Using the Log Entry Highlights dialog allows specific types of entry to be highlighted in a selected color. Select the **Event** type to be highlighted from the drop-down list adjacent to the **Color** required; hex values are shown in the event list. Select **OK** to close the dialog and implement the highlighting.

Saving the Device Log. The Device Log can be saved using the **Download Log...** button. In the **Log Download** dialog, select (or enter) a filename and path and select the **Start** button. Select the **Close** button when the operation has finished or to terminate the process early.

The resulting downloaded log file is saved in CSV (comma separated values) format.

Clearing the Device Log. Select **Clear Log** to clear the current log entries.

Time Zone. Monitoring devices across time zones may cause some confusion with respect to the timing of events. The displayed times at which log events occurred can be adjusted by making a selection from the **Time Zone** drop-down list at the top of the window. The following options are available:

- | | |
|-------------------|-------------------------------------------------------------------------------------------|
| Local | The time local to the machine on which MTM400 Remote User Interface is currently running. |
| UTC | Universal Coordinated Time. |
| RTM Device | The time local to the RTM device being monitored. |

Device Configuration

The Device Configuration screen allows the user to configure items specific to the MTM400 unit being monitored.

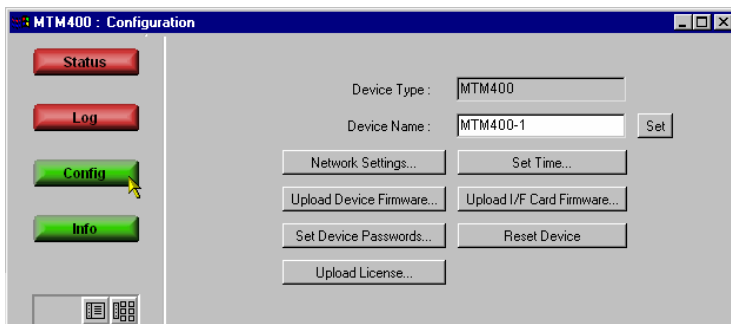


Figure 3-4: Device View - Configuration

Device Type: Displays the monitoring device type; this information is read from the unit being monitored.

Device Name: You can give the monitoring device a name, which is then displayed in the title bar of all screens. If a Device Name is not allocated, the IP address of the device is displayed.

Enter the name required and select **Set** to activate it.

Network Settings...

Allows the network settings of the device to be reconfigured. (See *Network Settings.*, page 3-7.)

Set Time...

Allows the RTM device time to be set. (See *Set Time.*, page 3-9.)

Upload Device Firmware...

Allows new firmware to be uploaded to overwrite the existing device firmware. (See *Firmware Upload.*, page 3-11.)

Upload I/F Card Firmware...

Allows new firmware to be uploaded to overwrite the existing interface card firmware. (See *Firmware Upload.*, page 3-11.)

Set Device Passwords

Allows the RUI passwords to be set. (See *Passwords.*, page 3-13.)

Reset Device Resets the MTM400 by rebooting. The configuration is reloaded from non-volatile RAM; any configuration settings not saved before the reset will be lost.
(See *Device Reset.*, page 3-13.)

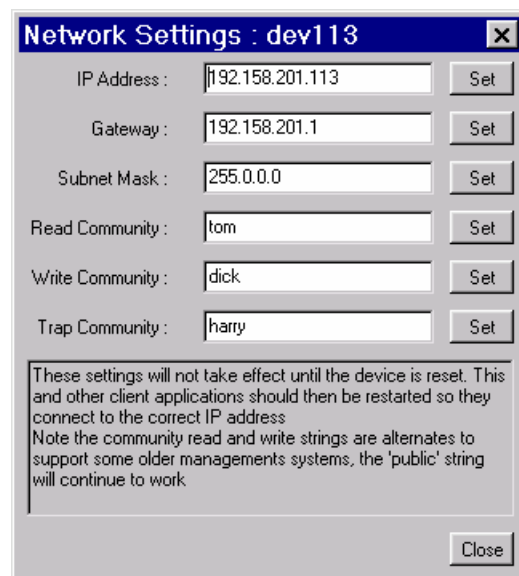
Upload License...
Allows the License Key details to be entered.
(See *Upload License.*, page 3-14.)

Network Settings. Although the MTM400 network identity is initially set up during installation, it can be changed subsequently through the **Network Settings** dialog.

SNMP community strings can also be set using the **Network Settings** dialog (see page 3-15).

In all cases, when the values have been changed as required, select the adjacent **Set** button to store the new settings in the MTM400.

To open the **Network Settings** dialog, select **Network Settings** from the Device Configuration dialog.

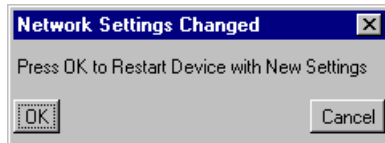


Network Settings : dev113 [X]

IP Address :	<input type="text" value="192.158.201.113"/>	<input type="button" value="Set"/>
Gateway :	<input type="text" value="192.158.201.1"/>	<input type="button" value="Set"/>
Subnet Mask :	<input type="text" value="255.0.0.0"/>	<input type="button" value="Set"/>
Read Community :	<input type="text" value="tom"/>	<input type="button" value="Set"/>
Write Community :	<input type="text" value="dick"/>	<input type="button" value="Set"/>
Trap Community :	<input type="text" value="harry"/>	<input type="button" value="Set"/>

These settings will not take effect until the device is reset. This and other client applications should then be restarted so they connect to the correct IP address
Note the community read and write strings are alternates to support some older managements systems, the 'public' string will continue to work

When the network settings have been changed and set and **Close** is selected, the following dialog is displayed:



For the network settings to take effect, select **OK** to restart the device. Select **Cancel** if a restart is not required. The new settings will not take effect until the unit is restarted.

If necessary, obtain the Gateway and Subnet Mask values from the Network Administrator.

NOTE: *If the Network Settings are changed and the MTM400 is restarted, the PC that is running the RUI will be unable to communicate with the MTM400, since the browser is trying to communicate with the 'old' network identity. It will be necessary to close the RUI by closing the Internet Explorer. Internet Explorer can then be reopened and the MTM400 accessed using the new Network identity.*

This will also be true of any WebMSM system configuration, which must be revised using the WebMSM Configuration Editor (refer to the WebMSM User Manual).

Set Time. You can coordinate the time used by the RTM device and/or the remote user interface. (For a general description of the timing model, see *Time Zones*, page 2-12.)

Three time sources are available to the MTM400 from the **Time Source:** drop-down menu.

Real Time Clock The MTM400 internal clock.

LTC (Longitudinal Time Clock) An analogue format time clock often available from a centralized source.

SNTP (Simple Network Time Protocol) A UTC-synchronized time clock available over the internet. Appropriate IP addresses of time servers should be available from the System Administrator.

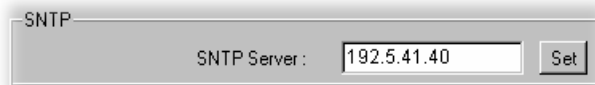
- **Local** time is the time being used by the remote user interface; it is the local PC time. It is referenced to UTC (Coordinated Universal Time) and may be offset to allow for local time variations, for example, British Summer Time = +60 minutes. The adjusted time is shown. Local time corresponds with the current Windows clock and time zone parameters.
- **RTM Device** time is the time being used by the RTM device; this may be in a completely different time zone. It is referenced to UTC (Coordinated Universal Time) and may be offset to allow for local time variations, for example, British Summer Time = +60 minutes. The adjusted time is shown.

With **Real Time Clock** selected from the **Time Source** drop-down list, the RTM device can be synchronized to local PC time using **Sync with Local**. Any offset required (for a different time zone) is entered in the **UTC to Time Zone Offset** field (in minutes) and activated using **Set**.

NOTE: *There may be a slight delay between the RTM device time displayed and the actual time on the device due to network delays incurred in retrieving the time. This is most likely to be seen if the user applies **Sync with Local** and observes that the **Local** and **RTM Device** times are slightly out of step.*

With either **Longitudinal Time Code** or **Simple Network Time Protocol** selected from the **Time Source** drop-down list, the RTM device takes its time from the respective input. Any offset required (for a different time zone) is entered in the **UTC to Time Zone Offset** field (in minutes) and activated using **Set**.

To use a remote time server, **Simple Network Time Protocol** should be selected from the **Time Source** drop-down list, and the IP address of a suitable SNTP server entered in the **SNTP** field.



The network Gateway and Subnet Mask must be set up for the remote server to be able to communicate (see *Network Settings*, page 3-7).

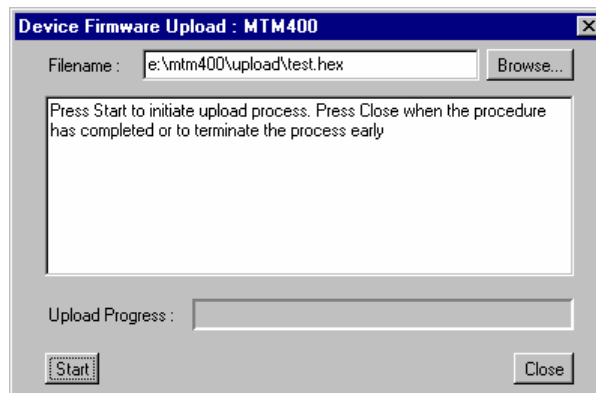
Firmware Upload. If new device or interface card firmware is available, this function allows it to be uploaded to the respective device. The firmware filename format is *.hex.



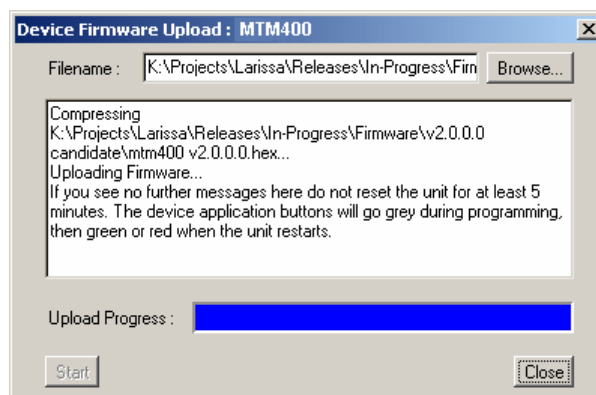
Device Firmware Upload

CAUTION. *The Device Log must be cleared immediately before uploading the firmware.*

1. To upload device firmware, select **Upload Device Firmware**.



2. Identify the firmware file either by entering the path and filename or using **Browse**.
3. Select **Start** to upload the firmware.



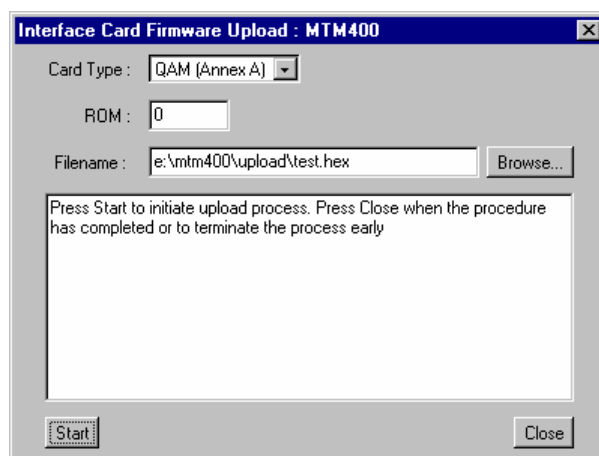
4. Select **Close** when the process has completed or to terminate the process.

Interface Card Firmware Upload

NOTE: *This feature will only be used for interim updates of the Interface Card Firmware. The update will comprise up to three files. Documentation specifying Card Type and ROM number to be used will be supplied with the firmware files.*

The firmware is uploaded to volatile RAM. If this firmware becomes corrupted and the device needs to be reset, the original firmware in non-volatile RAM will be used and the uploaded data will be lost. The upload will need to be repeated.

1. To upload interface card firmware, select **Upload I/F Card Firmware**.

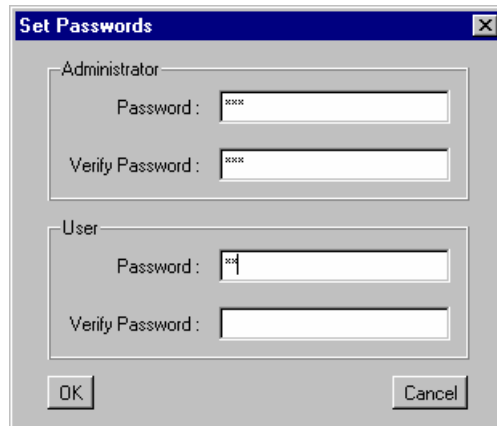


2. Select the **Card Type** to which the firmware is to be uploaded from the drop-down list.
3. Enter the **ROM** number (0, 1 or 2).
4. Identify the firmware **Filename:** (either by entering the path and filename or using **Browse**).
5. Select **Start** to upload the firmware.

Select **Close** when the process has completed or to terminate the process.

Passwords. Use the Password feature in the device configuration to change the current password. This is the password that will be required by those accessing the device using the RUI. The password file created is stored on the RTM device.

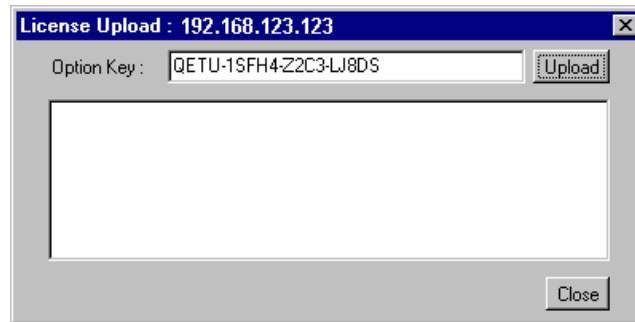
Note that only users with Administrator access can change the RUI passwords.

A screenshot of a 'Set Passwords' dialog box. The dialog has a title bar with 'Set Passwords' and a close button. It contains two sections: 'Administrator' and 'User'. Each section has a 'Password' field and a 'Verify Password' field. The 'Administrator' fields contain 'xxxx'. The 'User' fields contain 'x' and an empty field. At the bottom are 'OK' and 'Cancel' buttons.

1. For the Administrator, enter a password in the **Password** field. Verify it by entering it again in the **Verify Password** field.
2. Repeat for the User.
3. Select **OK** to confirm the passwords.

Device Reset. Selecting **Reset Device** resets the RTM device; it is equivalent to removing and re-instating power. The configuration is reloaded from non-volatile RAM; any configuration settings not saved before the reset will be lost. (To save the configuration settings, see MTM400 Configuration Files, page 3-76).

Upload License. A license key is applied to each RTM device to enable functionality. When new or upgraded functions are added, for example as part of a field upgrade, you will receive a new license key with the upgrade kit. Use the **License Upload** dialog to apply the new license key.



Enter the new License Key; this will accompany the upgrade documentation. Select **Upload**. A progress message will be displayed.

The license key will be stored on the RTM device.

Note that licensing is specific to a single RTM device.

Device Information

The Info view details the software and hardware build state of the MTM400. (The values shown in this example screenshot will differ from the values shown on your display.)

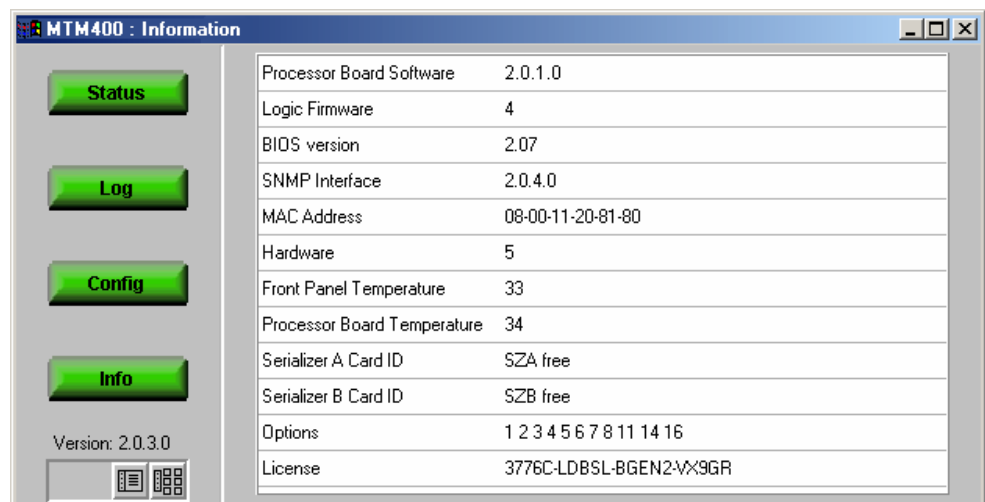


Figure 3-5: Device View - Information

This information may be required if you request technical support from Tektronix.

SNMP

The MTM400 Simple Network Management Protocol (SNMP) agent is a software process that responds to queries using the SNMP to provide status and statistics about the MTM400. This enables management applications to be developed that can access MTM400 units remotely across a network using SNMP.

Each of the events available from the MTM400 is kept in a database described by a Management Information Base (MIB). The various values that can be retrieved from the MIB are called *MIB variables*. These variables are defined in the MIB for the MTM400. Each MIB variable is named by an *Object Identifier (OID)*.

The MTM400 MIB is documented in the *MTM400 Programmer Manual*, Tektronix Part number 071-1375-xx.

Communities

An SNMP Community String is like a password. It is sent along with each SNMP request and allows (or denies) access to the MTM400. Most agents accept a default password of 'public'. However, some older systems use alternative community strings for read and write actions. Alternative community strings can also be used to ensure security. Read and Write community strings can be set in the **Network Settings** dialog (see page 3-7).

SNMP Traps

An SNMP Trap is an unsolicited message from an MTM400 to an SNMP agent that an event has occurred. Traps provide an immediate notification for an event that might only be discovered during occasional polling using normal SNMP techniques.

SNMP traps accept a default community string of 'public'. An alternative community string can be assigned in the **Network Settings** dialog (see page 3-7).

Stream View

The Stream view provides information about the monitored stream.

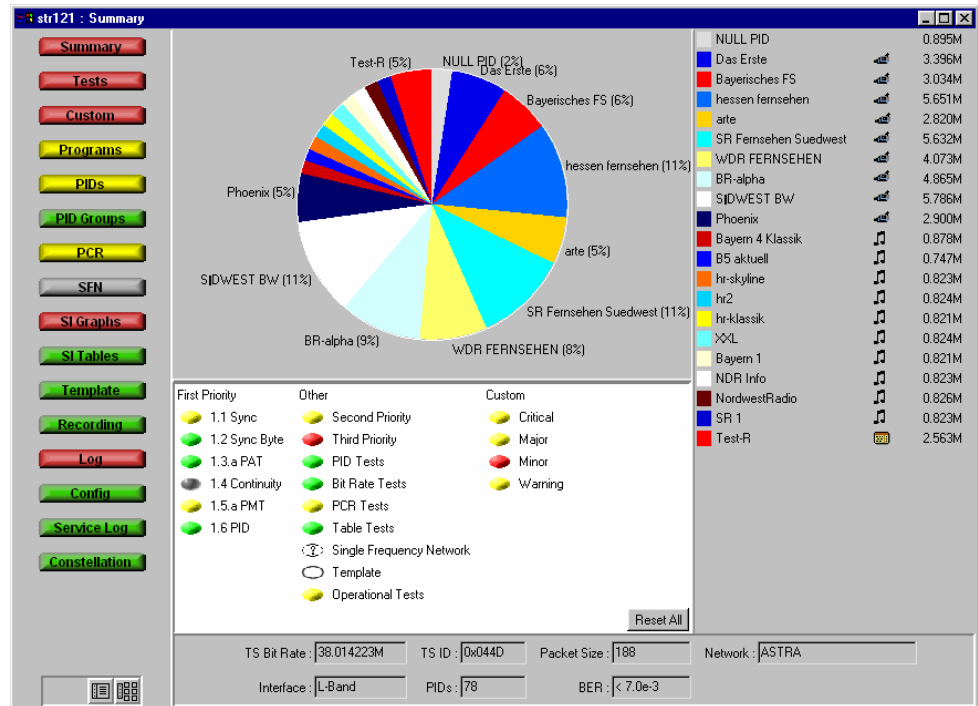


Figure 3-6: Stream View

The title bar displays the Stream Name (configured by the user), the current view type.

The information takes the form of a series of screens; a brief summary of each follows:

Summary

A dynamic visual overview of the stream and monitoring status. The information is updated at regular intervals. (See page 3-19.)

Tests

Displays the state of the tests applied to the stream. It also allows users with read-write permissions (Administrators) to configure alarms and relays and parameters associated with each test. (See page 3-19.)

Custom	<p>Displays the state of the tests in the same way as the Tests view, but ordered according to the categories Critical, Major, Minor or Warning.</p> <p>The allocation of tests to categories is pre-configured, but you can override the settings at run time. However, the settings will not be saved when the unit is switched off. (See page 3-25.)</p>
Programs	<p>Displays the programs that are being transmitted on the stream along with bit rate and the minimum and maximum bit rates observed. Administrators can set bit rate limits for each program provided that bit rate limits are licensed. (See page 3-27.)</p>
PIDs	<p>Displays the PIDs that are being transmitted on the stream along with bit rate and the minimum and maximum bit rates observed. Administrators can set bit rate limits for each PID provided that bit rate limits are licensed. (See page 3-31.)</p>
PID Groups *	<p>Displays the PID groups that have been created by the user. The information displayed includes the error state and the bit rate. (See page 3-37.)</p>
PCR *	<p>Displays the following PCR graphs: Inaccuracy, Arrival, Overall Jitter, Frequency Offset and Drift Rate. (See page 3-43.)</p>
SFN	<p>Displays the Single Frequency Network (SFN) information when available. (See page 3-50.)</p>
TMCC	<p>Displays the Transmission and Multiplexing Configuration Control (TMCC) information when available. (See page 3-51.)</p>
SI Graphs *	<p>Displays information about repetition rates of SI tables and subtables in graphical format. (See page 3-52.)</p>
SI Tables *	<p>Displays the SI Information for the stream. (See page 3-56.)</p>
Template *	<p>Displays the structure and status of templates applied to the stream. (See page 3-59.)</p>

- Recording** * Displays the Triggered Recording setup screen.
(See page 3-87.)
- Log** Displays the stream log.
(See page 3-63.)
- Config** Displays general configuration parameters for the stream. Administrators can modify certain parameters. Scheduling, triggered recording and interface setup are configured here.
(See page 3-67.)
- Service Log** Displays the Service Log. Service logging allows packet counts for specified PIDs (range: 0 to 100) to be collected at a user-definable interval.
(See page 3-70.)
- Constellation** The constellation screen provides a visual and numerical indication of the integrity of the signals received by either a QPSK (Quaternary Phase-Shift Keying) interface board or one of the QAM interface boards (Annex A, Annex B or Annex C.)
(See page 3-73.)

* - licensed options (see Table 1-5: MTM400 Options Summary).

Monitoring Overview Screen (Summary Screen)

This screen provides a dynamic visual overview of the stream and monitoring status. The information is updated at regular intervals.

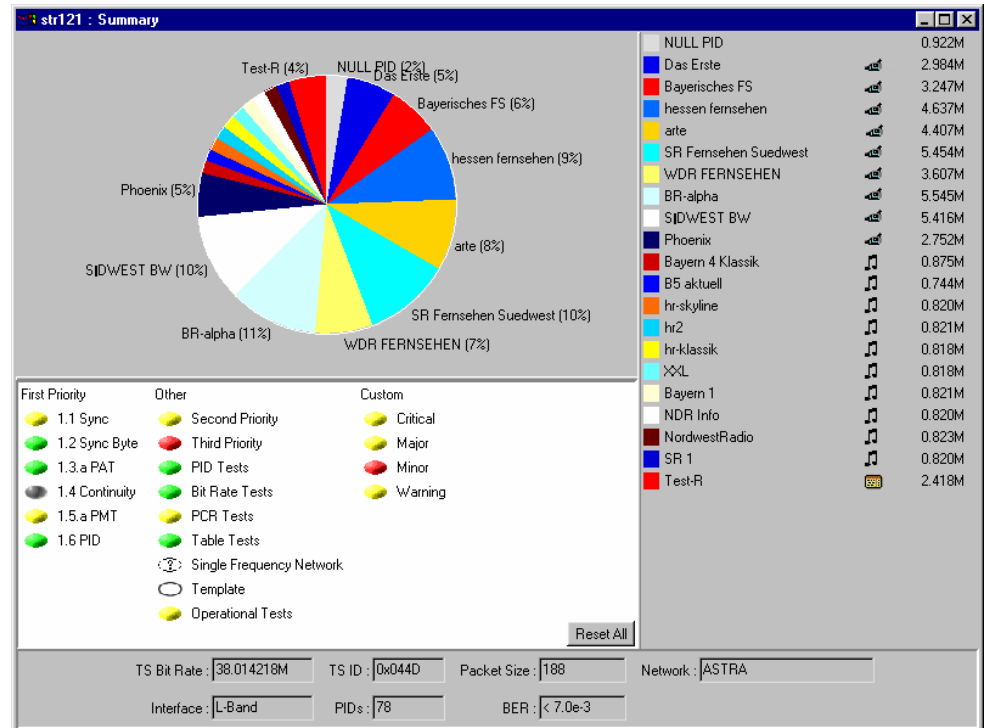


Figure 3-7: Stream View - Overview

The upper half of the Overview screen displays service information in the form of a pie chart and a list. Services are named and color coded to allow correlation between the pie chart and the list. A percentage value is displayed adjacent to each service; this indicates the bit rate of the service as a percentage of the overall stream bit rate. Bit rates of individual service are given in the service list. The icons in the service list give an indication of the program content: video, audio or data.

The lower half of the screen displays an overview of the tests applied to the stream. The tests are grouped as follows:

First Priority: Lists the first priority tests in DVB or ATSC order.

Other: Summarizes all test groups except First Priority. The groups are derived from the Tests screen (see page 3-21).

Custom: Represents the highest error state present in the events associated with the category. (These can be edited on the *Custom screen*, see page 3-25.)

The button to the left of the test name shows the current error status of the individual test or, in the case of test groups, the highest error state reported by any test within that group (see also *Color Coding*, page 2-10).

All tests can be reset using **Reset All**.

The Stream State summary table shows the overall status of the stream in terms of error severity and event classification..

A summary of stream statistics is provided at the bottom of the screen. The fields are as follows:

TS Bit Rate:	Overall bit rate of stream.
TS ID:	Transport stream identity; derived from the Program Association Table (PAT).
Packet Size:	Transport stream packet size (188/204).
Network:	Network name; derived from the Network Information Table (NIT) in the stream..
Interface:	Indicates the interface selected (SMPTE, ASI, L-Band, QAM).
PIDs:	Number of Packet Identifiers (PIDs) in the transport stream.
BER:	Bit Error Rate (Only displayed with L-Band or QAM interfaces fitted).

Tests Screen

The Tests and Custom screens provide the same information prioritized in different ways.

On the Tests screen the test results for the current stream are grouped in DVB or ATSC priority order. Additional proprietary tests are grouped by function; for example, Bit Rate tests and PID Tests.





The screenshot shows a window titled "MTM400 : Tests Grouped by Priority 1 2 3". The table below represents the data shown in the screenshot.

State	Error	Alm	TTL1	TTL2	TTL3	T-	T+	RLY1	RLY2	RLY3	RLY4	RLY5	Rec
Any Stream Error		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
First Priority													
1.1 Sync		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
1.2 Sync Byte		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
1.3.a PAT		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
1.4 Continuity		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
1.5.a PMT		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
1.6 PID		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
Second Priority													
2.1 Transport		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
2.2 CRC		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
2.3.a PCR Repetition		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
2.3.b PCR Discontinuity Indicator		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
2.4 PCR accuracy		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
2.5 PTS		⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘

Figure 3-8: Stream View - Tests

A full list of tests and their associated parameters is given in *Appendix B: Test Parameters*.

In addition to providing an overview of the stream status, up to four types of alarm can be activated when an error on a test occurs. The alarms may be:

	An internal audible alarm.
	A TTL output on the rear of the unit, allocated to the stream.
	An SNMP (Simple Network management Protocol) trap event.
	One or more relay outputs on the rear of the unit, allocated to the stream.

The alarm output specifications are given in Appendix A: MTM400 Specifications.

Each test can be enabled/disabled by double-clicking the appropriate icon.

Only Administrators can set parameters, enable and disable tests and set alarms.

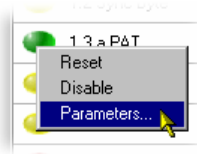
The button (State) to the left of the test name (Error) shows the current status of the test (see *Color Coding*, page 2-10).

The screen comprises the following information:

Title Bar The title bar of the screen displays the name of the stream under test. (Assigned on the Stream Configuration screen, page 3-65).



State Icon showing the state of the event:

When the user right-clicks on this icon it will invoke a popup menu which will allow them either to Reset the error, Disable/Enable monitoring of this event or adjust the parameters of the test.



Double-clicking the icon will disable/enable the event monitoring.

Error Name of the event (for example, 1.1 Sync). The names are those allocated by the DVB or ATSC standards.



Alarm (Alm) Off - ; On -  ;
Indicates whether an audible alarm will be sounded when an error occurs. When the user double clicks on this icon it will toggle its state: enabled or disabled.

TTL (TTL1, TTL2 and TTL3) Off - ; On - ;

Indicates whether a TTL output will activate when an error occurs. When you double click on this icon, the state toggles: enabled or disabled.

SNMP (T- and T+) Off -  (grey); On -  (yellow);

Indicates whether SNMP trap messages should be sent when a specific event starts and finishes.

Relay (RLY1 to RLY5) Off - ; On - ;

Indicates whether a relay will activate when an error occurs. When you double click on this icon, the state toggles: enabled or disabled. Five relays are available (**Rly1**, **Rly2**, **Rly3**, **Rly4** and **Rly5**). The relay connections are given in the relevant RTM device user guide.

Rec Off - ; Set - ;

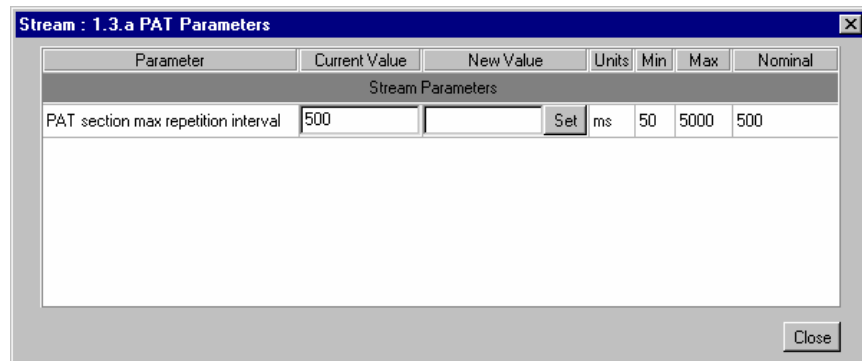
This icon, when active, indicates that the test has been selected as a trigger for recording a stream. To select a test, double click the icon in the Rec column; an activated icon is red; an inactive icon is a clear circle.

This icon is only displayed if Triggered Recording (Option 01) is licensed for use.

The Triggered Recording parameters are set up from the *Configuration screen* (see page 3-87).

Test Parameters. Many tests are associated with parameters recommended by the standard (DVB, ATSC) being applied to the stream. The parameters can be adjusted to suit local conditions (although the test result may then not conform to the standard).

The parameters dialogs are accessed by right-clicking on the error **State** icon of the required test and selecting **Parameters....** An example dialog is shown below:



Tests and Parameters are fully described elsewhere (see *Appendix B: Test Parameters*).

SNMP Traps. The MTM400 SNMP agent allows various parameters within MTM400 to be viewed and set. Specially developed management applications can be used to control MTM400 units remotely across a network using SNMP.

Custom Screen

State	Error	Alm	TTL1	TTL2	TTL3	T-	T+	RLY1	RLY2	RLY3	RLY4	RLY5	Rec
Critical Events													
●	Any Stream Error	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
●	1.2 Sync Byte	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
●	2.1 Transport	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
●	3.1.a NIT Actual	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
●	PCR Jitter	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
●	Processing Overwhelmed	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
Major Events													
●	2.2 CRC	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
●	2.4 PCR accuracy	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
○	3.1.b NIT Other	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
●	3.5.a SDT Actual	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
●	3.6.b EIT Other	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘
●	Transport Stream Occupancy	⊘	▶	▶	▶	⚡	⚡	⊘	⊘	⊘	⊘	⊘	⊘

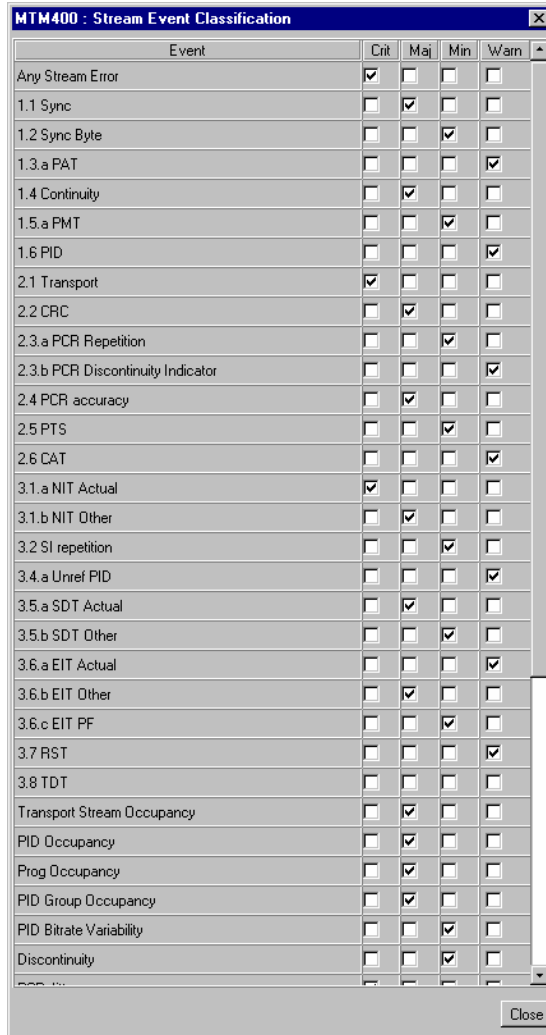
Figure 3-9: Stream View - Custom

The Tests and Custom screens provide the same information prioritized in different ways.

All fields in the view are as described in the Test screen section (page 3-19). On the Custom screen the test results for the current stream are grouped in Event Classification order. Setting up the Event Classification is described below.

Only users logged on as Administrators can set parameters, enable and disable tests and set alarms.

Stream Event Classification. The Stream Event Classification dialog is opened by selecting the **Custom Classifications...** button in the Custom view.



The dialog box allows the associated Event Classification file to be temporarily modified. All changes made will be lost when the current session is ended by closing the MTM400.

The dialog box allows each error event to be designated in one of four categories: Critical, Major, Minimal and Warning. The list of events presented in the dialog will reflect the stream standard (DVB, ATSC) notified by the RTM device. Some proprietary tests may also be listed. The classifications set are used in the stream summary screen to show the overall status of the stream. Tests may appear in more than one category if required.

Select the **Close** button to retain the temporary settings and close the dialog.

Programs Screen

The Programs screen provides the user with a quick overview of the program contents of a transport stream.

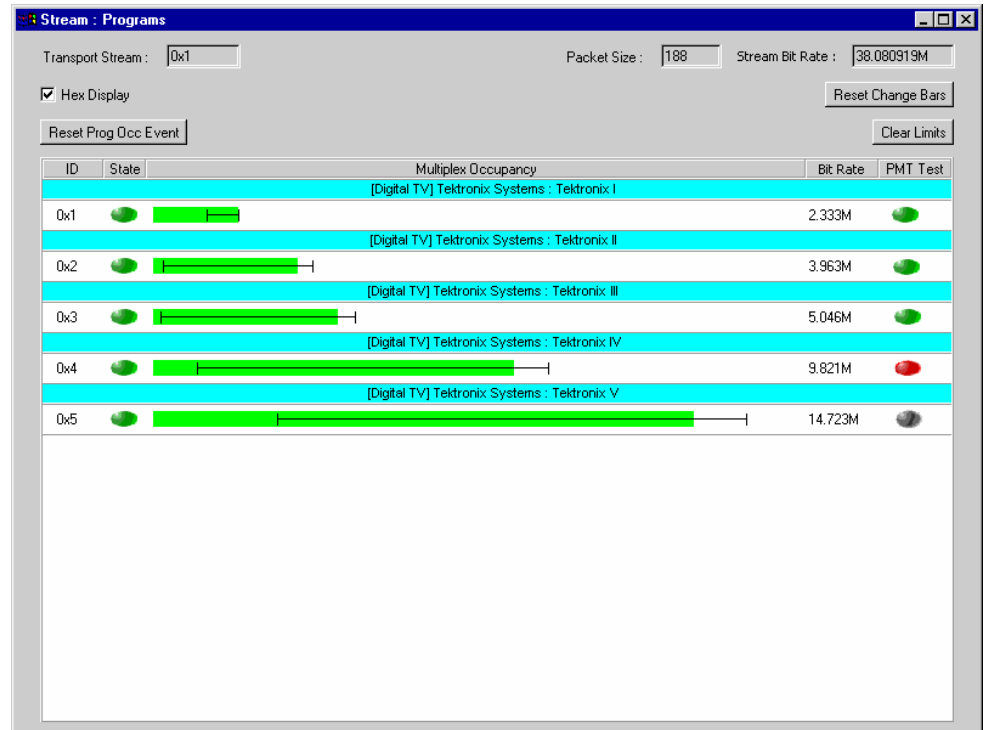


Figure 3-10: Stream View - Programs

In this view, all the programs detected in the incoming transport stream are displayed. Each program displayed is accompanied by:

- Program name
- Program ID
- Error state (only displayed if Bit Rate Testing (Option 05) is licensed for use)
- Program bit rate (graphically and numerically)
- PMT Test

Also displayed, at the top of the view, are the transport stream ID and the packet size and the total stream bit rate.

The view comprises the following elements (a more detailed description follows):

Title Bar The title bar of the screen displays the name of the stream under test (assigned on the Configuration screen, page 3-65).

Transport Stream: The transport stream identity.

Packet Size: The transport stream packet size.

Stream Bit Rate: The total bit rate of the stream.

Hex Display If enabled, the Transport Stream ID and the program ID are displayed in hex format. If disabled, they are displayed in decimal format.

Table:

Program ID (ID): The program number.

Program Occupancy Status (State):*
Indicates the Program Occupancy test error state for the program.

Program Bit Rate (Multiplex Occupancy):*
A graphical representation of the program bit rate. The bar color indicates the error status of the program bit rate. Superimposed on the bar are the Change Bar and (where set) the limits (see below).

Program Bit Rate (Bit Rate):
The program bit rate in bits per second.

PMT Test : Shows the PMT Test result (see page 3-30).

Buttons:

Reset Change Bars *
Resets the Change Bars of all programs.

Reset Prog Occ Event *
Resets the proprietary Program Occupancy test normal state (no error).

Clear Limits * Resets and disables the Bit Rate Limits of all programs.

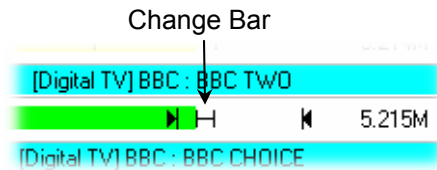
* - only displayed if Bit Rate Testing (Option 05) is licensed for use.

Only Administrators can adjust bit rate limits.

Bit Rates. The program bit rate (**Bit Rate**) shows the sum of the individual bit rates for all the PIDs that make up the program.

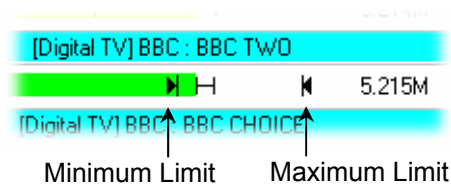
NOTE: *It is possible that in certain transport streams, different programs may reference a single PID; for example, programs may reference one PCR PID. In these cases, the PID bit-rate will be included in all the programs from which the PID is referenced. Therefore the total bit-rate of all the programs may add up to more than the total stream bit rate displayed at the top of the page.*

Change Bar. The Change Bar indicates the variation of bit rate in each program. The ends of the Change Bar show the maximum and minimum values of the bit rate since monitoring started or since the change bars were last reset.

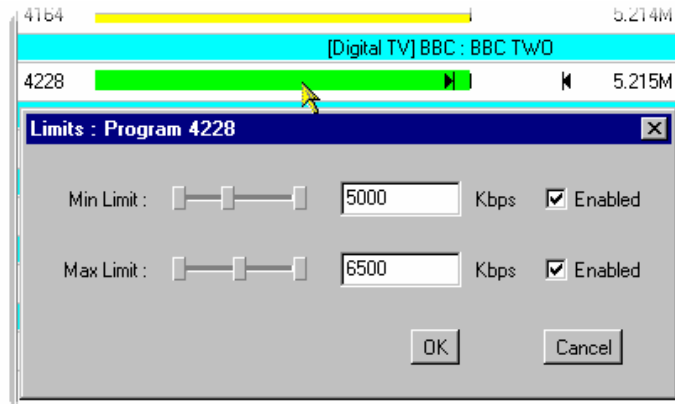


The Change Bar on *all* programs can be reset by selecting the **Reset Change Bars** button at the top of the Programs screen.

Bit Rate Limits. For each program it is possible to set a minimum (⏪) and maximum (⏩) bit rate limit. If the incoming bit rate falls outside the values that have been set, an alarm is indicated on the screen by a color change in the graphical bit rate bar; the Program Occupancy test and state icon on the Tests view are also set. This test can also activate the external alarm outputs. When enabled, the limits appear as in the diagram shown above.



The maximum and minimum bit rate limits are set in the **Limits** dialog. Click on the program bar to open the dialog box:



Only users logged on as Administrator can adjust bit rate limits. Users logged on as User can only view the limits.

The maximum and minimum values can be set either using the appropriate slider bar or by entering a value in the numeric field. Values are expressed in kilobytes per second. The **Enabled** checkbox must be selected before the limit will be implemented. To confirm the settings select the **OK** button; to discard any changes, select the **Cancel** button.

The Bit rate Limits of *all* programs in a stream can be disabled and reset by selecting the **Clear Limits** button at the top of the Programs screen.

PMT Test. The PMT column shows the results of the PMT test (MPEG Test 1.5) for specific programs; green indicates a pass, red indicates a fail, yellow indicates a previous fail. Normally the test would be enabled for all of the programs in a stream, but programs with known problems can be excluded by right-clicking the test button and selecting **Disable**; the button is colored gray.

PIDs Screen

The PIDs screen provides an overview of the PIDs contained in a transport stream sorted by program.

PID	Test	Scrambled	Type	Multiplex Occupancy	Bit Rate
[Digital TV] Tektronix Systems : Tektronix I					
0x64	Any PID Error		PMT		13.536k
0x6E	Any PID Error		Video+PCR	██████████	1.875M
0x78	Any PID Error		MPEG Audio		87.232k
0x82	Any PID Error		MPEG Audio		372.992k
[Digital TV] Tektronix Systems : Tektronix II					
0xC8	Any PID Error		PMT		13.536k
0xD2	Any PID Error		Video+PCR	██████████	3.731M
0xDC	Any PID Error		MPEG Audio		142.880k
0xE6	Any PID Error		MPEG Audio		87.232k
[Digital TV] Tektronix Systems : Tektronix III					
0x12C	Any PID Error		PMT		13.536k
0x136	Any PID Error		Video+PCR	██████████	4.698M
0x140	Any PID Error		MPEG Audio		200.032k
0x14A	Any PID Error		MPEG Audio		142.880k
[Digital TV] Tektronix Systems : Tektronix IV					
0x190	Any PID Error		PMT		13.536k
0x19A	Any PID Error		Video+PCR	██████████	9.361M

Figure 3-11: Stream View - PIDs

In this view, all the PIDs detected in the incoming transport stream are displayed. The PIDs are grouped by program; PIDs not associated with specific programs are displayed in numerical order below the program listings under the section title **Other PIDs in the Multiplex**.

The view comprises the following elements (a more detailed description follows where necessary):

Title Bar The title bar of the screen displays the name of the stream under test (assigned on the *Configuration screen*, page 3-65).

Transport Stream: The transport stream identity.

Packet Size: The transport stream packet size.

Stream Bit Rate: The total bit rate of the stream.

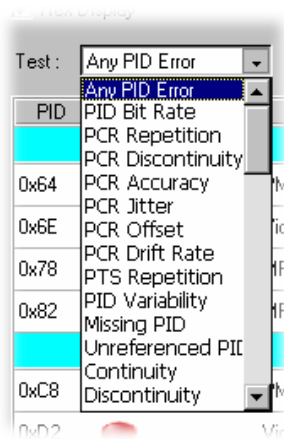
Hex Display

If enabled, the Transport Stream ID and the PID identities are displayed in hex format. If disabled, they are displayed in decimal format.

Test:

Allows specific tests, selected from the drop-down list, to be applied to all of the PIDs in the stream. The state of the test is indicated for each PID by the **Test** icon. Where a test is not relevant to a PID, the test is disabled for that PID; the **Test** icon indicates this.

The tests shown below are those that can be applied to each PID where appropriate:



(See *Test Selection*, page 3-36)

Table:

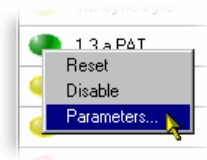
PID

The PID number carrying the data.


Test

Icon showing the state of the currently selected PID test:

Right click this icon to open a popup menu that allows you to either reset the error, disable or enable monitoring of this event, or adjust the parameters of the test.



Double-clicking the icon will disable/enable the event monitoring.

Scrambled	The status of the PID Scramble feature; a key icon  is shown if the PID is scrambled.
Type	The data type carried by the PID, for example, Video+PCR, MPEG Audio.
Multiplex Occupancy	A graphical representation of the PID bit rate. The bar color indicates the error status of the PID. Superimposed on the bar are the Change Bar and (where set) the limits (see below). The graphic is displayed in the color according to whether there are any PID errors (where a set limit has been exceeded).

Note that the graphical representation and section Title bar is changed when PID Variability is selected (see *Test Selection* below).

Bit Rate The PID bit rate in bits per second.

Buttons:

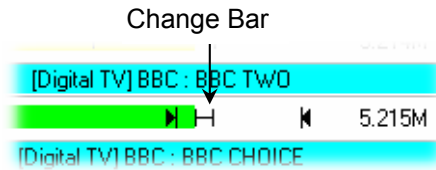
Reset Change Bars	Resets the Change Bars of all programs.
Clear Limits *	Resets and disables the Bit Rate Limits of all programs.
User PIDs	Allows you to add PIDs to the displayed list.
Reset All	Resets the selected test for all PIDs.

* - only displayed if Bit Rate Testing (Option 05) is licensed for use.

The **Stream Bit Rate** shows the sum of the individual PID bit rates that make up the stream. The PID bit rate (**Bit Rate**) shown for each PID is that for the individual PID.

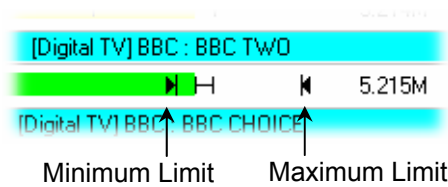
Only users logged on as Administrators can adjust bit rate limits.

Change Bar. The variation of bit rate in each PID is indicated by a Change Bar (except when PID Variability is selected). The ends of the Change Bar show the maximum and minimum values of the bit rate since monitoring started or since the change bars were last reset.

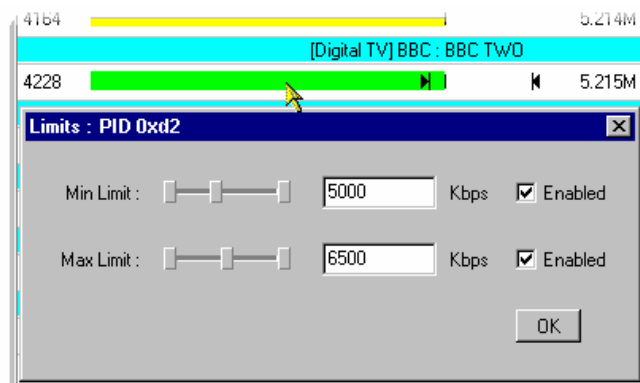


The Change Bar on *all* PIDs can be reset by selecting the **Reset Change Bars** button at the top of the PIDs screen.

Bit Rate Limits. For each PID you can set a minimum (⏪) and maximum (⏩) bit rate limit. If the incoming bit rate falls outside the values that have been set, an alarm is indicated on the screen by the graphical bit rate bar changing from green to red or yellow; the PID Occupancy test on the Tests view is also set. This test can also activate the external alarm outputs. When enabled, the limits appear as in the following diagram:



The maximum and minimum bit rate limits are set in the **Limits** dialog. Click on the program bar to open the dialog box:



The maximum and minimum values can be set either using the appropriate slider bar or by entering a value in the numeric field. Values are expressed in kilobytes per second. The **Enabled** checkbox must be selected before the limit will be implemented.

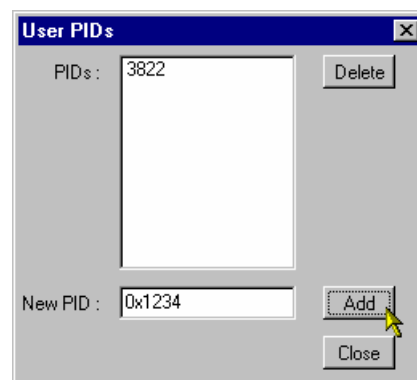
The Bit Rate Limits of *all* PIDs in a stream can be disabled and reset by selecting the **Clear Limits** button at the top of the PIDs screen.

User PIDs. PIDs not automatically recognized in the stream can be added to the display by the user. The additional PIDs will appear in the **Other PIDs in the Multiplex** section of the display.

Adding a User PID

1. From the PIDs screen, select **User PIDs...**.

The **User PIDs** dialog is displayed.



2. Enter the PID ID in the **New PID:** field.

The PID ID can be entered in either Hex (0xnnnn) or decimal (nnnn) format.

3. Select **Add**.

The PID ID will be displayed in the **PIDs:** list. It will be displayed in decimal format.

Deleting a User PID

1. From the PIDs screen, select **User PIDs...**.

The **User PIDs** dialog is displayed.

2. In the **PIDs:** list, highlight the PID to be deleted.
3. Select **Delete**.

The selected PID will be removed from the list and subsequently from the main PIDs screen display.

Test Selection. The **Test:** drop-down list allows the user to select and apply specific tests to the PIDs in the stream. Tests on those PIDs to which the selected test is not applicable are disabled.

The following PID tests can be selected from the **Test:** drop-down list:

- Any PID Error
- PID Bit Rate *
- PCR Repetition
- PCR Discontinuity
- PCR Accuracy
- PCR Jitter
- PCR Offset
- PCR Drift Rate
- PTS Repetition
- PID Variability *
- Missing PID
- Unreferenced PID
- Continuity
- Discontinuity

* Require Bit Rate Testing to be licensed (License Option 05, Table 1-2: MTM400 Options).

The result of the tests are indicated by the **Test** icons. Where the test is inapplicable, the icon will be gray.

For most of the tests, the parameters applied to each PID can be varied by right clicking on the **Test** state button and selecting the **Parameters...** option.

Each of these tests and the associated parameters are described in *Appendix B: Test Parameters*.

The results of tests applied here are not reflected in the PID Groups.

PID Groups Screen

PIDs can be grouped together to enable composite bit rate and test reporting of user-selected PIDs, perhaps carrying similar information. Up to 32 PID Groups can be formed. Currently, a maximum of 128 PIDs can be included in each of 32 groups formed.

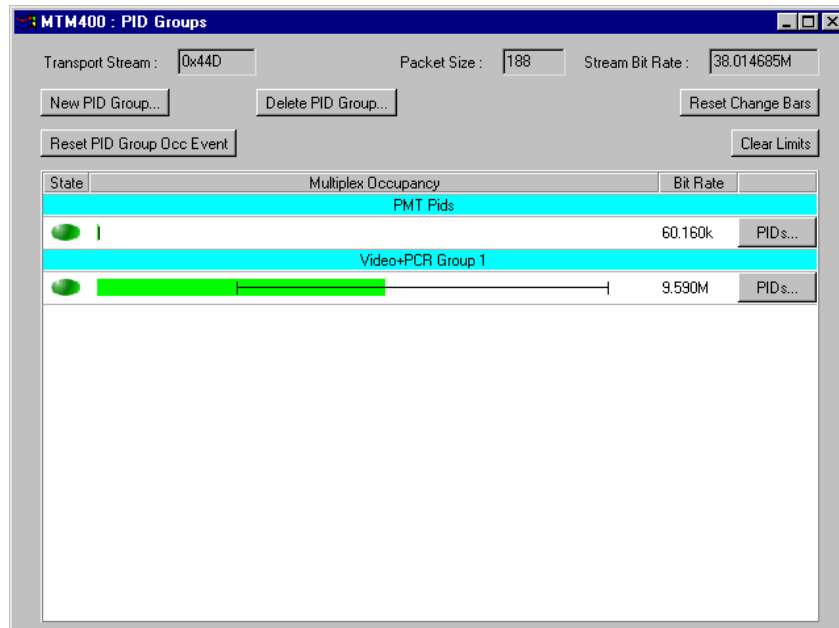


Figure 3-12: Stream View - PID Groups

In this view, the PID Groups set up for the incoming transport stream are displayed. PID Group editing is performed using this screen.

Only users logged on as Administrator can adjust bit rate limits and modify the PID Groups.

The view comprises the following elements (a more detailed description follows where necessary):

Title Bar The title bar of the screen displays the name of the stream under test (assigned on the *Configuration screen*, page 3-65).

Transport Stream: The transport stream identity.

Packet Size: The transport stream packet size.

Stream Bit Rate: The total bit rate of the stream.

Table:

Each PID Group formed displays a title bar carrying the allocated name of the group. Each PID Group displays the following information:

State Icon showing the state of the PID Group (whether the bit rate limits are exceeded).

Multiplex Occupancy:

A graphical representation of the total bit rate of the PID Group. The bar color indicates the error status of the PID Group. Superimposed on the bar are the Change Bar and (where set) the limits (see below). The graphic is displayed in the color according to whether there are any PID Group errors (that a set limit has been exceeded).

Bit Rate: The PID bit rate in bits per second.

Buttons:**New PID Group...**

Opens a new (empty) PID Group, after a name has been allocated.

Delete PID Group...

Displays a list of all PID Groups and allows one or more to be deleted.

Reset Change Bars

Resets the Change Bars of all programs.

Reset PID Group Occ Event

Resets all PID Group errors. Note that this also resets the individual PID errors.

Clear Limits

Resets and disables the Bit Rate Limits of all programs.

PIDs...

(See *PID Group Management*, page 3-39.)

The **Stream Bit Rate** shows the sum of the individual PID bit rates that make up the stream. The bit rate (**Bit Rate**) shown for each PID group, is the sum of the grouped PID bit rates.

PID Group Management. This section describes how to add, edit, and remove PID Groups. Only an Administrator can add and delete PID Groups.

Adding a New PID Group

PID Groups are created in three stages:

- Identify the PIDs to be grouped.
- Create a new, named PID Group.
- Populate the new PID Group.

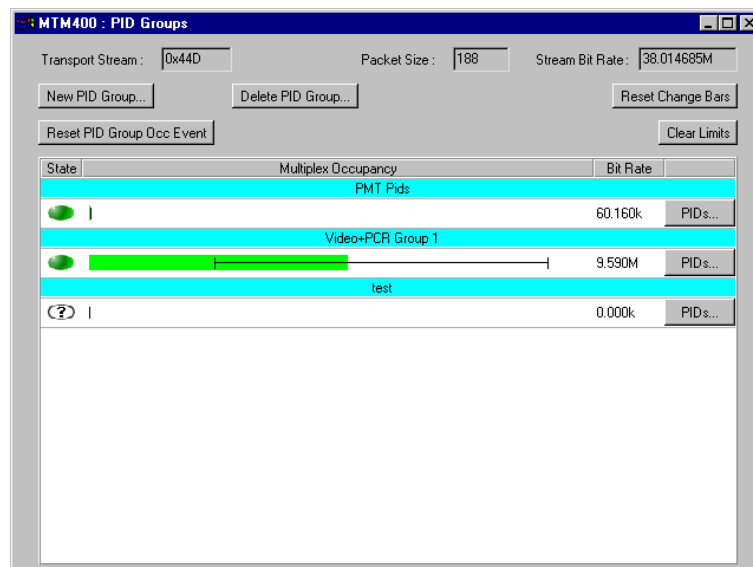
The procedure is as follows:

1. Use the PID screen to identify the PIDs to be grouped. The hex or the decimal PID can be used.
2. In the PID Group screen, select **New PID Group...**.
3. Enter the PID Group name.



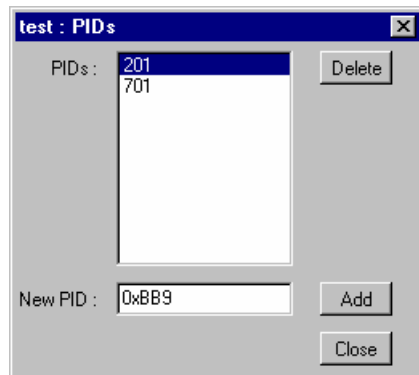
Select **OK**. Selecting **Cancel** will end the PID Group creation.

4. The new PID Group is displayed in the PID Group screen:

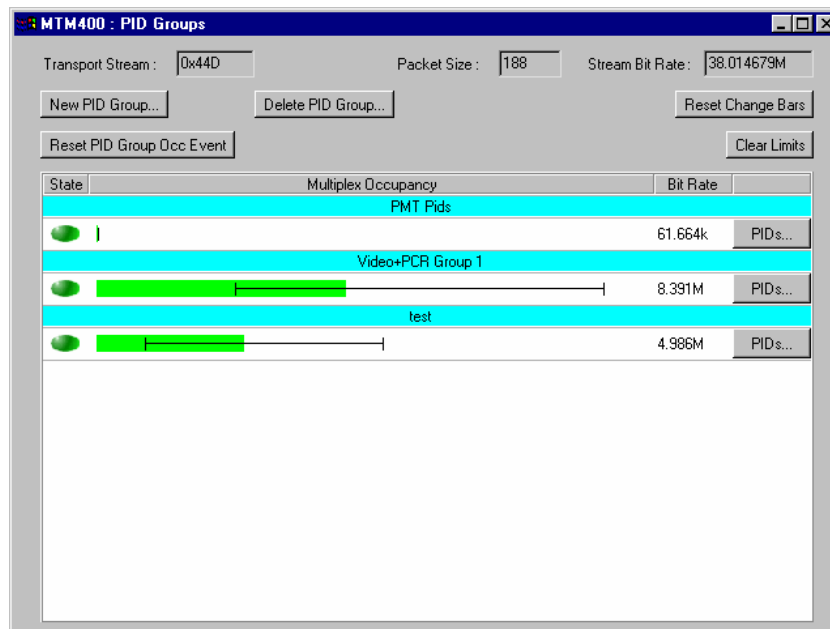


The new PID Group is empty and must be populated with PIDs.

5. Select **PIDs...** from the new group title bar.



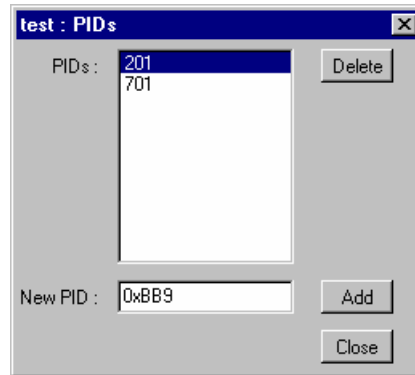
6. In the **PIDs** dialog box and in the **New PID:** field, enter the identity of one PID in either hex (0xnnnn) or decimal (nnn) format.
7. Select **Add**.
The PID is added to the **PIDs:** field.
8. Repeat the previous steps until all the PIDs to be included in the group have been added and are listed.
9. Select **Close** to close the dialog box. Display will begin immediately, confirming that the PID Group is operational.



Editing a PID Group

To add or remove a PID from a PID Group:

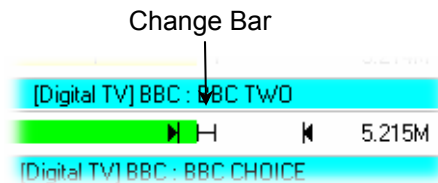
1. Select **PIDs...** from the PID Group title bar.



Delete removes the PID highlighted in the **PIDs:** field.
The PID is removed from the **PIDs:** field.

Add adds the PID identified in the **New PID:** field to the PID Group.
The PID is added to the **PIDs:** field.

Change Bar. The variation of bit rate in each PID is indicated by a Change Bar. The ends of the Change Bar show the maximum and minimum values of the bit rate since monitoring started or since the change bars were last reset.

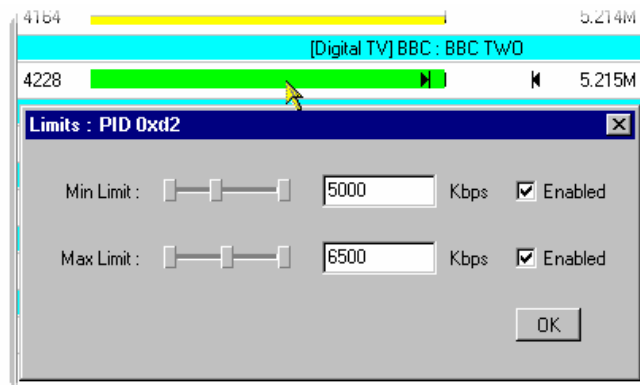


The Change Bar on *all* PID Groups can be reset by selecting the **Reset Change Bars** button at the top of the PID Groups screen.

Bit Rate Limits. For each PID Group you can set a minimum (M) and maximum (K) bit rate limit. If the incoming bit rate falls outside the values that have been set, an alarm is indicated on the screen by the graphical bit rate bar changing from green to red or yellow; the corresponding **State** icon is also set to the correct color. This test can also activate the external alarm outputs. When enabled, the limits appear as in the following diagram:



The maximum and minimum bit rate limits are set in the **Limits** dialog box; click on the program bar to open the dialog box:



The maximum and minimum values can be set either using the appropriate slider bar or by entering a value in the numeric field. Values are expressed in kilobytes per second. The **Enabled** checkbox must be selected before the limit will be implemented.

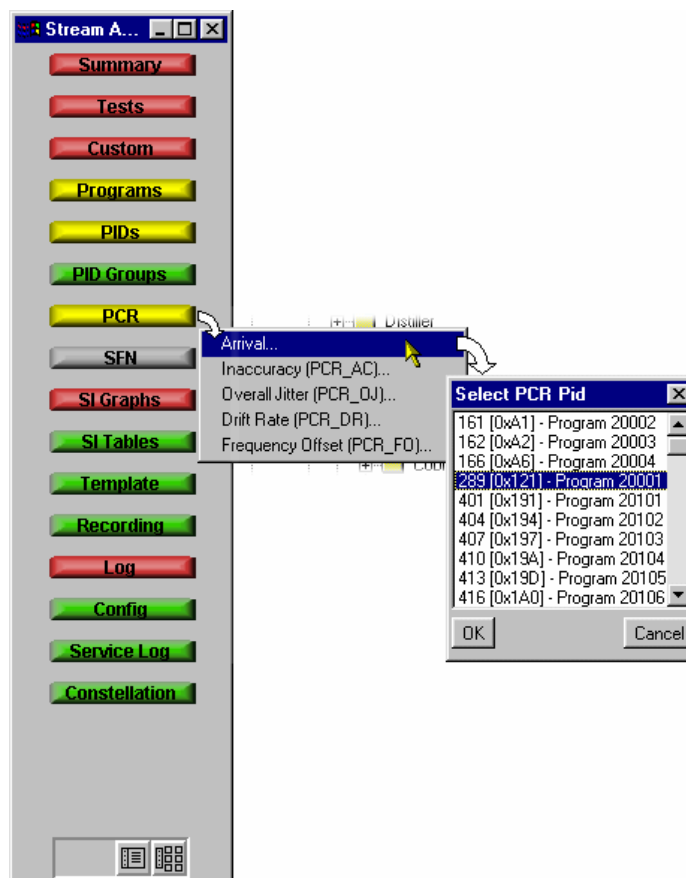
The Bit Rate Limits of *all* PID Groups can be disabled and reset by selecting the **Clear Limits** button at the top of the PID groups screen.

PCR Screen

Real time analysis is performed on PCRs and displayed in graphical format. The following options are available:

- PCR Arrival
- PCR Inaccuracy (PCR_AC)
- PCR Overall Jitter (PCR_OJ)
- PCR Drift Rate (PCR_DR)
- PCR Frequency Offset (PCR_FO)

Selecting the **PCR** button displays a pop-up menu from which the graph type can be selected.



The PCR to be displayed can then be selected in the **Select PCR PID** dialog box. PID numbers are displayed in decimal and hex form.

Common Elements. Statistical information for each graph is shown at the bottom of each graph. When enabled, the **View Limits** checkbox ensures that the parameter limits are shown on the Y-axis. When disabled, the data is allowed to expand to fill the available screen. Limits are set using the parameter function on the Test and PID screens.

Inaccuracy (PCR_AC).... The PCR Inaccuracy graph shows the difference between the actual and expected values for each PCR on the y-axis. Expected PCR values are calculated from the byte index of the PCR.

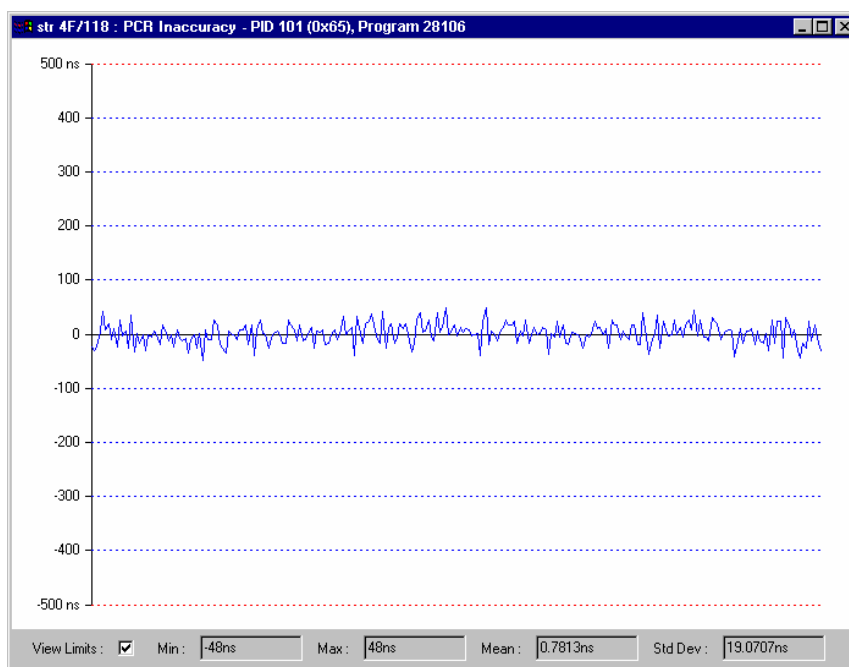


Figure 3-13: Stream View - PCR Graph - Inaccuracy

The MPEG-2, DVB and ATSC standards specify that PCRs must be within ± 500 ns of the actual transport rate. By default the scale is set to ± 500 ns. If the Inaccuracy in any of the displayed PIDs is greater than ± 500 ns, the y-axis is drawn to show the complete range of values as full scale.

The Maximum PCR Accuracy Error can be adjusted for all PIDs as follows:

- **Tests screen** → **2.4 PCR Accuracy** parameter (right-click) → **Max PCR accuracy error**.

For individual PIDs:

- **PIDs screen** → **Test:** select **PCR Accuracy** → individual PID parameter (right-click) → **Max PCR accuracy error**.

Arrival.... The PCR Arrival graph provides a display of the time interval between successive PCRs. The interval is displayed on the y-axis. By default (with the **View Limits** checkbox enabled) the y-axis scale shows the conformance thresholds for the DVB, ATSC or MPEG-2 standards.

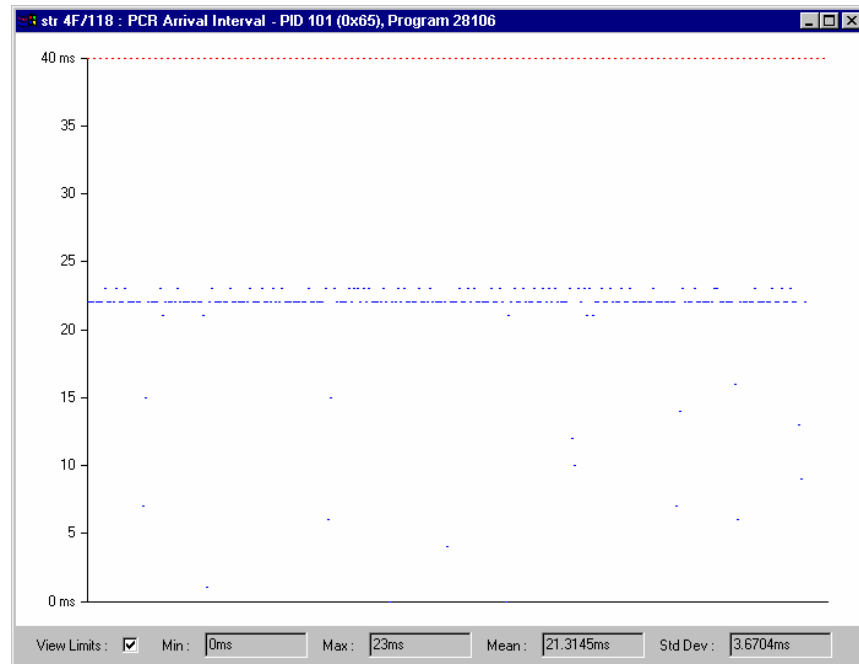


Figure 3-14: Stream View - PCR Graph - Arrival

The PCR Arrival graph provides a display of the time interval between successive PCRs, during the last 256 PCRs. The interval is displayed on the y-axis. Points are color-coded with respect to the Maximum Repetition Period set in DVB test 2.3. By default this is 40 ms. Points are plotted in blue when they fall within the specified period. Any points that exceed the interval are plotted in red. If the interval exceeds the limits displayed on the screen the scale is adjusted automatically as necessary to include the maximum displayed values.

The PCR Maximum Repetition Interval can be adjusted for individual PIDs as follows:

- **PIDs screen** → **Test:** select **PCR Repetition** → individual PID parameter (right-click) → **PCR max repetition interval.**

Overall Jitter (PCR_OJ).... The PCR Overall Jitter graph shows the time interval between the actual value of the PCR and its expected value based on its arrival time.

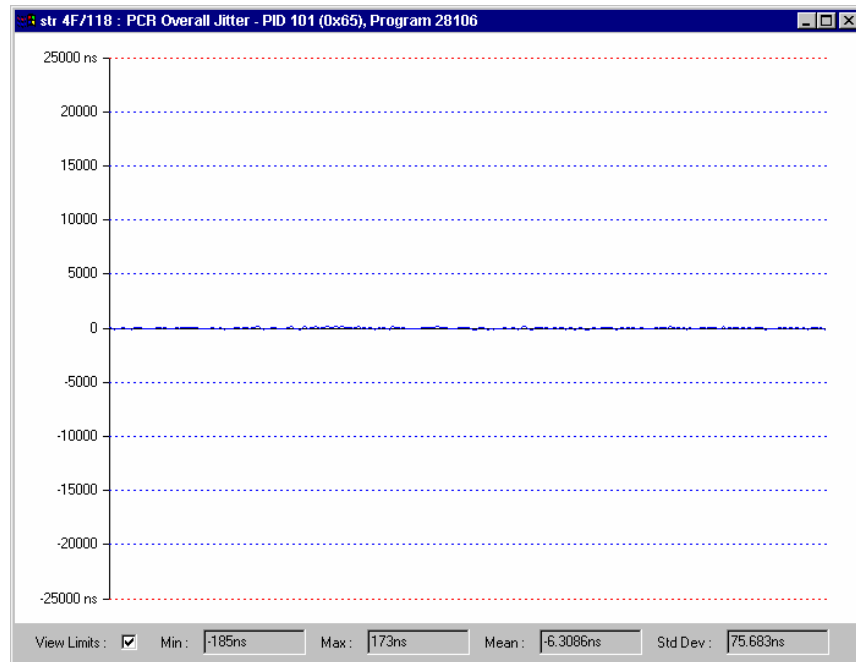


Figure 3-15: Stream View - PCR Graph - Overall Jitter

The Maximum PCR Accuracy Error can be adjusted for all PIDs as follows:

- **Tests** screen → **PCR Tests** section → **PCR Overall Jitter (PCR_OJ)** parameter (right-click) → **Max PCR overall jitter**.

For individual PIDs:

- **PIDs** screen → **Test**: select **PCR Jitter** → individual PID parameter (right-click) → **Max PCR overall jitter**.

Frequency Offset (PCR_FO).... The Frequency Offset graph shows the difference between the program clock frequency and the nominal clock frequency (measured against a reference that is not PCR or transport stream derived).

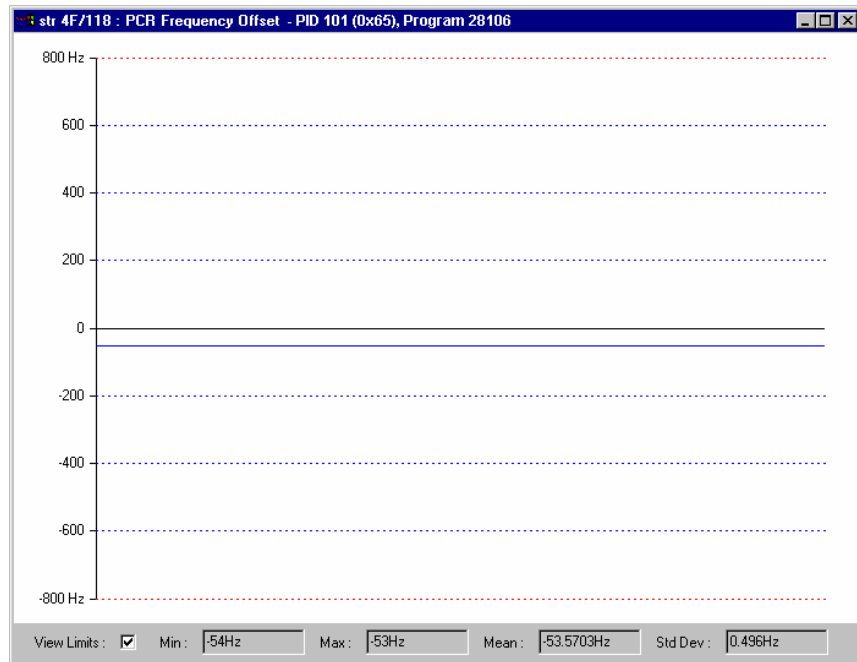


Figure 3-16: Stream View - PCR Graph - Frequency Offset

PCR Frequency Offset is a measurement of the error in the PCR frequency from the specified 27 MHz; the MPEG specification sets the limits at ± 810 Hz.

The Maximum PCR Frequency Offset can be adjusted for all PIDs as follows:

- **Tests** screen → **PCR Tests** section → **PCR Frequency Offset (PCR_FO)** parameter (right-click) → **Max PCR overall jitter**.

For individual PIDs:

- **PIDs** screen → **Test**: select **PCR Offset** → individual PID parameter (right-click) → **Max PCR frequency offset**.

Drift Rate (PCR_DR).... This Drift Rate graph shows the rate of change of PCR Frequency Offset, which is often very small. It is calculated using PCR Frequency Offset measurements.

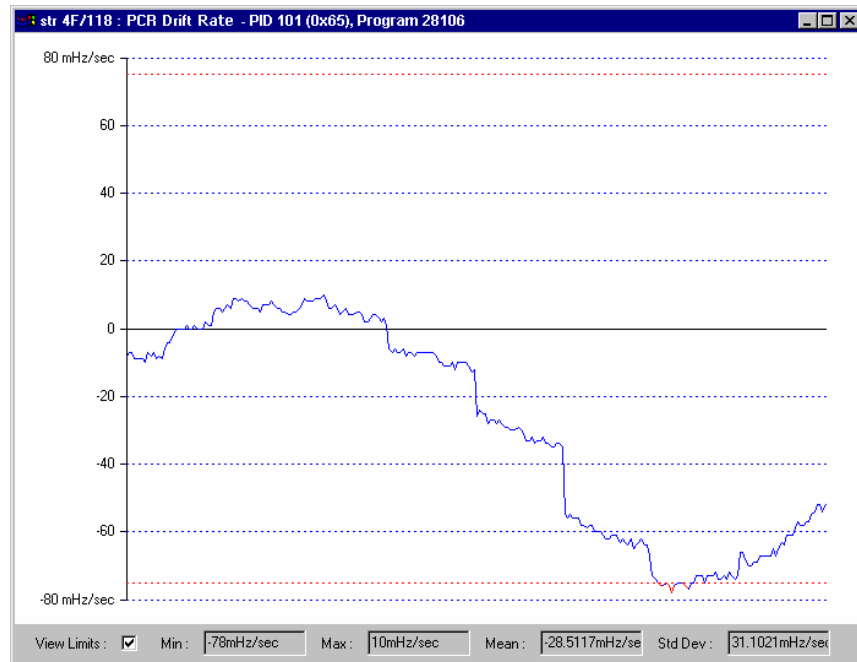


Figure 3-17: Stream View - PCR Graph - Drift Rate

The Maximum PCR Drift Rate can be adjusted for all PIDs as follows:

- **Tests** screen → **PCR Tests** section → **PCR Drift Rate (PCR_DR)** parameter (right-click) → **Max PCR frequency drift rate.**

For individual PIDs:

- **PIDs** screen → **Test:** select **PCR Drift Rate** → individual PID parameter (right-click) → **Max PCR frequency drift rate.**

PCR Graphing Methods. The data required to create the PCR graphs is calculated using two methods: 'Line fit differential' measurements and 'Previous point differential' measurements. The method required is selected by the user using the Configuration screen (see *Configuration Screen*, page 3-67).

The inaccuracy of a PCR value is calculated as an *ideal PCR value* minus the *actual PCR value*. To calculate the ideal PCR value, the most recent 256 PCR values are used. A straight line is fitted through a plot of each PCR value against its position in the stream, calculated from the start of monitoring. In the case of the 'Line fit differential' method, the *ideal PCR value* is read from this straight line at the position of the actual PCR. In the case of the 'Previous point differential' measurement method, the *ideal PCR value* is found by using the slope of the straight line to project forward from the most recently found PCR.

The two methods can give significantly different results, depending on the characteristics of the stream. The results from the 'Line fit differential' method are more likely to represent the way a typical decoder will react to the stream. The 'Previous point differential' method more accurately reflects the buffer model calculations in the MPEG-2 specification (ISO 13818-1).

The PCR Frequency Offset and Drift Rate graphs are always calculated using the 'Line fit differential' method, irrespective of the selection made on the Configuration screen.

For more information about PCR measurements, read the *PCR Measurements Primer*, available on the Tektronix Web site (www.tektronix.com).

SFN Screen

Where Single Frequency Network (SFN) information is included in a stream, it can be viewed by selecting the SFN button. This action will open an SFN Information screen (see Figure 3-18):

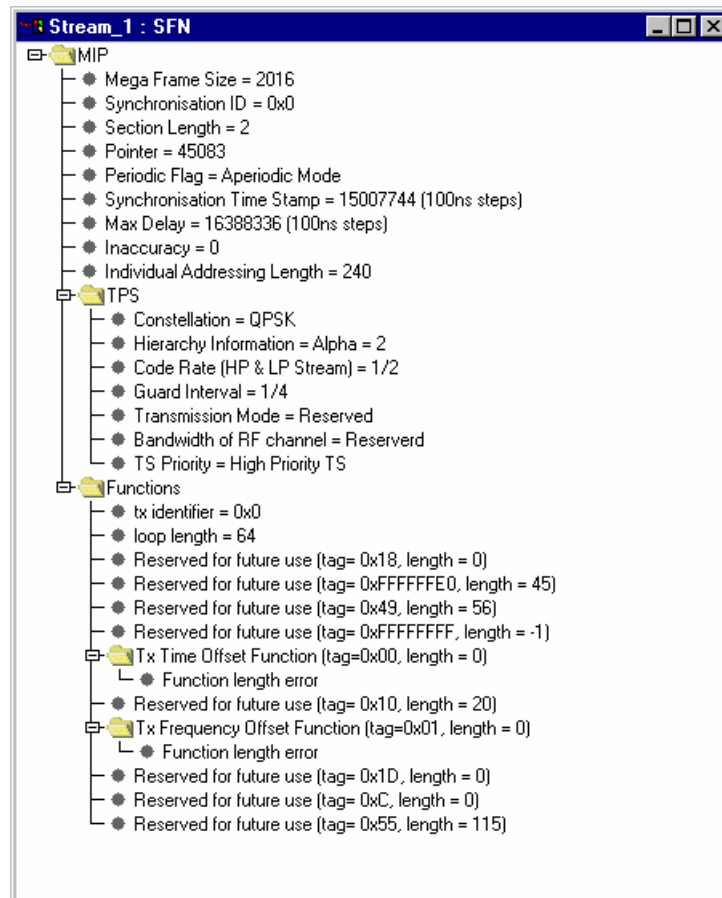


Figure 3-18: Stream View - SFN Screen

The screen displays SFN Information when it is transmitted on PID 0x15. The screen displays a snapshot of the Mega Frame Initialization packet in a tree format similar to the SI Tables. The information is updated at regular intervals.

TMCC Screen

This screen shows the Transmission and Multiplexing Configuration Control (TMCC) content of the stream; it is updated in real time. The screen displayed (Satellite or Terrestrial) will depend on the standard selected for analysis in the Configuration screen (see page 3-67).

The information displayed is that contained in the TMCC header blocks when that information is present in the transport stream. The information presented is read-only.

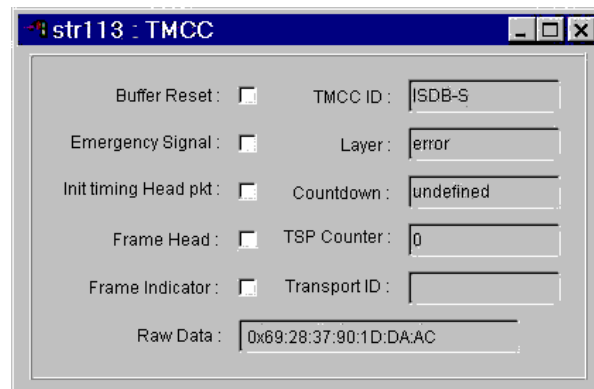


Figure 3-19: Stream View - TMCC (Terrestrial) Screen

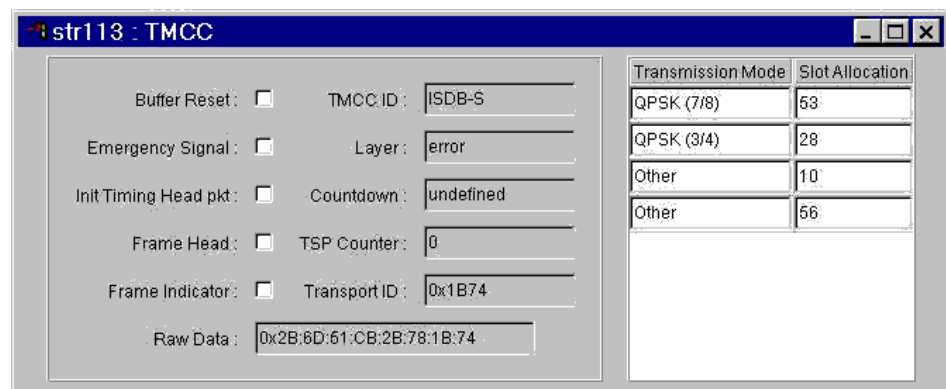


Figure 3-20: Stream View - TMCC (Satellite) Screen

This screen is part of the basic installation; it is not a licensed option. If TMCC data is not present in the stream, the **TMCC** button will not be displayed.

SI Graphs Screen

The SI Graphs screens display in graphical format information about repetition rates of SI tables and subtables.

The following graphs can be displayed:

- Section Repetition Interval
- Subtable Inter Section Gap
- Subtable Repetition Interval

Each graph type can be displayed for a selection of table types.

Statistical information for each graph is shown at the bottom of each graph. When enabled, the **View Limits** checkbox ensures that the parameter limits are shown on the Y-axis. When disabled, the data is allowed to expand to fill the available screen. Limits are set using the parameter function on the Test screen and are dependent on the table type.

A brief explanation of each graph type follows:

Section Repetition Interval. On a specific PID, this is the interval between the arrival of a section with a specific table_id and the next section with the same table_id.

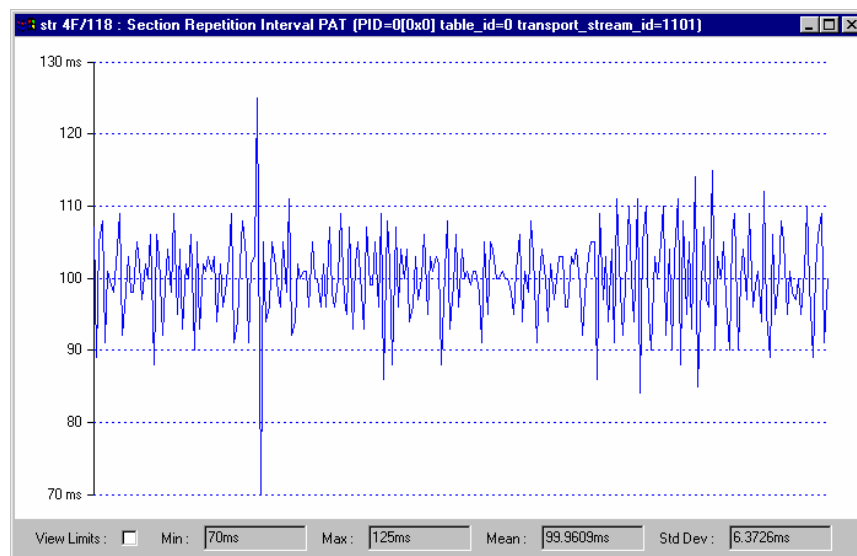


Figure 3-21: Stream View - SI Graphs Screen - Section Repetition Interval

Subtable Inter Section Gap. This is the interval between the end of one section and the start of the next section in the same subtable. A PID, table_id and table_id extension usually define a subtable, but this varies with table type (not available for ATSC).

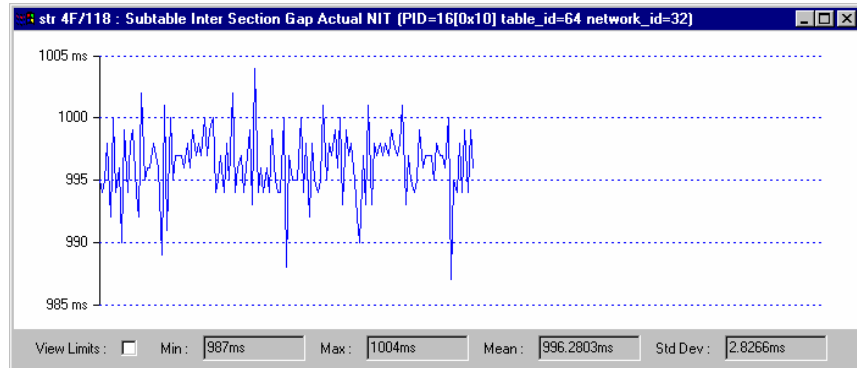


Figure 3-22: Stream View - SI Graphs Screen - Subtable Inter-Section Gap

Subtable Repetition Interval. This is the repetition rate for complete subtables.

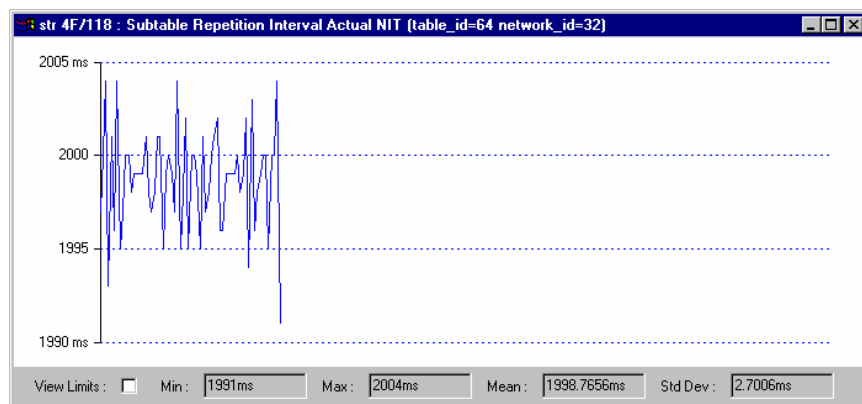
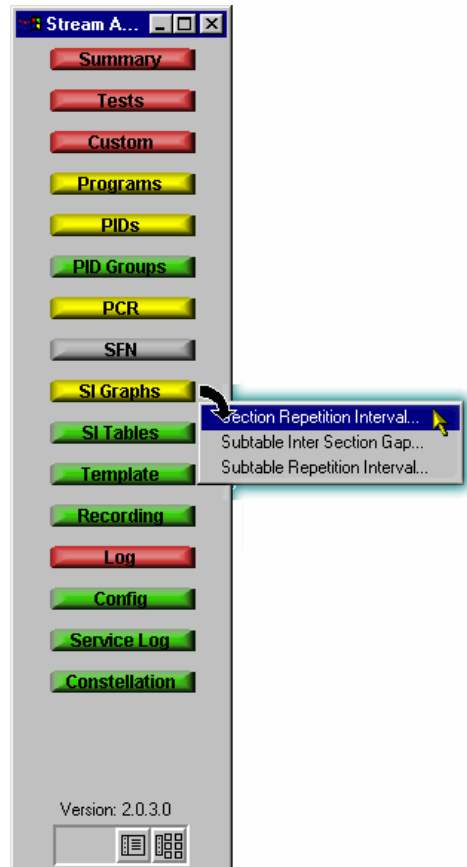


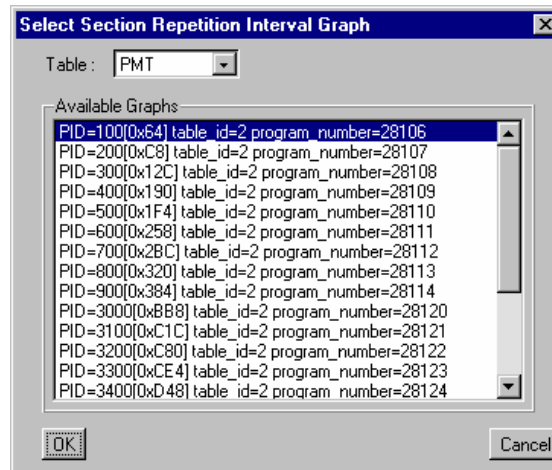
Figure 3-23: Stream View - SI Graphs Screen - Subtable Repetition Interval

All graphs are selected in the same way:

1. Select the **SI Graphs** button to display a pop-up menu from which the graph type can be selected.



2. In the **Select...** dialog, select a table type from the drop-down list.



Only those table types for which the graphed information is relevant are available in the list. If the table type is not present in the stream, the message **No Graphs** is displayed.

A list of all PIDs carrying the selected table type is displayed.

3. Highlight the PID required and select **OK**.
4. The associated graph is displayed.

SI Tables Screen

This button will display the SI Tables screen that shows the transport stream structure. A snapshot of the table structure is built and displayed. A progress bar indicates the progress of the analysis of the structure. The analysis can be stopped at any time before completion by selecting **Stop**; only the analyzed elements will be displayed. The structure can be refreshed at any time by selecting the **Update** button. The **Update** button is only enabled when new or changed information is detected in the stream.

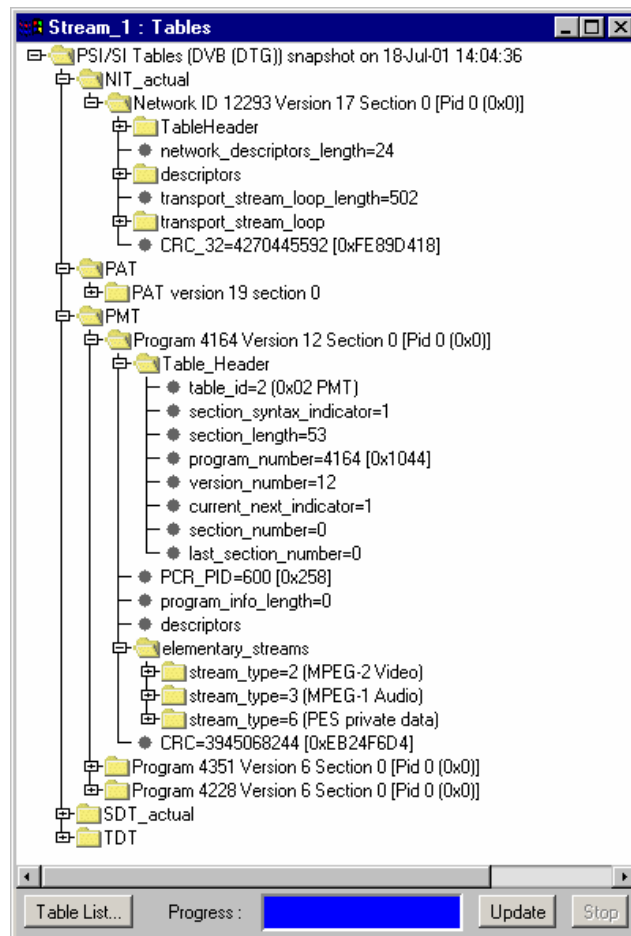


Figure 3-24: Stream View - SI Tables Screen

The screen shows the following DVB information:

- Structure of the Service Information (SI) and Program Specific Information (PSI), including their payload information.
- List of all Active Packet Identifiers (PIDs).

In the DVB version, some of the DVB information displayed will depend on the Regional Setting in the Stream Configuration dialog (see page 3-65), since there are regional variations in the specification of some of the descriptors.

The following information is displayed on the ATSC Structure screen:

- Structure of the Service Information (SI), Program Specific Information (PSIP), including their payload information and the Program Identifier Table (A/57).
- List of all Active Packet Identifiers (PIDs).

At Start-up, a set of default tables is displayed in the SI Tables view. The list can be changed and modified by selecting the **Table List...** button and selecting the Tables required.

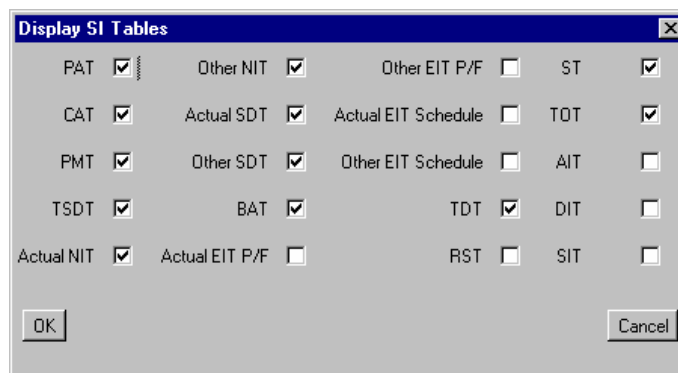


Figure 3-25: DVB SI Tables dialog

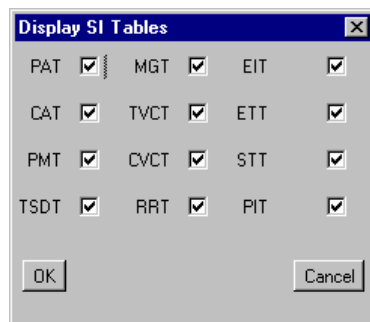


Figure 3-26: ATSC SI Tables dialog

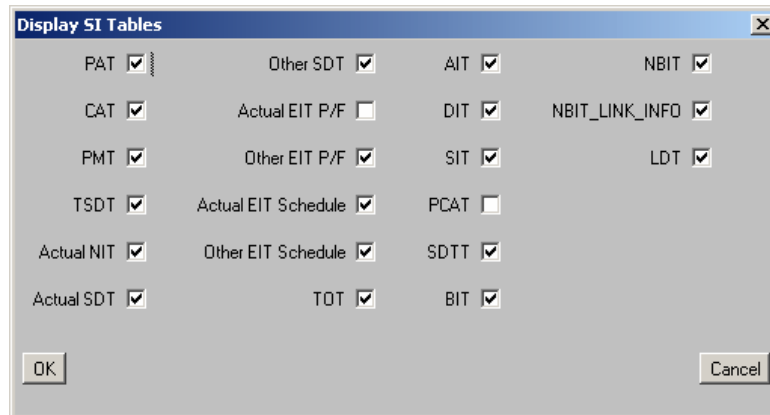


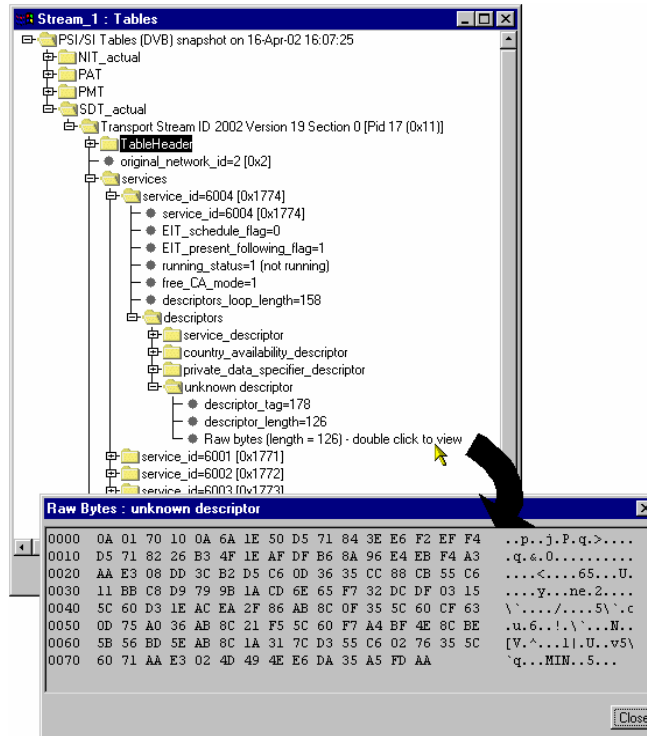
Figure 3-27: ISDB SI Tables dialog

The selections do not take effect in the SI Tables view until the view is refreshed using the **Update** button. The speed of the update depends on the network speed, the SI/PSI complexity and the table types selected.

A tree diagram, with the 'root node' or highest level component at the top is represented in this structure. A square box (or node) indicates components that contain more information beneath them in the structure. If the node has a minus sign in the box, the level of detail below it is already displayed. If the node contains a plus sign, there is another level contained by the node which is currently hidden. The lower levels may be hidden or displayed by clicking on the node.

Components that are connected to a branch of the tree without a square box are leaf nodes. They display the lowest and finest level of detail.

Raw Bytes View. Data that cannot be interpreted can be viewed in hex format. Sections that can be viewed in this way will be indicated in the SI Table screen (as shown in the following screen shot).



Severely errored tables, stuffing tables and tables having non-standard identities are not included in the SI table display

Template

Simply monitoring the syntax of a Transport Stream according to TR101 290 is not enough to guarantee that the correct information is being delivered to the viewers' receiver. Ensuring that the contents of the Transport Stream are correct requires the monitoring equipment to have prior knowledge of what the broadcaster plans to transmit. A template in which the operator enters the values expected to be present in a Transport Stream can be compared with a transport stream to verify its content, and made to indicate any discrepancy.

The composition of a transport stream may vary during the day as daytime programming is replaced by the evening primetime and then the late night programs. You can schedule template changes to coincide with changes in the program content.

Among the items that can be checked using a template are the following:

- Transport stream identifier
- Services - presence, name
- PIDs in services
- PID types and scrambling state
- Service regional ratings

The template feature allows you to create a template can be applied to a stream (or streams) that is being monitored. If the stream does not conform to the template, the associated icon changes color (in the same way as the error icons) and an entry is made in the error log.

Initially, templates are stream specific, that is, a template will be created and applied to a specific stream. However, a template can subsequently be uploaded to any device.

In Figure 3-28, the presence of two services (Service 28129 and 28132) in transport stream 1101 is being checked. In addition, details of the service and associated PIDs are checked.

	State	Expected Value	Description
Template			
● TransportStream ID		1101	
● Network ID		32	
● Other Services Allowed		true	
Services			
Service 28129			
● Constraint		Present	
● Service Type		2	
● Service Name		SR 1	
● PCR PID		3901	
● Other PIDs Allowed		true	
PIDs			
PID 1902			
● Constraint		Present	
● Stream Type		5	
Service 28132			
● Constraint		Present	Actual Value = NotPresent
● Service Type		1	
● Service Name		ARD WM2002	
● PCR PID		1101	

Figure 3-28: Stream View - Template

The device and stream identities are shown in the title bar. The template currently in use is shown in the field at the top of the screen.

- The first column shows, in hierarchical and graphical form, the categories of template elements to be applied. Each category can be expanded by clicking on the folder icon (see *Template Manipulation.*, page 3-63)
- If the element conforms to the template setting, the **State** icon will be green. Failure to conform is indicated by a red icon. If any elements fail to conform, the Template button will also be red.
- The **Expected Value** is the value provided in the template configuration file.
- A brief **Description** of the reason for failure may be given.

The template content is supplied in XML format as part of the configuration file. The template lists data whose presence and content is to be checked in the transport stream. The State icons indicate that an element listed in the template has conformed to the requirement.

An example of the template section of the configuration file that gave the screen shot shown in Figure 3-28 is given below:

```
<MTM400Configuration Name = "Template Example">
  <Streams>
    <Stream Number="1">
      <PS56>
        <TransportStreamId>1101</TransportStreamId>
        <NetworkId>32</NetworkId>
        <OtherServicesAllowed>1</OtherServicesAllowed>
        <ServiceList Update = "Incremental">
          <Service Number="28132">
            <Constraint>0</Constraint>
            <ServiceType>1</ServiceType>
            <ServiceName>ARD WM2002</ServiceName>
            <PCRPID>1101</PCRPID>
            <OtherPIDsAllowed>1</OtherPIDsAllowed>
            <PIDList Update = "Incremental">
              <PID Number="1102">
                <Constraint>0</Constraint>
                <StreamType>4</StreamType>
              </PID>
            </PIDList>
          </Service>
          <Service Number="28129">
            <Constraint>0</Constraint>
            <ServiceType>2</ServiceType>
            <ServiceName>SR 1</ServiceName>
            <PCRPID>3901</PCRPID>
            <OtherPIDsAllowed>1</OtherPIDsAllowed>
            <PIDList Update = "Incremental">
              <PID Number="1902">
                <Constraint>0</Constraint>
                <StreamType>5</StreamType>
              </PID>
            </PIDList>
          </Service>
        </ServiceList>
      </PS56>
    </Stream>
  </Streams>
</MTM400Configuration>
```

Template Manipulation. The categories of template elements are interpreted in a tree format, the branches of which can be expanded and contracted if the file is viewed in an XML editor or Microsoft Internet Explorer.

Each category title is accompanied by a folder icon. Clicking on a folder will expand that category. Expanding a category may reveal the basic components of the category or it may reveal further sub-categories which can also be expanded. A bullet icon is displayed adjacent to basic components. Selecting the folder icon of an expanded category will collapse the category.

XML files can be edited with an XML editor or a text editor (for example, Microsoft Notepad).

Templates and Schedules. The use of templates can be enhanced by scheduling their application and use. In this way a series of templates can be applied chronologically to a stream.

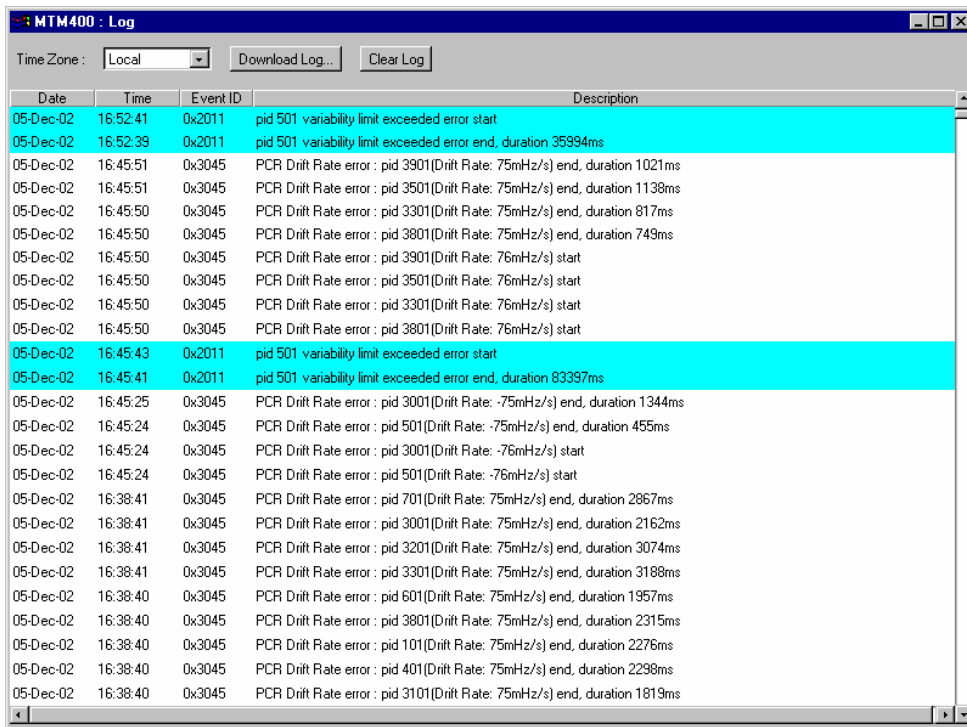
Scheduling is described on page 3-81.

Recording

(See *Triggered Recording*, page 3-87.)

Log Screen

An error event log is maintained for the stream being monitored. Each log has a maximum capacity of 10K entries; when full, the oldest entries are dropped to make room for new entries.



The screenshot shows a window titled "MTM400 : Log". At the top, there is a "Time Zone" dropdown menu set to "Local", and two buttons: "Download Log..." and "Clear Log". Below this is a table with the following columns: "Date", "Time", "Event ID", and "Description". The table contains multiple rows of log entries, including "pid 501 variability limit exceeded error start/end" and "PCR Drift Rate error" for various pids.

Date	Time	Event ID	Description
05-Dec-02	16:52:41	0x2011	pid 501 variability limit exceeded error start
05-Dec-02	16:52:39	0x2011	pid 501 variability limit exceeded error end, duration 35994ms
05-Dec-02	16:45:51	0x3045	PCR Drift Rate error : pid 3901(Drift Rate: 75mHz/s) end, duration 1021ms
05-Dec-02	16:45:51	0x3045	PCR Drift Rate error : pid 3501(Drift Rate: 75mHz/s) end, duration 1138ms
05-Dec-02	16:45:50	0x3045	PCR Drift Rate error : pid 3301(Drift Rate: 75mHz/s) end, duration 817ms
05-Dec-02	16:45:50	0x3045	PCR Drift Rate error : pid 3801(Drift Rate: 75mHz/s) end, duration 749ms
05-Dec-02	16:45:50	0x3045	PCR Drift Rate error : pid 3901(Drift Rate: 76mHz/s) start
05-Dec-02	16:45:50	0x3045	PCR Drift Rate error : pid 3501(Drift Rate: 76mHz/s) start
05-Dec-02	16:45:50	0x3045	PCR Drift Rate error : pid 3301(Drift Rate: 76mHz/s) start
05-Dec-02	16:45:50	0x3045	PCR Drift Rate error : pid 3801(Drift Rate: 76mHz/s) start
05-Dec-02	16:45:43	0x2011	pid 501 variability limit exceeded error start
05-Dec-02	16:45:41	0x2011	pid 501 variability limit exceeded error end, duration 83397ms
05-Dec-02	16:45:25	0x3045	PCR Drift Rate error : pid 3001(Drift Rate: -75mHz/s) end, duration 1344ms
05-Dec-02	16:45:24	0x3045	PCR Drift Rate error : pid 501(Drift Rate: -75mHz/s) end, duration 455ms
05-Dec-02	16:45:24	0x3045	PCR Drift Rate error : pid 3001(Drift Rate: -76mHz/s) start
05-Dec-02	16:45:24	0x3045	PCR Drift Rate error : pid 501(Drift Rate: -76mHz/s) start
05-Dec-02	16:38:41	0x3045	PCR Drift Rate error : pid 701(Drift Rate: 75mHz/s) end, duration 2867ms
05-Dec-02	16:38:41	0x3045	PCR Drift Rate error : pid 3001(Drift Rate: 75mHz/s) end, duration 2162ms
05-Dec-02	16:38:41	0x3045	PCR Drift Rate error : pid 3201(Drift Rate: 75mHz/s) end, duration 3074ms
05-Dec-02	16:38:41	0x3045	PCR Drift Rate error : pid 3301(Drift Rate: 75mHz/s) end, duration 3188ms
05-Dec-02	16:38:40	0x3045	PCR Drift Rate error : pid 601(Drift Rate: 75mHz/s) end, duration 1957ms
05-Dec-02	16:38:40	0x3045	PCR Drift Rate error : pid 3801(Drift Rate: 75mHz/s) end, duration 2315ms
05-Dec-02	16:38:40	0x3045	PCR Drift Rate error : pid 101(Drift Rate: 75mHz/s) end, duration 2276ms
05-Dec-02	16:38:40	0x3045	PCR Drift Rate error : pid 401(Drift Rate: 75mHz/s) end, duration 2298ms
05-Dec-02	16:38:40	0x3045	PCR Drift Rate error : pid 3101(Drift Rate: 75mHz/s) end, duration 1819ms

Figure 3-29: Stream View - Log

The title bar of the screen identifies the RTM device and the stream currently being monitored.

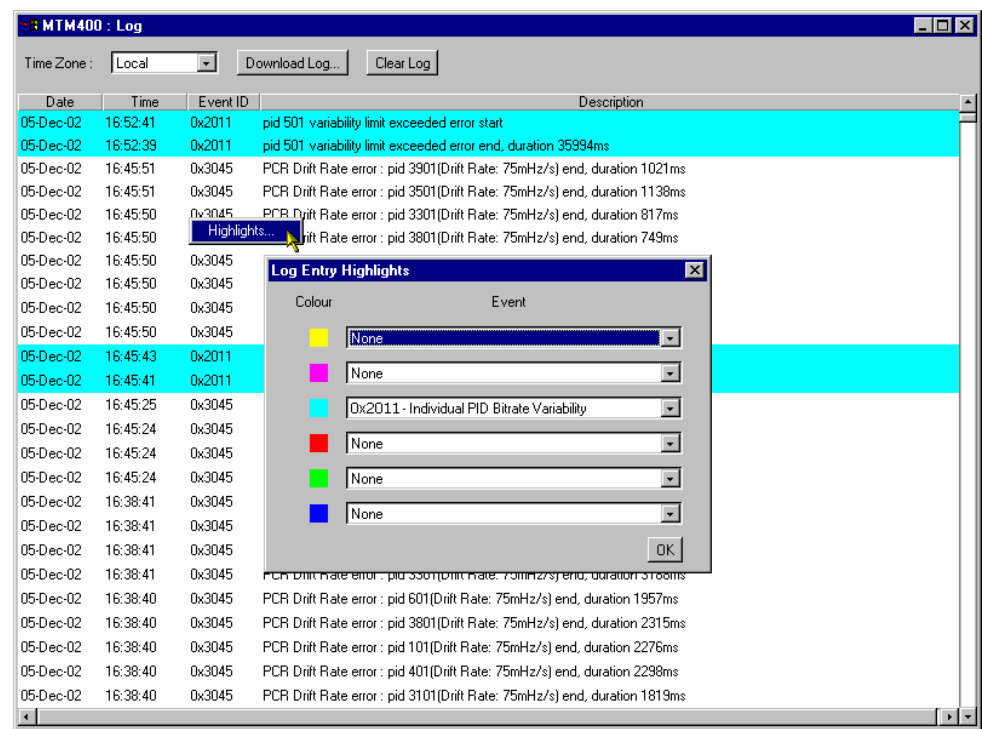
The **Log** button displays a screen that contains the events logged for the stream in a scrolling list. The list will have the following columns, each with a text heading:

- Date
- Time
- Event ID
- Error Description

The displayed times at which log events occur is the local MTM400 time.

Manipulating the Log Display. When first opened, the most recent events are displayed at the top of the screen; they are scrolled down as new events appear. Using the **Home** key on the keyboard displays the most recent events; similarly the **End** key will display the oldest events; in both cases events will continue to scroll. If a single event is to be viewed, selecting the **PageDown** key will scroll and freeze the display. However, since events continue to be recorded, the event will eventually reach the bottom of the log and be lost; how quickly this happens will depend on the number and speed of events being displayed.

Log entry Highlights. A popup menu is available by right clicking anywhere within the listing.



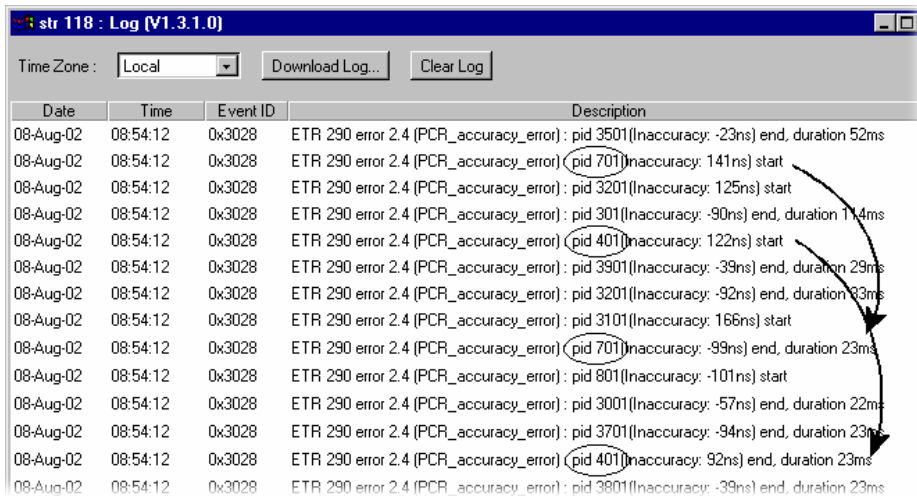
Using the Log Entry Highlights dialog allows specific types of entry to be highlighted in a selected color. Select the **Event** type (Event ID) to be highlighted from the drop-down list adjacent to the **Color** required. Select OK to close the dialog and implement the highlighting.

Saving the Stream Log. The Stream Log can be saved using the **Download Log...** button. In the **Log Download** dialog, select (or enter) a filename and path and select the **Start** button. Select the **Close** button when the operation has finished or to terminate the process early.

The resulting downloaded log file is saved in CSV (comma separated values) format.

Clearing the Stream Log. Select **Clear Log** to clear the current log entries.

Multiple Entries. Sometimes, errors of a specific type are generated many times. To avoid reporting excessive error entries (which could make the error log difficult to read), each time a new error is detected, the word **start** is added to the error message in the Log screen. No more occurrences of the same error are reported until the test is passed. At that point, a message will be displayed on the Log screen giving the error Event ID, and appending the word **end** to the message; the duration (ms) between the start (event fail) and end (event pass) message is also given.



Time Zone. The displayed times at which log events occurred can be adjusted by making a selection from the **Time Zone** drop-down list at the top of the window. The following options are available:

- Local** The time local to the machine on which MTM400 Remote User Interface is currently running.
- UTC** Universal Coordinated Time.
- RTM Device** The time local to the RTM device being monitored.

(For a general description of the timing model, see *Time Zones*, page 1-12.)

Configuration Screen

The Stream Configuration screen which allows the user to configure various stream settings, triggered recording and scheduling. The configuration settings available for DVB and ATSC differ; both screens are shown below. The fields displayed are also dependent on the options enabled. The descriptions following describe all settings.

The screenshot shows the 'Stream : Configuration' dialog box for the DVB format. The 'Standard' is set to 'DVB' and 'DVB Region' is 'DVB'. 'PCR Accuracy Mode' is 'Line Fit Differential'. 'Interface' is 'ASI' with a 'Config...' button. 'Stream Name' is 'Stream' with a 'Set' button. 'Template Checking' is checked. 'Maintenance Mode' is unchecked with a 'Factory Default' button. 'Configuration Slot' is 'Test Template' with buttons for 'Select Slot...', 'Store to Slot...', 'Upload Slot...', and 'Download Slot...'. 'Last Slot Changed' is '30-Jul-02 11:45:31' with a 'Local Time' dropdown and a 'Clear Slot...' button. 'Scheduler Enabled' is unchecked. 'Current Schedule' is 'Test Schedule' with buttons for 'Upload Schedule...' and 'Download Schedule...'.

Figure 3-30: Stream View - Configuration (MTM400 DVB format)

The screenshot shows the 'Stream : Configuration' dialog box for the ATSC format. The 'Standard' is set to 'ATSC'. 'PCR Accuracy Mode' is 'Line Fit Differential'. 'Virtual Channel Table Mode' is 'EIT Test On, Either VCT'. 'Interface' is 'L-Band' with a 'Config...' button. 'Stream Name' is 'Stream' with a 'Set' button. 'Template Checking' is checked. 'Maintenance Mode' is unchecked with a 'Factory Default' button. 'Configuration Slot' is 'Test Template' with buttons for 'Select Slot...', 'Store to Slot...', 'Upload Slot...', and 'Download Slot...'. 'Last Slot Changed' is '30-Jul-02 11:45:31' with a 'Local Time' dropdown and a 'Clear Slot...' button. 'Scheduler Enabled' is unchecked. 'Current Schedule' is 'Test Schedule' with buttons for 'Upload Schedule...' and 'Download Schedule...'.

Figure 3-31: Stream View - Configuration (MTM400 ATSC format)

Standard: Shows the MPEG broadcast standard selected for stream analysis: **DVB**, **ATSC**, **ISDB** or **Chinese**.

Region: This selection dictates the way in which regional variations in SI Tables view are interpreted. The options available are:

Table 3-10: DVB Regional Options

DVB Region	Description
Std	default setting uses standard DVB interpretation of descriptors.
DTG	DVB + DTG interpretations.
Nordig	DVB + Nordic interpretations.
Reserved	(Not Used.)
Aus	DVB + Australian interpretations.

No regional variant are available for the **ATSC** standard.

Table 3-11: ISDB Regional Options

ISDB Region	Description
ISDB-S	(default) Satellite setting.
ISDB-T	Terrestrial setting.

Table 3-12: Chinese Regional Options

Chinese Region	Description
GY/Z 174-2001	DVB + GB2312 encoding.
GB2312	DVB + implied GB2312.

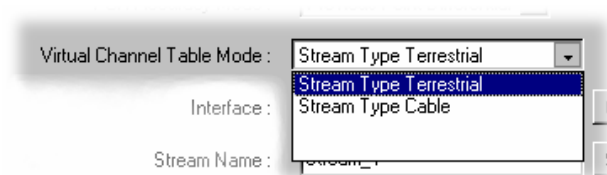
Changing either the **Standard** or the **Region** restarts the MTM400 unit. A warning message, requiring confirmation, is displayed.

PCR Accuracy Mode:

Allows you to select the algorithm to be used for calculating PCR Accuracy; the algorithm can be either Previous Point Differential or Line Fit Differential (see *PCR Graphing Methods*, page 3-49).

Virtual Channel Table Mode:

(ATSC only) A drop-down list from which the Virtual Channel Table Mode can be selected. The options available are shown below:

**Interface:**

A drop-down list from which the interface to be used for the stream is selected. The interfaces available, such as SMPTE, ASI and QPSK (L-Band), will depend upon the RTM device.

Config...

Opens the configuration dialog for the selected interface. (See page 3-70.)

Stream Name:

Allows you to assign a name to the stream. The name set will appear wherever the stream name is displayed, for example, in the title bar of all screens.

Enter the name required and select the **Set** button.

If you do not set a name, the default name, Stream, is used.

Template Checking: *

When enabled, applies the current template to the stream.

Maintenance Mode:

When enabled, no alarms (TTL, relays or audible) will be raised for the stream. The RTM device will continue to monitor the stream and errors will be logged. The action of enabling and disabling maintenance mode is also recorded in the log. In this mode, all buttons are colored black.

Configuration

See *MTM400 Configuration Files*, page 3-76.

Scheduling *

See *Scheduling*, page 3-81.

Buttons:

Factory Default

When selected, all stream configuration items for the current stream are reset to their factory defaults.

* - licensed options (see *Table 1-5: MTM400 Options Summary*).

Service Log

Each program in a transport stream can contain one or more elementary streams (for example, video, audio and control). The content of each elementary stream is carried as packets of data; each elementary stream is assigned a Packet Identifier (PID). Service Logging allows packet counts for specified PIDs (range: 0 to 100) to be collected at a user-definable interval.

Typically this information can be used by network operators to bill customers for data transferred. Network operators may want to present an itemized bill for packets of data carried in each time period.

The data is stored as a grid. After each time period, all the counts move down one position and a new count is started in the top row. The grid is 64 rows (time periods) deep and 100 PIDs wide. So up to 100 PIDs may be monitored, with a common timing resolution.

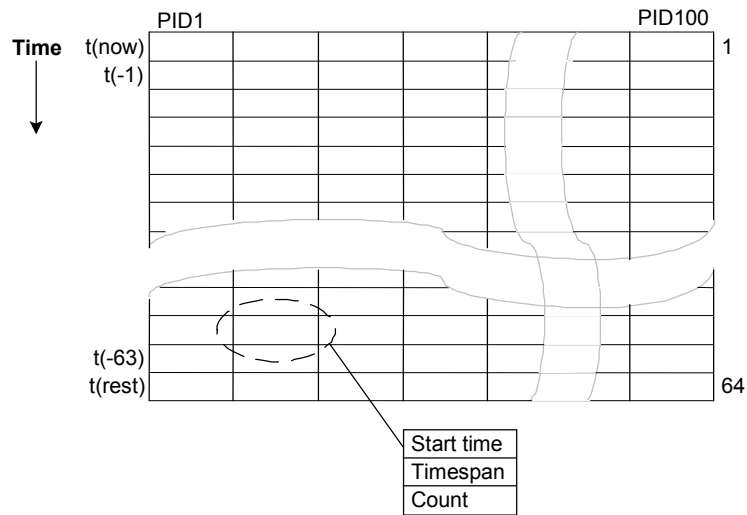


Figure 3-32: Service Logging - Data Storage

The timing resolution should not be set too fast or data may reach the bottom of the grid ($t(\text{rest})$) before it can be read. If data does reach the bottom of the grid, it can be either discarded (consumed) or accumulated. Accumulated data is added to the

bottom row for up to three days. After this time the data is discarded and the PID is no longer monitored.

When a service log is being monitored from multiple locations, only one location should be selected to consume entries. This will allow all locations adequate time to view or log the entries.

The customer must balance the level of detail required (the timing resolution) with the infrastructure required to collect, store and collate the information. Typically the timing resolution is set for 1000 ms; in this case the grid cell will contain a value approximating to 'packets per second'; to improve accuracy each count has an associated duration.

The screenshot shows the 'Stream : Service Log' window. At the top, there are several configuration options: 'Consume Entries' (unchecked), 'Log Entries' (unchecked), 'Packet Counting Bin Duration (PS4): 100ms', 'Log Filename:' (empty), 'Number of Packet Counting Bins (PS6): 2', 'Max List Entries: 100', and 'Timing Interval (PS4 * PS6 * 10): 2000ms'. Below these are 'Set' buttons for the filename and timing interval. The main area is a table with the following data:

Time	Duration	PID 4176	PID 4178	PID 4180	PID 4182	PID 4184	PID 4186
15/07/03 08:15:11	2.002	7903	0	0	0	0	0
15/07/03 08:15:08	2.998	11968	0	0	0	0	0
15/07/03 08:15:06	2.002	7882	0	0	0	0	0
15/07/03 08:15:03	2.999	11971	0	0	0	0	0
15/07/03 08:15:00	2.999	11894	0	0	0	0	0
15/07/03 08:14:58	2.001	7924	0	0	0	0	0
15/07/03 08:14:55	2.999	11931	0	0	0	0	0
15/07/03 08:14:53	2.003	7921	0	0	0	0	0
15/07/03 08:14:51	1.998	7965	0	0	0	0	0
15/07/03 08:14:49	2.000	7953	0	0	0	0	0
15/07/03 08:14:47	2.003	7974	0	0	0	0	0
15/07/03 08:14:44	2.999	11970	0	0	0	0	0
15/07/03 08:14:42	2.002	7901	0	0	0	0	0
15/07/03 08:14:40	1.998	7981	0	0	0	0	0
15/07/03 08:14:38	2.002	7980	0	0	0	0	0
15/07/03 08:14:36	1.999	7915	0	0	0	0	0
15/07/03 08:14:34	2.002	7980	0	0	0	0	0
15/07/03 08:14:31	2.999	11915	0	0	0	0	0
15/07/03 08:14:29	2.001	7950	0	0	0	0	0
15/07/03 08:14:26	3.000	11951	0	0	0	0	0
15/07/03 08:14:23	2.999	11875	0	0	0	0	0
15/07/03 08:14:21	2.001	7981	0	0	0	0	0

Figure 3-33: Stream View - Summary

The following settings are available:

Consume Entries:

Packet count entries reaching the bottom of the grid will be discarded when this checkbox is selected.

If the checkbox is not selected, packet count entries will be accumulated.

Log Entries:

Select this checkbox if entries are to be logged to a file.

Log Filename:

Displays the log file name.

A log file name can only be set when the **Consume Entries** checkbox is selected.

The log file is written in CSV (comma separated values) format. In this format, it can be transferred to any suitable analysis program, for example, Microsoft Excel.

Max. List Entries:

This value sets the number of entries that are displayed. It does not affect the actual logging of counts.

Enter a value in the field and select **Set**.

The timing resolution of counts is controlled by configuration file parameter PS4 (**Packet Counting Bin Duration**) multiplied by PS6 (**Number of Packet Counting Bins**), typically PS4 * PS6 is set for 1000 ms.

PS4 is the τ (tau) value for the PID occupancy bit rate measurement as defined in TR 101 290. This value affects many measurements; in this case it ensures that the timespan is a whole multiple of the bit rate counting interval and reduces sampling errors. PS6 should be set to give the required count duration (**Timing Interval (PS4 * PS6 * 10)**).

PIDs...

Select this button to display the Service PIDs dialog that lists the PIDs currently being logged. The dialog also allows PIDs to be added and deleted.

Service Log Configuration

The Service Log parameters can also be set using the configuration file.

The example below shows how to monitor four PIDs. Note that the PIDs may be specified as separate elements or as a space delimited list.

```
<?xml version="1.0" encoding="UTF-8"?>
<MTM400Configuration Name="Service Log Config"
  xmlns:xsi="XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="config.xsd">
  <Streams>
    <Stream Number="1">
      <PS6>10</PS6>
      <PS4>100</PS4>
      <ServiceLog>
        <PIDS>301</PIDS>
        <PIDS>302</PIDS>
        <PIDS>304 410</PIDS>
      </ServiceLog>
    </Stream>
  </Streams>
</MTM400Configuration>
```

This configuration can be embedded in a full configuration file, or just uploaded as an incremental change (refer to *Appendix C: Configuration File Structure*).

Constellation Screen

The constellation screen provides a visual and numerical indication of the integrity of the signals received by either a QPSK (Quaternary Phase-Shift Keying) interface board or one of the QAM interface boards (Annex A, Annex B or Annex C).

The constellation display is a graphical representation of the digitally modulated carrier's instantaneous phase and amplitude for each transmitted symbol. A good constellation will have well-defined dot clusters in tight formations; each cluster should be centered in a grid overlay square. The overall shape of the dot clusters should form a square as represented by the outer edges of the grid.

The screen is available only when one of the following interface cards are installed: QPSK (L-Band), QAM (Annex A, Annex B or Annex C). If no interface card is installed, the **Constellation** button is not displayed.

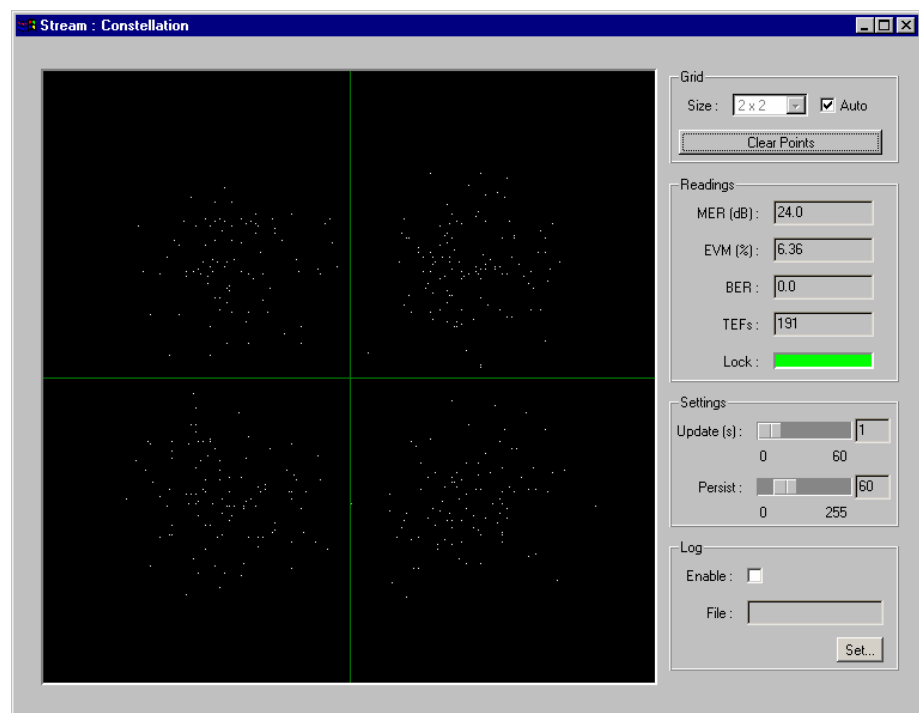


Figure 3-34: Stream View - Constellation (4 x 4)

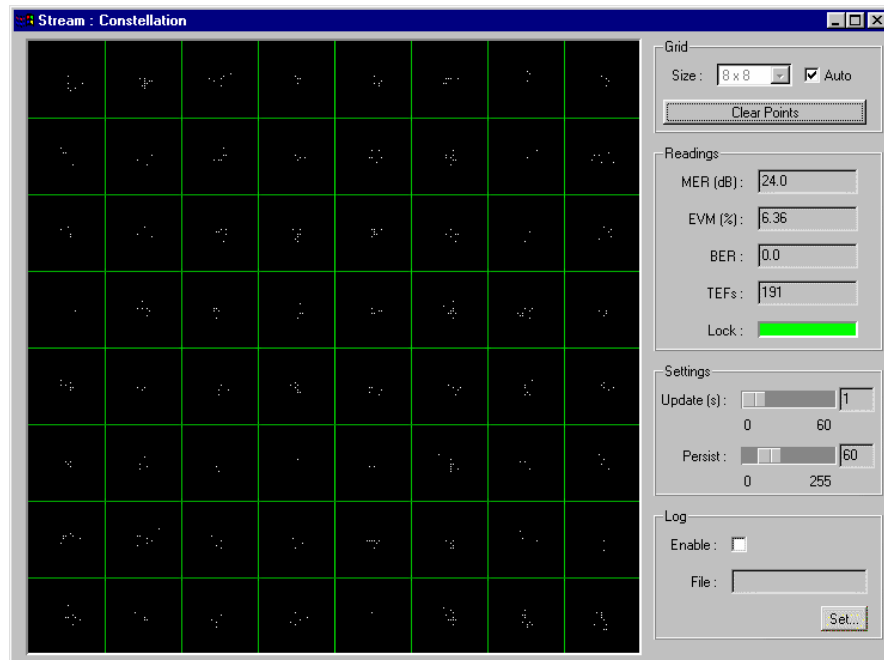


Figure 3-35: Stream View - Constellation (8 x 8)

The information displayed comprises the following:

Grid.

Size: This selection will be dictated by the installed interface card. If the **Auto** checkbox is selected, the grid size can be selected from the drop-down list.

Clear Points

Clears all points from the display grid.

Readings.

MER (dB): (Modulation Error Ratio) Provides a single 'figure of merit' for received signal. It is the ratio of 'ideal signal vectors' to 'errored signal vectors' expressed in dB. MER is similar to a signal-to-noise measurement (ref: TR 101 290).

EVM (%): (Error Vector Magnitude) Closely related to, and can normally be calculated from, MER. It is a ratio of 'errored signal vectors' to maximum signal amplitude expressed in dB (ref: TR 101 290 Annex).

BER: (Bit Error Rate) Provides an indication of the Forward Error Correction workload.

- TEFs:** (Transport Error Flag) Indicates the Forward Error Correction success.
- Lock:** If the QAM interface is able to acquire full lock onto the channel and is receiving the signal correctly, the **Lock** indicator will light up green.
- Settings.**
- Update (s):** Allows the period in seconds between samples of the incoming signal to be set.
- Persist:** Allows the time that the dots persist on the grid display to be set.
- Log.**
- File:** Constellation data can be written to the file identified in this field; data is saved in csv format.

MTM400 Configuration Files

Configuration files provide a means of supplying and storing all stream-related, user-definable parameters active in an RTM device. Configuration files may be complete, containing all parameters, or partial, containing only those parameters that require changing. The files are composed in XML (Extensible Markup Language) format and can contain sections relating to all aspects of configuration; template information can also be included. The files can be viewed in Internet Explorer or they can be viewed and edited in a text editor, for example, Microsoft Notepad. (See also *Appendix C: Configuration File Structure*.)

The concept of configuration files allows uniformity in setup to be achieved at a range of locations (RTM devices), especially where scheduling is supported. An additional facility allows weekly schedules to be written for each stream, which instructs MTM400 to load configuration slots at specific times and days during the week (see *Scheduling*, page 3-81).

In MTM400, configuration settings are held in 'storage slots'; eight storage slots are available for each stream. The contents of a storage slot must be applied to the 'active' area (active configuration) before it is implemented.

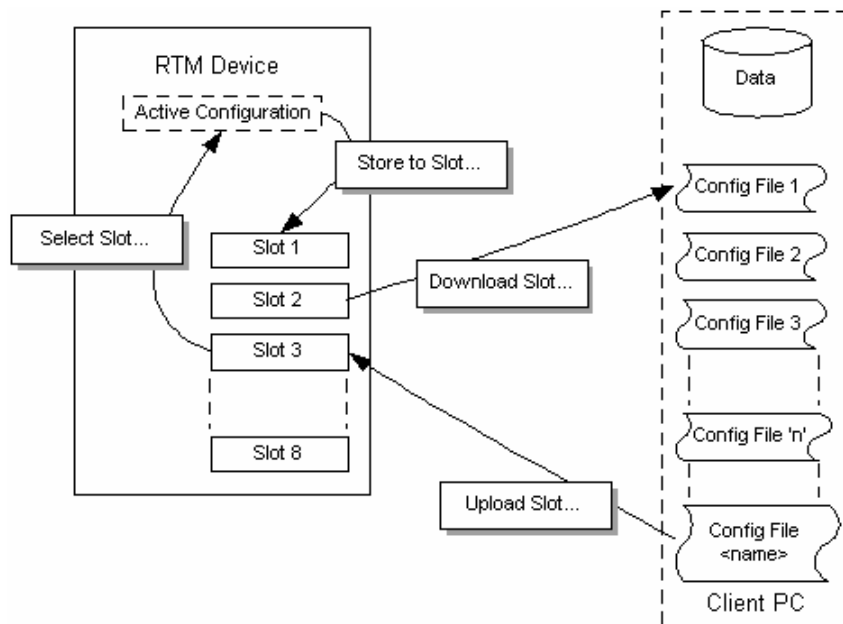


Figure 3-36: Configuration File Handling

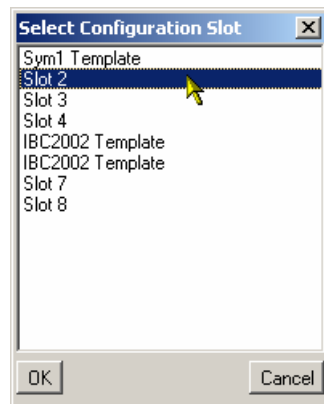
You can modify the active parameters during normal operation; these changes will only affect the active configuration. The active configuration is saved in non-volatile RAM as operational changes are made and will be recovered after the unit is reset or powered off.

The active configuration settings can also be saved to any of the storage slots. The contents of a storage slot can subsequently be downloaded to a file on a remote, networked PC. Similarly, a correctly configured file (or portion of a file) can be uploaded into any slot; where a 'portion of a file' can be a correctly configured XML file which specifies a subset of the total configuration file.

The default names allotted to the slots are **Slot 1** to **Slot 8**; they are always displayed in the same order. When a configuration file occupies the slot, the name is changed to that of the configuration file; however, the position of the slot in the list remains the same.

Activating a Slot. For the settings stored in a slot to become active, the contents of a storage slot must be transferred to the active configuration.

1. From the Configuration view, select **Select Slot...**.

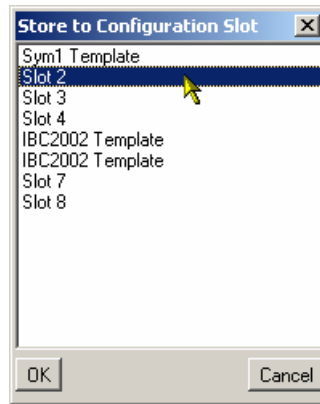


2. From the list, select the slot required.
3. Select **OK**.

The settings stored in the selected slot will be copied to the active configuration.

Storing Active Settings to a Slot. The settings currently held in the active configuration can be copied to any storage slot.

1. From the Configuration view, select **Store to Slot...**.

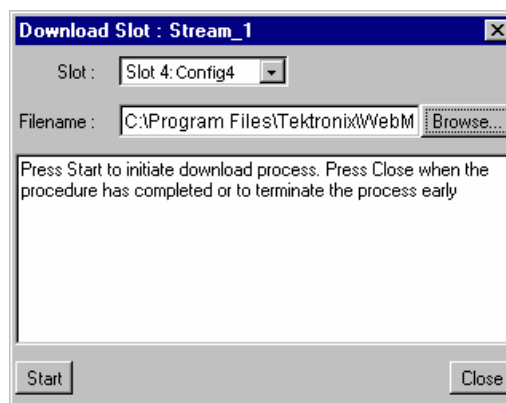


2. From the list, select the slot required.
3. Select **OK**.

The active configuration settings will be stored in the selected slot.

Downloading from a Storage Slot. The settings currently held in a storage slot can be copied to a file, for example, for modification.

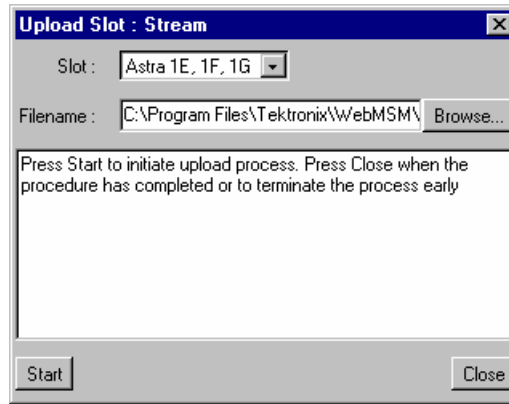
1. From the Configuration view, select **Download Slot...**.



2. From the **Slot:** drop-down list, select the slot required.
3. Locate and select the configuration file or type in a new name; use the **Browse...** button if necessary.
4. Select **Start** to download the configuration setting from the selected slot.

Uploading to a Slot. Correctly prepared configuration files can be uploaded to a slot.

1. From the Configuration view, select **Upload Slot...**

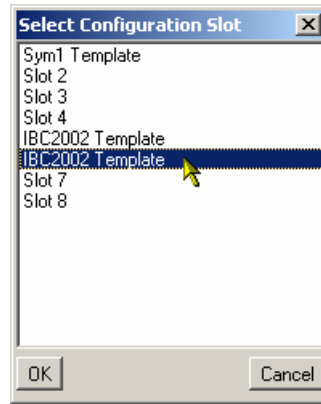


2. From the **Slot:** drop-down list, select the slot required.
3. Locate and select the configuration file to be uploaded or type in the path and name (*.xml); use the **Browse...** button if necessary.
4. Select **Start** to upload the configuration setting into the selected slot.

If the file is incorrectly formatted, the operation will fail and a message will be displayed in the dialog box.

Clearing a Slot. Slots can be cleared as follows:

1. From the Configuration view, select **Clear Slot...**.



2. From the list, highlight the slot to be deleted.
3. Select **OK**.

The slot name is deleted from the dialog and replaced with the slot number.

4. Select **Start** to upload the configuration setting into the selected slot.

Scheduling

Configuration schedules allow information held in configuration slots (see page 3-70) to be activated at specified times and days of the week. Schedules operate on a weekly basis.

A schedule includes the following information:

- A schedule name. When the schedule is uploaded to the RTM device, the schedule name will be displayed in the **Current Schedule** field in the **Configuration** dialog.
- UTC Offset (see *Scheduling and Time Zones*, page 3-85).

The schedule file can be uploaded to RTM devices in many time zones, ensuring that the configuration files will be activated at the same moment on each device.

It will then contain a number of schedule items, each specifying the following details:

- Configuration Slot - the number of the stored slot (1 to 8) to copy to the 'active' slot
- Load Time - time configuration slot should be copied in the specified schedule time zone (HH:MM:SS)
- The days of the week when this is to be applied, (Mon | Tue | Wed | Thu | Fri | Sat | Sun). This may be a single day, or a list of days.
- Start Error Reporting Holdoff Period (seconds)
- Stop Error Reporting Holdoff Period (seconds)
- Start Error Logging Holdoff Period (seconds)
- Stop Error Logging Holdoff Period (seconds)

The changeover between configurations may cause an excessive number of spurious errors to be generated. The Error Logging and Reporting Hold-Off Periods are provided so that logging and reporting of errors can be suspended before, during and after the changeover, if required.

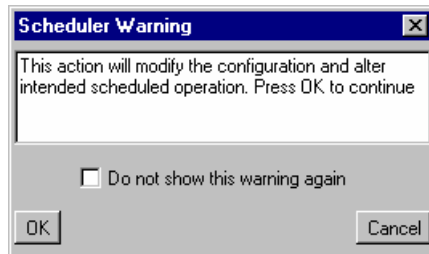
One schedule item must be specified as the base line (the first item to be loaded). This allows the RTM unit to synchronize; if it is switched on in the middle of a weekly schedule for example.

The schedule will be specified in a text file using XML. An example of the schedule file format is shown below:

```
<Schedule Name="<name>" UTCOffset="<offset>">
<!--where <offset> = Local, or an offset from UTC time e.g. -60 -->
  <BaseScheduleItem>
    <!--Defines the base schedule item - there should only be one of these -->
    <ConfigurationSlot>1</ConfigurationSlot>
    <LoadTime>16:34:30</LoadTime> <!-- Load time specified in HH:MM:SS -->
    <LoadDay>Mon</LoadDay> <!-- Mon, Tue, Wed, Thu, Fri, Sat or Sun>
    <HoldOffPeriods>
      <StartErrorReporting>5</StartErrorReporting> <!-- Optional -->
      <StopErrorReporting>5</StopErrorReporting> <!-- Optional -->
      <StartErrorLogging>5</StartErrorLogging> <!-- Optional -->
      <StopErrorLogging>5</StopErrorLogging> <!-- Optional -->
    </HoldOffPeriods>
  </BaseScheduleItem>
  <ScheduleItem>
    <ConfigurationSlot>2</ConfigurationSlot>
    <LoadTime>15:00:00</LoadTime> <!-- Load time specified in HH:MM:SS -->
    <LoadDays>Mon | Tue | Wed</LoadDays>
    <!-- any combination of Mon, Tue, Wed, Thu, Fri, Sat, Sun>
    <HoldOffPeriods>
      <StartErrorReporting>5</StartErrorReporting> <!-- Optional -->
      <StopErrorReporting>5</StopErrorReporting> <!-- Optional -->
      <StartErrorLogging>5</StartErrorLogging> <!-- Optional -->
      <StopErrorLogging>5</StopErrorLogging> <!-- Optional -->
    </HoldOffPeriods>
  </ScheduleItem>
</Schedule>
```

Scheduling Activities

NOTE: *If any changes are made to the configuration from the user interface, a warning message is displayed seeking confirmation of the action.*



Changes made may affect the configuration currently loaded by the scheduler. They may also affect or be affected by future scheduled configurations.

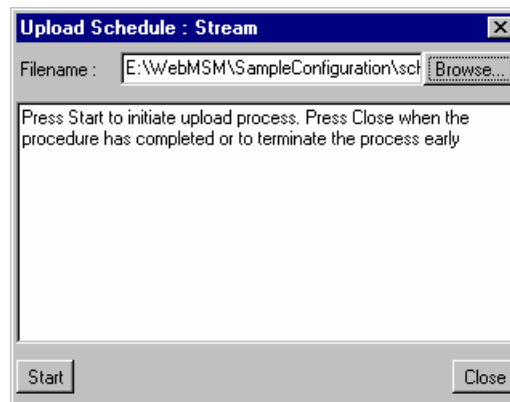
Select **OK** to continue and accept the change made to the configuration. Select **Cancel** to close the message box; the intended change will revert to its previous setting.

With a prepared schedule file available, the following activities can be performed from the stream Configuration dialog:

Uploading a Schedule. A schedule file is uploaded from either the client PC or from a network location:

1. Select **Upload Schedule...** from the stream **Configuration** dialog.

The Upload Schedule dialog is displayed.



2. Enter or browse the filename of the schedule file to be uploaded to the MTM400 and select **Start**.

Select **Close** when the upload has finished or to terminate the process early.

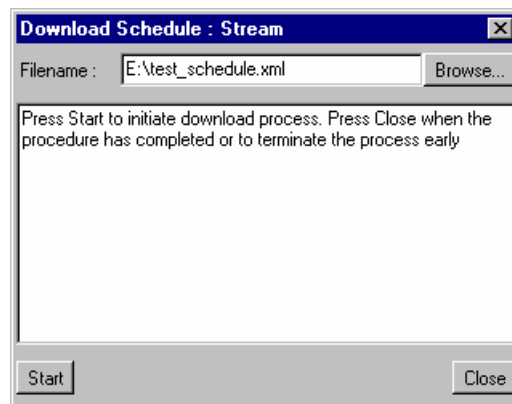
The schedule name will be displayed in the **Current Schedule** field in the **Configuration** dialog.

Note that if the uploaded schedule is replacing a currently running schedule, the **Scheduler Enabled** checkbox in the **Configuration** dialog should be unchecked and checked to allow the new schedule to take effect.

Downloading a Schedule. A schedule file is downloaded from the MTM400 to either the client PC or to a network location:

1. Select **Download Schedule...** from the stream **Configuration** dialog.

The Download Schedule dialog is displayed.



2. Enter or browse the filename of the schedule file to be downloaded from the MTM400.
3. Select **Start**.
Select **Close** when the upload has finished or to terminate the process early.

Enable Scheduling. Scheduling will not be enabled until the **Scheduler Enabled** checkbox is selected.

If an uploaded schedule is replacing a currently running schedule, the **Scheduler Enabled** checkbox in the **Configuration** dialog should be unchecked and checked to allow the new schedule to take effect.

Scheduling and Time Zones. A schedule consists of a list of schedule items that specify the times when specific configuration slots should be loaded. The schedule attribute 'UTC Offset' allows the times to be interpreted in different ways, as described below.

- Local

If you set the 'UTC Offset' attribute to the value 'Local', then the schedule times will represent the local times on the RTM device. For example, if the 'UTC to Time Zone Offset' of the device is -360 minutes (6 hours behind UTC) and a schedule load time is specified as 13:00, then the appropriate configuration will be loaded at 13:00 in the local time zone of the RTM device, that is $13:00 + 360 \text{ minutes} = 19:00 \text{ UTC}$.

'UTC to Time Zone Offset' is set through **Device → Configuration → Set Time...** (See page 3-8).

Having the 'UTC Offset' attribute set to 'Local' is useful where it is easier for the user to think of times in the time zone where the RTM device is installed. It is also useful where there are multiple RTM devices situated across different time zones, and configurations should be loaded in the local time of each RTM device.

Figure 3-37 shows the times at which configurations would be loaded if a schedule with the 'UTC Offset' attribute set to 'Local' containing a load time of 13:00 were used by RTM devices in several different time zones.

- User Defined Offset

You can also set the 'UTC Offset' attribute to a numeric value specifying the time zone in which the schedule is written and which is independent of the RTM device. 'UTC Offset' represents the difference in minutes between the time zone that the schedule times are written in and UTC. In other words, subtract the number of minutes from the times specified in the schedule to obtain UTC time.

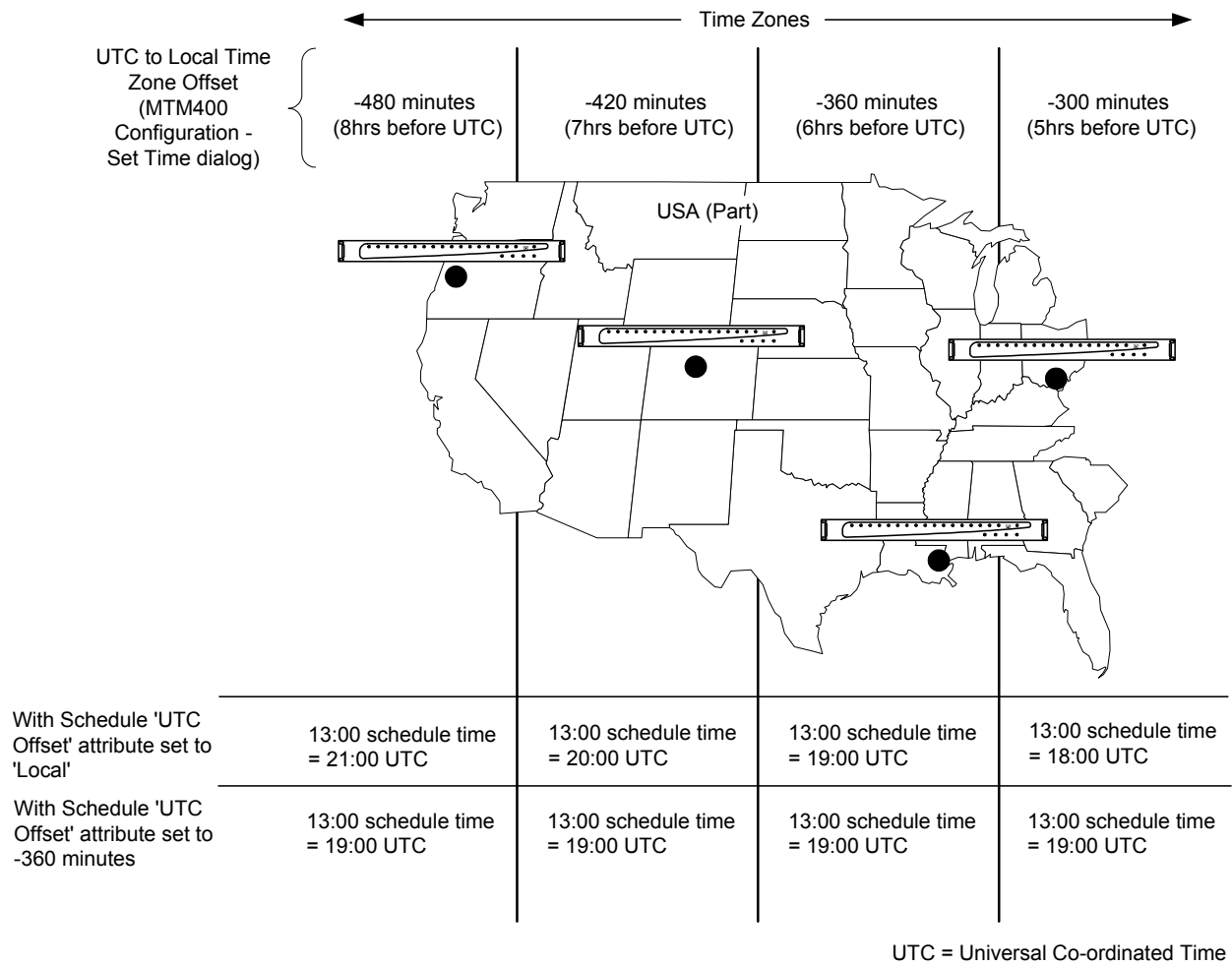


Figure 3-37: Scheduling and Time Zones

For example if 'UTC Offset' is set to 60, then schedule times defined are one hour ahead of UTC. This means that if a schedule time of 11:00 is specified, the appropriate configuration should be loaded at 11:00 - 60 minutes = 10:00 UTC.

This method of operation is useful where there are multiple RTM devices monitoring a transmission chain that spans several time zones, and configurations that check features of the transport stream have to be loaded by each RTM device at the same instant in time.

Triggered Recording

In order to examine offline events that occur in a stream, recordings can be made whose start is triggered either by the event itself, manually or by an alarm. The recording is held in RAM and can be downloaded from the MTM400 to the client PC for storage and further analysis.

The Triggered Recording setup is accessed by the **Recording...** button on the Stream button bar. The **Triggered Recording** dialog comprises two panels: **Settings** and **Operation**.

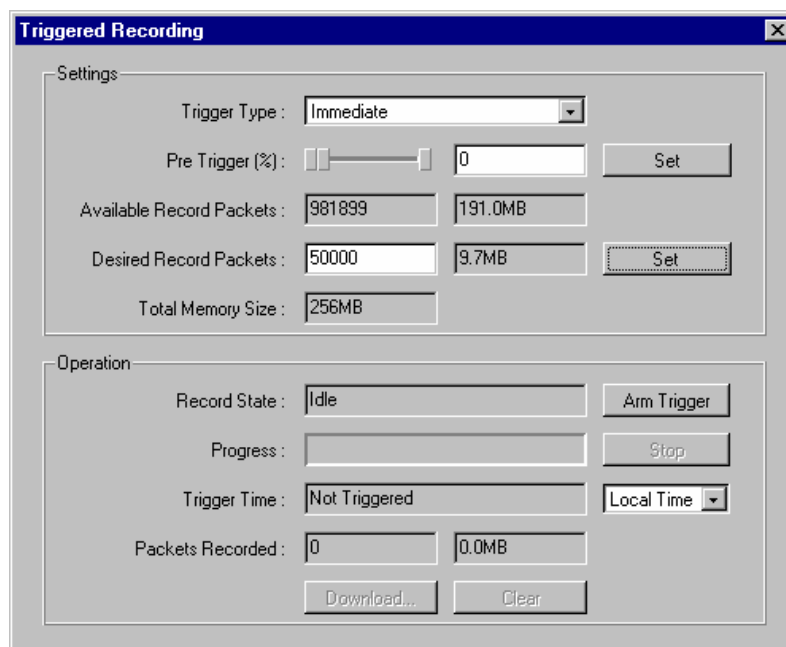
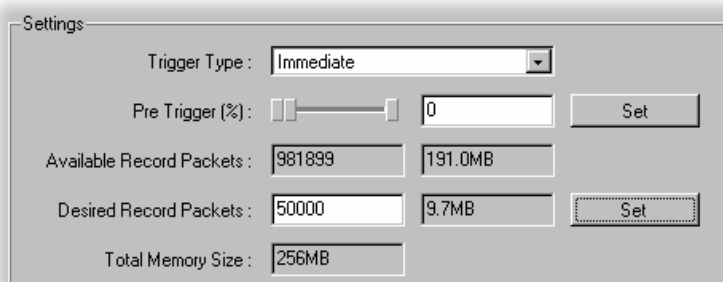


Figure 3-38: Triggered Recording dialog box

Triggered Recording Settings

The **Settings** section of the **Triggered Recordings** dialog is used to set up the trigger event, including the pre-trigger properties and the amount of memory to be reserved for the recording.



The screenshot shows a dialog box titled "Settings" with the following controls:

- Trigger Type:** A drop-down menu set to "Immediate".
- Pre Trigger (%):** A slider and a text box set to "0", with a "Set" button to its right.
- Available Record Packets:** A text box showing "981899" and a text box showing "191.0MB".
- Desired Record Packets:** A text box showing "50000" and a text box showing "9.7MB", with a "Set" button to its right.
- Total Memory Size:** A text box showing "256MB".

Trigger Type: The event that triggers the recording can be one of four types, selected from the drop-down list.

Immediate

The trigger is set as soon as **Arm** is selected on the **Operations** section; in effect, recording will start immediately.

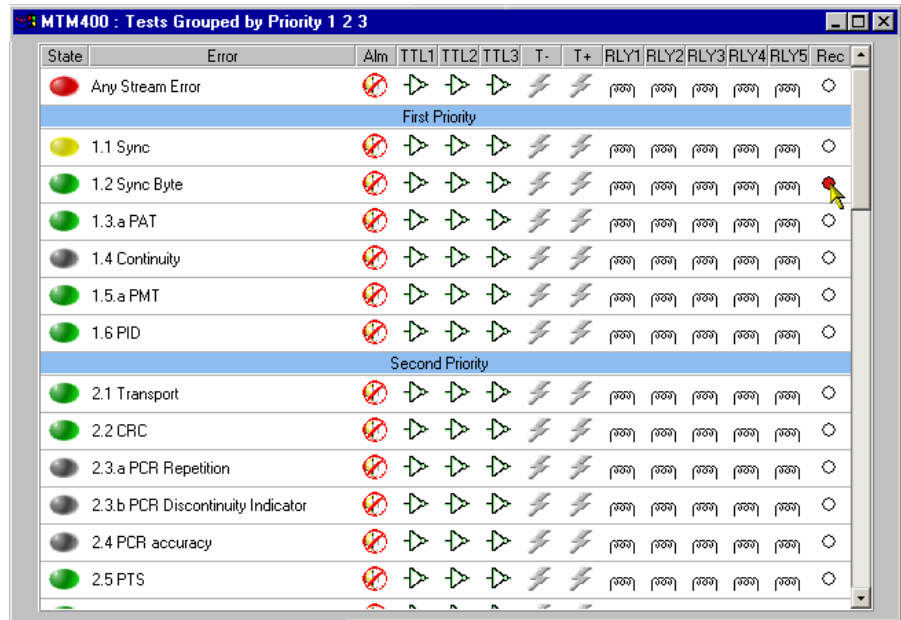
External Rising Edge / External Falling Edge

The trigger is set when **Arm** has been selected on the **Operations** section. Recording will start when a rising / falling edge is detected at the TTL input on the TS Processor, Alarms connector (see *Appendix A: MTM400 Specifications*).

Event Alarm

The trigger is set when **Arm** has been selected on the **Operations** section. Recording will start when an error occurs on an event that has been flagged in the Tests or Custom views.

Trigger events are flagged in the Tests or Custom view by activating the **Rec** function associated with the event. In the screen shot below, test numbers 1.2 and 2.3a are set. With **Event Alarm** selected, recording will start if an error event occurs on either test.



The **Rec** icon is toggle action; it is activated/deactivated by double-clicking it.

Pre Trigger (%): A proportion of a stream can be recorded before a trigger event occurs. (See *Pre-Trigger Recordings*, page 3-90.)

Set or enter the percentage of the recorded file that is to be pre-recorded and select **Set** to confirm the setting.

Available Record Packets:

Two fields which indicate the maximum number of packets (at 204 bytes/packets) that can be recorded in the reserved memory and the amount of memory that will be used.

Desired Recording Packets:

Two fields which indicate the number of packets (at 204 bytes/packets) that are to be recorded in the reserved memory (**Total Memory Size**) and the amount of memory that will be used.

Enter the number of packets required and select **Set** to confirm the setting.

NOTE. *Any value can be entered in the **Desired Record Packets** field. The required memory will be calculated and displayed, even if it exceeds the available memory. However, when recording actually starts, the entered value is automatically adjusted to reflect the available memory.*

Total Memory Size: Displays the total system memory available.

Pre-Trigger Recordings

A proportion of a stream can be recorded before a trigger event as specified by the Pre-Trigger setting. The start of recording is dependent upon the selected trigger type. However, the stream is being recorded in memory at all times; the available memory is used as a circular buffer, in that it is filled and written over continuously until a trigger event occurs.

NOTE: *A Circular Buffer is an area of memory used to store a continuous stream of data by starting again at the beginning of the buffer after reaching the end.*

As soon as the trigger event occurs, recording will commence. Recording continues until the memory buffer is full. The recording will remain in memory until it is uploaded to the client PC.

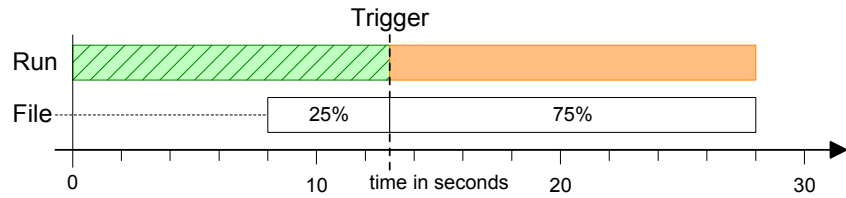
The Pre-trigger set up can be changed only when no recording activity is in progress.



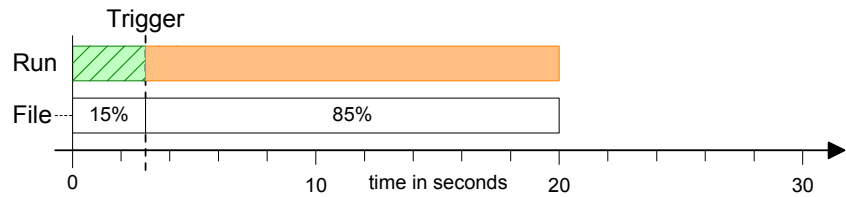
The Pre-trigger setting allows the proportion of data saved *before* a trigger event to be specified as a percentage of the final recorded file. Editing the value or dragging the slider in the tab can change the proportions.

The proportion of pre-trigger data may be less than specified if the trigger event occurred before enough packets were recorded in the circular buffer (particularly after clearing the buffer).

For example, if the available memory will hold a 20 second recording, with 25% pre-trigger specified and an event-triggered recording starting five seconds or more into the run, the contents of the recorded file will be:

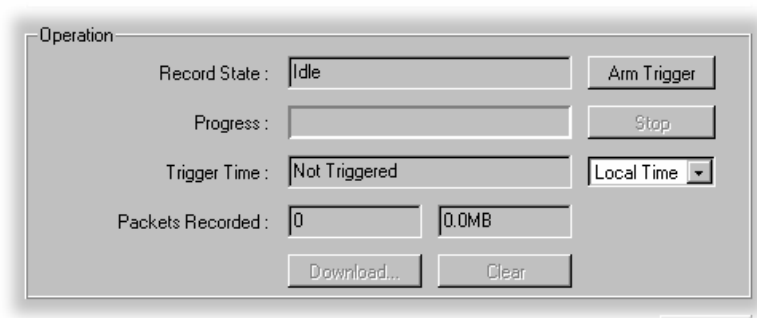


If the Trigger event was detected earlier than five seconds into the run, the 20 second file will contain all of the data up to the Trigger. If recording was triggered at three seconds only the first 15% of the file would hold pre-trigger data. The file contents would be:



Triggered Recording Operation

The **Operation** section of the **Triggered Recordings** dialog is used to arm the trigger before recording and shows the status of the recording activity.



Arm Trigger

Use this button to set or arm the trigger event set up in the Settings panel.

Stop

Use this button to disarm the previously armed trigger or to stop the current recording. Any recording made up to the point when the button is pressed will be available for analysis.

- Record State:** This field indicates the current state of the Pre trigger function. Possible states are:
- Idle** - Pre-Trigger not armed.
 - Waiting to Trigger** - Armed and waiting for the trigger event to occur.
 - Recording in Progress...** - Trigger event has occurred and recording is in progress.
 - Recording complete** - The recording is complete and available for downloading and clearing.
- Progress:** Displays the progress of recording.
- Trigger Time:** Displays the time that the trigger event occurred.
- The time zone in which trigger times are presented can be selected from the drop-down list:
- Local** - the time local to the machine on which MTM400 Remote User Interface is currently running.
 - UTC** - Universal Coordinated Time.
 - RTM Device** - the time local to the RTM device being monitored.
- Packets Recorded:** Displays the number of packets recorded and the amount of memory used.
- Download...** Select and enter the location to which the recorded stream is to be saved.
- Clear** Clears the current recording. Background recording (for the pre-trigger) will start again immediately.

Interface Configuration

The interfaces available are dependent upon the RTM device; however, the interface settings dialogs will be common to the MPEG Transport Stream Monitor. They are described in the following paragraphs.

QPSK (L-Band) Settings

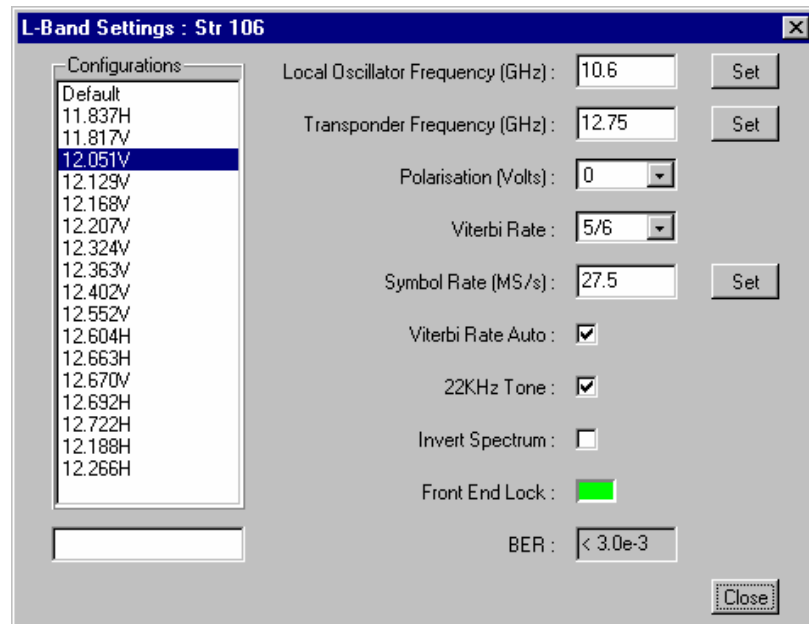


Figure 3-39: Interface Configuration - QPSK (L-Band)

The QPSK (L-Band) Interface option allows you to connect to QPSK equipment operating in the L-Band (950 MHz to 2150 MHz). It will internally I-Q demodulate the signal with its on-board AGC control, Viterbi decoder and FEC decoder.

The module will tune the full Satellite IF band, which is considerably wider than the L-Band itself. As LNB support is included, this allows the module to be used with a stand alone TVRO dish.

The input to the interface card is looped through to the output connector, allowing subsequent processing of the input signal.

The L-Band Interface allows you to monitor and/or record the transport streams from within the L-Band signal.

Bit Error Rate (BER) values are available during operation.

Configurations Allows you to select from a range of preset L-Band configurations.

The configurations are made available by the MTM400 configuration file (see *Configuration Screen*, page 3-67; also *Appendix C: Configuration File Structure*).

You can activate an L-Band configuration by highlighting the name in the **Configurations** field; the field below will display the message 'Updating values' until the settings are recalled.

Local Oscillator Frequency (GHz):

The Local Oscillator (LO) frequency of the Low Noise Block (LNB) is dependent on the Transponder frequency and must be such that the difference falls within the input range of the receiver. Typically, these values are 10.6 GHz (Hi-Band) and 9.75 GHz (Lo-Band) when converting from KU band. The values are 5.7 GHz (Hi-Band) and 5.15 GHz (Lo-Band) respectively when converting from C-Band. This information should be confirmed for the specific type of LNBs used.

Enter the required value and select **Set**.

Transponder Frequency (GHz):

The IF frequency that is used to initialize the L-Band Interface card is calculated as follows:

$$\text{Transponder_Frequency} - \text{LO_Frequency.}$$

If you want to specify the IF frequency rather than the individual LO and Transponder frequencies, set the Local Oscillator Frequency to a value of 0 (zero) and specify the required IF frequency under this parameter. If the IF frequency is specified, it must be in the range 0.950 GHz to 2.150 GHz; the tuning increment is 125 kHz

Enter the required value and select **Set**.

Polarization (Volts):

This parameter selects the polarization by applying 13 V (vertical) or 18 V (horizontal) to the LNB (Low Noise Block). A value of 0 can be used if no voltage is to be applied from this card; for example, if the polarization voltage is being supplied from an external source.

Viterbi Rate: This is the harmonic fraction and takes one of the values specified in the drop-down list: 1/2; 2/3; 3/4; 5/6; 6/7; 7/8. However, it may be overwritten if the Viterbi Rate Auto selection is enabled.

Symbol Rate (MS/s):
Symbol rate value

Enter the required value and select **Set**.

Viterbi Rate Auto:
When enabled, the L-Band adapter automatically establishes the Viterbi Rate when acquiring Front End Lock.

NOTE: *The Viterbi Rate Auto option will not work correctly if the Viterbi rate is 5/6. If this rate (5/6) is known, or suspected, then the Auto option should not be used.*

22KHz Tone: The Local Oscillator Frequency is selected by applying the 22 kHz tone.

Invert Spectrum: The sense of modulation may be inverted due to the number of mixing stages in the installation. Enabling the Invert Spectrum checkbox will invert the L-Band output.

Front End Lock: If the L-Band adapter Front End is able to acquire full lock onto the channel and is receiving the signal correctly, the **Front End Lock** (FEL) indicator will light up green. When no lock is achieved the indicator stays unlit (gray).

BER: Bit Error Rate.

(Refer to the *Specification* section for more details about the QAM interfaces.)

QAM Interface Settings

The following QAM interfaces are available for the MTM400:

- Annex A
- Annex B
- Annex C

Each interface carries a selection of setting as shown in the Table 3-1:

Table 3-1: QAM Settings – Overview

Setting	Annex A	Annex B	Annex C
Rx Frequency	✓	✓	✓
Symbol Rate	✓	✗	✓
2 nd Local Oscillator Frequency	✓	✗	✓
Constellation	✓	✓	✓
Inversion	✓	✓	✓
BER	✓	✓	✓
Front End Lock	✓	✓	✓

For example, the Annex A interface appears as shown in Figure 3-40:

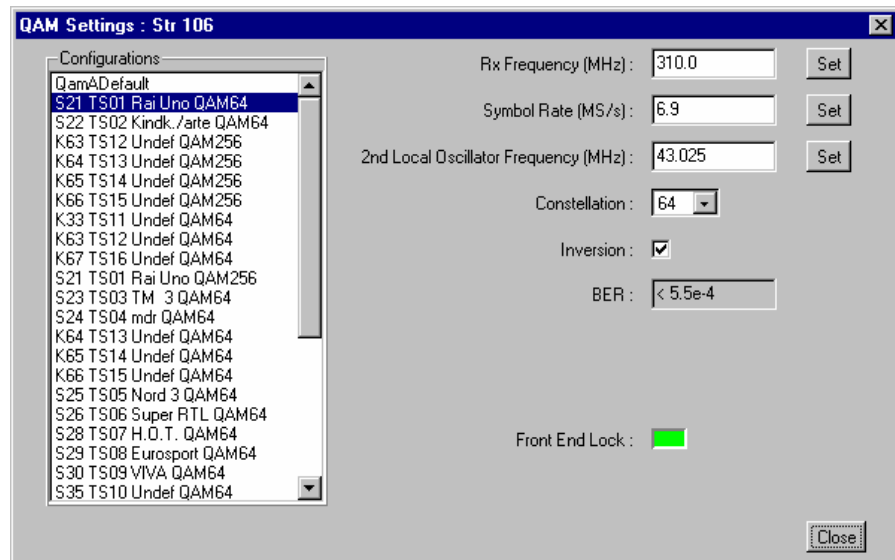


Figure 3-40: QAM Interface Configuration – Annex A (Example)

The settings (where applicable) are as follows:

Configurations The **QAM Settings** dialog provides an option to recall a number of settings configuration files. The configuration files are created and stored in the MTM400. To select a configuration file, highlight the required name in the list.

Rx Frequency (MHz):

Receive frequency

Enter the required value and select **Set**.

Symbol Rate (MS/s):

Symbol rate value

Enter the required value and select **Set**.

2nd Local Oscillator Frequency (MHz):

Allows you to select the internal 2nd IF (intermediate frequency). Optimum performance is achieved when the 2nd IF is equal to the Symbol Rate. The 2nd IF is equal to the selected value minus 36.125 MHz.

Enter the required value and select **Set**.

Constellation: Provides the option to set the modulation scheme; 4-QAM, 16-QAM, 64-QAM or 256-QAM.

Select the required value from the drop-down list.

Inversion: The sense of modulation may be inverted due to the number of mixing stages in the installation. Enabling the **Inversion** checkbox will invert the QAM output.

BER: Bit Error Rate.

Front End Lock: If full lock is acquired onto the channel and it is receiving the signal correctly, the **Front End Lock** (FEL) indicator will light up green. When no lock is achieved the indicator will be red.

(Refer to the *Specification* section for more details about the QAM interfaces.)

SMPTE310 Settings

There are no user settings associated with the SMPTE (Society of Motion Picture and Television Engineers) interface.

(Refer to the *Specification* section for more details about the SMPTE interface.)

ASI Settings

There are no user settings associated with the ASI (Asynchronous Serial Interface) interface.

(Refer to the *Specification* section for more details about the ASI interface.)

Closing the Remote User Interface

To close the Remote User Interface, close the original Web browser window. All associated windows will close.



Appendices

Appendix A: MTM400 Specifications

This section lists the electrical, environmental, and physical specifications of the MTM400 system. All specifications are guaranteed unless labeled typical. Typical specifications are provided for your convenience and are not guaranteed. Electrical characteristics apply to test systems operating within the environmental conditions.

Electrical, Hardware and Signal Specifications

Table A-1: Remote User Interface Platform Characteristics

Characteristics	Description
Minimum specification	500 MHz Intel Pentium Processor
Operating system	Any Microsoft Windows operating system
Disk space	30 MB free disk space
Ethernet	10/100-base T
Installed Software	Microsoft Internet Explorer, Version 5.0 minimum; Microsoft Java Virtual Machine installed, Version 5.0 minimum.
RAM	256 MB
CD-ROM drive	8x
Display	1024 x 768 pixel video monitor with 16 available colors

Table A-2: TS Processor - System Timing Clock

Characteristics	Description
PCR Offset Measurement Accuracy	± 2.0 ppm

Table A-3: TS Processor - ASI Interface

Characteristics	Description
ASI Input	
Connector	BNC
Transport Stream Rate	155 Mbps maximum, 250 kbps minimum
Data Format	Accepts both Burst and Packet mode ASI format
Signal Amplitude	2.0 V _{p-p} max; 200 mV _{p-p} min
Termination	75 ohms nominal, transformer coupled
Return Loss	- 10 db min, 5 MHz to 270 MHz
Link Rate	270 Mbaud \pm 100 ppm
ASI Output (The Output is an active loop through of the Input.)	
Connector	BNC
Impedance	75 ohms nominal, transformer coupled
Transport Stream Rate	same as the input
Signal Amplitude	1.0 V _{p-p} max, 600 mV _{p-p} min, into a 75 ohm load
Return Loss	- 10 db min at 270 MHz

Table A-4: TS Processor - SMPTE310M Interface

Characteristics	Description
SMPTE310M Input	
Connector	BNC
Termination	75 ohms, transformer coupled
Data Format	Bi-phase coded. Compliant with SMPTE310M
Input Bit Rate	19,392,658.5 bps \pm 2.8 ppm
Signal Amplitude	2.0 V _{p-p} maximum, 200 mV _{p-p} minimum
Return Loss	- 10 db min at 20 MHz
SMPTE310M Output (The Output is an active loop through of the Input.)	
Connector	BNC
Output Bit Rate	Same as the Input
Signal Amplitude	600 mV min, 1.0 V max, into 75 ohm load
Output Impedance	75 ohms, transformer coupled
Return Loss	- 10 db min at 20 MHz

Table A-5: I/O Port Characteristics - QPSK (L-Band)

Characteristics	Description
Connectors	
Input	Type 'F' (loop through to output)
Output	Type 'F'
Input Frequency Range	950 MHz to 2150 MHz in 100 kHz steps
Input Signal Amplitude Range	-60 dBm min, -30 dBm max for a CBER of <math><1e-6</math>
Input Termination Impedance	75 ohm nominal
Input Return Loss	-10 db min, 950 MHz to 2150 MHz
Modulation Format	QPSK
Modulated Baud Rate	2 MBaud min, 45 MBaud max
Viterbi Values Supported	1/2, 2/3, 3/4, 5/6, 6/7, 7/8
Loop Through Output Amplitude	-6 db to +3 db
Loop Through Output Reverse Isolation	30 db typical
LNB Support	
LNB Supply Voltage	selectable; 13.0 V \pm 1.5 V or 18.0 V \pm 1.5 V, with 100 ohm, 5 watt resistor load
LNB Supply Maximum Current	200 mA maximum
LNB 22kHz Signaling Frequency	17.6 kHz min, 26.4 kHz max (22 kHz \pm 20%)
LNB 22kHz Signaling Amplitude	600 mV _{p-p} with 100 ohm load

Table A-6: I/O Port Characteristics - ITU-J83 Annex A QAM

Characteristics	Description
Input Frequency Range	51 MHz to 858 MHz, 62.5 kHz steps
Modulation Format	16 QAM, 64 QAM, 256 QAM (compliant with DVB-C ETS 300 421)
Modulation Baud Rate, QAM A	5.0 Mbaud/s minimum, 6.952 Mbaud/s maximum
Input Signal Level	-57 dBm (50 dBuV) to -27 dBm(80 dBuV), with a 16, 64, and 256 QAM input, providing five or less Transport Error Flags in 10 seconds, which corresponds to a post FEC rate of $1e^{-8}$
Modulation Error Ratio	38 dB min, with a 64QAM input
Receiver Bandwidth, QAM A	8 MHz nominal
Input Termination Impedance	75 ohm nominal
Input Return Loss	-6 db min, -10 dB typical, 51 MHz to 858 MHz
Loop Through Power Gain	1.5 db to 4 db typical, 51 MHz to 858 MHz
Loop Through Noise Figure	8 db typical
Loop Through Output Return Loss	Greater than 10 db typical

Table A-7: I/O Port Characteristics - ITU-J83 Annex B QAM

Characteristics	Description
Input Frequency Range	88 MHz to 858 MHz , 62.5kHz steps
Modulation Format	64QAM, 256QAM (compliant with ITU J-83 Annex B) Only interleaving modes with I,J = 128,1; 64,2; 32,4; 16,8; 8,16; 128,1 are supported. Modes described as I = 128, and J = 2,3,4,5,6,7,8 are not supported.
Modulation Baud Rate, QAM B	5.056941 Mbaud/s (64QAM); 5.360537 Mbaud/s (256QAM)
Input Signal Level	-57 dBm (50 dBuV) to -27 dBm(80 dBuV), with a 16, 64, and 256 QAM input, providing five or less Transport Error Flags in 10 seconds, which corresponds to a post FEC rate of 1e-8
Modulation Error Ratio	37 dB min, with a 64QAM input
Receiver Bandwidth, QAM B	6 MHz nominal
Input Termination Impedance	75 ohm nominal
Input Return Loss	-6 db min, -10 dB typ, 88 MHz to 858 MHz

Table A-8: I/O Port Characteristics - ITU-J83 Annex C QAM

Characteristics	Description
Input Frequency Range	88 MHz to 858 MHz , 62.5kHz steps
Modulation Format	16QAM, 64QAM, 256QAM (compliant with ITU J-83 Annex C)
Modulation Baud Rate, QAM C	4.5 Mbaud/s min. 5.5 Mbaud/s max
Input Signal Level	-57 dBm (50 dBuV) to -27 dBm(80 dBuV), with a 16, 64, and 256 QAM input, providing a 5 or less Transport Error Flags in 10 seconds, which corresponds to a post FEC rate of 1e-8
Modulation Error Ratio	38 dB min, with a 64QAM input
Receiver Bandwidth, QAM C	6 MHz nominal
Input Termination Impedance	75 ohm nominal
Input Return Loss	-6 db min, -10 dB typ, 51 MHz to 858 MHz

Table A-9: TS Processor - Alarms - Connector

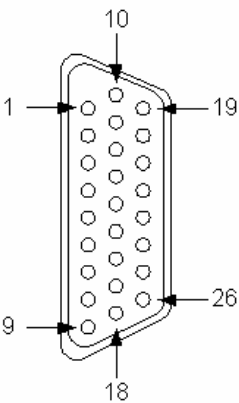
26-pin D-type connector	Pin	Function	Description
	1	DGND	Ground
	2	TTL02	TTL Output 2
	3	DGND	Ground
	4	P5V	5 V
	5	RL1NC	Relay 1 : Normally closed contact
	6	RL2NC	Relay 2 : Normally closed contact
	7	RL3NC	Relay 3 : Normally closed contact
	8	RL4NC	Relay 4 : Normally closed contact
	9	RL5NC	Relay 5 : Normally closed contact
	10	DGND	Ground
	11	DGND	Ground
	12	TTL03	TTL Output 3
	13	P5V	5 V
	14	RL1CC	Relay 1 : Common contact
	15	RL2CC	Relay 2 : Common contact
	16	RL3CC	Relay 3 : Common contact
	17	RL4CC	Relay 4 : Common contact
	18	RL5CC	Relay 5 : Common contact
	19	TTL01	TTL Output 1
	20	DGND	Ground
	21	TTLI1	TTL Input 1
	22	RL1NO	Relay 1 : Normally open contact
	23	RL2NO	Relay 2 : Normally open contact
	24	RL3NO	Relay 3 : Normally open contact
	25	RL4NO	Relay 4 : Normally open contact
	26	RL5NO	Relay 5 : Normally open contact
Connector shell - Chassis ground			

Table A-10: TS Processor - Alarms

Description	Value
Alarm Relay	
Number of relays	5
Maximum Switching Current	1 Amp
Maximum Switch Voltage	24 Vdc
Contact Resistance	100 milli-ohm max
TTL Output pins of the Alarms Output connector	
Output Type	TTL open collector, requires external pull up resistor
Logic High Voltage	2.0 V min
Logic Low Voltage	0.8 V max , sinking 100 mA
Maximum Switching Current	100 mA
TTL Input pins of the Alarms Output connector	
Maximum Input Voltage	5.1 V
Logic High Input Voltage	2.0 V min
Logic Low Input Voltage	0.8 V max
+5V Output, Pins 4 and 13 of the Alarms Output connector	
Output Voltage	4.9 V min, 5.1 V max, no load
Maximum Output Current	100 mA
Output Protection	fused, self resetting

Table A-11: TS Processor - LTC In

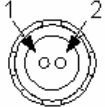
LTC 2-pin connector	Pin	Function	Description
	1	IN+	
	2	IN-	
	Connector shell - Chassis ground		
Port Specification			
Type	Linear time code, SMPTE standard to ANSI/SMPTE 12M - 1995		
Input Voltage	2.0 V _{p-p} differentially min		

Table A-12: TS Processor - Ethernet RJ-45 Connector

Characteristics	Description
Connector	10/100Base-T; RJ-45
Note: Use only good quality screened cable; Cat 6	

Power Source Characteristics

Table A-13: AC Power Source Characteristics

Characteristics	Description
Source Voltage	100 VAC to 240 VAC
Frequency Range	50 Hz/60 Hz
Power Consumption	1 A max
Peak Inrush Current	7.2 A peak at 240 VAC, 50 Hz
Fuse Rating	Mains fuse is 3.15 A, 250V (Not operator replaceable. Refer servicing to qualified service personnel.)

Table A-14: Transport Stream Board Batteries

Characteristics	Description
Quantity	2 (In single carrier)
Voltage	3 V
Capacity	210 mAh
Continuous discharge (maximum)	3 mA
Overall Dimensions (Single cell)	
Height:	3.2 mm (0.13 in)
Width (Diameter):	20 mm (0.79 in)
Battery Type	Tektronix Part Number: 146-0096-00

Environmental Characteristics

Table A-15: Environmental Characteristics

Characteristics	Description
Temperature Operating: Non-operating:	+5 °C to +40 °C -10 °C to +60 °C
Humidity Operating: Non-operating:	10% to 80% relative humidity up to 31 °C. Above 31 °C, decreasing linearly to 50% at 40 °C. Non-operating: 10% to 95% relative humidity, non-condensing.
Altitude Operating: Non-operating	0m to 3000 m (9800 ft) 0m to 12000 m (40000 ft)

Mechanical (Physical) Characteristics

Table A-16: Mechanical Characteristics

Characteristics	Description
Classification	Transportable platform also intended for 19 inch rack mounted applications, 1RU high.
Overall Dimensions Height: Width: Depth:	44 mm (1.73 in) (1RU) 430 mm (17.13 in) 600 mm (23.62 in)
Required Clearance	Top and bottom: 0 mm; Sides: Standard 19 in rack mount
Weight	6.0 kg (13.3 lbs); fully loaded
Packaged Dimensions Height: Width: Depth:	241 mm (9.5 in) 590 mm (23.1 in) 760 mm (30 in)
Weight (Packaged)	9 kg (19.7 lbs)

Certifications and Compliances

Table A-17: Certifications and Compliances

Category	Standard or Description
EC Declaration of Conformity - EMC	<p>Meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:</p> <p>EN 55103 Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use¹. Environment E4 – controlled EMC environment</p> <p>Part 1 Emission EN 55022 Class A radiated and conducted emissions EN 55103-1, Annex A Radiated magnetic field emissions EN 55103-1, Annex B Inrush current</p> <p>Part 2 Immunity IEC 61000-4-2 Electrostatic discharge immunity IEC 61000-4-3 RF electromagnetic field immunity IEC 61000-4-4 Electrical fast transient / burst immunity IEC 61000-4-5 Power line surge immunity IEC 61000-4-6 Conducted RF Immunity IEC 61000-4-11 Voltage dips and interruptions immunity EN 55103-2, Annex A Radiated magnetic field immunity EN 55103-2, Annex B Balanced ports common mode immunity</p> <p>EN 61000-3-2 AC power line harmonic emissions</p> <p>¹ To ensure compliance with the listed standards, any cables attached to this instrument should be well shielded with low impedance connections of the cable shield to conductive housings at each end.</p>
Australia/New Zealand Declaration of Conformity – EMC	<p>Complies with EMC provision of Radiocommunications Act per the following standard(s):</p> <p>AS/NZS 2064.1/2 Class A limits for Industrial, Scientific, and Medical Equipment: 1992</p>
FCC	<p>Radiated and conducted emissions do not exceed the levels specified in FCC 47 CFR, Part 15, Subpart B, for Class A equipment.</p>

Table A-18: Certifications and Compliances (cont.)

Category	Standard or Description
EC Declaration of Conformity – Low Voltage	<p>Compliance was demonstrated to the following specification as listed in the Official Journal of the European Union:</p> <p>Low Voltage Directive 73/23/EEC, amended by 93/69/EEC</p> <p>EN 61010-1:1993 Safety requirements for electrical equipment for measurement control and laboratory use.</p>
U.S. Nationally Recognized Testing Laboratory Listing	UL3111-1 Standard for electrical measuring and test equipment.
Canadian Certification	CAN/CSA C22.2 No. 1010.1 Safety requirements for electrical equipment for measurement, control, and laboratory use.
Additional Compliance	<p>ANSI/ISA S82.02.01 : 1999 Safety standard for electrical and electronic test, measuring, controlling, and related equipment.</p> <p>IEC61010-1/A2: 1995 : Safety requirements for electrical equipment for measurement, control, and laboratory use (first edition).</p>
Installation (Overvoltage) Category	<p>Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:</p> <p>CAT III Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location.</p> <p>CAT II Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected.</p> <p>CAT I Secondary (signal level) or battery operated circuits of electronic equipment.</p>

Table A-19: Certifications and Compliances (cont.)

Category	Standard or Description
Pollution Degree Description	<p>A measure of the contaminates that could occur in the environment around and within a product.</p> <p>Typically the internal environment inside a product is considered to be the same as the external.</p> <p>Products should be used only in the environment for which they are rated.</p> <p>Pollution Degree 1 No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.</p> <p>Pollution Degree 2 Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.</p> <p>Pollution Degree 3 Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.</p> <p>Pollution Degree 4 Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.</p>

Table A-20: Environmental Limits and Use Classification for Safety Certification Compliance

Category	Standard or Description
Temperature, operating	+5 °C to +40 °C
Altitude (maximum operating)	3000 meters
Equipment Type	Test and measuring
Safety Class	Class 1 (as defined in IEC61010-1) – grounded product
Installation (Overvoltage) Category	Overvoltage Category II (as defined in IEC61010-1)
Source Voltage Range	100 VAC to 240 VAC, 50 Hz/60 Hz, single phase
Fuse Rating	Mains fuse is 3.15A, 250V, Fast; Not operator replaceable. Refer servicing to qualified service personnel.
Pollution Degree	Pollution Degree 2 (as defined in IEC61010-1). Note: Rated for indoor use only.

Appendix B: Test Parameters

The error states displayed on the user interface are each the result of making one or more measurements or tests on the incoming transport stream. The tests displayed are derived from the DVB and ATSC standards. Additional proprietary tests are also included.

Some measurements and tests translate directly to an error state; others are the result of a combination of tests. For many of the tests, the user can affect the result by varying parameters that influence the test result, for example, maximum and minimum bit rate values.

This section sets out each of the tests available through the user interface. For each of the tests, the following information is given:

Test Name	Test name.
Standard Applicable	DVB or ATSC.
Standard Equivalent	Source standard.
Description	The condition that causes the test to fail.
Variable Parameters	Parameters which can be varied by the user are available from the Test screen by right-clicking an Error State button and selecting Parameters.... Note that not all tests have user variable parameters.
Config. File Ref.	Configuration File Reference: Cross reference to Configuration file parameter (refer to Appendix C: Configuration File Structure).

All Stream Test

Any Stream Error

Test Name	Any Stream Error
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Stream Parameters					
PID bit rate bin duration (bit rate is over 10 bins)	ms	20	310	100	PS4
PID bit rate bin count for service log	Integer > 0	1	100	10	PS6
PAT/PMT obsolescence count	Integer > 0	5	100	25	PS10
PID reference transition time	ms	200	5000	1000	PS57
Minimum stream bit rate for processing	bit/s	64000	300000000	64000	PS59
Default PID Parameters					
PID bit rate limit and missing test integration test count	Integer > 0	1	60	1	PP1

First Priority

Necessary for decodability (basic monitoring).

1.1 Sync

Test Name	Transport Stream synchronization loss
Standard Applicable	DVB
Standard Equivalent	TR101 290, 1.1, TS_sync_loss
Description	Loss of synchronization with consideration of hysteresis parameters

Variable Parameters

None

1.2 Sync Byte

Test Name	Sync Byte error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 1.2, sync_byte error
Description	Sync_byte not equal to 0x47 (or 0xB8)

Variable Parameters

None

1.3a PAT

Test Name	PAT section maximum repetition interval
Standard Applicable	DVB
Standard Equivalent	TR101 290, 1.3a, PAT_error
Description	PID 0x0000 does not occur at least every 0.5s. A PID 0x0000 does not contain a table_id 0x00, i.e. a PAT. Scrambling_control_field is not 00 for PID 0x0000

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
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Stream Parameters

PAT section maximum repetition interval	ms	50	5000	500	PS8
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1.4 Continuity

Test Name	Continuity Count Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 1.4, continuity_count_error
Description	Incorrect packet order. A packet occurs more than twice. Lost packet.

Variable Parameters

None

1.5a PMT

Test Name	PMT Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 1.5a, PMT_error
Description	Sections with table_id 0x02, (a PMT), do not occur at least every 0.5s on the PID which is referred to in the PAT. Scrambling_control_field is not 00 for all PIDs containing sections with table_id 0x02, (a PMT).

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
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Stream Parameters

PMT section maximum repetition interval	ms	50	5000	500	PS9
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1.6 PID

Test Name	PID Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 1.6, PID_error
Description	Referred PID does not occur for a user specified period.

Variable Parameters

None

Second Priority

Recommended for continuous or periodic monitoring.

2.1 Transport

Test Name	Transport Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 2.1, transport_error
Description	Transport_error_indicator in the TS-Header is set to '1'.

Variable Parameters

None

2.2 CRC

Test Name	CRC Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 2.2, CRC_error
Description	CRC error occurred in CAT, PAT, PMT, NIT, EIT, BAT, SDT or TOT table.

Variable Parameters

None

2.3a PCR Repetition

Test Name	PCR Repetition Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 2.3a, PCR_repetition_error
Description	Time interval between two consecutive PCR values more than 40ms.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
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Default PID Parameters

PCR maximum repetition interval	ms	10	500	40	PP2
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2.3b PCR Discontinuity Indicator

Test Name	PCR Discontinuity Indicator Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 2.3b, PCR_discontinuity_indicator_error
Description	The difference between two consecutive PCR values. $(PCR_{i+1} - PCR_i)$ is outside the range of 0ms to 100 ms without the discontinuity_indicator set.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
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Default PID Parameters

Maximum PCR discontinuity	ms	10	1000	100	PP3
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2.4 PCR Accuracy

Test Name	PID Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 2.4, PCR_accuracy_error
Description	PCR accuracy of selected program is not within ± 500 ns.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
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Stream Parameters

PCR accuracy/jitter history length	Integer > 0			32	PS11
PCR accuracy/jitter integration count	Integer > 0	25	2560	256	PS12

Default PID Parameters

Maximum PCR accuracy error	ns	100	10000	500	PP4
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2.5 PTS

Test Name	PTS Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 2.5, PTS_error
Description	PTS repetition period more than 700ms

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
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Default PID Parameters

Maximum PTS repetition interval	ms	100	5000	700	PP5
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2.6 CAT

Test Name	CAT Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 2.6, CAT_error
Description	Packets with transport_scrambling_control not 00 present, but no section with table_id = 0x01 (a CAT) present. Section with table_id other than 0x01 (not a CAT) found on PID 0x0001).

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
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Stream Parameters

CAT present timer	ms	1000	100000	10000	PS13
CAT obsolescence count	Integer > 0	5	100	25	PS61

DVB Third Priority

Application dependant monitoring

3.1.a NIT Actual

Test Name	NIT Actual Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.1a, NIT_actual_error
Description	<p>Section with table_id other than 0x40 or 0x41 or 0x72 (not an NIT or ST) found on PID 0x0010.</p> <p>No section with table_id 0x40 (an NIT_actual) in PID value 0x0010 for more than 10s.</p> <p>Any two sections with table_id = 0x40 (NIT_actual) occur on PID 0x0010 within a specified value (25 ms or lower).</p>

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Stream Parameters					
NIT actual network minimum section repetition interval	ms	10	100	25	PS14
NIT actual network maximum repetition interval	ms	1000	30000	10000	PS15
NIT actual network obsolescence count	integer > 0	5	100	25	PS16

3.1.b NIT Other

Test Name	NIT Other Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.1b, NIT_other_error
Description	Interval between sections with the same section_number and table_id = 0x41 (NIT_other) on PID 0x0010 longer than a specified value (10 s or higher).

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
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Stream Parameters

NIT other network minimum section repetition interval	ms	10	100	25	PS17
NIT other network maximum repetition interval	ms	1000	30000	10000	PS18
NIT other network obsolescence count	integer > 0	5	100	25	PS19

3.2 SI Repetition

Test Name	SI Repetition Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.2, SI_repetition_error
Description	Repetition rate of SI tables outside of specified limits.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Stream Parameters					
Repetition interval history length	Integer > 0	1	256	32	PS7
TOT minimum repetition interval	Ms	10	100	25	PS41
TOT maximum repetition interval	Ms	5000	120000	30000	PS42
BAT minimum section repetition interval	Ms	10	100	25	PS43
BAT maximum section repetition interval	Ms	2000	50000	10000	PS44
BAT obsolescence count	Integer > 0	5	100	25	PS45
ETT maximum repetition interval	Ms	50	20000	500	PS52
ETT obsolescence count	Integer > 0	5	100	25	PS53
TSDT maximum repetition interval	Ms	1000	30000	10000	PS62
TSDT obsolescence count	Integer > 0	5	100	25	PS63
PCAT obsolescence count	Integer > 0	5	100	25	PS68
PCAT maximum repetition interval	Ms	1000	30000	10000	PS69
LIT obsolescence count	Integer > 0	5	100	25	PS80
LIT maximum repetition interval	Ms	1000	30000	10000	PS81
ERT obsolescence count	Integer > 0	5	100	25	PS82
ITT obsolescence count	Integer > 0	5	100	25	PS84
ERT maximum repetition interval	ms	1000	30000	10000	PS83
ITT maximum repetition interval	ms	1000	30000	10000	PS85

3.4.a Unref PID

Test Name	Unreferenced PID Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.4, Unreferenced_PID
Description	PID (other than PMT_PIDs, PIDs with numbers between 0x00 and 0x1F or PIDs user defined as private data streams) not referred to by a PMT or a CAT within 0.5 s

Variable Parameters

None

3.5.a SDT Actual

Test Name	SDT Actual error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.5.a, SDT_actual_error
Description	Sections with table_id = 0x42 (SDT, actual TS) not present on PID 0x0011 for more than 2 s. Sections with table_ids other than 0x42, 0x46, 0x4A or 0x72 found on PID 0x0011. Any two sections with table_id = 0x42 (SDT_actual) occur on PID 0x0011 within a specified value (25 ms or lower).

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Stream Parameters					
SDT actual minimum section repetition interval	ms	10	100	25	PS20
SDT actual maximum repetition interval	ms	500	30000	2000	PS21
SDT actual obsolescence count	integer > 0	5	100	25	PS22

3.5.b SDT Other

Test Name	SDT Other Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.5.b, SDT_other_error
Description	Interval between sections with the same section_number and table_id = 0x46 (SDT, other TS) on PID 0x0011 longer than a specified value (10 s or higher).

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Stream Parameters					
SDT other minimum section repetition interval	ms	10	100	25	PS23
SDT other maximum repetition interval	ms	1000	30000	10000	PS24
SDT other obsolescence count	integer > 0	5	100	25	PS25

3.6.a EIT Actual

Test Name	EIT Actual Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.6.a, EIT_actual_error
Description	<p>Section '0' with table_id = 0x4E (EIT-P, actual transport stream) not present on PID 0x0012 for more than 2 s.</p> <p>Section '1' with table_id = 0x4E (EIT-F, actual transport stream) not present on PID 0x0012 for more than 2 s</p> <p>Sections with table_ids other than in the range 0x4E - 0x6F or 0x72 found on PID 0x0012.</p> <p>Any two sections with table_id = 0x4E (EIT-P/F, actual transport stream) occur on PID 0x0012 within a specified value (25 ms or lower).</p>

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Stream Parameters					
EIT actual PF minimum section repetition interval	ms	10	100	25	PS26
EIT actual PF maximum repetition interval	ms	500	30000	2000	PS27
EIT actual PF obsolescence count	integer > 0	5	100	25	PS28
EIT actual schedule minimum section repetition interval	ms	10	100	25	PS32
EIT actual schedule maximum repetition interval	ms	2000	120000	10000	PS33
EIT actual schedule obsolescence count	integer > 0	5	100	25	PS34

3.6.b EIT Other

Test Name	EIT Other Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.6.a, EIT_other_error
Description	Interval between sections '0' with table_id = 0x4F (EIT-P, other transport stream) on PID 0x0012 longer than a specified value (10 s or higher). Interval between sections '1' with table_id = 0x4F (EIT-F, other transport stream) on PID 0x0012 longer than a specified value (10 s or higher).

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Stream Parameters					
EIT other PF minimum section repetition interval	ms	10	100	25	PS29
EIT other PF maximum repetition interval	ms	1000	30000	10000	PS30
EIT other PF obsolescence count	integer > 0	5	100	25	PS31
EIT other schedule minimum section repetition interval	ms	10	100	25	PS35
EIT other schedule maximum repetition interval	ms	2000	600000	10000	PS36
EIT other schedule obsolescence count	integer > 0	5	100	25	PS37

3.6.c Event Information Table Present/Following

Test Name	EIT PF Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.6.c, EIT_PF_error
Description	If either section ('0' or '1') of each EIT P/F subtable is present, both must exist. Otherwise EIT_PF_error should be indicated

Variable Parameters

None

3.7 Running Status Table

Test Name	RST Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.7, RST_error
Description	Sections with table_id other than 0x71 or 0x72 found on PID 0x0013. Any two sections with table_id = 0x71 (RST) occur on PID 0x0013 within a specified value (25 ms or lower).

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Stream Parameters

RST minimum section repetition interval	ms	10	100	25	PS38
-----------------------------------------	----	----	-----	----	------

3.8 Time and Date Table

Test Name	TDT Error
Standard Applicable	DVB
Standard Equivalent	TR101 290, 3.8, TDT_error
Description	Sections with table_id = 0x70 (TDT) not present on PID 0x0014 for more than 30s. Sections with table_id other than 0x70, 0x72 (ST) or 0x73 (TOT) found on PID 0x0014. Any two sections with table_id = 0x70 (TDT) occur on PID 0x0014 within a specified value (25 ms or lower).

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Stream Parameters

TDT minimum section repetition interval	ms	10	100	25	PS39
TDT maximum repetition interval	ms	5000	120000	30000	PS40

ATSC (Third Priority)

A/53 Prog Paradigm

Test Name	A/53 Program Paradigm
Standard Applicable	ATSC
Standard Equivalent	Tektronix proprietary
Description	Passes if the current copy of the PSI information conforms to the program paradigm specified in ATSC standard A/53 or explicitly states its non-conformance by setting bit 12 of the program_number to '1'.

Variable Parameters

None

A/65 MGT

Test Name	Master Guide Table
Standard Applicable	ATSC
Standard Equivalent	ATSC A/65, 6.2
Description	The Master Guide Table (MGT) lists version numbers, length in bytes, and PIDs for all of the PSIP tables with the exception of the STT, which works independently from the other tables.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Stream Parameters

MGT minimum section repetition interval	ms	50	2000	150	PS47
MGT obsolescence count	Integer > 0	5	100	25	PS64

Appendix B: Test Parameters - ATSC (Third Priority)

A/65 STT

Test Name	System Time Table
Standard Applicable	ATSC
Standard Equivalent	ATSC A/65, 6.1
Description	The System Time Table (STT) provides the current date and time of day information.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Stream Parameters

STT maximum section repetition interval	ms	250	60000	1000	PS46
-----------------------------------------	----	-----	-------	------	------

A/65 RRT

Test Name	Rating Region Table
Standard Applicable	ATSC
Standard Equivalent	ATSC A/65, 6.4
Description	The Rating Region Table (RRT) carries rating information for multiple geographical regions.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Stream Parameters

RRT maximum section repetition interval	ms	5000	120000	60000	PS49
RRT obsolescence count	Integer > 0	5	100	25	PS66

A/65 VCT

Test Name	Virtual Channel Table
Standard Applicable	ATSC
Standard Equivalent	ATSC A/65, 6.3
Description	The Virtual Channel Table (VCT) contains a list of attributes for virtual channels carried in the Transport Stream.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Stream Parameters

VCT maximum subtable repetition interval	ms	50	3000	400	PS48
VCT obsolescence count	Integer > 0	5	100	25	PS65

A/65 EIT

Test Name	Event Information Table
Standard Applicable	ATSC
Standard Equivalent	ATSC A/65, 6.5
Description	The Event Information Table (EIT) contains information (such as titles or start times) for events on defined virtual channels.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Stream Parameters

EIT maximum repetition interval	ms	50	20000	500	PS50
EIT obsolescence count	Integer > 0	5	100	25	PS51

A/65 Base Pid

Test Name	Base PID
Standard Applicable	ATSC
Standard Equivalent	ATSC A/65
Description	Only the following tables are allowed to be carried on PID 0x1FFB: MGT, CVCT, TVCT, STT and RRT

Variable Parameters

None

PID Tests

Discontinuity

Test Name	Discontinuity Indicator Error
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	The discontinuity_indicator must not be set to '1' in three consecutive transport stream packets of that same PID.

Variable Parameters

None

Bit Rate Tests

Transport Stream Occupancy

Test Name	Transport stream bit rate within limits
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Passes if the bit rate of the transport stream is within the expected limits.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Stream Parameters

Measurement interval for overall bit rate	ms	100	60000	1000	PS1
Minimum overall bit rate	bit/s	64000	300000000	64000	PS2
Maximum overall bit rate	bit/s	64000	300000000	300000000	PS3

PID Occupancy

Test Name	PID bit rate limits violated
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	The bit rate of this PID exceeds the user-set limits.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Default PID Parameters

Minimum PID bit rate	bit/s	0	300000000	0	PP6
Maximum PID bit rate	bit/s	50	300000000	-1 (where -1 means disabled)	PP7

Prog Occupancy

Test Name	Program bit rate limits violated
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	The bit rate of this program exceeds the set limits.

Variable Parameters

None

PID Group Occupancy

Test Name	PID group bit rate limits violated
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	The bit rate of this PID Group exceeds the set limits.

Variable Parameters

None

PID Bit Rate Variability

Test Name	PID Bit Rate Variability
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	PID bit rate variability is a measure of individual PID bit rates over a set period

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Stream Parameters					
PID bit rate bin count for variability	Integer > 0	1	10	3	PS5
Default PID Parameters					
PID bit rate variability integration count	Integer > 0	2	30	10	PP8
PID bit rate variability fraction	Fraction	0	1	0.25	PP9

PCR Tests

PCR Jitter

Test Name	PCR Overall Jitter
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	This test only applies to PIDs that are indicated as PCR_PIDs in a current PMT. Passes if the most recent PCR overall jitter PCR_OJ measurement is less than the limit.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Default PID Parameters					
Maximum PCR overall jitter	ns	250	250000	25000	PP11

PCR Frequency Offset

Test Name	PCR Frequency Offset
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	This test only applies to PIDs that are indicated as PCR_PIDs in a current PMT. Passes if the most recent PCR frequency offset PCR_FO measurement is less than the limit.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Default PID Parameters					
Maximum PCR frequency offset	Hz	200	10000	800	PP12

PCR Drift Rate

Test Name	PCR Drift Rate
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	This test only applies to PIDs which are indicated as PCR_PID in a current PMT. Passes if the average of the most recent PP14 PCR frequency drift rate measurements is less than the limit.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
----------------	------	-----	-----	---------	-------------------

Default PID Parameters

Maximum PCR frequency drift	MHz/s	10	600	75	PP13
PCR frequency drift rate integration count	Integer > 0	1	250	25	PP14

Table Tests

Program Number Consistency

Test Name	PAT/PMT program_number consistency
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Passes if, for all programs listed in the PAT, there is a PMT on the correct program_map_PID whose program_number matches that in the PAT.

Variable Parameters

None

DVB - PAT/SDT Consistency

Test Name	PAT/SDT consistency
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Passes if, for all programs listed in the PAT, there is an entry in the SDT actual_transport_stream subtable whose service_id matches the program_number in the PAT and whose transport_stream_id matches the PAT.

Variable Parameters

None

ATSC - PAT/VCT Consistency

Test Name	PAT/xVCT consistency
Standard Applicable	ATSC
Standard Equivalent	Tektronix proprietary
Description	Passes if, for all programs listed in the PAT, there is an entry in the VCT whose program_number matches that in the PAT and whose channel_TSID matches the PAT.

Variable Parameters

None

ATSC - MGT/EIT -k Presence

Test Name	MGT/EIT-k presence
Standard Applicable	ATSC
Standard Equivalent	Tektronix proprietary
Description	Passes if the current version of the MGT contains entries for table_types EIT-0, EIT-1, EIT-2 and EIT-3 or if the MGT contains no table_type entry for TVCT.

Variable Parameters

None

Table Syntax

Test Name	Table Syntax Check
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	A long list of checks on the reserved bits, lengths, section numbers and indicators of table sections, depending on the severity of the error faults may be tolerated or result in the section being discarded.

Variable Parameters

None

Single Frequency Network

SFN Error

Test Name	Single Frequency Network Error
Standard Applicable	DVB
Standard Equivalent	Tektronix proprietary
Description	Several tests are made on the SFN content when present.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Stream Parameters					
MIP maximum repetition interval	ms	500	3000	1500	PS54
MIP synch time stamp jitter limit	ns	100	20000	300	PS55

Template

Any Template Error

Test Name	Any Template Error
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Indicates the highest state of any template error.

Variable Parameters

None

Template Header Error

Test Name	Template Header Error
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Checks for correct content in the Service section of the Template, including 'transportstreamid', 'networkid', 'originalnetworkid' and 'otherservicesallowed'.

Variable Parameters

None

Template Service Error

Test Name	Template service information is acceptable
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Passes if the current copy of the service information matches the service information template parameters 'constraint', 'serviceType', 'serviceName', 'PcrPid' and 'otherPIDsAllowed'.

Variable Parameters

None

Template PID Error

Test Name	Template PID information is acceptable
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Passes if the program PID information, found in the current copy of the PSI, satisfies the 'PIDs' part of the service information template.

Variable Parameters

None

Template Rating Error

Test Name	Template program rating is acceptable
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Passes if the program rating as found in the current copy of the service information satisfies the 'ratings' part of the service information template.

Variable Parameters

None

Operational Tests**Processing Strained**

Test Name	Processing strained
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Occurs when the monitoring system has to discard some information in order to keep up with events on the Transport Stream; however, monitoring continues.

Variable Parameters

None

Processing Overwhelmed

Test Name	Processing overwhelmed
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	Occurs when, in spite of discarding some information, the monitoring system is unable to keep up with the Transport Stream. Results from the monitoring should be considered unreliable in this state. The monitoring system will recover when conditions improve.

Variable Parameters

None

Service Information Strained

Test Name	Service Information Strained
Standard Applicable	DVB / ATSC
Standard Equivalent	Tektronix proprietary
Description	In the MTM400, received tables are held in a fixed sized database. This is large enough for the majority of streams, but if the stream contains too much SI, some will be discarded and this test will indicate an error. The tables are discarded in a priority order that ensures that analysis is very unlikely to be affected. Once raised the priority will not fall until either the stream is reapplied, or a manual reset of this test is performed.

Variable Parameters

None

PID Tests

The tests in this section are accessed from the PID screen and are applicable on a per PID basis.

Some tests have parameters that can be varied by the user. The parameters are available from the PID screen by right-clicking an Error State button and selecting **Parameters...**

Any PID Error

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
PID bit rate limit and missing test integration count	Integer > 0	1	60	1	PP1

PID Bit Rate

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Minimum PID bit rate	bit/s	0	300000000	0	PP6
Maximum PID bit rate	bit/s	0	300000000	-1	PP7

PCR Repetition

This test applies only to PIDs that are indicated as PCR_PID in the current PMT.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
PCR maximum repetition interval	ms	10	500	40	PP2

PCR Discontinuity

This test applies only to PIDs that are indicated as PCR_PID in the current PMT.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Maximum PCR discontinuity	ms	10	1000	100	PP3

PCR Accuracy

This test applies only to PIDs that are indicated as PCR_PID in the current PMT.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Maximum PCR accuracy error	ns	100	10000	500	PP4

PCR Jitter

This test applies only to PIDs that are indicated as PCR_PID in the current PMT.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Maximum PCR overall jitter	ns	250	250000	25000	PP11

PCR Offset

This test applies only to PIDs that are indicated as PCR_PID in the current PMT.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Maximum PCR frequency offset	Hz	200	10000	800	PP12

PCR Drift Rate

This test applies only to PIDs that are indicated as PCR_PID in the current PMT.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Maximum PCR drift rate	MHz/s	10	600	75	PP13
PCR frequency drift rate integration count	Integer > 0	1	250	25	PP14

PTS Repetition

This test applies only to PIDs that carry an elementary stream expected to contain PTS values.

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
Maximum PTS repetition interval	ms	100	5000	700	PP5

PID Variability

Note that for this test, the multiplex occupancy bars indicate the variability value (0 to 1).

Variable Parameters

Parameter Name	Unit	Min	Max	Nominal	Config. File Ref.
PID bit rate variability integration count	Integer > 0	2	30	10	PP8
PID bit rate variability fraction	fraction	0	1	0.25	PP9

Missing PID

Equivalent to TR101 290, PID_error, 1.6. The test only applies to PIDs referenced in the stream.

Variable Parameters

None

Unreferenced PID

Variable Parameters

None

Continuity

Variable Parameters

None

Discontinuity.

Variable Parameters

None

Appendix C: Configuration File Structure

This appendix provides an overview of the MTM400 configuration file, which allows units to be completely configured or partially updated. If no configuration file is implemented, settings will use default values. Note that configuration files can be uploaded to the unit, but must be made 'active' to have any effect.

The file is presented in XML (Extensible Markup Language) format. XML is a hierarchical language format which can be interpreted by the MTM400 units. It can be edited using a simple text editor such as Microsoft NotePad, although more sophisticated editors are available.

NOTE. *Where a dedicated XML Editor is used, a configuration definition file or model can be downloaded by your browser by typing <http://<mtm400 address>/config.xsd> in the address field.*

XML is formatted using elements and attributes, which are indicated in a document using tags. Tags begin with a '<' and close with a '>'. End tags include a '/' before the name of the element; empty tags include a '/' before the closing '>'. For example, the following section of a configuration file includes three elements: two elements with content, and one empty tag.

```
<LBandSettings Name = "Default">
  <OscillatorFrequency>10600000</OscillatorFrequency>
  <TransponderFrequency>11837000</TransponderFrequency>
  <PolarVolts>0</PolarVolts>
  <SymbolRate>27500000</SymbolRate>
  <ViterbiRate>2</ViterbiRate>
  <ViterbiRateAuto>1</ViterbiRateAuto>
  <Tone22K>0</Tone22K>
  <InvertSpectrum>1</InvertSpectrum>
</LBandSettings>
```

The <LBandSettings Name = "Default"> tag opens the LBandSettings element. The LBandSettings attribute, Name, is set to 'Default'. The LBandSettings element contains a number of discrete elements. This results in a nested structure. Any of the elements can contain further nested elements. The LBandSettings element is closed with the closing tag </LBandSettings>.

Configuration file sections can comprise arrays or 'ever-present' parameters.

- **Arrays** are lists or collections of related parameters, those relating to PIDs for example, and may or may not be present depending on the setup required.

In the extract shown below, an array of disabled events is allocated to PID number 0:

```
<PID Number="0" ForcePresence="0">
<DisabledEvents>0x2004 0x2011 0x3017 0x3028 0x303a 0x3043 0x3044 0x3045 0x3117 0x3118 0x3124
0x3132 0x3133 0x3728</DisabledEvents>
</PID>
```

- **Ever-present** parameters always have current values in the MTM400, for example, <PI1> Interface Selection. They will never be deleted, but may be updated through the configuration file.

Updating

The Update attribute attached to a number of container elements allows members of a group to be completely replaced or partially updated.

For example, in the Programs group, each Program contains three parameters, that is, <PV1>, <PV2> and <PV3>.

- If the Programs Update attribute is set to Absolute (<Programs Update="Absolute">), values included in each Program container will completely replace the current values. Program values not explicitly stated in the configuration file will revert to default values.

Table C-1: Absolute Update - Example

Current Values	Configuration File Values	Updated Values
..... Program 1 PV1 = 98 kbit/s PV2 = 34 Mbit/s PV3 = PMT test disabled Program 2 PV1 = 110 kbit/s PV2 = 100 Mbit/s PV3 = PMT test disabled Program 3 PV1 = 75 kbit/s PV2 = 123 Mbit/s PV3 = PMT test disabled <Programs Update="Absolute"> <Program Number="1"> <PV1>300000</PV1> <PV2>2000000</PV2> <PV3>0</PV3> </Program> <Program Number="3"> <PV1>400000</PV1> <PV2>10000000</PV2> <PV3>1</PV3> </Program> </Programs> Program 1 PV1 = 300 kbit/s PV2 = 2 Mbit/s PV3 = PMT test disabled (Program 2 will use default values.) Program 3 PV1 = 400 kbit/s PV2 = 100 Mbit/s PV3 = PMT test enabled

- If the Programs Update attribute is set to Incremental (<Programs Update="Incremental">), values present in the configuration file will be created or overwrite the current values. Program values that have been previously set, but not included in this configuration file, will remain unchanged. Program values that do not exist in the current setup will be added.

Table C-2: Incremental Update - Example

Current Values	Configuration File Values	Updated Values
..... Program 1 PV1 = 98 kbit/s PV2 = 34 Mbit/s PV3 = PMT test disabled Program 2 PV1 = 110 kbit/s PV2 = 100 Mbit/s PV3 = PMT test disabled Program 3 PV1 = 75 kbit/s PV2 = 123 Mbit/s PV3 = PMT test disabled <Programs Update="Incremental"> <Program Number="1"> <PV1>300000</PV1> <PV2>2000000</PV2> <PV3>0</PV3> </Program> <Program Number="3"> <PV1>400000</PV1> <PV2>10000000</PV2> <PV3>1</PV3> </Program> </Programs> Program 1 PV1 = 300 kbit/s PV2 = 2 Mbit/s PV3 = PMT test disabled Program 2 PV1 = 110 kbit/s PV2 = 100 Mbit/s PV3 = PMT test disabled Program 3 PV1 = 400 kbit/s PV2 = 100 Mbit/s PV3 = PMT test enabled

The Update attribute is not used for 'ever-present' parameters.

As a further example, if the current active configuration contains the following section:

```
<LBandSettings Name = "Default">
    <OscillatorFrequency>1060000</OscillatorFrequency>
    <TransponderFrequency>11837000</TransponderFrequency>
    <PolarVolts>0</PolarVolts>
    <SymbolRate>2750000</SymbolRate>
    <ViterbiRate>2</ViterbiRate>
    <ViterbiRateAuto>1</ViterbiRateAuto>
    <Tone22k>0</Tone22k>
    <InvertSpectrum>1</InvertSpectrum>
</LBandSettings>
```

and it is replaced, using a configuration file, with the following section:

```
<LBandSettings Update = "Absolute" Name = "Default">
    <OscillatorFrequency>355000</OscillatorFrequency>
    <TransponderFrequency>24000</TransponderFrequency>
</LBandSettings>
```

the active configuration will be as follows:

```
<LBandSettings Update = "Absolute" Name = "Default">
    <OscillatorFrequency>355000</OscillatorFrequency>
    <TransponderFrequency>24000</TransponderFrequency>
</LBandSettings>
```

The original section was, in effect, deleted and replaced with the new section.

However, if the original section was replaced with the following section:

```
<LBandSettings Update = "Incremental" Name = "Default">
  <OscillatorFrequency>355000</OscillatorFrequency>
  <TransponderFrequency>24000</TransponderFrequency>
</LBandSettings>
```

the active configuration will be as follows:

```
<LBandSettings Update = "Incremental" Name = "Default">
  <OscillatorFrequency>355000</OscillatorFrequency>
  <TransponderFrequency>24000</TransponderFrequency>
  <PolarVolts>0</PolarVolts>
  <SymbolRate>27500000</SymbolRate>
  <ViterbiRate>2</ViterbiRate>
  <ViterbiRateAuto>1</ViterbiRateAuto>
  <Tone2K>0</Tone2K>
  <InvertSpectrum>1</InvertSpectrum>
</LBandSettings>
```

Note that the original section was modified, but those tags not specified in the updating file were left unchanged.

Defaults

Default values are 'hardwired' into the MTM400; they will be used when no value has been given using a configuration file. However for some elements, for example, <Program>, alternative default values can be supplied. If the defaults are supplied through the configuration file, all subsidiaries of that element will use those defaults unless specific values are given.

<pre><!-- Program Default Parameters --> PV1 = 98 kbit/s PV2 = 34 Mbit/s PV3 = PMT test disabled</pre>	<p>Program default values: all programs will adopt these values unless specific values are given (as below).</p>
<pre><Programs Update="Absolute"> <Program Number="1234"> PV1 = 400 kbit/s PV2 = 100 Mbit/s PV3 = PMT test enabled </Program> </Programs></pre>	<p>Specific program values: these values will be adopted by Program 1234. All other programs will adopt the default values given above.</p>

Configuration File Content

The following sections list all of the parameters that can be used in the MTM400 configuration file.

For each parameter, the following information is given (where relevant):

Path:	The specification of a parameter node by listing the node hierarchy from the top down.
	Comment labels, for example <code><!-- Program parameters --></code> , are included in the configuration file to help orientate the user. These are also included in the path information given here to help the user.
Attribute:	Attributes are name-value pairs which occur inside tags. Attribute values are enclosed in double-quotes, for example <code>"Absolute"</code> .
Child Element:	A list of dependent parameter nodes.
Data Value:	A brief description of the parameter. Information about the format and range of acceptable values is also given where relevant.

An example of a Configuration file is given at the end of the section (see page C-52).

<MTM400Configuration Name = " " > <MTM400Configuration>

Attribute:	Name: Configuration file name, for example 'Tek Test Config'.
Description:	A container for all MTM400 Configuration settings.
Child Elements:	All elements.

<Streams></Streams>

Path:	<code><MTM400Configuration></code> → <code><Streams></code>
Description:	A container for all Stream settings.
Child Elements:	<code><Stream></code>

Interfaces Parameters

<LBand></LBand>

Path: <MTM400Configuration> → <Streams> → <Stream> → <LBand>

Description: A container for all QPSK (L-Band) settings.

Attribute: **Selection:** Use the <LBandSettings> Name attribute to indicate which collection of LBand settings should be activated.

Update: Indicates that existing settings should be either completely replaced (Absolute) or supplemented (Incremental)

Child Elements: <LBandSettings>

<LBandSettings Name=" "></LBandSettings>

Path: <MTM400Configuration> → <Streams> → <Stream> → <LBand> → <LBandSettings>

Description: A container for individual QPSK (L-Band) settings.

Attribute: **Name:** LBand channel name, for example, 'LBand Channel 1'.
Up to 128 L-Band channels can be specified.

Type: Text Range: up to 32 characters

Child Elements: <OscillatorFrequency>, <TransponderFrequency>, <PolarVolts>, <SymbolRate>, <ViterbiRate>, <ViterbiRateAuto>, <Tone22K>, <InvertSpectrum>

<OscillatorFrequency></OscillatorFrequency>

Path: <MTM400Configuration> → <Streams> → <Stream> → <LBand> → <LBandSettings> → <OscillatorFrequency>

Description: The Local Oscillator (LO) frequency of the Low Noise Block (LNB) is dependent on the Transponder frequency and must be such that the difference falls within the input range of the receiver. Typically, these values are 10.6 GHz (Hi-Band) and 9.75 GHz (Lo-Band) when converting from KU band. The values are 5.7 GHz (Hi-Band) and 5.15 GHz (Lo-Band) respectively when converting from C-Band. This information should be confirmed for the specific type of LNBs used.

Data Value: Type: Numeral Unit: Hz

<TransponderFrequency></TransponderFrequency>

Path: <MTM400Configuration> → <Streams> → <Stream> → <LBand> → <LBandSettings> → <TransponderFrequency>

Description: The IF frequency which is used to initialize the L-Band Interface card is calculated as follows:

$$\text{Transponder_Frequency} - \text{LO_Frequency}$$

If you want to specify the IF frequency rather than the individual LO and Transponder frequencies, set the <OscillatorFrequency> to a value of 0 (zero) and specify the required IF frequency under this parameter (<Transponder_Frequency>). If the IF frequency is specified, it must be in the range 0.950 GHz to 2.150 GHz; the tuning increment is 125 kHz.

Data Value: Type: Numeral Unit: Hz

<PolarVolts></PolarVolts>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<LBand> → <LBandSettings> → <PolarVolts>

Description: This parameter selects the polarization by applying 13 V (vertical) or 18 V (horizontal) to the LNB (Low Noise Block). A value of 0 can be used if no voltage is to be applied from this card; that is, the polarization voltage is being supplied from an external source.

Data Value: Type: Numeral Values: 0 = 0 V
1 = 13 V
2 = 18 V

<SymbolRate></SymbolRate>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<LBand> → <LBandSettings> → <SymbolRate>

Description: Symbol rate value

Data Value: Type: Numeral Unit: symbol/s Range: 1 to 45 Msymbol/s

<ViterbiRate></ViterbiRate>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<LBand> → <LBandSettings> → <ViterbiRate>

Description: This is the harmonic fraction and takes one of the values specified. It may be overwritten if <ViterbiRateAuto> is on.

Data Value: Type: Integer Values: 0 = $1/24 = 5/6$
1 = $2/35 = 6/7$
2 = $3/47 = 7/8$

<ViterbiRateAuto></ViterbiRateAuto>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<LBand> → <LBandSettings> → <ViterbiRateAuto>

Description: This flag, values 0 or 1, indicates if the Viterbi Rate will be automatically tracked (0) or not (1).

Data Value: Type: Numeral Values: 0 = Viterbi Rate Auto Off
1 = Viterbi Rate Auto On

<Tone22K></Tone22K>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<LBand> → <LBandSettings> → <Tone22K>

Description: The <OscillatorFrequency> is selected by applying the 22kHz tone.

Data Value: Type: Numeral
Values: 0 = Tone 22K Absent (select Hi-Band)
1 = Tone 22K Present (select Lo-Band)

<InvertSpectrum></InvertSpectrum>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<LBand> → <LBandSettings> → <InvertSpectrum>

Data Value: Frequency spectrum inversion
Type: Numeral Values: 0 = Invert Spectrum Off
1 = Invert Spectrum On

<QAM></QAM>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<QAM>

Description: A container for all QAM (Annexe A) settings.

Attribute: Selection: Use the <QAMSettings> Name attribute to indicate which collection of QAM settings should be activated.
Update: Indicates that existing settings should be either completely replaced (Absolute) or supplemented (Incremental).

Child Elements: <QAMSettings>

<QAMSettings Name=" ">/QAMSettings>

Path: <MTM400Configuration> → <Streams> → <Stream> → <QAM> → <QAMSettings>

Description: A container for individual QAM (Annexe A) settings.

Attribute: QAM channel name, for example, 'QAM 1'. Up to 128 QAM channels can be specified.

Type: Text Range: up to 32 characters

Child Elements: <Frequency>, <SymbolRate>, <TwoLoFrequency>, <Constellation>, <Inversion>, <VControl>, <UncorrectablePacketMode>

<Frequency>/Frequency>

Path: <MTM400Configuration> → <Streams> → <Stream> → <QAM> → <QAMSettings> → <Frequency>

Description: QAM Input frequency.

Data Value: Type: numeral Unit: Hz

<SymbolRate>/SymbolRate>

Path: <MTM400Configuration> → <Streams> → <Stream> → <QAM> → <QAMSettings> → <SymbolRate>

Description: Symbol rate value.

Data Value: Type: numeral Unit: symbol/s Range: 5 to 7 Msymbol/s

<TwoLoFrequency>/TwoLoFrequency>

Path: <MTM400Configuration> → <Streams> → <Stream> → <QAM> → <QAMSettings> → <TwoLoFrequency>

Description: Equal to the Symbol Rate Value plus 36.125 MHz.

Data Value: Type: numeral Range: Hz

<Constellation></Constellation>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<QAM> → <QAMSettings> → <Constellation>

Description: Sets the modulation scheme.

Data Value: Type: Numeral Values: 0 = Constellation 4
1 = Constellation 16
2 = Constellation 64
3 = Constellation 256

<Inversion></Inversion>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<QAM> → <QAMSettings> → <Inversion>

Description: Frequency spectrum inversion.

Data Value: Type: Numeral Values: Invert Spectrum Off = 0
Invert Spectrum On = 1

<BroadcastStandard></BroadcastStandard>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<BroadcastStandard>

Description: Broadcast standard selection; MPEG, DVB, ATSC.

Data Value: Type: Numeral Values: 0 = MPEG
1 = DVB
2 = ATSC

<DvbRegion></DvbRegion>

Path:	<MTM400Configuration> → <Streams> → <Stream> → <DvbRegion>	
Description:	DVB region selection (Only relevant when the DVB <BroadcastStandard> is selected).	
Data Value:	Type: Integer	Values: 0 = DVB 1 = DVB (DTG) 2 = DVB (Nordic) 3 = DVB (Reserved) 4 = DVB (Aus)

<TmccAcquisition></TmccAcquisition>

Path:	<MTM400Configuration> → <Streams> → <Stream> → <TmccAcquisition>	
Description:	TMCC acquisition enable/disable.	
Data Value:	Type: Numeral	Values: 0 = Disabled 1 = Enabled

<MpeAcquisition></MpeAcquisition>

Path:	<MTM400Configuration> → <Streams> → <Stream> → <MpeAcquisition>	
Description:	MPE acquisition enable/disable. This parameter must be disabled, that is, set to 0.	
Data Value:	Type: Numeral	Values: 0 = Disabled 1 = Enabled

<ResetEventsOnSyncAcquired> </ResetEventsOnSyncAcquired>

Path: <MTM400Configuration> → <Streams> → <Stream> → <ResetEventsOnSyncAcquired>

Description: Determines whether alarms for the stream should be reset to green when sync is reacquired after having been lost.

Data Value: Type: Numeral Values: 0 = Disable
1 = Enable

<MonitorRepetitionRates></MonitorRepetitionRates>

Path: <MTM400Configuration> → <Streams> → <Stream> → <MonitorRepetitionRates>

Description: Monitor Stream repetition rates enable/disable.

Data Value: Type: Numeral Values: 0 = Enable
1 = Disable

<PcrAccuracyMode></PcrAccuracyMode>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PcrAccuracyMode>

Description: Select the PCR Accuracy calculation algorithm to be used.

Data Value: Type: Numeral
Values: 0 = Previous Point Differential
1 = Line Fit Differential

<OS1></OS1>

Path: <MTM400Configuration> → <Streams> → <Stream> → <OS1>

Description: Determines how often PID occupancy bitrate maximum and minimum values are written to the stream log.

Data Value: Type: Numeral Unit: s
 Range: 0 to 60000 Default: 60 s

Miscellaneous Stream Parameters

Comment only

<PS58></PS58>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PS58>

Description: Name used in the user interface to identify this Transport Stream.

Data Value: Type: Text

<PS60></PS60>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PS60>

Description: ATSC broadcast type.

Data Value: Type: Numeral Values: 0 = Terrestrial
 1 = Cable
 2 = Either

Stream Integer Parameters

Comment only

<PS2></PS2>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS2>

Description: Minimum transport stream bit rate.

Data Value: Type: Numeral Unit: bit/s
Range: 64kbit/s to 300Mbit/s

<PS3></PS3>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS3>

Description: Maximum transport stream bit rate.

Data Value: Type: Numeral Unit: bit/s
Range: 64kbit/s to 300Mbit/s

<PS5></PS5>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS5>

Description: Packet counting bin count for variability.

Data Value: Type: Numeral Unit: Integer
Range: 1 to 10 Default: 1

<PS6></PS6>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS6>

Description: Packet counting bin count for service log

Data Value: Type: Numeral Unit: Integer
Range: 1 to 100 Default: 1

<PS7></PS7>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS7>

Description: Repetition interval count.
This determines how many repetition intervals are stored for each PID/table combination (in the case of section repetition), PCR PID (in the case of PCR repetition rate) or ES PID (in the case of PTS repetition rate).

Data Value: Type: Numeral Unit: Integer
Default: 32

<PS10></PS10>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS10>

Description: PAT/PMT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS11></PS11>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS11>

Description: PCR accuracy/jitter store count

Data Value: Type: Numeral Unit: Integer
Range: 0 to 1000 Default: 32

<PS12></PS12>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS12>

Description: PCR accuracy/jitter integration count

Data Value: Type: Numeral Unit: Integer
Range: 25 to 2560 Default: 256

<PS16></PS16>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS16>

Description: NIT actual_network obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS19></PS19>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS19>

Description: NIT other_network obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS22></PS22>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS22>

Description: SDT actual_transport_stream obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS25></PS25>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS25>

Description: SDT other_transport_stream obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS28></PS28>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS28>

Description: DVB EIT actual_transport_stream present/following
obsolescence count

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS31></PS31>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS31>

Description: DVB EIT other_transport_stream present/following
obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS34></PS34>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS34>

Description: DVB EIT actual_transport_stream schedule obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS37></PS37>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS37>

Description: DVB EIT other_transport_stream schedule obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS45></PS45>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS45>

Description: BAT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS51></PS51>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS51>

Description: ATSC EIT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS53></PS53>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS53>

Description: ATSC ETT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS55></PS55>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS55>

Description: MIP synchronization_time_stamp jitter limit.

Data Value: Type: Numeral Unit: ns
Range: 100 to 20000 Default: 300

<PS59></PS59>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS59>

Description: Minimum Transport Stream bit rate for availability.

Data Value: Type: Numeral Unit: bit/s
Range: 64kbit/s to 3005Mbit/s

<PS61></PS61>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS61>

Description: CAT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS63></PS63>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS63>

Description: TSDT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS64></PS64>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS64>

Description: MGT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS65></PS65>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS65>

Description: VCT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS66></PS66>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS66>

Description: RRT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS68></PS68>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS68>

Description: PCAT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS70></PS70>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS70>

Description: SDTT obsolescence count.

Data Value: Type: Numeral Unit: Integer
Range: 5 to 100 Default: 25

<PS72></PS72>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Integer Parameters --> → <PS72>

Description: BIT obsolescence count.

Data Value: Type: Numeral Unit: Integer
 Range: 5 to 100 Default: 25

<PS74></PS74>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Integer Parameters --> → <PS74>

Description: NBIT obsolescence count.

Data Value: Type: Numeral Unit: Integer
 Range: 5 to 100 Default: 25

<PS76></PS76>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Integer Parameters --> → <PS76>

Description: NBIT_LINK_INFO obsolescence count.

Data Value: Type: Numeral Unit: Integer
 Range: 5 to 100 Default: 25

<PS78></PS78>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Integer Parameters --> → <PS78>

Description: LDT obsolescence count.

Data Value: Type: Numeral Unit: Integer
 Range: 5 to 100 Default: 25

<PS80></PS80>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS80>

Description: LIT obsolescence count.

Data Value: Type: Numeral Unit: Integer
 Range: 5 to 100 Default: 25

<PS82></PS82>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS82>

Description: ERT obsolescence count.

Data Value: Type: Numeral Unit: Integer
 Range: 5 to 100 Default: 25

<PS84></PS84>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS84>

Description: ITT obsolescence count.

Data Value: Type: Numeral Unit: Integer
 Range: 5 to 100 Default: 25

<PS92></PS92>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Integer Parameters --> → <PS92>

Description: AIT obsolescence count.

Data Value: Type: Numeral Unit: Integer
 Range: 5 to 100 Default: 10

Stream Interval Parameters

Comment only

<PS1></PS1>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS1>

Description: Measurement interval for Transport Stream bit rate.

Data Value: Type: Integer Unit: ms
Range: 0.1 s to 60 s Default: 1000 ms

<PS4></PS4>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS4>

Description: Packet counting bin duration.

Data Value: Type: Integer Unit: ms
Range: 0.1 s to 1.0 s Default: 100 ms

<PS8></PS8>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS8>

Description: PAT section maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 0.05 s to 5.0 s Default: 500 ms

<PS9></PS9>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS9>

Description: PMT section maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 0.05 s to 5.0 s Default: 500 ms

<PS13></PS13>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Interval Parameters --> → <PS13>

Description: CAT present timer.

Data Value: Type: Integer Unit: ms
 Range: 1 s to 100 s Default: 10000 ms

<PS14></PS14>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Interval Parameters --> → <PS14>

Description: NIT actual_network minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
 Range: 10 ms to 100 ms Default: 25 ms

<PS15></PS15>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Interval Parameters --> → <PS15>

Description: NIT actual_network maximum repetition interval.

Data Value: Type: Integer Unit: ms
 Range: 1 s to 30 s Default: 10000 ms

<PS17></PS17>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Interval Parameters --> → <PS17>

Description: NIT other_network minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
 Range: 10 ms to 100 ms Default: 25 ms

<PS18></PS18>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS18>

Description: NIT other_network maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS20></PS20>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS20>

Description: SDT actual_transport_stream minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS21></PS21>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS21>

Description: SDT actual_transport_stream maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 0.5 s to 30 s Default: 2000 ms

<PS23></PS23>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS23>

Description: SDT other_transport_stream minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS24></PS24>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS24>

Description: SDT other_transport_stream maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS26></PS26>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS26>

Description: DVB EIT actual_transport_stream present/following minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS27></PS27>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS27>

Description: DVB EIT actual_transport_stream present/following maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 0.5 s to 30 s Default: 2000 ms

<PS29></PS29>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS29>

Description: DVB EIT other_transport_stream present/following minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS30></PS30>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Interval Parameters --> → <PS30>

Description: DVB EIT other_transport_stream present/following maximum repetition interval.

Data Value: Type: Integer Unit: ms
 Range: 1 s to 100 s Default: 10000 ms

<PS32></PS32>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Interval Parameters --> → <PS32>

Description: DVB EIT actual_transport_stream schedule minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
 Range: 10 ms to 100 ms Default: 25 ms

<PS33></PS33>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Interval Parameters --> → <PS33>

Description: DVB EIT actual_transport_stream schedule maximum repetition interval.

Data Value: Type: Integer Unit: ms
 Range: 2 s to 120 s Default: 10000 ms

<PS35></PS35>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <!-- Stream Interval Parameters --> → <PS35>

Description: DVB EIT other_transport_stream schedule minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
 Range: 10 ms to 100 ms Default: 25 ms

<PS36></PS36>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS36>

Description: DVB EIT other_transport_stream schedule maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 2 s to 600 s Default: 10000 ms

<PS38></PS38>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS38>

Description: RST minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS39></PS39>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS39>

Description: TDT minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS40></PS40>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS40>

Description: TDT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 5 s to 120 s Default: 30000 ms

<PS41></PS41>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS41>

Description: TOT minimum repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS42></PS42>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS42>

Description: TOT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 5 s to 120 s Default: 30000 ms

<PS43></PS43>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS43>

Description: BAT minimum section repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS44></PS44>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS44>

Description: BAT maximum subtable repetition interval.

Data Value: Type: Integer Unit: ms
Range: 2 s to 50 s Default: 10000 ms

<PS46></PS46>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS46>

Description: STT maximum section repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 0.25 s to 60 s Default: 1000 ms

<PS47></PS47>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS47>

Description: MGT maximum section repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 50 ms to 2000 ms Default: 150 ms

<PS48></PS48>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS48>

Description: VCT maximum subtable repetition interval.

Data Value: Type: Numeral Unit: ms
Range: 50 ms to 3000 ms Default: 400 ms

<PS49></PS49>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS49>

Description: RRT maximum section repetition interval.

Data Value: Type: Integer Unit: ms
Range: 5 s to 120 s Default: 60000 ms

<PS50></PS50>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS50>

Description: ATSC EIT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 50 ms to 20 s Default: 500 ms

<PS52></PS52>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS52>

Description: ATSC ETT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 50 ms to 20 s Default: 500 ms

<PS54></PS54>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS54>

Description: MIP maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 0.5 s to 3.0 s Default: 1500 ms

<PS57></PS57>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS57>

Description: PID reference transition time.

Data Value: Type: Integer Unit: ms
Range: 0.2 s to 5.0 s Default: 1000 ms

<PS62></PS62>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS62>

Description: TSDT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS69></PS69>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS69>

Description: PCAT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS71></PS71>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS71>

Description: SDTT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS73></PS73>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS73>

Description: BIT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS75></PS75>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS75>

Description: NBIT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 20000 ms

<PS77></PS77>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS77>

Description: NBIT_LINK_INFO maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS79></PS79>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS79>

Description: LDT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 20000 ms

<PS81></PS81>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS81>

Description: LIT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS83></PS83>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS83>

Description: ERT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS85></PS85>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS85>

Description: ITT maximum repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 30 s Default: 10000 ms

<PS86></PS86>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS86>

Description: SDTT minimum section repetition interval.

Data Value: Type: Integer Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS87></PS87>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS87>

Description: BIT minimum section repetition interval.

Data Value: Type: Integer Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS88></PS88>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS88>

Description: NBIT minimum section repetition interval.

Data Value: Type: Integer Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS89></PS89>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS89>

Description: NBIT_LINK_INFO minimum section repetition interval.

Data Value: Type: Integer Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS90></PS90>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS90>

Description: LDT minimum section repetition interval.

Data Value: Type: Integer Unit: ms
Range: 10 ms to 100 ms Default: 25 ms

<PS91></PS91>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<!-- Stream Interval Parameters --> → <PS91>

Description: VCT maximum section repetition interval.

Data Value: Type: Integer Unit: ms
Range: 9999999.999 s to 999999.999 s
Default: 5000000000 ms

<PS93></PS93>

Path: <MTM400Configuration> → <Streams> → <Stream> → <!-- Stream Interval Parameters --> → <PS93>

Description: AIT minimum section repetition interval.

Data Value: Type: Integer Unit: ms
Range: 1 s to 100 s Default: 10000 ms

Template

Comment only

<PS56></PS56>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PS56>

Child Elements: <TransportStreamId>, <NetworkId>, <OriginalNetworkId>, <OtherServicesAllowed>, <ServiceList>

Description: Container for Service Information Templates.

<TransportStreamId></TransportStreamId>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PS56> → <TransportStreamId>

Description: Match with DVB transport_stream_id in the PAT.

Data Value: Type: Integer

<NetworkId></NetworkId>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PS56> → <NetworkId>

Description: Match with the DVB network_identity in the NIT. Must be omitted for ATSC operation.

<Constraint></Constraint>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PS56> → <ServiceListUpdate> → <Service> → <Constraint>

Description: Specifies whether this service must be present, may be present or must not be present in the PAT.

Data Value: Type: Integer Values: 0 = Must be present
1 = May be present
2 = Must not be present

<ServiceType></ServiceType>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PS56> → <ServiceListUpdate> → <Service> → <ServiceType>

Description: DVB: Match against service_type in SDT service_descriptor, ATSC: Match against service_type in VCT.

Data Value: Type: Integer

<ServiceName></ServiceName>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PS56> → <ServiceListUpdate> → <Service> → <ServiceName>

Description: DVB: Match against service_name in SDT service_descriptor, ATSC: Match against short_name in the VCT.

Data Value: Type: Text Example: 'BBC 1'

<PCRPID></PCRPID>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PS56> → <ServiceListUpdate> → <Service> → <PCRPID>

Description: Match against PCR PID for this service in the PMT.

Data Value: Type: Integer

<OtherPIDsAllowed></OtherPIDsAllowed>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <PS56> → <ServiceListUpdate> → <Service> →
 <OtherPIDsAllowed>

Description: Specifies whether any pids other than those specified in the PID list (see below) are allowed to be present for this service.

Data Value: Type: Boolean

<PIDList Update=" "><PIDList>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <PS56> → <ServiceListUpdate> → <Service> → <PIDList>

Child Elements: <PID>

Description: Container for all PID settings.

<PID Number=" "></PID>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <PS56> → <ServiceListUpdate> → <Service> → <PIDList> →
 <PID>

Attribute: Number: PID identifier.

Child Elements: <Constraint>, <StreamType>, <CADescriptorPresent>,
 <IsScrambled>

Description: Container for individual PID settings.

<Constraint></Constraint>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <PS56> → <ServiceListUpdate> → <Service> → <PIDList> →
 <PID> → <Constraint>

Description: Specifies whether this PID must be present, may be present or must not be present for this service within the PMT. (This is not a test to check whether this PID is being transmitted.)

Data Value: Type: Integer Values: 0 = Must be present
 1 = May be present
 2 = Must not be present

<StreamType></StreamType>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PS56> → <ServiceListUpdate> → <Service> → <PIDList> →
<PID> → <StreamType>

Description Match against stream_type in the PMT.

Data Value: Type: Integer

<CADescriptorPresent></CADescriptorPresent>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PS56> → <ServiceListUpdate> → <Service> → <PIDList> →
<PID> → <CADescriptorPresent>

Description: Specifies whether the CA_descriptor should be present in the PMT for this service, either in the per-program descriptor loop, or in the descriptor loop for this PID.

Data Value: Type: Boolean

<IsScrambled></IsScrambled>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PS56> → <ServiceListUpdate> → <Service> → <PIDList> →
<PID> → <IsScrambled>

Description: Match against the scrambled state of this PID.

Data Value: Type: Boolean

<RatingList></RatingList>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PS56> → <ServiceListUpdate> → <Service> → <RatingList>

Child Elements: <DVBRatingList>, <ATSCRatingList>

Description: Container for all Rating Lists.

<DVBRatingList Update=" " ></DVBRatingList>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <PS56> → <ServiceListUpdate> → <Service> → <RatingList>
 → <DVBRatingList>

Child Elements: <DVBRatingTemplate>

Description: Container for all DVB Rating Templates.

<DVBRatingTemplate Country=" " ></DVBRatingTemplate>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <PS56> → <ServiceListUpdate> → <Service> → <RatingList>
 → <DVBRatingList> → <DVBRatingTemplate>

Attribute: Country: The country_code from the parental_rating_descriptor in the EIT present table for this service, for example, 'FRA'.

Child Elements: <DVBAcceptableValues>

Description: Container for all DVB country-specific ratings.

<DVBAcceptableValues></DVBAcceptableValues>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <PS56> → <ServiceListUpdate> → <Service> → <RatingList>
 → <DVBRatingList> → <DVBRatingTemplate> →
 <DVBAcceptableValues>

Child Elements: <DVBRatingValue>

Description: Container for all DVB country-specific acceptable values.

<DVBRatingValue></DVBRatingValue>

Path: <MTM400Configuration> → <Streams> → <Stream> →
 <PS56> → <ServiceListUpdate> → <Service> → <RatingList>
 → <DVBRatingList> → <DVBRatingTemplate> →
 <DVBAcceptableValues> → <DVBRatingValue>

<ATSCRatingList Update=" " ><ATSCRatingList>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PS56> → <ServiceListUpdate> → <Service> → <RatingList>
→ <ATSCRatingList>

Child Elements: <ATSCRatingTemplate>

Description: Container for all ATSC Rating Lists.

<ATSCRatingTemplate Region=" " ></ATSCRatingTemplate>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PS56> → <ServiceListUpdate> → <Service> → <RatingList>
→ <ATSCRatingList> → <ATSCRatingTemplate>

Attribute: Region: rating_region from the country_advisory_descriptor.

Child Elements: <ATSCAcceptableValues>

Description: Container for all ATSC country-specific ratings.

<ATSCAcceptableValues></ATSCAcceptableValues>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PS56> → <ServiceListUpdate> → <Service> → <RatingList>
→ <ATSCRatingList> → <ATSCRatingTemplate> →
<ATSCAcceptableValues>

Attribute: None

Child Elements: <ATSCRatingValue>

Description: Container for all ATSC country-specific acceptable values.

<ATSCRatingValue></ATSCRatingValue>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PS56> → <ServiceListUpdate> → <Service> → <RatingList>
→ <ATSCRatingList> → <ATSCRatingTemplate> →
<ATSCAcceptableValues> → <ATSCRatingValue>

<PP4></PP4>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PP4>

Description: Maximum PCR accuracy error.

Data Value: Type: Integer Unit: ns
Range: 100 ns to 10000 ns Default: 500 ns

<PP5></PP5>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PIDS> → <PID> → <PP5>

Description: Maximum PTS repetition interval.

Data Value: Type: Integer Unit: ms
Range: 100 ms to 5000 ms Default: 700 ms

<PP6></PP6>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PP6>

Description: Minimum PID bit rate.

Data Value: Type: Integer Unit: bps
Range: 0 bps to 300 Mbps Default: 0

<PP7></PP7>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PP7>

Description: Maximum PID bit rate.

Data Value: Type: Integer Unit: bps
Range: 0 bps to 4294967295 bps
Default: 1

<PP13></PP13>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PP13>

Description: Maximum PCR frequency drift rate.

Data Value: Type: Integer
Range: 10 to 600 Default: 75

<PP14>25</PP14>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PP14>

Description: PCR frequency drift rate integration count.

Data Value: Type: Integer
Range: 1 to 250 Default: 25

PID Groups

<PIDGroups><PIDGroups>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PIDGroups>

Attribute: Update: Indicates that existing settings should be either completely replaced (Absolute) or supplemented (Incremental)

Child Elements: <PIDGroup>

Description: Container for all PID Group settings.

<PIDGroup Number=" " ><PIDGroup>

Path: <MTM400Configuration> → <Streams> → <Stream> → <PIDGroups> → <PIDGroup>

Attribute: Number: Unique PID group number, for example, '1'.

Child Elements: <Name>, <PG1>, <PG3>, <PG3>

Description: Container for individual PID Group settings.

<Name></Name>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PIDGroups> → <PIDGroup> → <Name>

Description: PID Group name.

Data Value: Type: Text Range: 20 characters max.
Example: 'Radio 1 Audio Pids'

<PG1></PG1>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PIDGroups> → <PIDGroup> → <PG1>

Description: A list of PIDs in the group.

Data Value: Type: Space separated integers
Example: 1 16 345 789 1010 1344 2040 8190

<PG2></PG2>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PIDGroups> → <PIDGroup> → <PG2>

Description: Minimum group bit rate.

Data Value: Type: Integer Unit: bps
Range: 0 bps to 155 Mbps

<PG3></PG3>

Path: <MTM400Configuration> → <Streams> → <Stream> →
<PIDGroups> → <PIDGroup> → <PG3>

Description: Maximum group bit rate.

Data Value: Type: Integer Unit: bps
Range: 0 bps to 4294967295 bps

Events

<Events Update=" " ><Events>

Path: <MTM400Configuration> → <Streams> → <Stream> → <Events>

Attribute: Update: Indicates that existing settings should be either completely replaced (Absolute) or supplemented (Incremental)

Child Elements: <Event>

Description: Container for all Event settings.

<Event ID=" " ><Event>

Path: <MTM400Configuration> → <Streams> → <Stream> → <Events> → <Event>

Attribute: ID: Unique event identity. Hex number format, for example, 0x1000

Child Elements: <Enabled>, <AlarmSetting>

Description: Container for individual Event settings.

<Enabled></Enabled>

Path: <MTM400Configuration> → <Streams> → <Stream> → <Events> → <Event> → <Enabled>

Description: Alarm enabled/disabled. The event may still be logged even when disabled.

Data Value: Type: Boolean Values: 0 = Disabled
1 = Enabled

<AlarmSetting></AlarmSetting>

Path: <MTM400Configuration> → <Streams> → <Stream> → <Events> → <Event> → <AlarmSetting>

Description: The Event Alarm Setting element uses a bit mask. A bit mask is a pattern of binary values, each of which is equivalent to a particular alarm output. The 32-bit bit mask, which can represent all of the available alarm outputs, is reduced to a four-byte hex value; this is the value that is used in <AlarmSetting>.

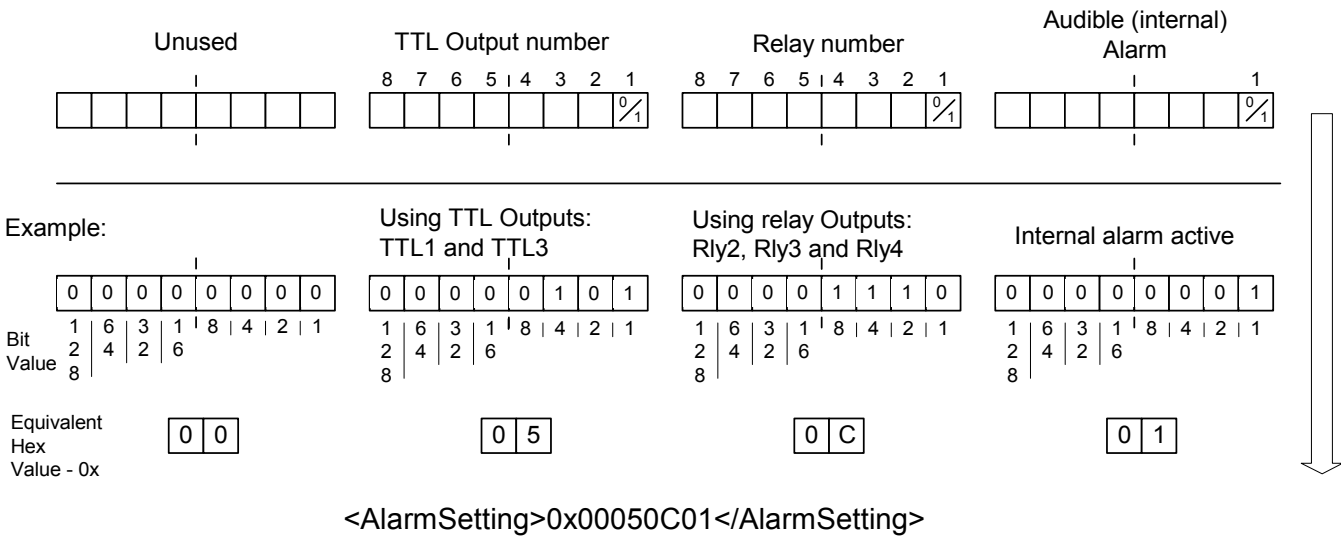


Figure C-41: Alarm Settings

Service Log

<ServiceLog></ServiceLog>

Path: <MTM400Configuration> → <Streams> → <Stream> → <ServiceLog>

Child Elements: <PIDs>

Description: Container for Service Log settings.

<PIDs></PIDs>

Path: <MTM400Configuration> → <Streams> → <Stream> → <ServiceLog> → <PIDs>

Description: A list of PIDs in the group.

Data Value: Type: Space separated integers
Example: 1 16 345 789 1010 1344 2040 8190

Example Configuration File

```
<?xml version="1.0" encoding="UTF-8"?>
<MTM400Configuration Name = "Telefonica SubtableRepetitionTest"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="config.xsd">
  <Streams>
    <Stream Number="1">
      <PI1>1</PI1>
      <LBand Update = "Incremental" Selection = "Default">
        <LBandSettings Name = "Default">
          <OscillatorFrequency>10600000</OscillatorFrequency>
          <TransponderFrequency>11837000</TransponderFrequency>
          <PolarVolts>0</PolarVolts>
          <SymbolRate>27500000</SymbolRate>
          <ViterbiRate>2</ViterbiRate>
          <ViterbiRateAuto>1</ViterbiRateAuto>
          <Tone22K>0</Tone22K>
          <InvertSpectrum>1</InvertSpectrum>
        </LBandSettings>
      </LBand>
      <Qam Update = "Incremental" Selection = "QamADefault">
        <QamSettings Name = "QamADefault">
          <Frequency>474000000</Frequency>
        </QamSettings>
      </Qam>
    </Stream>
  </Streams>
</MTM400Configuration>
```

```

        <SymbolRate>700000</SymbolRate>
        <TwoLoFrequency>43125000</TwoLoFrequency>
        <Constellation>2</Constellation>
        <Inversion>1</Inversion>
    </QamSettings>
</Qam>
<BroadcastStandard>1</BroadcastStandard>
<DvbRegion>0</DvbRegion>
<TmccAcquisition>1</TmccAcquisition>
<MpeAcquisition>0</MpeAcquisition>
<ResetEventsOnSyncAcquired>0</ResetEventsOnSyncAcquired>
<MonitorRepetitionRates>0</MonitorRepetitionRates>
<PcrAccuracyMode>1</PcrAccuracyMode>
<OS1>60000</OS1>

<!-- Stream Miscellaneous Parameters -->
<PS58>sh117</PS58>
<PS60>0</PS60>

<!-- Stream Integer Parameters -->
<PS2>64000</PS2>
<PS3>155000000</PS3>
<PS5>1</PS5>
<PS6>10</PS6>
<PS7>32</PS7>
<PS10>25</PS10>
<PS11>32</PS11>
<PS12>256</PS12>
<PS16>25</PS16>
<PS19>25</PS19>
<PS22>25</PS22>
<PS25>25</PS25>
<PS28>25</PS28>
<PS31>25</PS31>
<PS34>25</PS34>
<PS37>25</PS37>
<PS45>25</PS45>
<PS51>25</PS51>
<PS53>25</PS53>
<PS55>300</PS55>
<PS59>64000</PS59>
<PS61>25</PS61>
<PS63>25</PS63>
<PS64>25</PS64>
<PS65>25</PS65>
<PS66>25</PS66>
<PS68>25</PS68>
<PS70>25</PS70>
<PS72>25</PS72>

```

```
<PS74>25</PS74>
<PS76>25</PS76>
<PS78>25</PS78>
<PS80>25</PS80>
<PS82>25</PS82>
<PS84>25</PS84>
<PS92>10</PS92>

<!-- Stream Interval Parameters -->
<PS1>1000</PS1>
<PS4>100</PS4>
<PS8>530</PS8>
<PS9>500</PS9>
<PS13>10000</PS13>
<PS14>50</PS14>
<PS15>6700</PS15>
<PS17>25</PS17>
<PS18>10000</PS18>
<PS20>50</PS20>
<PS21>1700</PS21>
<PS23>25</PS23>
<PS24>10000</PS24>
<PS26>25</PS26>
<PS27>2100</PS27>
<PS29>25</PS29>
<PS30>10000</PS30>
<PS32>25</PS32>
<PS33>10000</PS33>
<PS35>25</PS35>
<PS36>10000</PS36>
<PS38>25</PS38>
<PS39>50</PS39>
<PS40>30100</PS40>
<PS41>50</PS41>
<PS42>31000</PS42>
<PS43>50</PS43>
<PS44>9000</PS44>
<PS46>1000</PS46>
<PS47>150</PS47>
<PS48>400</PS48>
<PS49>60000</PS49>
<PS50>500</PS50>
<PS52>500</PS52>
<PS54>1500</PS54>
<PS57>1000</PS57>
<PS62>10000</PS62>
<PS69>10000</PS69>
<PS71>10000</PS71>
<PS73>10000</PS73>
```



```

<PS75>20000</PS75>
<PS77>10000</PS77>
<PS79>20000</PS79>
<PS81>10000</PS81>
<PS83>10000</PS83>
<PS85>10000</PS85>
<PS86>25</PS86>
<PS87>25</PS87>
<PS88>25</PS88>
<PS89>25</PS89>
<PS90>25</PS90>
<PS91>999999999</PS91>
<PS93>10000</PS93>

<!-- Program Integer Default Parameters -->
<PV1>0</PV1>
<PV2>4294967295</PV2>
<PV3>1</PV3>

<!-- Pid Group Integer Default Parameters -->
<PG2>0</PG2>
<PG3>4294967295</PG3>

<!-- Pid Integer Default Parameters -->
<PP1>1</PP1>
<PP4>500</PP4>
<PP6>0</PP6>
<PP7>4294967295</PP7>
<PP8>10</PP8>
<PP11>25000</PP11>
<PP12>400</PP12>
<PP13>75</PP13>
<PP14>25</PP14>
<OP1>0</OP1>

<!-- Pid Interval Default Parameters -->
<PP2>40</PP2>
<PP3>100</PP3>
<PP5>700</PP5>

<!-- Pid Other Parameters -->
<PP9>0.000000</PP9>

<PS56>
</PS56>
<PIDS Update = "Incremental">
  <PID Number="0" ForcePresence="0">
    <DisabledEvents>0x3017 0x3028 0x3045 0x3117 0x3728</DisabledEvents>
  </PID>

```

```
<PID Number="110" ForcePresence="0">
  <PP6>576000</PP6>
  <PP7>8513779</PP7>
</PID>
</PIDS>
<Events Update = "Incremental">
  <Event ID="0x1000">
    <Enabled>1</Enabled>
    <AlarmSetting>0x0</AlarmSetting>
  </Event>
  (Events cut for brevity)
  <Event ID="0x6fff">
    <Enabled>1</Enabled>
    <AlarmSetting>0x0</AlarmSetting>
  </Event>
</Events>
<ServiceLog>
  <PIDS></PIDS>
</ServiceLog>
</Stream>
</Streams>
</MTM400Configuration>
```

Warning

The following servicing instructions are for use only by qualified personnel. To avoid injury, do not perform any servicing other than that stated in the operating instructions unless you are qualified to do so. Refer to all safety summaries before performing any servicing.



Appendix D: Networking

A major feature of the MTM400 MPEG Transport Stream Monitor is its versatility with respect to configuration. Although always operating within a client-server architecture, the following configuration options are available:

- The MTM400 can be left unattended. In this setup, the front panel LEDs and any configured external alarms will indicate monitoring test failures.
- The MTM400 can be monitored from a PC over an Ethernet or the Internet using the Web Monitoring Systems Manager (WebMSM) or the Remote User Interface.

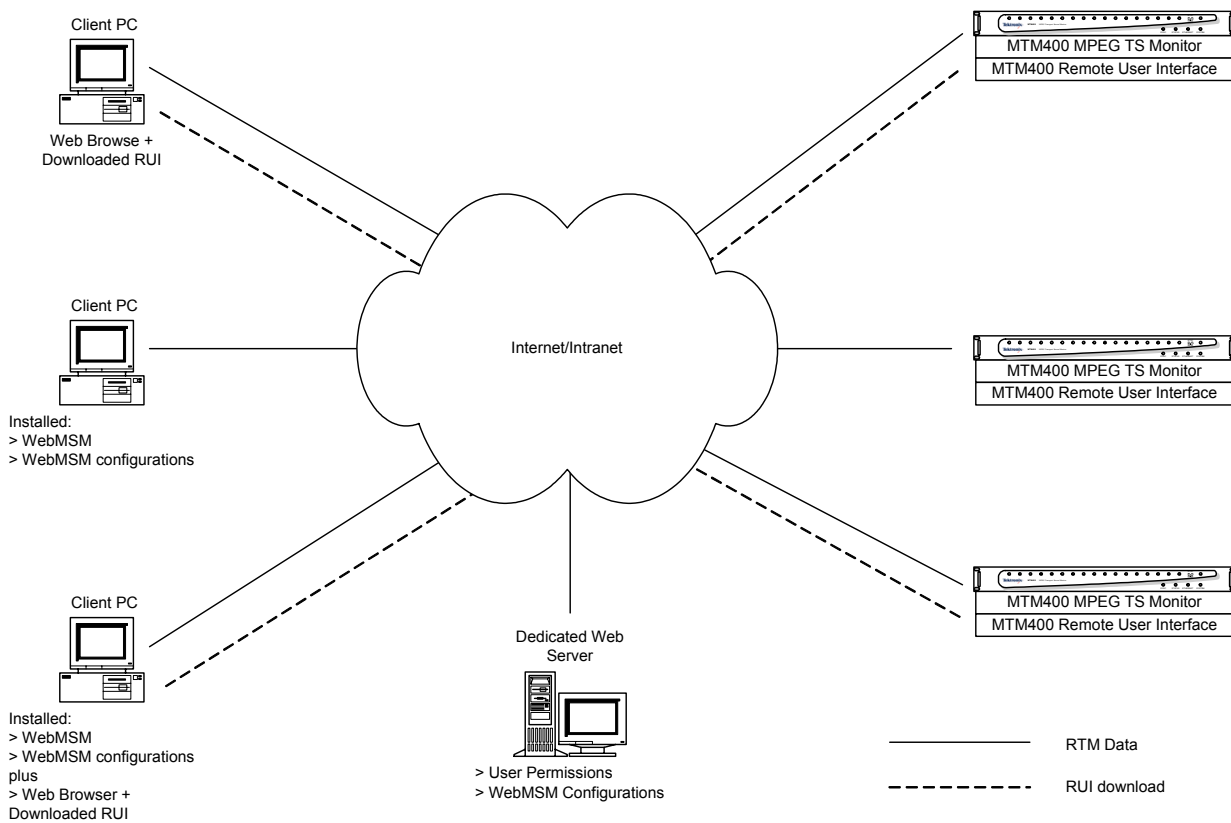


Figure D-1: Network Set-up - Example

- The WebMSM software is installed on a client PC and allows the user to monitor and control the MTM400. The WebMSM can be used to monitor all compatible devices on a network (if the appropriate license is held).

- The Remote User Interface (RUI) software, based on the WebMSM, is downloaded and accessed from the MTM400 using a browser (Microsoft Internet Explorer with Microsoft Virtual Machine installed) of any networked personal computer.

The provided HTML file allows you to invoke the WebMSM by typing in the URL `http://<IP address>` or network identity on a Web Browser on a Client PC. The user permissions are set up to allow an Administrator to have read-write permissions and a Guest to have read-only permissions.

When logging in, the default password for the Administrator is 'tek'; by default, the User does not require a password.

Before proceeding, ensure that the following information is available:

- MTM400 MAC address: `xx-xx-xx-xx-xx-xx`
 - Location 1: rear panel
 - Location 2: main circuit board (internal)
 - Location 3: instrument top cover (optional)
 - MTM400 IP address: `yyy.yyy.yyy.Yyy`
 - Location 1: instrument top cover (optional)
 - MTM400 software license: `zzzz-zzzz-zzzz-zzzz`
 - Location 1: instrument top cover (optional)
-

MAC Address

The Transport Stream Processor board in the MTM400 unit is assigned a unique MAC (Media Access Control) address; this is also used as the unique address of the complete unit. The MAC address is printed on labels attached to the Processor card and the unit.

The MAC address is written as six pairs of hex digits separated by hyphens, for example, '00-01-F8-A7-33-CC'.

The MAC address must be associated with an IP address for the unit to be able to function within a network.

IP Address

An IP address is assigned to each unit and acts as a unique identifier within a network. An IP address will be assigned by the Network Administrator.

IP addresses are written as four groups of up to three digits each separated by periods, for example, '119.183.115.11'.

The IP address must be associated with a MAC address for the unit to be able to function within a network.

New units are shipped with the IP address set to 0.0.0.0; this is because the IP address that will be used by a customer is unknown. In this situation, the steps described below must be followed in order to associate the proper IP address with the MAC address (see *Network Set-Up*, page D-8).

If the IP address is not known, it must be reset to 0.0.0.0 and set up with the new IP address before the unit can be used.

Resetting the IP Address

There are two ways of resetting the IP address of an MTM400 unit to the factory default, that is, '0.0.0.0'.

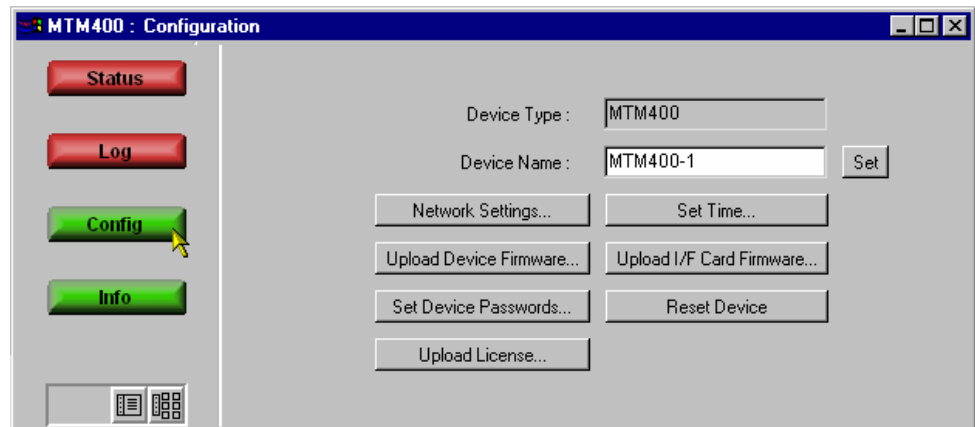
Method 1: If the current IP address of the unit is known, the address can be reset using the MTM400 user interface.

Method 2: If the current IP address of the unit is unknown, the address must be reset by clearing the non-volatile RAM on the Transport Stream Processor board. Clearing the RAM resets all configuration data, including the IP address and the option license, to the factory defaults.

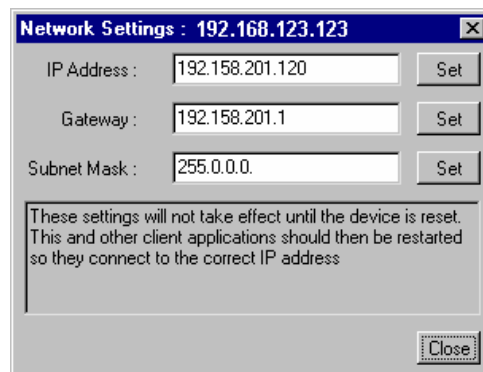
Resetting the IP Address using the User Interface

With the unit powered up and connected to the network in which its current IP address is recognized:

1. Open the user interface, logging on as Administrator.
2. From the Device view Configuration dialog, select **Network Settings...**.



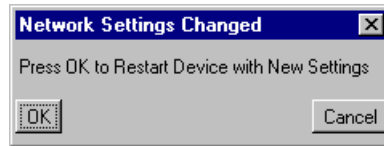
The **Network Settings** dialog is displayed.



3. When the values have been changed as required, select the adjacent **Set** button to store the new settings in the MTM400.

If necessary, obtain the Gateway and Subnet Mask values from the Network Administrator.

4. When the settings have been changed and set and **Close** is selected, the following dialog is displayed:



Select **OK** to restart the device and for the settings to take effect. Select **Cancel** if a restart is not required (the settings will take effect the next time that the unit is restarted).

The unit will be restarted, but the current network will not be able to communicate with it. At this point the unit must be disconnected and moved to its new location. If the new IP address was correctly entered, it should be immediately available on the new network. However, if the new network is unable to communicate with the new unit, you may need to reset the unit and reenter the new IP address, as described below.

Resetting the IP Address to Factory Default

An existing IP address can be reset to the factory default, that is '0.0.0.0', by resetting the battery-backed non-volatile RAM on the Transport Stream Processor board. Clearing the RAM resets all configuration data, including the IP address, to the factory defaults.

Another consequence of clearing the non-volatile RAM is the loss of the licensing information; this license key will need to be reentered after setting the IP address.

Removing the Cover

The unit cover is held in position by 21 x T10 Torx screws.

1. Remove and retain the 21 cover retaining screws.
2. Lift the cover from the unit.

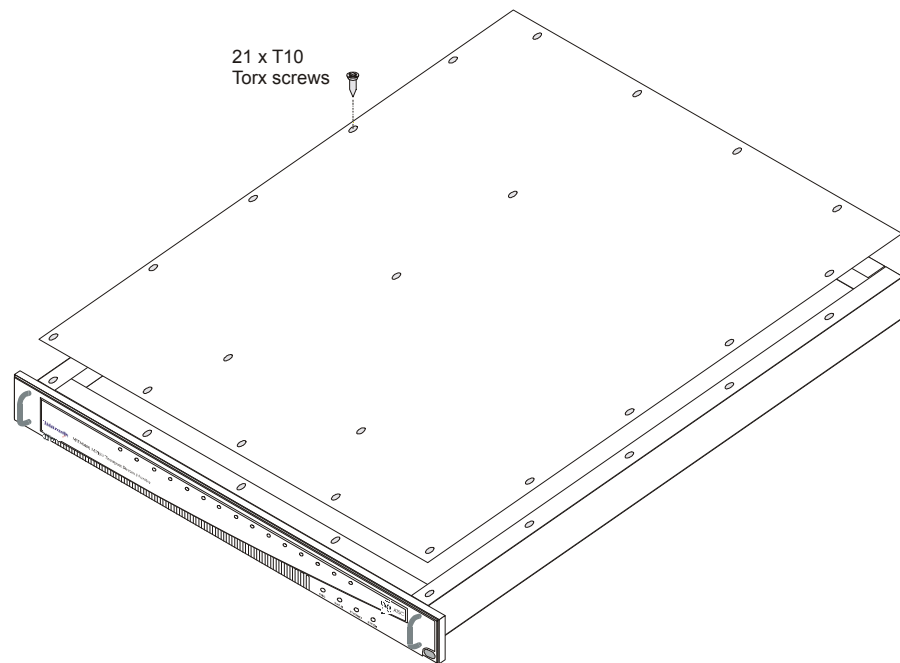


Figure D-2: Removing the Unit Cover

Resetting the Non-Volatile RAM

1. Locate and press the Non-Volatile RAM Reset switch (SW111). This action resets the non-volatile RAM and clears the current configuration. As part of this action, the IP address is reset to 0.0.0.0.

Another consequence of clearing the non-volatile RAM is the loss of the licensing information; the license key must be reentered after setting the IP address.

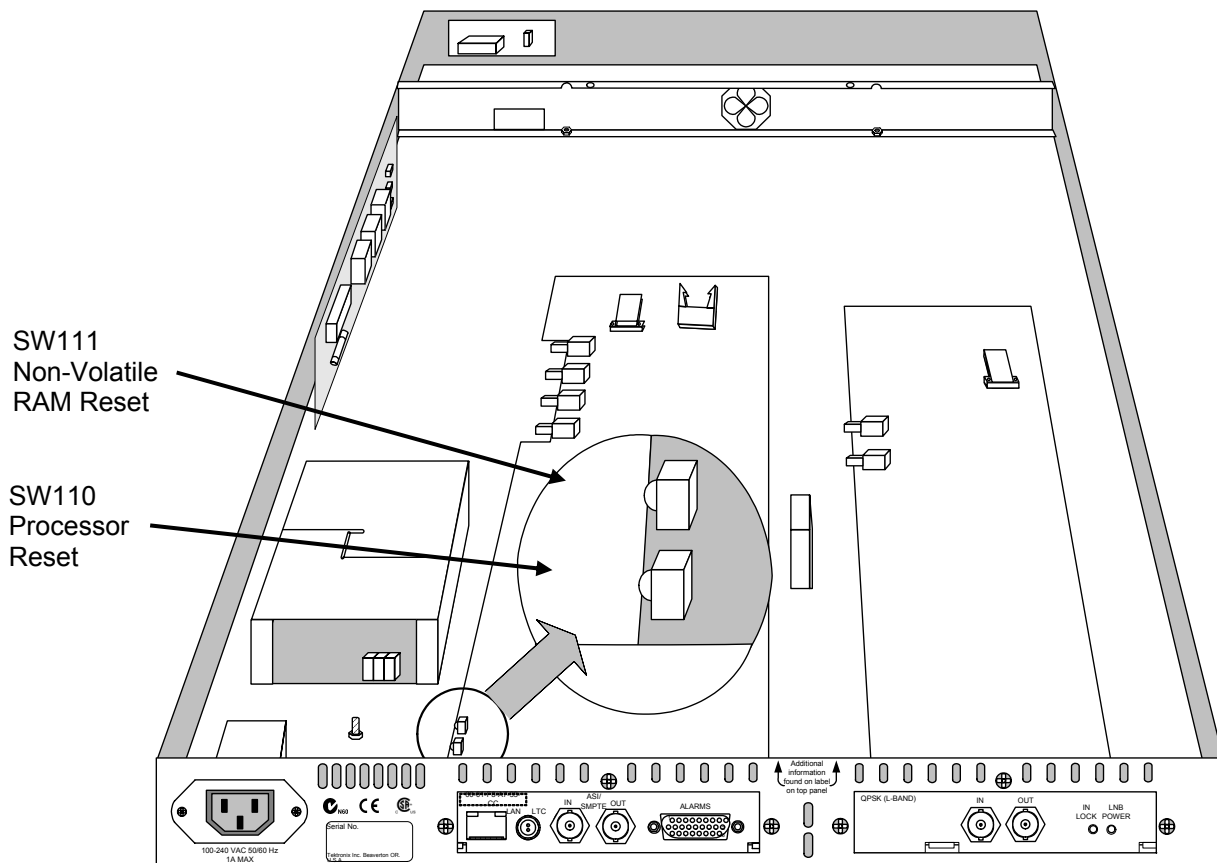


Figure D-3: Transport Stream Processor Reset Switches

Replacing the Cover

1. Before replacing the cover, ensure that all components are in place and that all connections are secure.
2. Replace the 21 cover retaining screws and ensure that they are uniformly tightened.

Proceed with setting up the required IP address.

Network Set-Up

Setting up requires MS-DOS on a client PC, with both the MTM400 and the Client PC powered up and attached to the same Ethernet network. They should also be attached to the same subnet, if present.

Setting Up a Static ARP Entry

Associating the MAC address with the IP address involves making an entry in the ARP (Address Resolution Protocol) table. This is done as follows:

1. On the client PC, open a MS-DOS window (**Start → Programs → Command Prompt**).
2. Enter: `C:\> ARP -s <IP address> <Ethernet MAC address>`
for example, `C:\> ARP -s 192.158.201.19 00-01-F8-A7-33-CC`
3. If the command is successful, the prompt is redisplayed with no message.

Testing the IP Address

4. On the client PC, in the MS-DOS window, enter:
`C:\> ping <IP address>`
for example, `C:\> ping 192.158.201.19`

The response should take the following form:

```
Pinging 192.158.201.19 with 32 bytes of data:
Reply from 192.158.201.19: bytes=32 time<10ms TTL=128
Reply from 192.158.201.19: bytes=32 time<10ms TTL=128
Reply from 192.158.201.19: bytes=32 time<10ms TTL=128
Reply from 192.158.201.19: bytes=32 time<10ms TTL=128
```

The IP set-up is now complete. Close the MS-DOS window. With the IP Address successfully set up, the network settings can be completed (refer to *Resetting the IP Address using the User Interface*, page D-4).

The ARP command cannot be used if the unit already has an IP address - it will only work if the IP is 0.0.0.0 (Refer to *Resetting the IP Address to Factory Default*, page D-5 if the IP address is to be reset).

Network Naming

If the MTM400 is to be accessible by network name rather than IP address, the relationship between the IP address and the network name will need to be set up on a DNS (domain name server) server on the network. This is not the name set up in the Configuration screen. Contact your Network Administrator for help.

When the IP address has been set up, if the MTM400 is to be accessed from a different net or subnet, the Gateway IP address and the Subnet Mask must be set up. Contact your Network Administrator for help. The Gateway IP address and the Subnet Mask values are set up in the **Device Configuration → Network Settings...** dialog. The MTM400 must be restarted in order for the settings to take effect.

Network Latency

It has been noted that where access to a remote MTM400 uses a number of internet/intranet links of varying speeds, the initial RUI download may be initiated successfully, but the process then ceases. The network speed is outside of the control of Tektronix, but it may be possible to alter some of the local network settings to alleviate the problem. Contact Tektronix support.

Appendix E: Hardware Maintenance

This appendix describes the general care and service procedures for the MTM400 MPEG Transport Stream Monitor.

- Preventive Maintenance provides cleaning instructions.
- Rack Mounting
- Interface Changing provides instructions on adding an Interface board.
- Repacking for Shipment gives instructions for packing and shipping the MTM400 MPEG Transport Stream Monitor.

Preventive Maintenance

Protect the unit from adverse weather conditions. The unit is not waterproof.



CAUTION. *To avoid damage to the unit, do not expose it to sprays, liquids or solvents.*

Do not use chemical cleaning agents; they may damage the instrument. Avoid chemicals that contain benzene, toluene, xylene, acetone or similar solvents.

Preventive maintenance mainly consists of periodic cleaning. The unit should be cleaned as needed based on the operating environment.

Cleaning the Exterior

Clean the exterior surfaces of the instrument with a dry, lint-free cloth or a soft-bristle brush. If dirt remains, use a cloth or swab dampened with a 75% isopropyl alcohol solution. A swab is useful for cleaning in narrow spaces around the connectors. Do not use abrasive compounds on any part of the unit.



CAUTION. *Avoid getting moisture inside the unit during external cleaning. Use only enough cleaning solution to dampen the cloth or swab. Use a 75% isopropyl alcohol solution as a cleanser. To rinse repeat the same process using a cloth dampened with de-ionized water.*

Rack Mounting



CAUTION. *Efficient cooling will be maintained in a rack-mounted unit if the air temperature at all intake air vents (inside the rack) does not exceed 40 °C.*



WARNING. *To avoid fire hazard, the MTM400 must be installed in the rack only as specified, and proper ventilation must be maintained*

The MTM400 can be mounted in a standard 19-inch equipment rack.

The chassis components of the rack slides are attached during manufacture as shown in the diagram below:

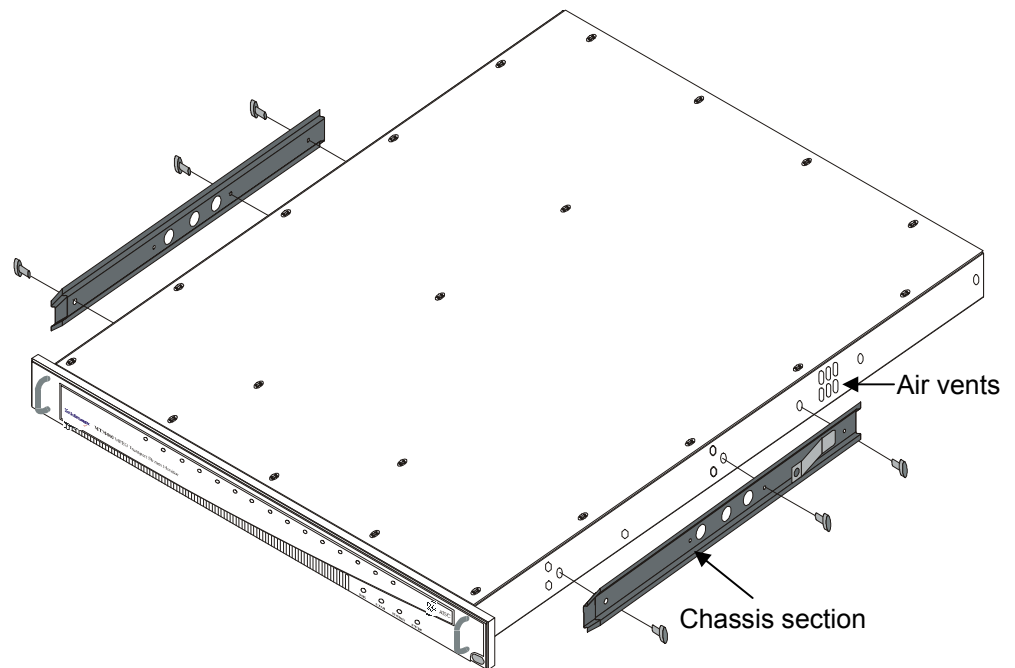


Figure E-1: Chassis Section Rack Slides



CAUTION: *If the right slide (shown) is replaced for any reason, it must not obstruct the adjacent air vents.*

The rack mounted sections are fitted as shown in the diagram below:

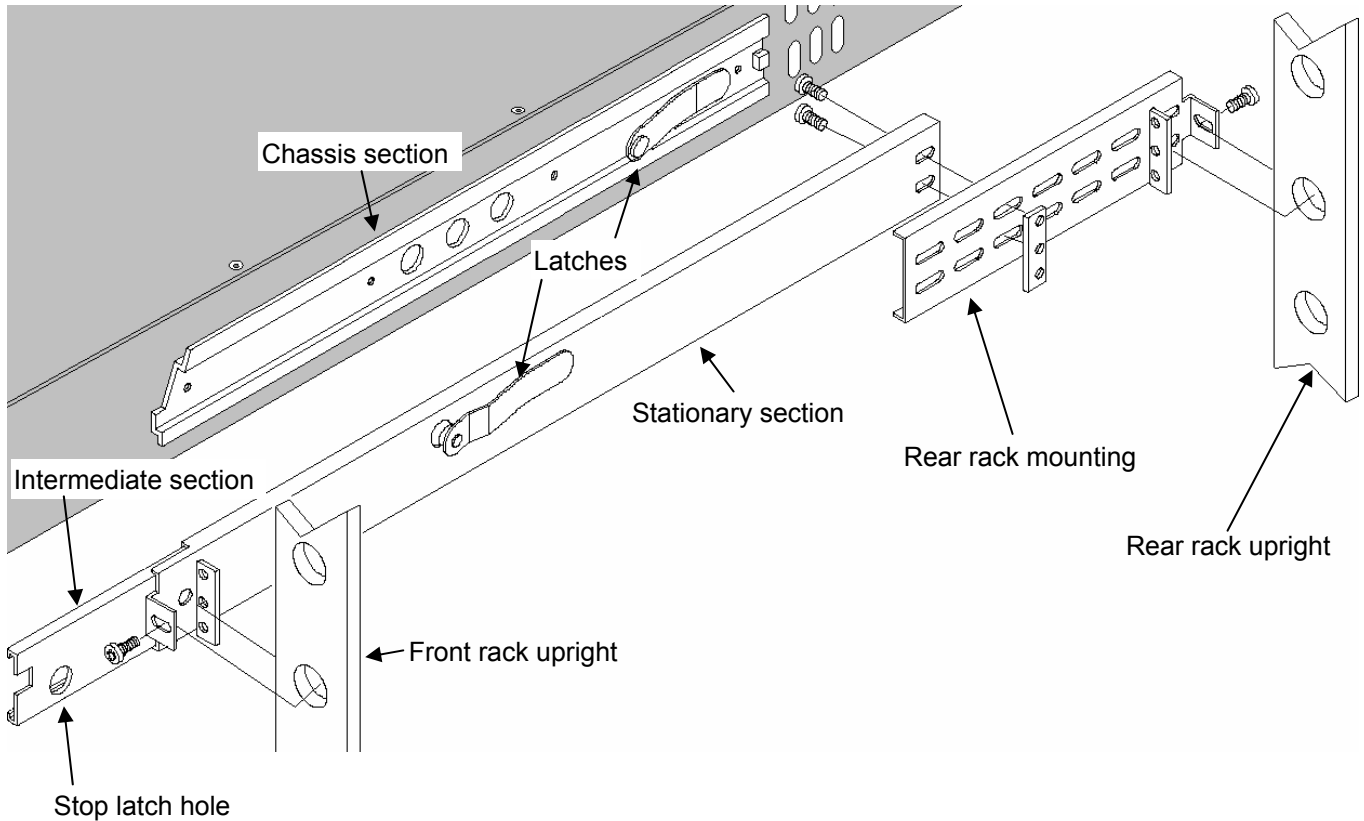


Figure E-2: Rack Mounted Sections

The Chassis section is already installed on the unit. The position of the rear rack mounting can be adjusted to suit the depth of the rack. Approximately six inches of clearance is required between the rear panel of the unit and any rear cabinet panel to allow for connector space and adequate air circulation.

Installing the MTM400 Unit

Refer to Figure E-3 to install the unit in the rack.

1. Pull the slide-out track section to the fully extended position.
2. Insert the MTM400 chassis sections into the slide-out sections.
3. Press the stop latches and push the unit toward the rack until the latches snap into their holes.
4. Press the stop latches again and push the unit fully into the rack.
5. Tighten the front panel retaining screw.

Removing the MTM400 Unit

Refer to Figure E-3 to remove the unit from the rack.

1. Loosen the front panel retaining screw and pull the unit out until the stop latches snap into the holes.
2. Press the stop latches and remove the unit.

When removing the unit from the rack, be sure to disconnect all cabling.

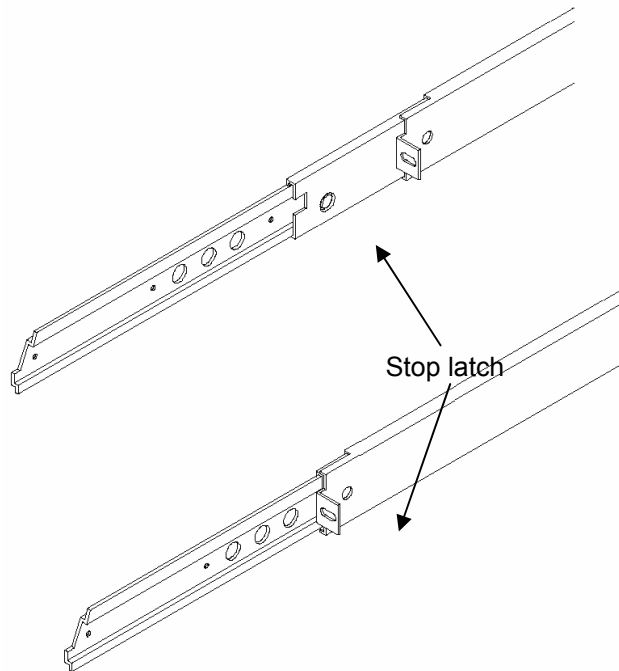


Figure E-3: Installing or Removing the Rack Slides

Rack Adjustments

After installation, if not properly adjusted, the slide tracks may bind. To adjust the tracks, slide the instrument out about 10 inches, slightly loosen the screws holding the tracks to the front rails, and allow the tracks to seek an unbound position. Retighten the screws and check the tracks for smooth operation by sliding the instrument in and out of the rack several times.

Once the instrument is in place within the rack, tighten the knurled retaining screw to fasten it securely into the rack.

Rack Slide Maintenance

The slide-out tracks do not require lubrication. The dark grey finish on the tracks is a permanent, lubricated coating.

Removing and Replacing an Interface Board

The following procedure describes access to and replacement of the Interface board.

A range of interface boards is available for the MTM400; contact Tektronix for a full list of those available. The principles involved in removing and replacing an interface board is similar; any differences in the procedure are indicated in the following paragraphs.



WARNING. *To avoid personal injury or damage to the unit do not operate without covers.*

*Disconnect power to the unit before removing the covers or panels.
Do not operate this product with covers or panels removed.*



CAUTION. *Only qualified personnel should perform this procedure. Read the Service Safety Summary and the General Safety Summary before performing this procedure.*

The following tools are recommended when removing and replacing MTM400 Interface board.

- An anti-static wrist-strap for safe handling of components containing static sensitive devices. It is advisable to wear the wrist-strap for all MTM400 maintenance activity.
- A screwdriver with T10, T15, and T20 Torx tips to remove the unit cover and module mounting screws

All connectors are polarized; they will only fit into their respective socket in one way. Do not use unnecessary force.

Accessing the Components. To access the replaceable components, the MTM400 must be disconnected and removed to a suitable working area.

The unit cover is held in position by 21 x T10 Torx screws.

Removing the Cover

1. Remove and retain the 21 cover retaining screws.
2. Lift the cover clear of the unit.

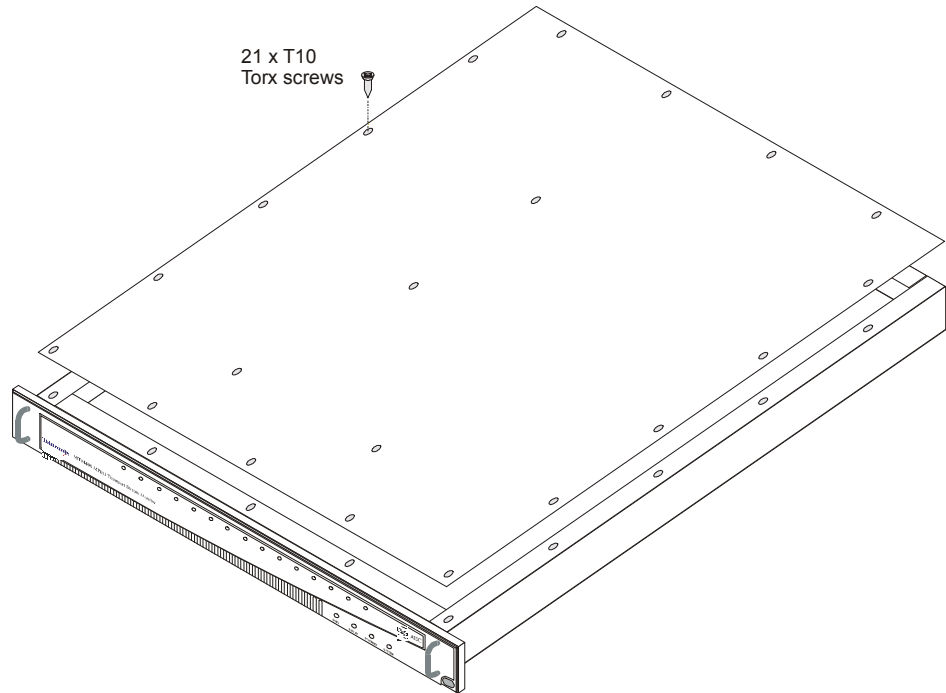


Figure E-4: Removing the Unit Cover

The Interface board is mounted on the right side of the MTM400 unit when viewed from the front.

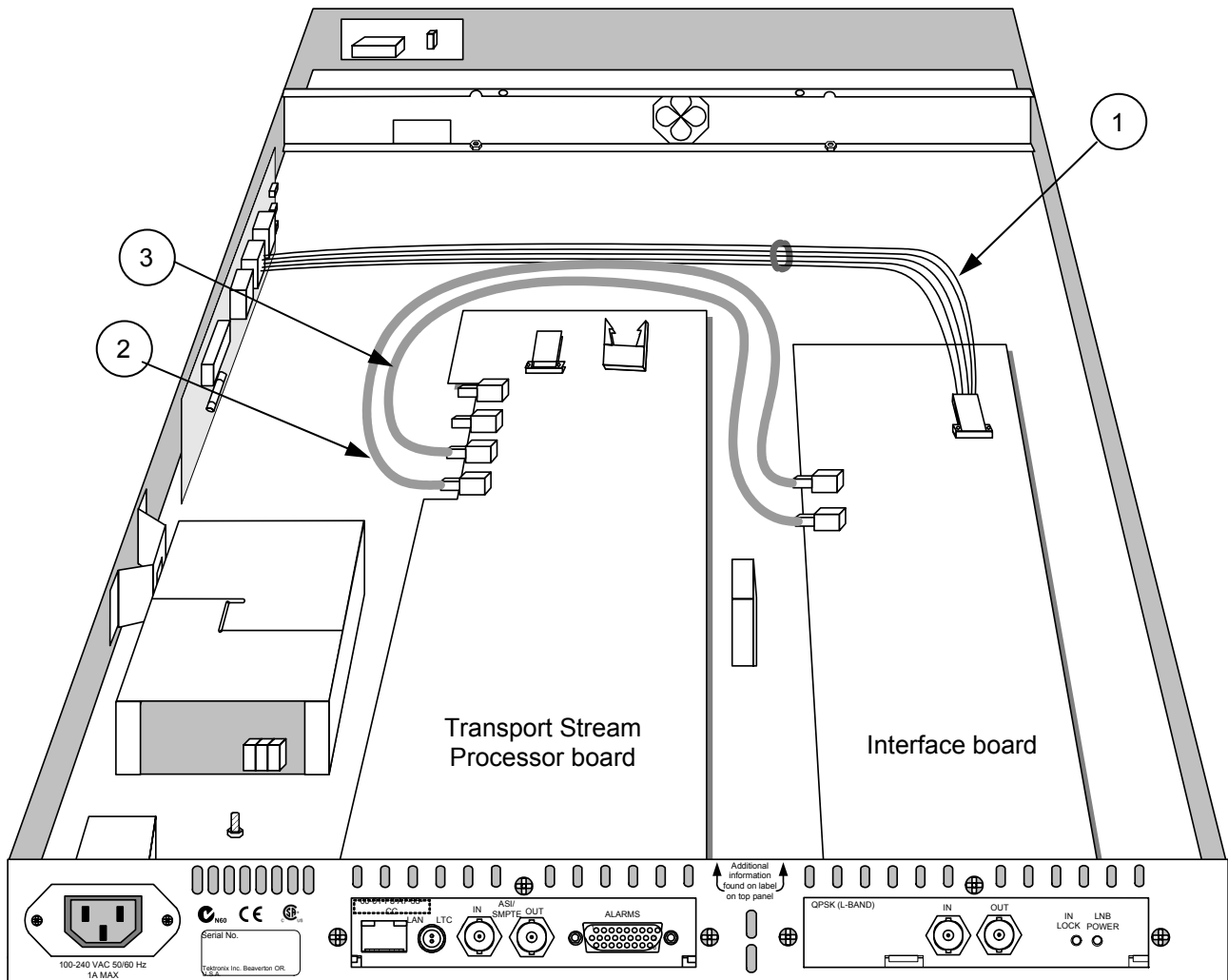


Figure E-5: Interface Board Position and Connections

Table E-3: Interface Boards Connections

Key	From Interface Board	To	Function
1	Connector Identity: P1 8 wires	Power Distribution board Connector Identity: J7 8-way wire	Power
2	Connector Identity: O/P Miniature coaxial	TS Processor board Connector Identity: I/P A Miniature coaxial	Data (serializer)
3	Connector Identity: I/P Miniature coaxial	TS Processor board Connector Identity: O/P A Miniature coaxial	Data (serializer)

The interface board is retained using four screws in the body of the board. Three screws also secure the end-plate to the rear panel. All screws are fitted with locking washers.

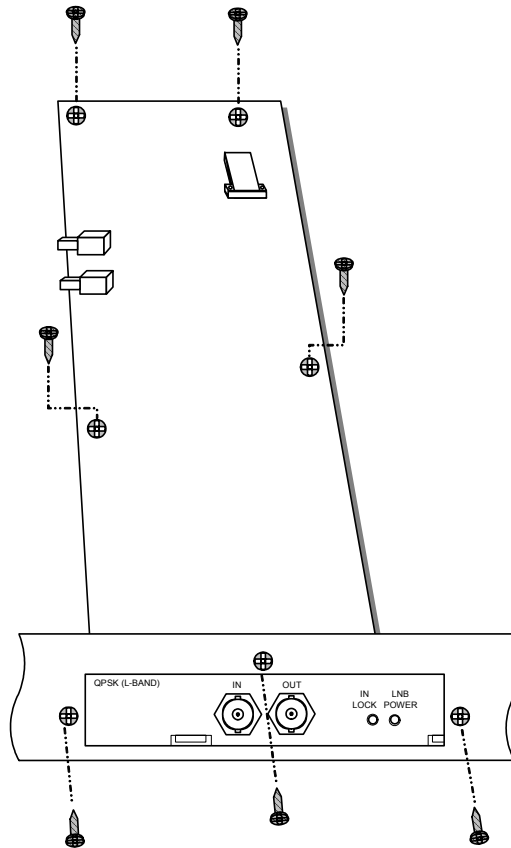


Figure E-6: Interface Board Mounting

Three connectors are mounted on the board (excluding the rear panel connectors) (refer to *Table E-3: Interface Boards Connections*).

Installing an Interface Board

3. If an interface board has not been previously installed in the unit, a blank cover is fitted in the rear panel. Before installing the board, undo the three retaining screws and remove the blank cover.
4. Place the board in the unit.
5. Line up the mounting points and replace the seven retaining screws (four on the board, three in the rear panel).
6. Reconnect the connectors (refer to *Table E-3: Interface Boards Connections*).

Replacing the Cover

7. Before replacing the cover, ensure that all components are in place and that all connections are secure.
8. Replace the 21 cover retaining screws and tighten them uniformly.

Selecting the Interface

9. The Interface board will be detected and initialized when the MTM400 unit is switched on. Before the interface board can be used, it must be selected through the user interface and an input provided. (Refer to *Configuration Screen*, page 3-67).

Battery Maintenance

A pair of Lithium batteries are mounted on the Transport Stream Processor board. They provide power to the backup circuits when mains power is off. Under normal circumstances, the shelf life of the batteries is in excess of five years.

The following precautions must be observed when replacing and handling the batteries.

- Batteries must only be replaced with the correct Tektronix part (see *Appendix A: MTM400 Specifications, Table A-14: Transport Stream Board Batteries*).
- *Both* batteries must always be replaced.
- Batteries must be disposed of in accordance with local regulations.

Replacing the Batteries. The batteries are mounted on the Transport Stream Processor board. It is only necessary to remove the top panel to gain access to the batteries.



WARNING. *To avoid personal injury or damage to the unit do not operate without covers.*

Disconnect power to the unit before removing the covers or panels.

Do not operate this product with covers or panels removed.



CAUTION. *Only qualified personnel should perform this procedure. Read the Service Safety Summary and the General Safety Summary before performing this procedure.*

Note. When the batteries are exhausted or removed, all configuration information will be lost, including the network address. The network installation procedure will have to be repeated (see Appendix D: Networking). It is also recommended that the configuration information is saved, since this will also be 'lost' (see MTM400 Configuration Files, page 3-76).

1. Remove the top panel (see *Accessing the Components*, page E-5).

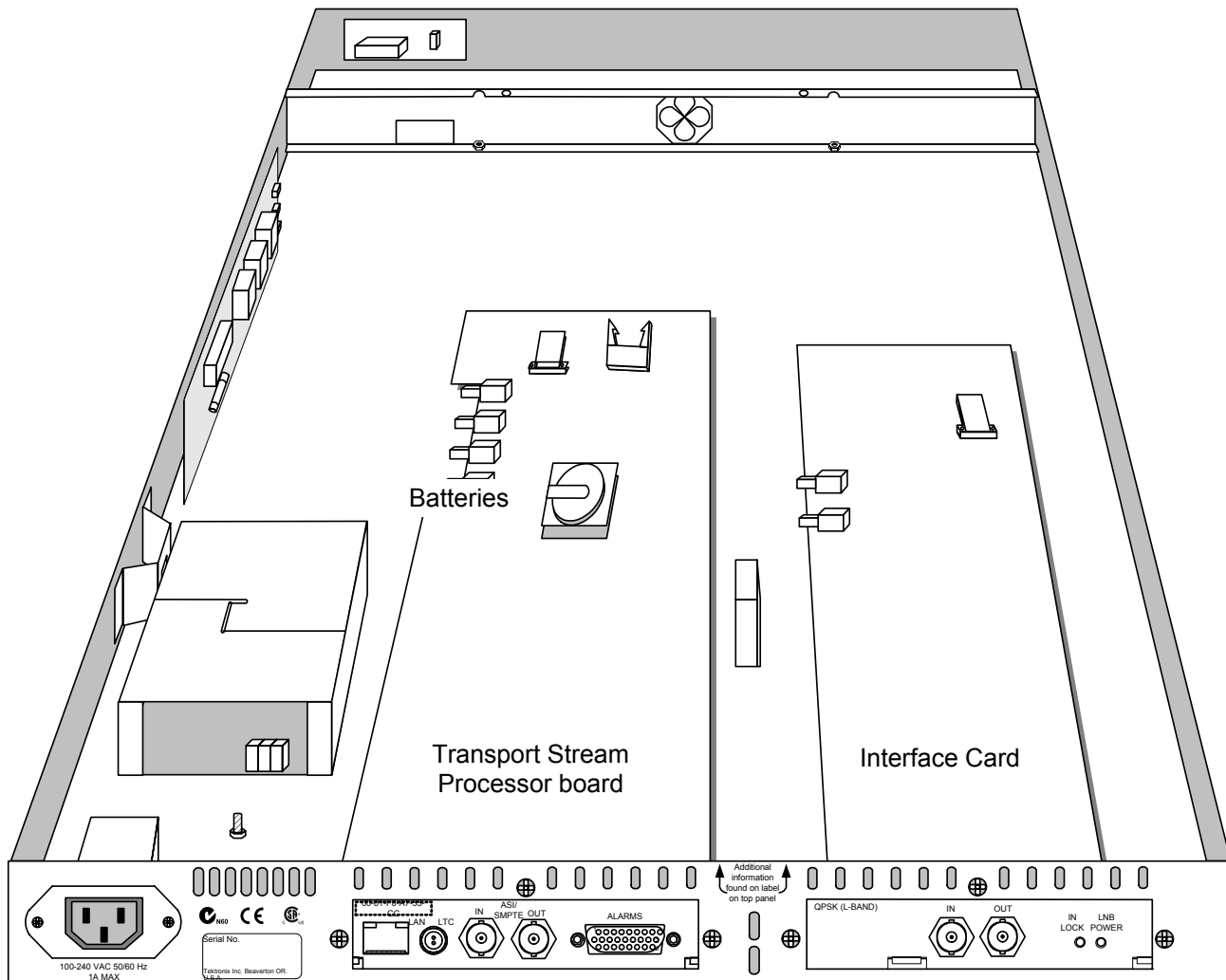


Figure E-7: Battery location

2. The batteries are held in a battery holder by a metal clip. Slide the batteries out of the holder.



CAUTION. *Dispose of the batteries in accordance with local regulations.*

Use only the specified battery. (See Table A-13).

3. Replace the batteries. The positive symbol (+) should be uppermost.



4. Replace the top panel (see *Replacing the Cover*, page E-9).
5. Reconnect the unit (see *Electrical Installation*, page 1-6) and apply power.
6. Reinststate the network identity of the unit (see *Appendix D: Networking*).
7. If required, reinststate the configuration information (see *MTM400 Configuration Files*, page 3-76).

Repacking for Shipment

If an instrument is to be shipped to a Tektronix field office for repair, attach a tag to the instrument showing the following:

- Owner's name and address
- Serial number
- Description of the problem(s) encountered and/or service required.

The MTM400 MPEG Transport Stream Monitor is shipped in cartons designed to provide it with the maximum protection. If you ship the instrument subsequently, you will need to use these cartons, the spacer pads, the protective bag, and the instrument support inserts to provide adequate protection.



CAUTION. *Tektronix cannot honor the instrument's warranties if the MTM400 arrives at the service center in a damaged condition. The unit must be packed in its original carton (and its supporting packaging material) or in such a way as to provide similar protection.*

To prevent the loss of your instrument's warranties, Tektronix strongly recommends that you use an MTM400 MPEG Transport Stream Monitor shipping carton (that is in good condition) when you ship your instrument to another location or when you return the instrument to a Tektronix service center for repair.

New packaging material is available from Tektronix. To obtain these items, contact your nearest Tektronix office or representative.



Glossary and Abbreviations

Glossary and Abbreviations

Program and Service: In this manual the terms program and service are interchangeable.

ARIB	Association of Radio Industries and Businesses
ASI	Asynchronous Serial Interface
ATSC	Advanced Television Systems Committee
BAT	Bouquet Association Table
BER	Bit Error Rate
CAT	Conditional Access Table
CRC	Cyclic Redundancy Check
CSV	Comma Separated Values
CVCT	Cable Virtual Channel Table
DNS	Domain Name Server
DVB	Digital Video Broadcasting
EIT	Event Information Table
EMM	Entitlement Management Message
ETT	Extended Text Table
EVM	Error Vector Magnitude
GMT	Greenwich Meantime
GPSI	General Purpose Serial Interface
ISA	Integrated Systems Architecture
ISDB	Integrated Services Digital Broadcasting
LNB	Low Noise Block
MER	Modulation Error Ratio
MGT	Master Guide Table
MHEG	Multimedia and Hypermedia Experts Group
MPEG	Moving Picture Experts Group
NIT	Network Information Table

PAT	Program Association Table
PCI	Peripheral Component Interconnect
PCR	Program Clock Reference
PID	Packet Identifier
PMT	Program Map Table
PSIP	Program and System Information Protocol (ATSC)
PTS	Presentation Time Stamp
QAM	Quadrature Amplitude Modulation
QPSK	Quaternary Phase-Shift Keying (also known as Quadrature Phase-Shift Keying)
RRT	Rating Region Table
RTM	Real-Time Monitor
RUI	Remote User Interface
SDT	Service Description Table
SI	Service Information (DVB)
SMC	Sub Miniature Connector
SMPTE	Society of Motion Picture and Television Engineers
SNMP	Simple Network Management Protocol
SSI	Synchronous Serial Interface
STT	System Time Table
TEF	Transport Error Flag
TMCC	Transmission and Multiplexing Configuration Control (ISDB-S)
TOT	Time Offset Table
TSDT	Transport Streams Description Table
TVCT	Terrestrial Virtual Channel Table
TVRO	Television Receive Only
UTC	Coordinated Universal Time
VCT	Virtual Channel Table
XML	Extensible Markup Language



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