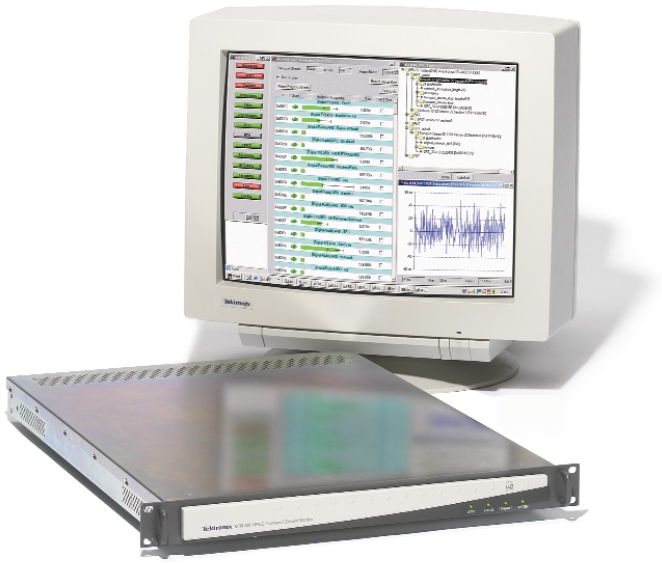
MPEG Transport Stream Monitor

MTM400



MTM400 single-stream MPEG transport stream monitor.

Technical Overview

The MTM400 is a real-time MPEG transport stream monitor. Together with the WebMSM MPEG Measurement Manager remote control and monitoring software*1, the MTM400 provides a complete solution for transmission monitoring of MPEG transport streams.

The MTM400 uses a single transport stream processor board packaged in a 1RU rackmount chassis to provide monitoring of a transport stream at data rates up to 155 Mbps*2 based on a single board MPEG transport stream analysis platform. The MTM400 uses the combination of complex custom FPGA technology with the latest embedded processor to provide a powerful and flexible transport stream analysis engine. The platform is used to provide an extended confidence monitoring product that, with the addition of software options, provides diagnostic monitoring capabilities. The confidence monitor provides the key MPEG tests; this reduced level of functionality and cost enables widespread deployment throughout a transmission network, facilitating rapid fault isolation. The diagnostic monitoring options provide more in-depth analysis of the MPEG transport stream including recording capability, PSI, SI, PSIP and ARIB analysis and service plan or template tests. Additionally, optional QPSK and QAM interfaces allow the MTM400 to receive RF inputs and demodulate the transport stream to provide measurements on the health of the stream. Deployed at key network nodes, the MTM400 equipped as a diagnostic monitor enables the cause of faults to be pinpointed and solved.

*1 Separate data sheet is available.

*2 Maximum transport stream bit rate is dependent on transport stream content and depth of analysis being performed. Depth of stream analysis is handled gracefully if SI/PSIP max content is exceeded to ensure critical measurements continue to be performed.

Features & Benefits

Monitor Key Measurements According to the Latest DVB Standard With Real-time 24x7 Monitoring of TR 101 290 First, Second and Third Priority Parameters

Remotely Monitor and Control All Units in a Monitoring Network From a Central Control Point via Industry-standard SNMP Using WebMSM Application*1

Review Quantitative Results of Transport Stream Health via Error Logging

Monitor Contribution and Primary Distribution Feeds at Data Rates up to 155 Mbps

Complete Solution for All MPEG Formats with MPEG-2, DVB, ATSC and ARIB Support

Complete Solution for DVB and ATSC Formats due to Included ASI and SMPTE310M Interfaces

Confidence Monitoring at the RF Layer and MPEG Transport Stream Monitoring of the Broadcast Signal with Optional QPSK and QAM Interfaces

Embedded Solution Provides a High-Reliability System that Enables Unattended 24x7 Operation

User-configurable Alarms Allow Activation of Relay and TTL Outputs by Any Test Performed

Clock Synchronization to either LTC Input or SNTP Enable Monitoring System Event and Alarm Reporting to be Accurate to Broadcast Network Time

Small 1RU Chassis

Applications

DTTV Distribution

DTTV Contribution and Primary Distribution

Local Cable Headend

DTH or Network Operator Satellite Uplink Facility

*1 Separate data sheet is available.

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Flexible and Upgradeable

The MTM400 provides a flexible solution with an upgrade path, including diagnostic monitoring features that enable customers to build a cost-effective monitoring system to suit their individual requirements. Diagnostic capability can be added to the key monitoring points where transport streams are manipulated while extended confidence monitoring probes can be installed throughout the network:

- Triggered recording enables problems to be captured and analyzed in greater depth using other tools such as the Tektronix MPEG Test System
- PSI/SI/PSIP/ARIB SI Analysis and repetition rate graphing allows broadcasters to determine that the system information is present and correct in the transport stream
- Template testing checks a number of key parameters to ensure that the transport stream has been constructed as the broadcaster intended. These parameters include the Transport Stream ID and Network ID, the number programs in the multiplex, that each program has all of its components (Video, Audio, Data, Teletext, Subtitles) and Conditional Access (CA) status
- Bit rate testing determines whether PIDs, programs, services or user-defined groups of PIDs are within user-definable limits to ensure correct multiplex operation. Tektronix-proprietary PID variability test gives indication of PID bit rate variation to assess effects of statistical multiplexing
- In-depth PCR analysis with graphical results views enable timing and jitter measurements to be made to ensure correct operation of the network
- Service logging enables verification of service level agreements to ensure that contractual obligations are met

Applications

DTTV (Digital Terrestrial Television) Distribution

The MTM400 can be used for DTTV distribution at transmitter sites with a small number of transport streams that are not manipulated at the MPEG level. The signal is received from the primary distribution network and modulated. Key attributes are as follows:

- Unattended operation
- Extended confidence monitoring
- Network of monitoring units linked to a central operations center

DTTV Contribution and Primary Distribution

The MTM400 can be used for DTTV contribution and primary distribution at local or national program and operation centers where a large number of transport streams are manipulated at the MPEG level. Key attributes are as follows:

- Extended confidence and diagnostic level monitoring
- Unattended operation
- Central control and visibility of a large number of monitoring units

Local Cable Headend

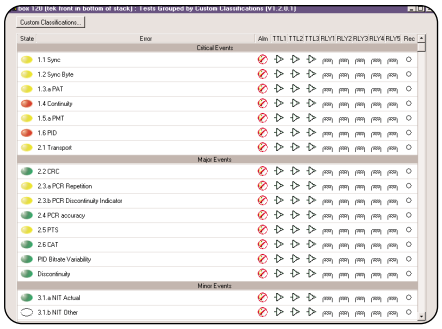
The MTM400 can be used at local cable headend, sites with a large number of transport streams that are not manipulated at the MPEG level, although the level of manipulation varies significantly between systems. Many local headends receive the signal from the primary headend via a distribution network. The local headend may only re-modulate the signal. The cost of monitoring equipment and the operators' commitment to quality are major issues that impact the decision to purchase monitoring equipment. Key attributes are as follows:

- Unattended operation
- Extended confidence monitoring
- Cost of monitoring equipment
- Network of monitoring units linked to a central operations center

DTH or Network Operator Satellite Uplink Facility

The MTM400 can be used at DTH or network operator satellite uplink facilities, sites where many transport streams are collected, possibly multiplexed and then modulated for uplinking. This is often the final stage the signal can be monitored before being viewed by the customer. Key attributes are as follows:

- Many streams monitored at one location
- Low cost per stream required
- Diagnostic capability required where transport stream is modified at uplink site, otherwise confidence monitoring



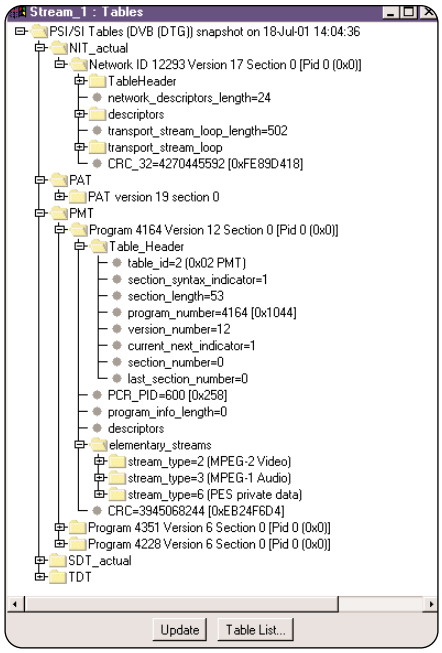
▶ *MTM400 stream testing.*

Measurement Functions

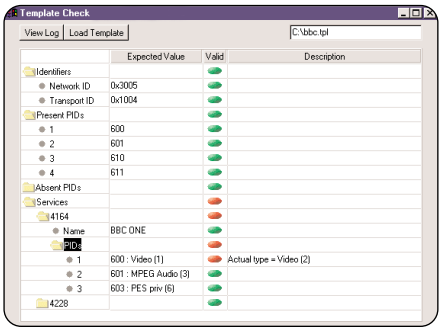
MTM400 Extended Confidence Monitor in Standard Configuration

- MPEG-2, DVB and ATSC supported
- TR 101 290 Priority 1, 2 and 3 measurements except T-STD buffer model in accordance with the techniques specified in TR 101 290
- Bit rate measurement in accordance with the methodology specified in TR 101 290 MGB2
- Maximum input transport stream bit rate up to 155 Mbps*[2]
- SFN measurements according to TR 101 290
- Packet size detection
- Error log
- Status of all tests and measurements available via SNMP MIB

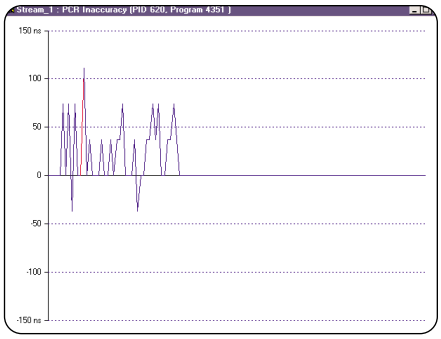
*[2] Maximum transport stream bit rate is dependent on transport stream content and depth of analysis being performed. Depth of stream analysis is handled gracefully if SI/PSIP max content is exceeded to ensure critical measurements continue to be performed.



▶ *MTM400 SI tables.*



▶ *MTM400 template testing.*



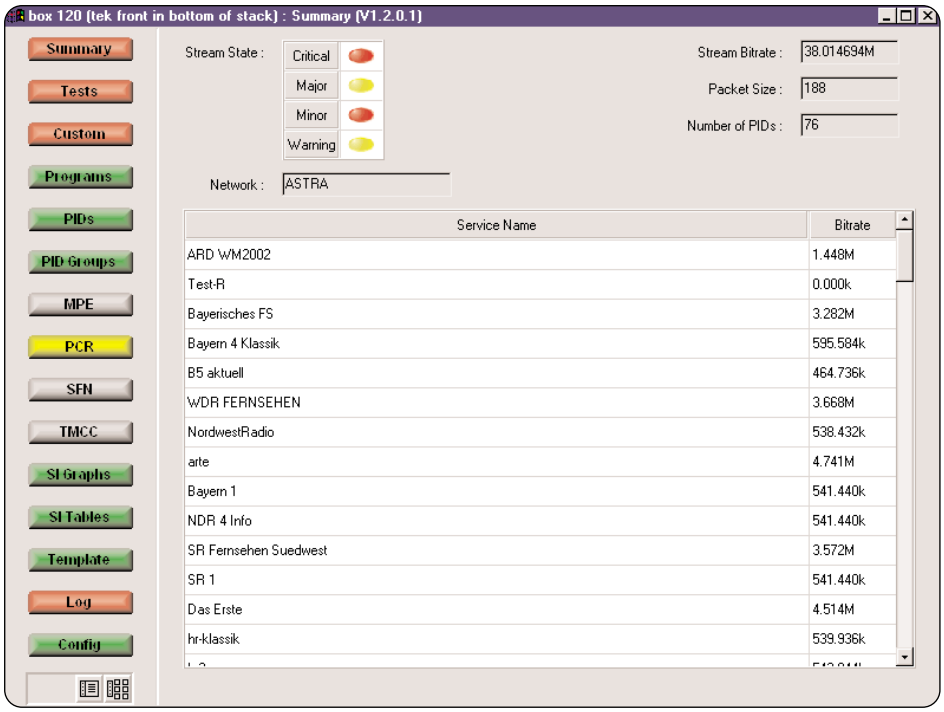
▶ *MTM400 PCR inaccuracy analysis.*

Diagnostic Monitoring Options

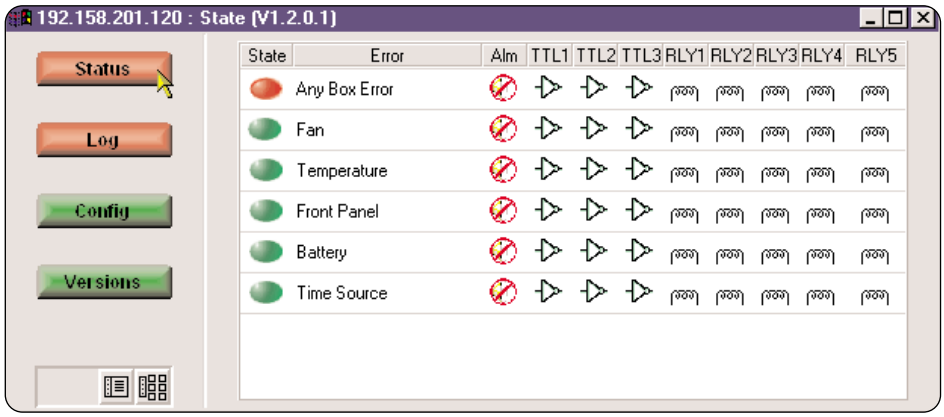
- Triggered recording with user definable pre-triggered buffering and 200 MB available storage
- PSI/SI/PSIP/ARIB SI analysis and repetition rate graphing. Transport stream structure view with ability to drill down to examine tables and service contents plus real-time graphical representation of table repetition rates
- Template testing (for user-defined service plan testing). User definable tests with scheduled template updating
- Bit rate testing on a per PIDs, program or user defined groups of PIDs basis
- In-depth PCR analysis with graphical results views:
  - PCR_OJ (overall jitter)
  - PCR_AC (accuracy)
  - PCR_FO (frequency offset)
  - PCR_DR (drift rate)
  - Arrival interval
- Service logging of configurable set of parameters at user definable intervals

Graphical User Interface

The Remote User Interface (RUI) software is supplied with each MTM400. It is accessed via a web browser (Microsoft Internet Explorer with Microsoft Virtual Machine installed) on any networked personal computer. The RUI is a Java applet downloaded from the MTM400 and runs on Internet Explorer. The interface initially displays a main status view with menu buttons to access either stream status summary or device status summary. The stream status summary provides the ability to access all available tests and measurements licensed for the unit.



▶ *The Remote User Interface software is pre-installed on the MTM400.*



▶ *The device status summary displays hardware status of the MTM400 including fan status and temperature, etc.*

▶ Characteristics

Power Requirements

Power Consumption (max) – 40 VA.

Voltage – 100 V to 260 V (switchable).

Frequency – 45 Hz to 65 Hz.

Monitoring

Data Rate

Maximum Data Rate – 155 Mbps*[1].

Minimum Data Rate – 250 kbps.

*[1] Maximum transport stream bit rate is dependent on transport stream content and depth of analysis being performed. Stream analysis is handled gracefully if SI/PSIP max content is exceeded to ensure critical measurements continue to be performed.

Environmental

Temperature

Specification ENVL-0018 Atmospherics Equipment Operating Procedures

Operating – 5 °C to 40 °C.

Nonoperating – –10 °C to 60 °C.

Humidity

Specification ENVL-0018 Atmospherics Equipment Operating Procedures

Operating – 10% to 95% RH, noncondensing.

Nonoperating – 10% to 50% RH, noncondensing.

▶ TR 101 290 Tests and Measurements

1st Priority Measurements	2nd Priority Measurements	3rd Priority Measurements
1.1 Ts_sync_loss	2.1 Transport error	3.1a NIT_actual_error
1.2 Sync_byte_error	2.2 CRC_error	3.1b NIT_other_error
1.3a PAT_error_2	2.3a PCR_repetition_error	3.2 SI repetition error
1.4 Continuity_count_error	2.3b PCR_discontinuity_ indicator_error	3.4a Unreferenced PID
1.5a PMT_error_2	2.4 PCR_accuracy_error	3.5a SDT_actual_error
1.6 PID_error	2.5 PTS_error	3.5b SDT_other_error
	2.6 CAT_error	3.6a EIT_actual_error
		3.6b EIT_other_error
		3.6c EIT_PF_error
		3.7 RST_error
		3.8 TDT_error

Altitude

Specification ENVL-0018 Atmospherics Equipment Operating Procedures

Operating – 0 to 5000 m.

Nonoperating – 0 to 12000 m.

Random Vibration

Specification ENVL-0058 Dynamics Qualifications

Nonoperating – 5 to 500 Hz, G_{RMS}=2.22.

Electromagnetic Compatibility

Meets EN55103 electromagnetic environment E4.

Safety

Meets 73/23/EEC, EN610101-1, UL3111-1 and CAN/CSA22.2 No. 1010-1-92, IEC61010-1.

▶ Physical Characteristics

MTM400

Dimensions	mm	in.
Height	44	1.73
Width	430	17.13
Depth	600	23.62

Weight	kg	lbs.
Net	9.0	19.84
Shipping	12.0	26.46

MECHANICAL

Required Clearance	mm	in.
Top	0	0
Bottom	0	0
Left side	Standard 19" rackmount	
Right Side	Standard 19" rackmount	
Front	Clearance for handles and connectors required	
Rear	Clearance for handles and connectors required	

▶ Ordering Information

MTM400

Single-stream extended confidence monitor packaged in 1RU chassis.

Includes: 1RU chassis fitted with transport stream processor card, manual, rackmount brackets, US mains lead, CD-ROM.

Options

Opt. 01 – Triggered recording capability up to 200 MB.

Opt. 02 – Transport stream service information analysis (PSI/SI/PSIP/ARIB view).

Opt. 03 – Template testing (for user-defined service plan testing).

Opt. 04 – In-depth PCR analysis with graphical result views.

Opt. 05 – Bit rate testing functionality.

Opt. 06 – Service logging.

Opt. QA – QAM Annex A interface

Opt. QP – QPSK interface.

Service

Opt. R3 – Repair service three years.

Opt. R5 – Repair service five years.

Power Plug Options

Opt. A0 – US plug 115 V, 60 Hz.

Opt. A1 – European plug 220 V, 50 Hz.

Opt. A2 – UK plug 240 V, 50 Hz.

Opt. A3 – Australia plug 240 V, 50 Hz.

Opt. A4 – N. American plug 240 V, 50 Hz.

Opt. A5 – Switzerland plug 220 V, 50 Hz.

Opt. A6 – Japanese plug 110/120 V, 60 Hz.

Opt. A10 – China plug, 50 Hz.

Opt. A99 – No power cord.

Field Upgrade Kits

MTM4FQA – Field upgrade kit to add QAM Annex A Interface to an existing probe.

MTM4FQP – Field upgrade kit to add QPSK Interface to an existing probe.

MTM4F01 – Field upgrade kit to add triggered recording capability up to 200 MB.

MTM4F02 – Field upgrade kit to add transport stream service information analysis (PSI/SI/PSIP/ARIB view).

MTM4F03 – Field upgrade kit to add template testing (for user-defined service plan testing).

MTM4F04 – Field upgrade kit to add in-depth PCR analysis with graphical result views.

MTM4F05 – Field upgrade kit to add bit rate testing functionality.

MTM4F06 – Field upgrade kit to add service logging.

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