

**MTM400A**  
**MPEG Transport Stream Monitor**  
**Quick Start User Manual**

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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 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 product manual for further ratings information before making connections to the product. The inputs are not rated for connection to mains or Category II, II, or IV circuits.

**Power Disconnect.** The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

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

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

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

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

**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 manual's installation instructions for details on installing the product so that it has proper ventilation.

## 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.

---

## Symbols and Terms on the Product

These terms may appear in 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.

The following symbol(s) may appear on the product:



CAUTION  
Refer to Manual



Protective Ground  
(Earth) Terminal

## Environmental Considerations

This section provides information about the environmental impact of the product.

### Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

**Equipment Recycling.** Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



The symbol shown to the left indicates that this product complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). For information about recycling options, check the Support/Service section of the Tektronix Web site ([www.tektronix.com](http://www.tektronix.com)).

**Perchlorate Materials.** This product may contain one or more type CR lithium coin cell batteries. According to the state of California, CR lithium coin cells are classified as perchlorate materials and require special handling. See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate) for additional information.

### Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

## Preface

This manual describes the MTM400A MPEG Transport Stream Monitor, which provides a complete solution for transmission monitoring of MPEG transport streams over RF, IP and ASI interfaces. The MTM400A monitor uses a single transport stream processor platform packaged in a 1 RU rackmount chassis to provide monitoring of a transport stream at data rates up to 155 Mbps. The platform is used to provide an extended confidence monitoring product that, with the addition of software options, provides comprehensive diagnostic monitoring capabilities.

The extended confidence monitor provides key MPEG tests; this basic level of functionality and low 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/ARIB analysis, and unique user-defined template tests to ensure right content, right place, right time. Deployed at key network nodes, the MTM400A monitor enables the cause of faults to be pinpointed and solved.

## Key Features

- Multilayer, multichannel, remote monitoring, and measurement at IP, RF and Transport Layers to DVB (TR 101 290), ATSC, DigiCipher® II (DCII), and ISDB-T (terrestrial and mobile) standards.
- The Gigabit Ethernet Interface allows monitoring and measurement of key IP parameters. Designed for monitoring networks that carry Multi Program Transport Streams (MPTS) or Single Program Transport Streams (SPTS) over Gigabit Ethernet networks. Opt GE of the MTM400A provides:
  - Simultaneous monitoring of both IP and MPEG layers to enable rapid fault isolation
  - Comprehensive confidence monitoring of video over IP with optional Gigabit Ethernet electrical and optical interfaces, IP protocol support including UDP, RTP, with Internet Group Management Protocol (IGMP), Address Resolution Protocol (ARP) & Internet Control Message Protocol (ICMP Remote ping)
- Comprehensive confidence monitoring at the RF modulated layer with optional COFDM, 8VSB, Turbo 8PSK, QPSK (L-Band), and QAM interface MER, BER, and constellation displays
- Critical RF measurements, MER, and EVM provide early indication of signal degradation before any picture impairment is visible to the end customer without additional costly RF test equipment
- Ability to switch between IP or RF and ASI/SMPTE monitoring when one of the optional interface cards is installed; only one interface card (IP or RF) can be installed at a time
- DPI (SCTE-35) Local content insertion monitoring
- DigiCipher® II (DCII) Protocol support
- User-defined template monitoring option to ensure that the right content is at the right place at the right time while content ratings checking ensures that only the appropriate content is broadcast
- Remote recording allows capture and analysis of stream events for expert offline analysis to diagnose difficult and intermittent problems, requiring no engineer site visits
- Scalable, upgradeable monitoring capability provides extended confidence monitoring, where you buy the capability you need when you need it
- In field upgrades minimizes upgrade time
- Simple user interface minimizes staff familiarization time


















## Applications

- Contribution and primary distribution
  - Terrestrial distribution
  - Cable headend monitoring
  - DTH or network operator satellite uplink monitoring
- IPTV
- Edge network monitoring
  - ASI to RF
  - IP to RF (requires two MTM400A Units)
  - IP to ASI




## Documentation

Table i lists the product documentation for the MTM400A monitor and shows the location(s) where you can find the documents: printed manual, MTM400A documentation CD-ROM, or the Tektronix Web site.

**Table i: Product documentation**

Item (Tektronix part number)	Purpose	Location
Quick Start User Manual (071-2492-xx English, 071-2493-xx Japanese)	Provides installation and high-level operational overviews (this manual)	 +  +  www.Tektronix.com
RUI v3.0 Upgrade Technical Reference (071-2505-xx)	Describes the RUI changes introduced with the MTM400A monitor	 +  +  www.Tektronix.com
Release Notes (071-2494-xx)	Describes late breaking product information and operational issues	 +  +  www.Tektronix.com
Technical Reference (071-2495-xx)	Provides in-depth operating information	 +  www.Tektronix.com
Specifications and Performance Verification Technical Reference (071-2496-xx)	Provides complete product specifications and a procedure for verifying the operation of the instrument	 +  www.Tektronix.com
Test Parameter and Configuration File Technical Reference (071-2497-xx)	Provides information about using test parameters and configuration files	 www.Tektronix.com
Programmer Manual (071-2498-xx)	Provides information about remote command syntax	 www.Tektronix.com

**Table i: Product documentation (Cont.)**

Item (Tektronix part number)	Purpose	Location
Declassification and Security Instructions (071-2499-xx)	Provides instructions for removing your proprietary information from the instrument	 www.Tektronix.com
Software Option Upgrades Instructions (075-0972-xx)	Provides instructions for upgrading the product firmware with additional software options	 www.Tektronix.com
Signal Interface Hardware Upgrade Instructions (075-0973-xx)	Provides instructions for installing the optional hardware interface cards	 www.Tektronix.com

## Software Upgrades

Updates to the MTM400A monitor firmware are released to the Tektronix Web site when software problems are fixed or when new product features are introduced. Firmware upgrade instructions are located starting on page 62.

To check for upgrades:

1. Go to the Tektronix Web site ([www.tektronix.com/software](http://www.tektronix.com/software)).
2. Select Software Downloads to link to the Software Downloads Web page.
3. Enter the product name (MTM400A) to find available software upgrades.

If you have an MTM400 monitor with software version 2.6 or earlier, you can upgrade the instrument with MTM400A software version 3.0. Instructions are included in the MTM400A Release Notes document.

The Sun Java RTE (run time environment) Version 1.6.0\_03 must be installed on your PC for the MTM400A monitor RUI v3.0 to operate successfully. If Java is not present on the PC, an opportunity to download it is offered when the RUI is first opened.

## Manual Conventions

The term “RUI” will appear throughout the MTM400A monitor product documentation. The controls of the MTM400A monitor are accessed using a PC connected to the same network as the instrument. Since the instrument does not have a front-panel display device, the MTM400A monitor display shown on the PC is called the Remote User Interface (RUI).

## Installation

This section includes instructions for installing the MTM400A monitor, connecting signal cables to the instrument, powering the instrument on and off, connecting the instrument to a network, and applying the Option Key.

**NOTE.** Some of the installation instructions require you to use the MTM400A monitor RUI. If you are unfamiliar with the RUI, refer to the following sections in this manual before installing the instrument:

- Getting Acquainted with your Instrument, see page 25
- Starting the RUI, see page 32

## Before Installation

Unpack the instrument and check that you received all of the standard accessories listed in Table 1. If you ordered software or hardware options with your instrument, any accessories shipped with those options are listed at the end of this manual (see page 60). Check the MTM400A monitor pages of the Tektronix Web site ([www.tektronix.com](http://www.tektronix.com)) for the most current product accessory information.

### Standard Accessories

Table 1 lists the standard accessories shipped with the MTM400A monitor.

**Table 1: MTM400A standard accessories**

Accessory	Tektronix part number
External grounding kit	020-2852-xx
Tektronix authorization key certificate	063-3158-xx
MTM400A MPEG Transport Stream Monitor Product Documentation CD-ROM Includes the following documents:  <b>Document (Tektronix part number)</b> Quick Start User Manual (071-2492-xx (English), 071-2493-xx (Japanese)) Release Notes (071-2494-xx) Technical Reference (071-2495-xx) Specifications and Performance Verification Technical Reference (071-2496-xx) RUI v3.0 Upgrade Technical Reference (071-2505-xx) Video Glossary (25W-15215-1)	063-4135-xx
MTM400A MPEG Transport Stream Monitor Application Firmware CD-ROM	063-4136-xx
MTM400A MPEG Transport Stream Monitor English Quick Start User Manual (Option L0 only)	071-2492-xx
MTM400A MPEG Transport Stream Monitor Japanese Quick Start User Manual (Option L5 only)	071-2493-xx
MTM400A MPEG Transport Stream Monitor Release Notes	071-2494-xx
MTM400 and MTM400A MPEG Transport Stream Monitors RUI v3.0 Upgrade Technical Reference	071-2505-xx
Rackmount slide assembly	351-0751-xx

**Power Cords.** The MTM400A monitor is shipped with one of the following power cord options. Power cords for use in North America are UL listed and CSA certified. Cords for use in areas other than North America are approved by at least one authority acceptable in the country to which the product is shipped.

- Opt. A0 - North America
- Opt. A1 - Universal EURO
- Opt. A2 - United Kingdom
- Opt. A3 - Australia
- Opt. A4 - 240 V, North America
- Opt. A5 - Switzerland
- Opt. A6 - Japan
- Opt. A10 - China
- Opt. A99 - No power cord or AC adapter

## Options

Licensed options and optional accessories are listed starting on page 60.

## Operating Considerations

Table 2 lists the electrical operating requirements for the MTM400A monitor. The complete electrical operating requirements of the MTM400A monitor are listed in the *MTM400A MPEG Transport Stream Monitor Specifications and Performance Verification Technical Reference*.

**Table 2: Electrical operating requirements**

Requirement	Specification
Temperature, operating	+5 °C to +40 °C
Altitude, operating	0 m to 3000 m (9800 ft)
Source voltage	100 VAC to 240 VAC, 50 Hz/60 Hz
Power consumption (maximum)	1 Amp
Peak inrush current	7.2 A peak at 240 VAC, 50 Hz
Fuse rating	Mains fuse is 3.15 A, 250 V, Fast; Not operator replaceable. Refer servicing to qualified service personnel.
Overvoltage category	II (as defined in IEC61010-1)
Pollution degree	2 (as defined in IEC61010-1) Rated for indoor use only

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## Hardware Installation

This section provides instructions for installing the MTM400A monitor in an equipment rack and installing an SFP module on the optional Gigabit Ethernet interface card. The instructions for installing an optional interface card are located in the *MTM400A MPEG Transport Stream Monitor Technical Reference*.

### Central Office Installation



**CAUTION.** *The intra-building interfaces of this platform, including the Gigabit Ethernet interface, are suitable for connection to intra-building or unexposed wiring or cabling only with shielded and grounded cables at both ends. The intra-building ports or the equipment must not be metalically connected to interfaces that connect to the outside plant or its wiring.*

---

A grounding and bonding strap for use in Central Office RBOC applications is supplied as a standard accessory with each MTM400A monitor. The instructions for installing the grounding strap are included in the rack mounting instructions.

### Rack Mounting the MTM400A Monitor

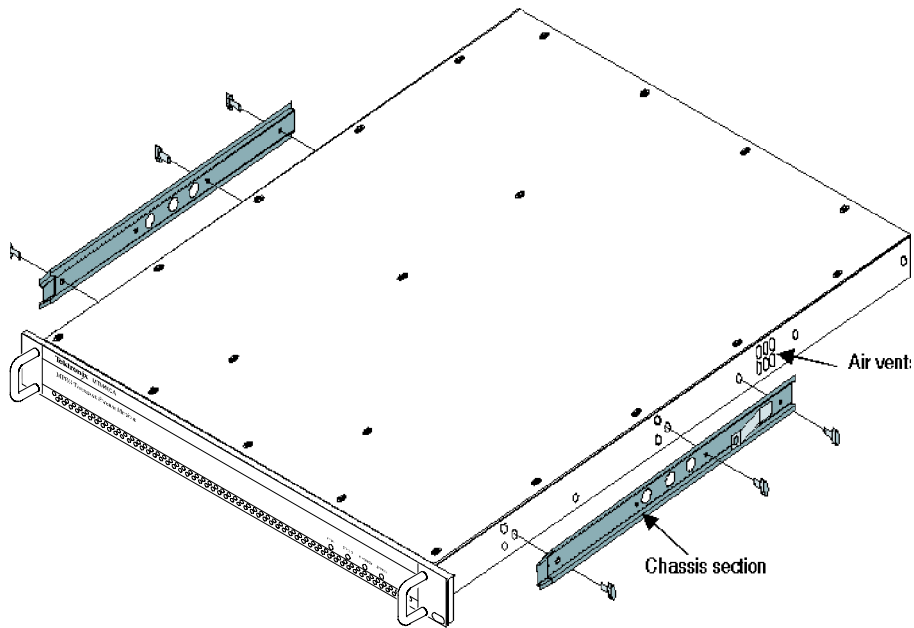


**WARNING.** *To avoid fire hazard, the MTM400 must be installed in the rack only as specified, and proper ventilation must be maintained. The right side rack slide must be mounted correctly so that it does not obstruct the adjacent air vent.*

*Efficient cooling will be maintained in a rack-mounted instrument only if the air temperature at all intake air vents (inside the equipment rack) does not exceed 40 °C.*

---

The MTM400A monitor is designed to be mounted in a standard 19-inch equipment rack; a rack-mounting kit is shipped as a standard accessory with each instrument. The chassis components of the rack slides are shipped from the factory attached to the instrument as shown in Figure 1.



**Figure 1: Chassis-mounted rack slide components**

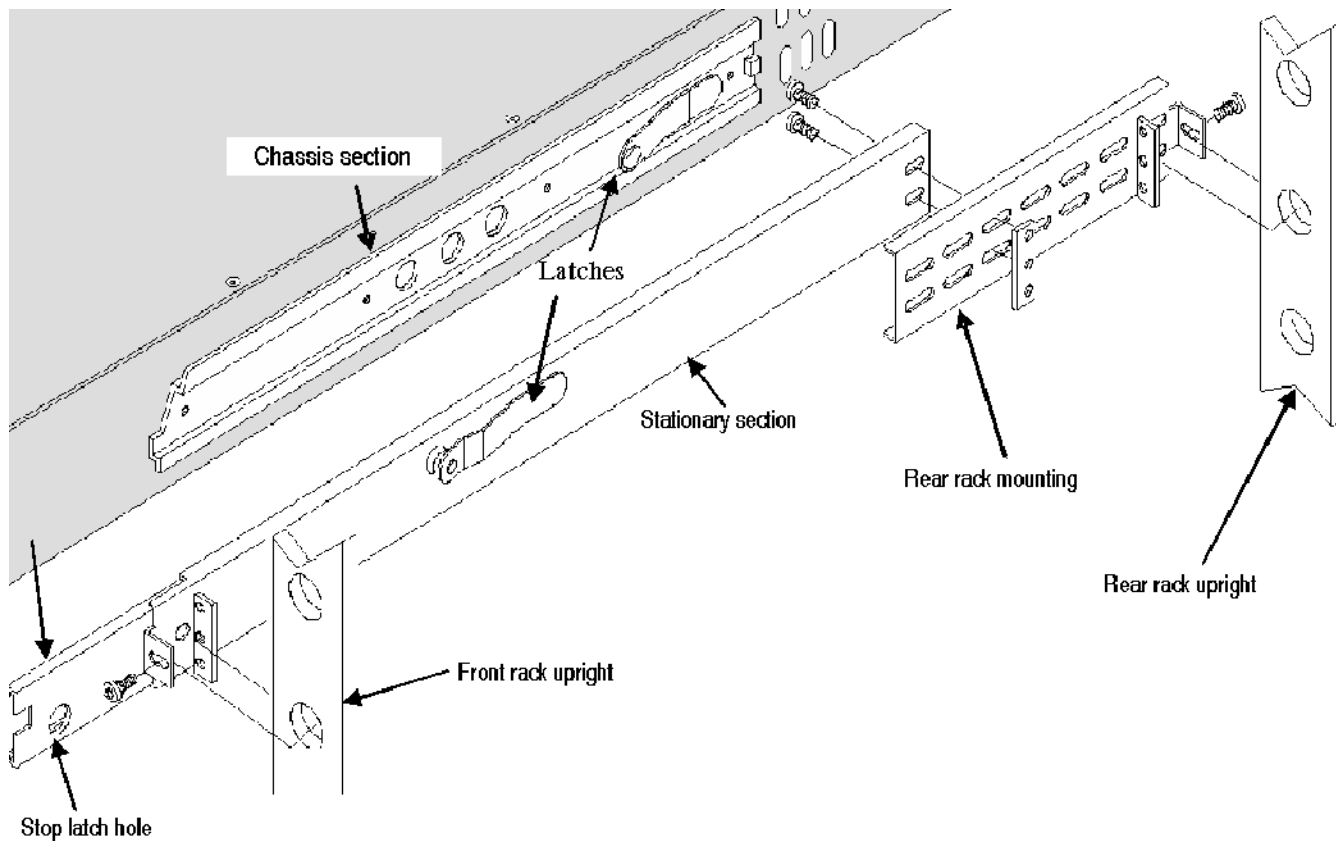
Perform the following steps to install the instrument in an equipment rack.

1. Install the rack-mounting brackets in the desired location in the equipment rack as shown in Figure 2. 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 instrument and any rear cabinet panel to allow for connector space and adequate air circulation.
2. After you install the rack-mounting hardware, pull the slide-out tracks out to the fully extended position.
3. Insert the rack slides on the MTM400A monitor chassis into the extended slide-out tracks.

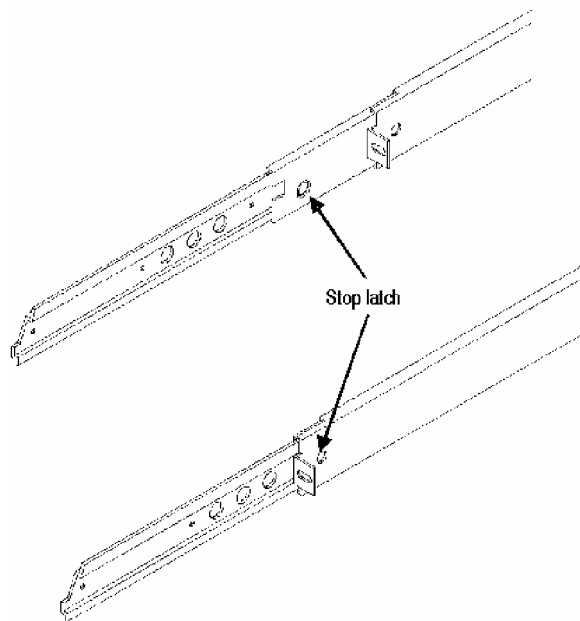


**WARNING.** To prevent the instrument from falling and causing personal injury and damage to the instrument, support the instrument until it is secured in the equipment rack.

4. Press the stop latches (see Figure 3) and push the instrument toward the equipment rack until the latches snap into their holes.
5. Press the stop latches again and push the instrument fully into the equipment rack.
6. Adjust the rack slides as described on page 8.
7. If you are installing the instrument in a Central Office RBOC application, perform the procedure starting on page 6 to install the ground strap.
8. Tighten the front panel retaining screws to secure the instrument in the equipment rack.



**Figure 2: Rack mounted sections**



**Figure 3: Installing or removing the rack slides**

**Installing the Ground Strap.** A grounding and bonding strap kit (Tektronix part number 020-2852-xx) to be used in Central Office RBOC applications is supplied as a standard accessory with each MTM400A monitor.



---

**CAUTION.** *The intra-building interfaces of this platform, including the Gigabit Ethernet interface, are suitable for connection to intra-building or unexposed wiring or cabling only with shielded and grounded cables at both ends. The intra-building ports or the equipment must not be metalically connected to interfaces that connect to the outside plant or its wiring.*

---

Perform the following steps to install the ground strap:

1. If the instrument is installed in an equipment rack, pull the instrument out to the extended position on the rack slides. Depending on your installation location, it may be necessary to remove the instrument from the rack to remove the screw in the following step.
2. Use a screwdriver with a number 15 TORX tip to remove the top, front-left handle retaining screw (6-32 x 0.375) as shown in the top of Figure 4.



---

**CAUTION.** *To limit corrosion, all mating surfaces must be cleaned and treated with an antioxidant before being joined. In an isolated bonding network (IBN), the requirements of Telcordia document TR-NWT-000295, Isolated and Mesh Bonding Networks, apply.*

---

3. Attach the smaller #6 ring terminal to the top, front-left handle position using the screw that was removed in step 1 (see Figure 4). Torque the screw to 10 in-lbs to so that the terminal provides good ground contact.
4. If necessary, install the instrument in the equipment rack (see page 3).



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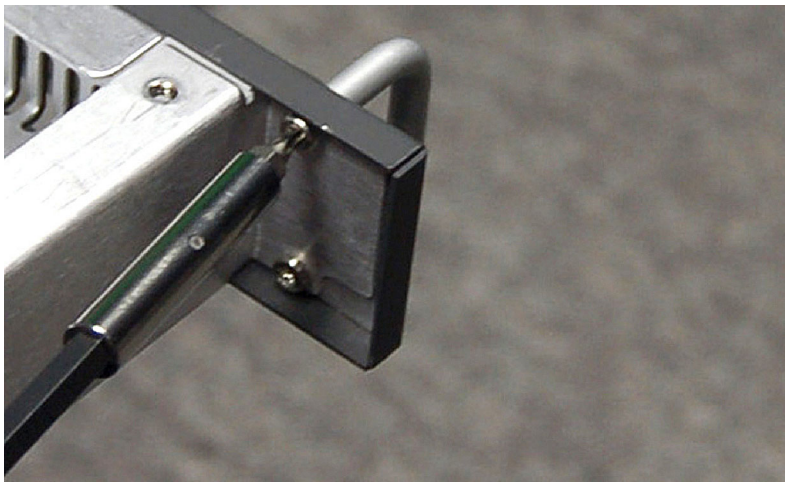
**CAUTION.** *All mating surfaces must be cleaned and treated with an antioxidant before being joined. In an isolated bonding network (IBN), the requirements of Telcordia document TR-NWT-000295, Isolated and Mesh Bonding Networks, apply.*

---

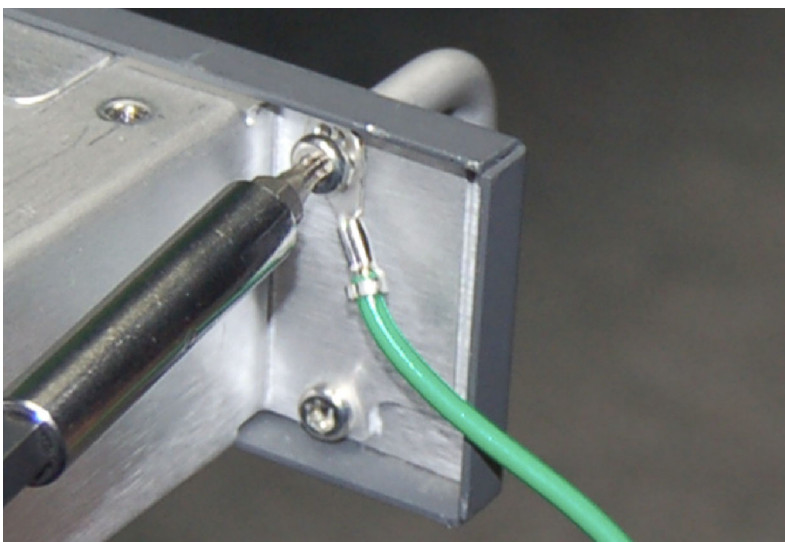
5. Attach the larger #10 ring terminal to the frame of the equipment rack using the Phillips thread-forming screw (10-32 x 0.500) supplied in the kit (see bottom of Figure 4). Secure the ground strap to the equipment-rack frame at an open unused hole in the frame as close to the MTM400A monitor as possible. Torque the screw to 10 in-lbs to so that the terminal provides good ground contact.



**Removing the handle retaining screw**



**Attaching the ground strap to the instrument**



**Attaching the ground strap to the equipment rack (MTM400 monitor shown)**



**Figure 4: Installing the ground strap**

**Adjusting the Rack Slides.** After installation, if the slide tracks are not properly adjusted, they may bind. Perform the following steps to adjust the slide tracks:

1. Slide the instrument out of the equipment rack about 10 inches.
2. Slightly loosen the screws holding the slide tracks to the front rails, and allow the tracks to seek an unbound position.
3. Retighten the screws and check the slide tracks for smooth operation by sliding the instrument in and out of the equipment rack several times.
4. Once the instrument is in place within the rack, tighten the knurled retaining screw to secure the instrument in the equipment rack.

**Removing the MTM400A Monitor from the Equipment Rack.** Refer to Figure 3 on page 5 and perform the following steps to remove the instrument from the equipment rack.

1. Disconnect all cabling from the instrument.
2. Loosen the front panel retaining screw and pull the instrument out until the stop latches snap into the holes.
3. Press the stop latches and remove the unit.

**Maintaining the Rack Slides.** The slide tracks do not require lubrication. The dark gray finish on the tracks is a permanent, lubricated coating.

### Installing the SFP Module (GigE Interface Only)

The optional GigE (Gigabit Ethernet) interface card allows you to remotely monitor and measure the quality of video over IP networks. The GigE interface uses SFP (Small Format Pluggable) modules to facilitate different optical wavelengths. Table 10 on page 60 lists the available SFP modules.



**WARNING.** To avoid exposure to hazardous laser radiation, use only Class 1 lasers as defined in the USA Federal Regulations CDRH 21 CFR 1040 and IEC/EN 60825/A2:2001.

---



**CAUTION.** To prevent static discharge damage, service the product only in a static-free environment. Observe standard handling precautions for static-sensitive devices while installing this module. Always wear a grounded wrist strap, grounded foot strap, and static resistant apparel while installing this module.

---

Figure 5 shows an SFP module with the optical port plug removed. Use the plug to protect the optical interface when no cable is connected or the module is not in use.

---

**NOTE.** The optical port plug must be in place when no fiber cable is connected.

---



**Figure 5: SFP module and optical port plug**

**Installing an SFP Module.** Perform the following steps to install an SFP module into the GigE interface card:

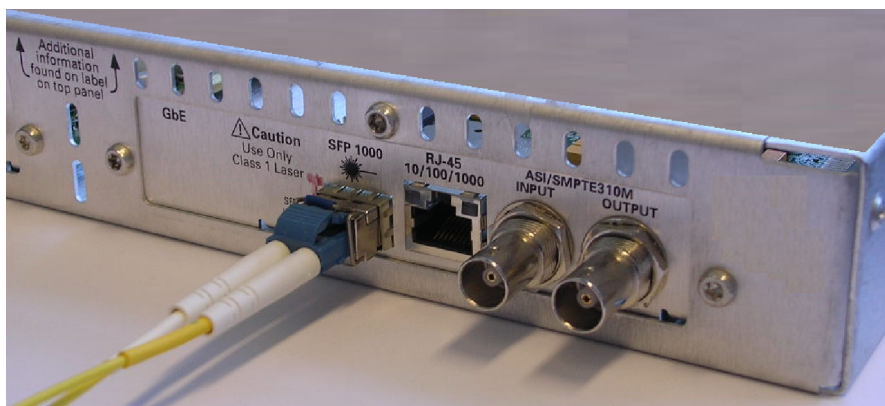


**CAUTION.** To avoid damage to the SFP module, remove power from the MTM400A monitor before removing or inserting an SFP module.

1. Disconnect the power cord from the instrument.
2. Insert the SFP module into the connector labeled SFP 1000 on the rear panel of the GigE interface board. When pushed in fully, the module is latched in position.
3. Remove the optical plug (not shown) and insert the optical fiber cable into the SFP module (see Figure 6). When pushed in fully, the cable connector is latched in position. Retain the optical port plug for later use when you need to remove the SFP module from the instrument.

**Removing an SFP Module.** Perform the following steps to remove an SFP module from the GigE interface card:

1. Disconnect the power cord from the instrument.
2. Press the top of the SFP module connector to unlatch the optical fiber cable, and then disconnect and withdraw the cable from the SFP module.
3. Flip down the SFP module retaining latch and remove the module from the unit (see Figure 7).
4. Install an optical port plug into the removed SFP module to protect the optical port interface (see Figure 5).



**Figure 6: SFP module with optical fiber cable connected**

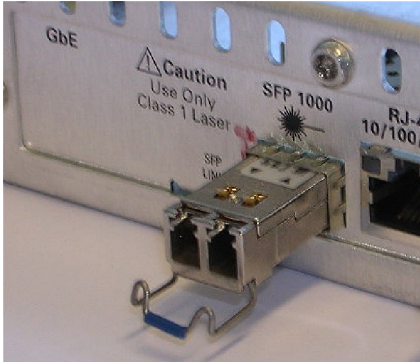


Figure 7: Removing an SFP module

## Connecting to the Instrument

The external connectors are all located on the rear panel of the instrument. Use the following procedure to make electrical, signal, and network connections to the MTM400A monitor:

1. After you install the MTM400A monitor in an instrument rack, connect the power cord that was provided with the instrument to the power connector on the rear panel. Connect the power cord plug to a properly grounded electrical outlet.



**CAUTION.** To ensure compliance with specified EMC standards and directives, use only high quality shielded cables with this product. Equipment performance can be affected. Typically, the cables are braid and foil types that have low impedance connection to shielded connectors at both ends.

2. Refer to Figures 8 and 9 and to Tables 3 and 4 to make the necessary transport stream, network, and peripheral device connections using the connectors at the rear of the instrument. See the *MTM400A MPEG Transport Stream Monitor Technical Reference* for more detailed information about each connector and the associated signals.

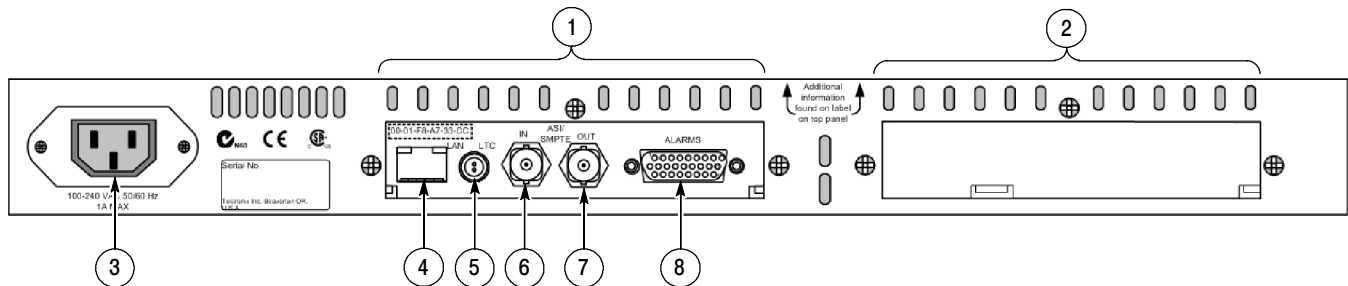
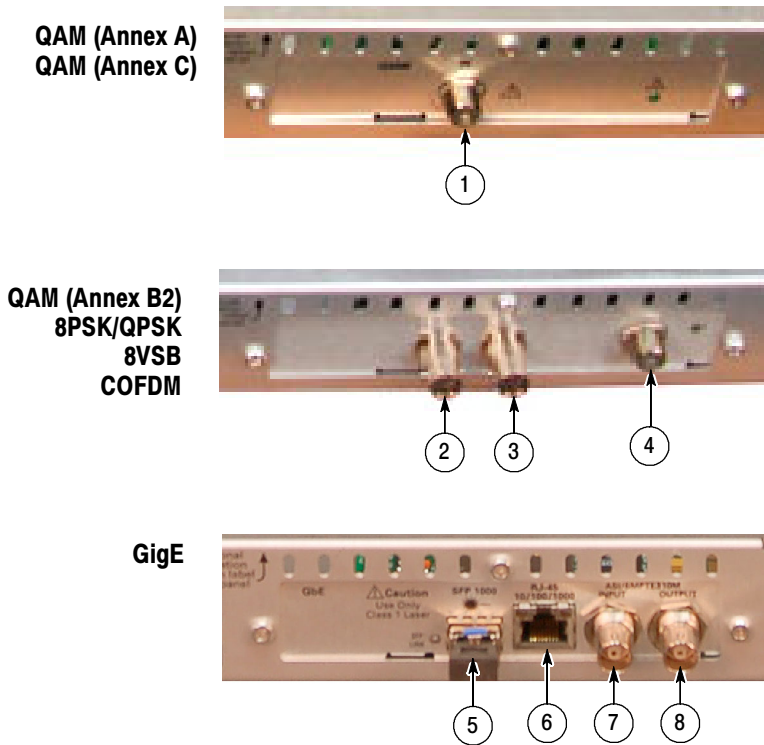


Figure 8: Standard external connectors

**Table 3: Standard external connectors**

<b>Figure 8 element</b>	<b>Item</b>	<b>Description</b>
1	Transport stream processor card	Standard hardware
2	Optional interface card	Optional hardware; connectors shown in Figure 9 and described in Table 4
3	Power	
4	Ethernet	10/100Base-T; RJ-45  The MAC address of the TS Processor card is on a label adjacent to the Ethernet connector
5	LTC In	Longitudinal tome code input
6	Transport stream input (ASI/SMPTE) <sup>1</sup>	75 ohm, transformer coupled, BNC connectors for the following signal formats: <ul style="list-style-type: none"> <li>• Accepts Burst and Packet mode ASI formats and M2S</li> </ul>
7	Transport stream output (ASI/SMPTE) <sup>1</sup>	<ul style="list-style-type: none"> <li>• An active loop-through of the corresponding input</li> <li>• Compliant with SMPTE310M (19.392 Mbps only)</li> <li>• An active loop-through of the corresponding input</li> </ul>
8	Alarms	(Digital input/output) 26-pin, D-type connector for five alarm relays, three TTL outputs, and a recording trigger input. The relays and the TTL outputs are triggered by test failures. The triggers are set using the RUI.

<sup>1</sup> ASI/SMPTE Input/Output are software selectable



**Figure 9: Optional interface card external connectors**

**Table 4: Optional interface card external connectors**

Interface card <sup>1</sup>	Figure 9 element	Connector	Description
QAM (Annex A) QAM (Annex C)	1	ASI/SMPTE310M input / output	Type F connector
QAM (Annex B2) 8PSK/QPSK 8VSB COFDM	2	ASI/SMPTE310M input	BNC connector
	3	ASI/SMPTE310M output	BNC connector
	4	RF input	Type F connector
GigE	5	SFP 1000	Small Pluggable Format module
	6	RJ-45 10/100/1000	RJ-45; 10/100/1000BASE-T IEEE 802.3
	7	ASI/SMPTE310M input	BNC connector
	8	ASI/SMPTE310M output	

<sup>1</sup> Only one optional interface card can be installed at a time.

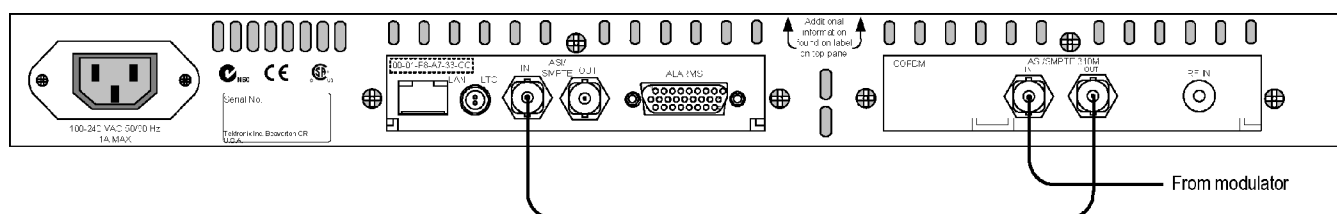


## Installing the ASI Cable (QAM (Annex B2), 8PSK/QPSK, 8VSB, and COFDM Interfaces Only)

The optional QAM (Annex B2), 8PSK/QPSK, 8VSB, COFDM, and GigE interface cards are each shipped with an ASI cable that enables you to monitor ASI and RF signals (for example, both the input and output of a modulator). To make stream measurements on an RF input, the RF signal must be made available to the Transport Stream Processor card by looping the interface card ASI output to the Transport Stream Processor card ASI input as shown in Figure 10.

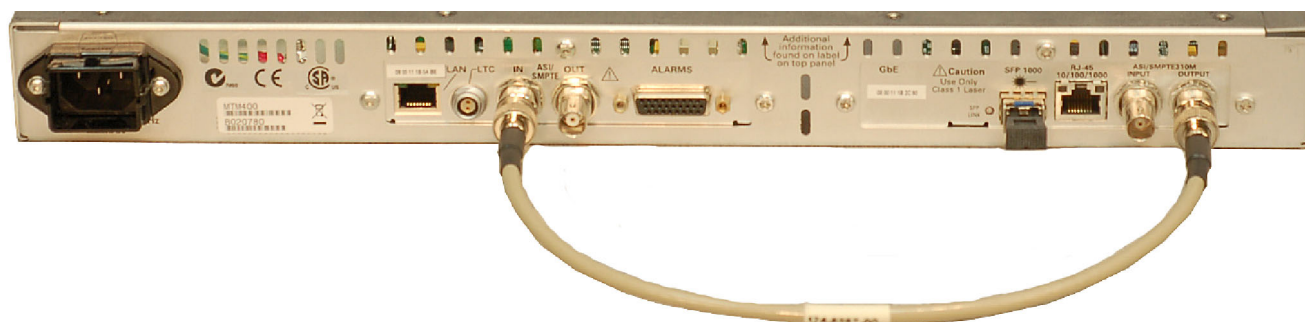
**NOTE.** The QAM (Annex A) and QAM (Annex C) interface cards do not need an external cable connection since these interface cards are connected to the Transport Stream Processor card inside the instrument.

1. For the QAM (Annex B2), 8PSK/QPSK, 8VSB, and COFDM interface cards only, perform the following steps:
  - a. Connect an ASI signal from the modulator to the interface card ASI In.
  - b. Connect the ASI cable supplied with the interface card between the ASI/SMPTE310M Out connector on the interface card and the ASI In connector on the Transport Stream Processor card (see Figure 10).



**Figure 10: Monitoring ASI and RF signals - QAM (Annex B2), 8PSK/QPSK, 8VSB, and COFDM interfaces**

2. For GigE interface boards only, if you want to monitor ASI and GigE signals, perform the following steps:
  - a. Connect an ASI signal from the modulator to the interface card ASI/SMPTE310M In connector.
  - b. Connect the ASI cable supplied in this kit between the ASI/SMPTE310M Out connector on the interface card to the ASI In connector on the Transport Stream Processor card (see Figure 11).
3. Configure the instrument to use the installed interface card. Refer to *Configuring an RF Card* on page 39.



**Figure 11: Monitoring ASI and GigE signals - GigE interface**

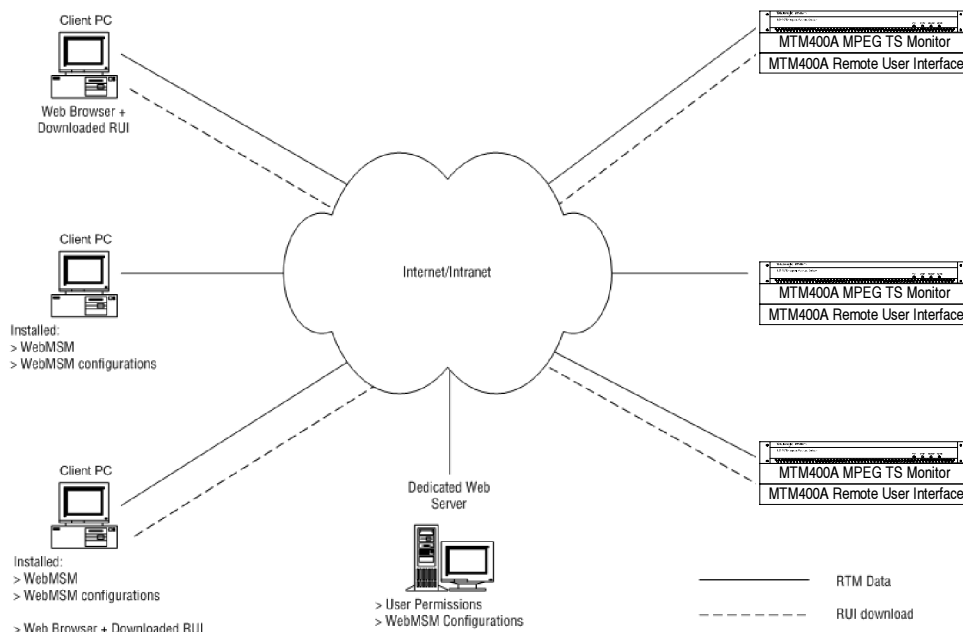
## Powering the Instrument On and Off

The MTM400A monitor does not have an external power switch. To power on the instrument, connect the power cord that was provided with the instrument to the power connector on the rear panel. Connect the power cord plug to a properly grounded electrical outlet. To power off the instrument, remove the power cord from the instrument.

## Network Installation

A major feature of the MTM400A monitor is its configuration versatility. Although the monitor always operates within a client-server architecture, the following configuration options are available:

- The instrument can be left unattended. In this setup, the front panel LEDs and any configured external alarms will indicate monitoring test failures.
- The instrument can be monitored from a PC over an Ethernet network or the Internet using the RUI or the Web Monitoring Systems Manager (WebMSM).



**Figure 12: Network setup example**

- The WebMSM software is installed on a client PC and allows you to monitor and control the MTM400A monitor. The WebMSM software can be used to monitor all compatible devices on a network (if the appropriate license is held).
- The RUI software is downloaded and accessed from the MTM400A monitor using a browser (Microsoft Internet Explorer with Sun Java 1.6.0\_03 or later software installed) on any networked personal computer.

The provided HTML file allows you to open the RUI 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 User 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:

- MTM400A MAC address: xx-xx-xx-xx-xx-xx
  - Location 1: rear panel
  - Location 2: main circuit board (internal)
  - Location 3: instrument top cover (optional)
- MTM400A IP address: yyy.yyy.yyy.yyy
  - Assigned by network administrator
- MTM400A software license: zzzz-zzzz-zzzz-zzzz
  - Location 1: instrument top cover (optional)

## MAC Address

The Transport Stream Processor board in the MTM400A monitor 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 MTM400A monitor 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, with the groups 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 MTM400A monitors 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 *Setting Up the Network* on page 18).

If the IP address is not known, it must be reset to 0.0.0.0 and set up with a new IP address before the unit can be used.

## Resetting the IP Address

There are two ways of resetting the IP address of an MTM400A unit to 0.0.0.0 (factory default).

**Method 1:** If the current IP address of the unit is known, the address can be reset using the MTM400A 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.** Perform the following steps after you power up the MTM400A monitor and connect to a network which recognizes the current IP address of the monitor. The procedure to start the RUI is described starting on page 32.

1. Start the RUI, select the administrator login type, enter the administrator password, and click **Upload License**.

2. Select **Configuration (toolbar) > Device > Network Settings**.

3. Make the necessary changes.

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

4. When you complete the changes, click **Apply**.

5. In the **Network Settings have changed** message box, click **Apply and Reboot**.

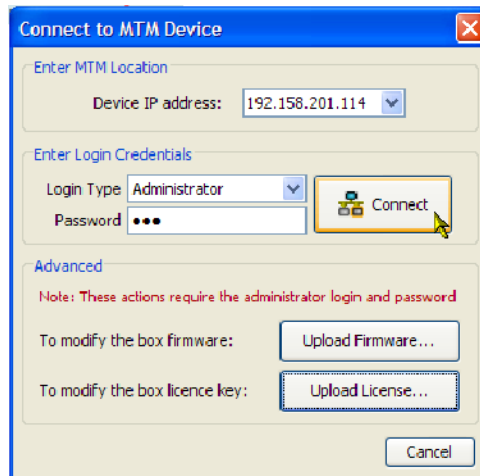
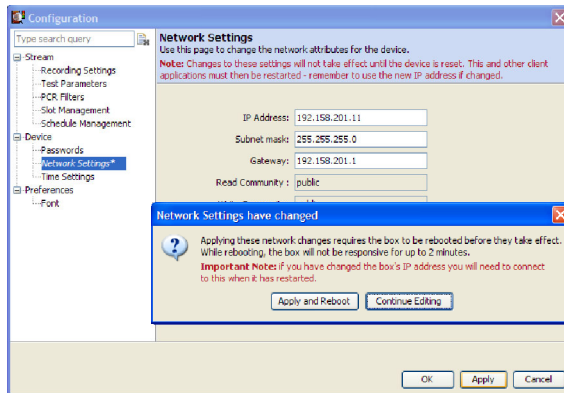
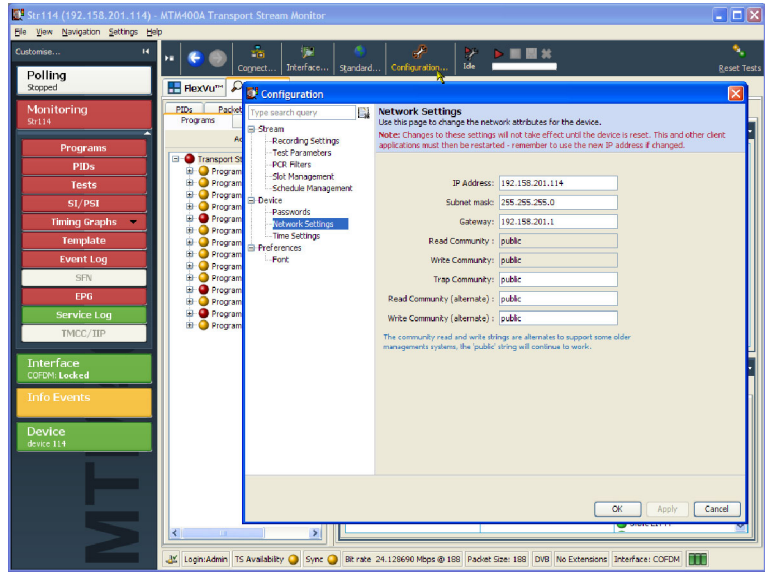
The MTM400A monitor is rebooted. This may take up to 2 minutes.

When the MTM400A monitor emits a beep, the instrument will respond to the new network settings. The **Connect to MTM Device** dialog box is displayed.

6. Enter the new IP address.

7. Enter your Login Type and Password. Click **Connect**.

The MTM400A monitor will download and display the RUI, indicating that you are connected to the instrument using the new IP address.



**Resetting the IP Address by Clearing the Non-Volatile RAM.** If the IP address of an MTM400A monitor is unknown, you can reset the existing IP address to the factory default value (0.0.0.0) by resetting the battery-backed, non-volatile RAM on the Transport Stream Processor card. When you clear the RAM, all configuration data is reset to the factory default values, including the IP address.



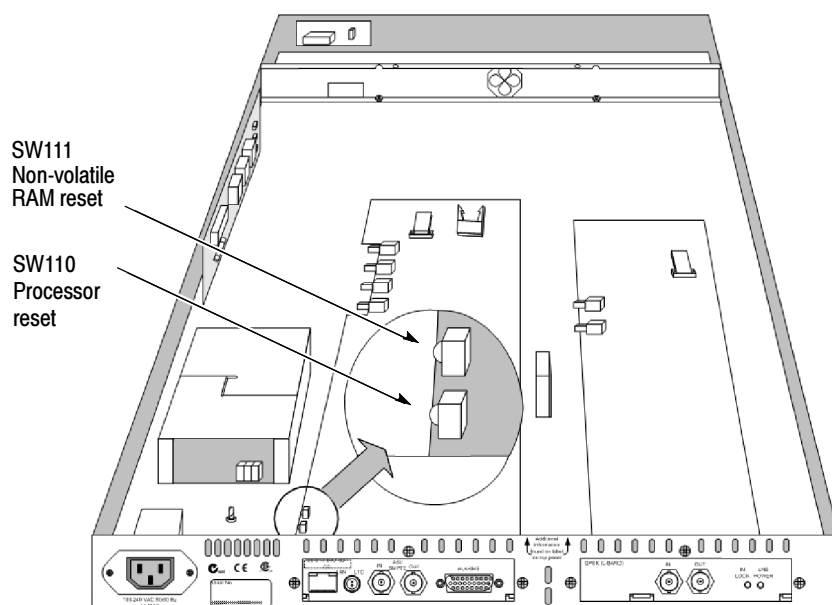
**CAUTION.** When you reset the non-volatile RAM, the licensing information for the instrument is lost. You will not be able to access all of the options that you purchased until you reenter the license key after you reset the IP address.

Perform the following steps to reset the non-volatile RAM:



**WARNING.** To avoid electric shock, disconnect the power cord from the mains power before removing the cover. Failure to do so could result in injury or death.

1. Disconnect the power cord from the MTM400A monitor.
2. To remove the instrument cover, remove the 21 T10 TORX retaining screws, and then lift the cover from the instrument.
3. Refer to Figure 13, and then reset the non-volatile RAM by pressing the Non-Volatile RAM Reset switch (SW111). This action clears the current configuration and resets the instrument IP address to 0.0.0.0.



**Figure 13: Transport stream processor reset switches**

4. To replace the instrument cover, first ensure that all components are in place and that all connections are secure. Position the cover in place, and then install the 21 retaining screws and tighten them uniformly.
5. Set up a static ARP entry and test the reset IP address (see page 18).
6. Assign the instrument a desired IP address using the user interface (see page 16), and then reenter the software license key provided with the instrument or upgrade (see page 23).

## Setting Up the Network

Setting up an MTM400A monitor for use on a network requires MS DOS on a client PC, both the instrument and the PC to be 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 an MS-DOS window (Start > Programs > Command Prompt).
2. Enter: C:\> ARP -s <IP address> <Ethernet MAC address>  
for example, C:\> ARP -s 192.168.201.19 00-01-F8-A7-33-CC
3. If the command is successful, the prompt is redisplayed with no message.

### Testing the IP Address

1. On the client PC, in the MS-DOS window, enter:  
C:\> ping <IP address>  
for example, C:\> ping 192.168.201.19

2. The response should take the following form:

```
Pinging 192.168.201.19 with 32 bytes of data:  
Reply from 192.168.201.19: bytes=32 time<10ms TTL=128  
Reply from 192.168.201.19: bytes=32 time<10ms TTL=128  
Reply from 192.168.201.19: bytes=32 time<10ms TTL=128  
Reply from 192.168.201.19: bytes=32 time<10ms TTL=128
```

3. The IP setup is now complete. Close the MS-DOS window.
4. With the IP Address successfully set up, the network settings can be completed (refer to *Resetting the IP Address using the User Interface* on page 16).

---

**NOTE.** The MTM400A monitor must receive a ping packet before the instrument will configure and store a new IP address.

The ARP command cannot be used if the unit already has an IP address; it will only work if the IP address of the MTM400A monitor is 0.0.0.0.

---

### Network Naming

If the monitor is to be accessible by a network name rather than the 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 that is set up in the Configuration screen. Contact your Network Administrator for help.

When the IP address has been set up, if the MTM400A 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 **Configuration** (toolbar) > **Stream** > **Network Settings** page. The MTM400A must be restarted in order for the settings to take effect.

## Network Latency

It has been noted that where access to a remote MTM400A monitor uses a number of internet/intranet links of varying speeds, the initial RUI download may be initiated successfully, but then the process 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.

## RUI Requirements

The RUI can be run on any personal computer that meets the requirements listed in Table 5.

**Table 5: RUI platform requirements**

<b>Characteristic</b>	<b>Description</b>
Minimum Specification	1.2 GHz Intel Pentium Processor (Preferred: 2 GHz)
Operating System	Microsoft Windows operating systems Windows 2000, Windows XP, and Windows Vista (Recommended: Windows XP Pro)
Disk space	2 GB free disk space
Ethernet	10/100-base T
Installed software	Microsoft Internet Explorer, Version 7.0 minimum; Sun Java Runtime Environment Version 6 Update 3 minimum (1.6.0_03)
RAM	1 GB
CD-ROM Drive	8x
Display	1024 x 768 pixel video monitor with 16 available colors

## Installing Japanese Font Extensions on your PC

The ARIB specifications for the ISDB standard make use of private extensions to the standard Unicode character set [0xE000-0xF8FF]. These extensions allow you to add additional characters and nonstandard proprietary characters to an existing font, or as a system-wide default. The extension sets are provided as TrueType Extension files (\*.tte). Any extension sets should be installed using the Private Character Editor, which is supplied as part of the standard Microsoft Windows operating system.

The MTM400A monitor RUI is capable of displaying these private character extensions when the operating system on the PC is correctly configured. If the operating system on your PC has not been configured to display private character extensions, perform the following steps:

1. Open the Control Panel on your PC and select **Regional and Language Options**.
2. Select the **Advanced** tab in the Regional and Language Options dialog box, and then select **Japanese** from the drop-down list (see Figure 14).
3. Click **Apply** to accept the setting change. After you apply the language setting change, Windows might display a message stating it needs to reboot. If this message appears, allow the PC to reboot.

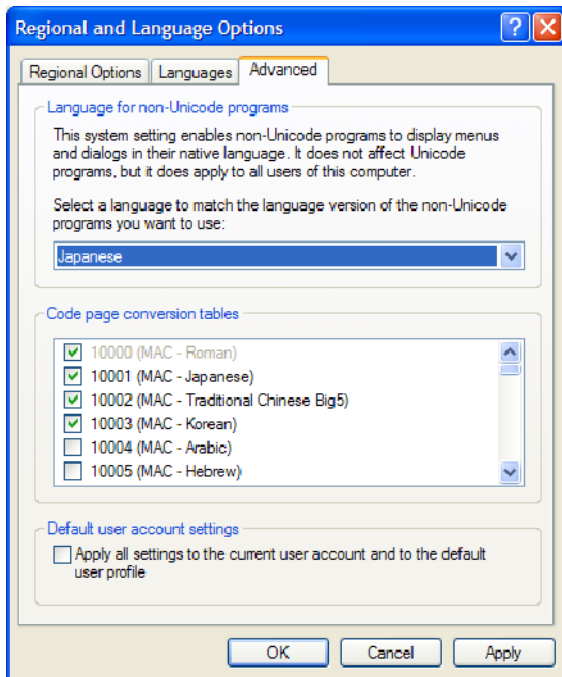


Figure 14: Selecting a regional language

4. Rename the TrueType Extension file (\*.tte) file that you want to use to **eu`udc`.tte**, and then copy the file to the following directory: C:\WINDOWS\Fonts.
5. Select **Run** from the Start menu, type **eu`dc`edit** in the Run dialog box, and click **OK** to run the Microsoft Windows Private Character Editor. The editor window will appear briefly and then exit. This action makes the appropriate changes to the registry to register eu`dc`.tte as the system default character extension font.

6. Launch the MTM400A monitor RUI on your PC.
7. Open the Font Configuration page (see Figure 15) by selecting **Configuration > Preferences > Font** from the toolbar.
8. If necessary, set the Font Name for Log Entries and Stream Content to <<default>>. The MTM400A monitor RUI will now display private characters correctly by obtaining them from the font supplied in the eudc.tte file.

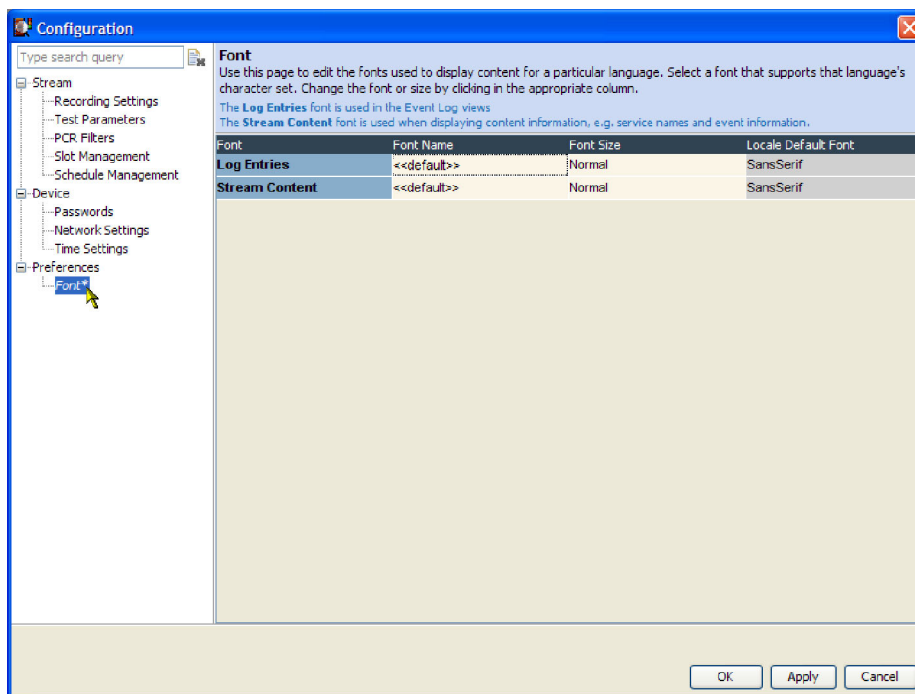


Figure 15: Font Configuration dialog box

## Video Thumbnail Support

Before thumbnails can be viewed using the RUI, thumbnail support software must be installed on the client PC and the feature must be turned on in the RUI. If thumbnail support is not installed, a message is displayed when an attempt to view thumbnails is made.

The thumbnail support software for the MTM400A monitor is based on modified open source material. The modified code is included in the executable file, and can be copied to the client PC and inspected if required.

Perform the following steps to install the thumbnail support software:

1. Close the MTM400A monitor RUI and any instance of Internet Explorer.
2. Locate the Thumbnail Support Package on the MTM400A Application Firmware CD-ROM that was supplied with the instrument (Tektronix part number 063-4136-xx). You can also download the software package from the Tektronix Web site (Tektronix part number 066-0945-xx).
3. Open the executable file (Tektronix part number 066-0945-xx). The thumbnail support installation wizard Welcome screen is displayed. Click **Next** and follow the instructions given in the subsequent screens.
4. In the Setup Type screen, select **Typical**.

If you want to inspect the open source code that forms the thumbnail support package, choose the Custom setup type and enable the Source Code option in the following screen (Select Components). Click Next to continue.

5. When all stages of the thumbnail support installation wizard are completed, the MTM400A thumbnail feature will be available when the MTM400A RUI is opened.
6. If necessary, enable the thumbnail display using the RUI **Configuration** (toolbar) > **Stream** page, or by clicking Enable Thumbnails on any of the thumbnail views (see Figure 16).



Figure 16: Enabling the thumbnail view



## Licensing

Options and upgrades to the MTM400A monitor are enabled using an Option Key. The Option Key is an encrypted code that unlocks and enables software and hardware functions that are installed on the instrument. Each Option Key is unique and can only be used with the specific MTM400A monitor to which it was assigned.

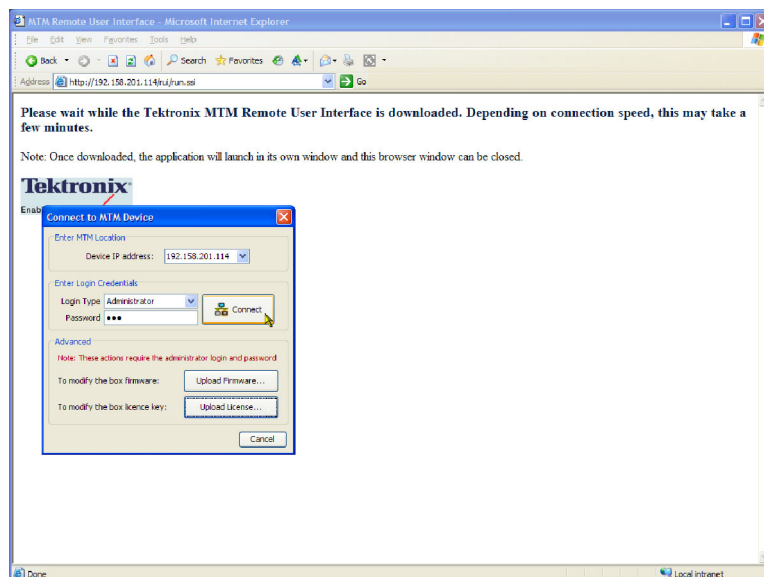
MTM400A monitors are shipped from the factory with the appropriate Option Key already applied to support all of the functions that were ordered. The Option Key is documented on the Tektronix Authorization Key Certificate that is shipped with the instrument.

When you purchase additional upgrades or options, a new Option Key is supplied with the upgrade kit. You must apply the new Option Key to enable the additional functions you purchased. The original Option Key that was shipped with the instrument will still be valid. However, it will only enable the functions originally purchased with the instrument.

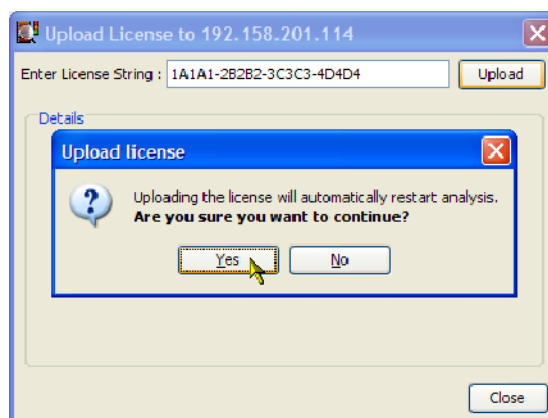
### Entering an Option Key

Use the following procedure if you need to update or reenter the Option Key on your MTM400A monitor.

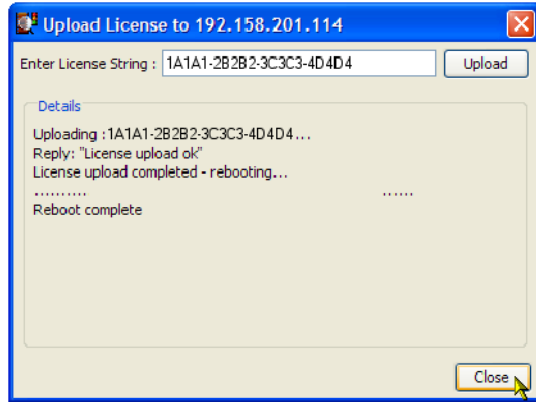
1. Close any Web browser windows that are connected to the MTM400A monitor.
2. Open a Web browser and enter the IP address or network name of the MTM400A monitor that you are updating in the browser address line.
3. In the Connect to MTM Device dialog box, select **Administrator** as the login type, enter the password, and then click **Upload License**.



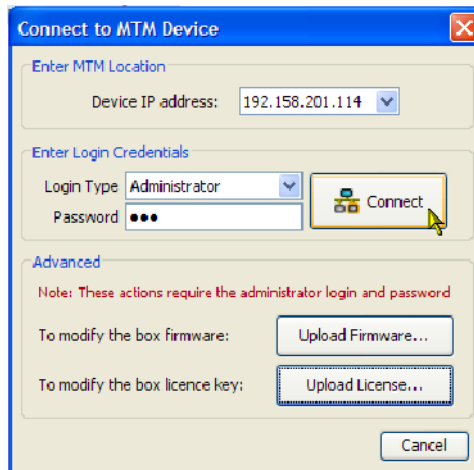
4. In the Upload License dialog box, enter the license string that was supplied with your instrument or upgrade, and then click **Upload**.
5. Click **Yes** in the Upload License confirmation dialog box.
6. The instrument will now reboot. The reboot process takes approximately two minutes to complete.



- Click **Close** in the Upload License dialog box after the Reboot complete message appears.

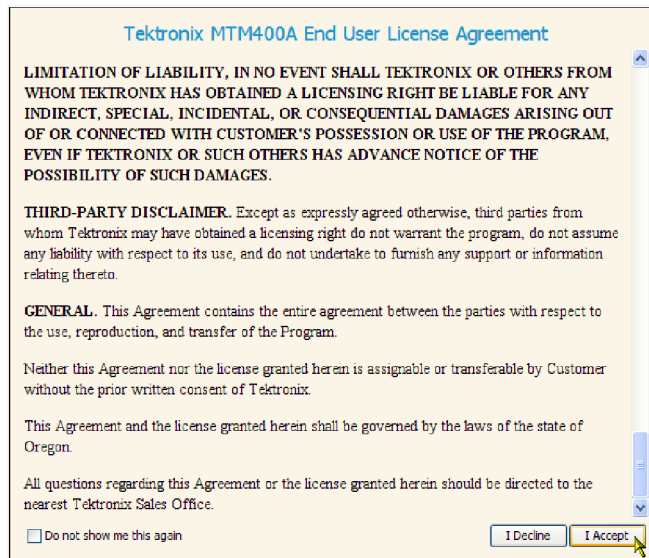


- In the Connect to MTM Device dialog box, select **Administrator** as the login type, enter the password, and then click **Connect**.



- Read the Tektronix MTM400A End User License Agreement and click **I Accept**.

- The MTM400A RUI will now appear.



## Operation

This section describes the front-panel indicators on the MTM400A monitor, the RUI display elements, and the various views that are available within the RUI.

## Getting Acquainted with your Instrument

### Front Panel Indicators

Since the MTM400A monitor is designed to be operated remotely, the local interface is limited to four front-panel LEDs (see Figure 17), which indicate the instrument status. Table 6 describes the function of the four LEDs.

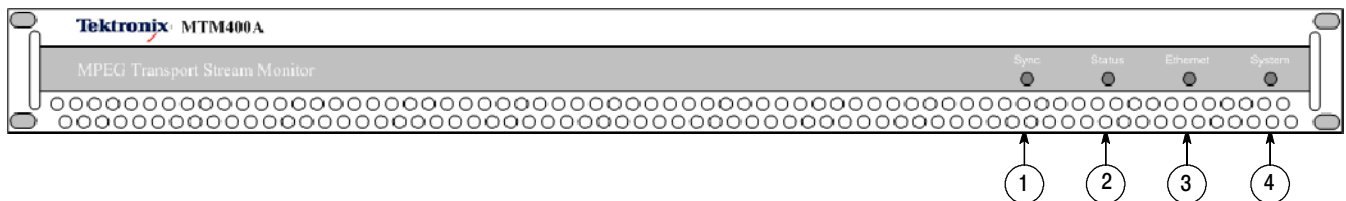


Figure 17: MTM400A monitor front panel

Table 6: Front panel LEDs

Figure 17 element	LED name	Description
1	SYNC	Indicates that a valid MPEG transport stream is connected to the unit.
2	STATUS	Indicates the combined state of the tests currently being performed on the stream. The test reported by the STATUS LED corresponds to the Stream Tests status in the Analysis > Tests view.
3	ETHERNET	Indicates the state of the Ethernet physical link.
4	SYSTEM	State of all non-stream items (hardware, time sources). The test reported by the SYSTEM LED corresponds to the Device Tests status in the Analysis > Tests view.

Each LED can display one of the three following colors, except the Ethernet LED, which never displays yellow.

- Green indicates that the monitor is passing the test
- Red indicates that the monitor is failing the test
- Yellow indicates that the monitor is passing the test, but has failed since the last system reset

## RUI Display Elements

You can use the RUI to monitor real-time transport streams from your networked PC. The RUI software is downloaded from the MTM400A monitor each time the instrument is accessed. The procedure to start the RUI is described starting on page 32.

Figure 18 shows the main elements of the RUI display. The display elements are described in more detail in the *MTM400A MPEG Transport Stream Monitor Technical Reference*. Table 7 describes the RUI display elements.

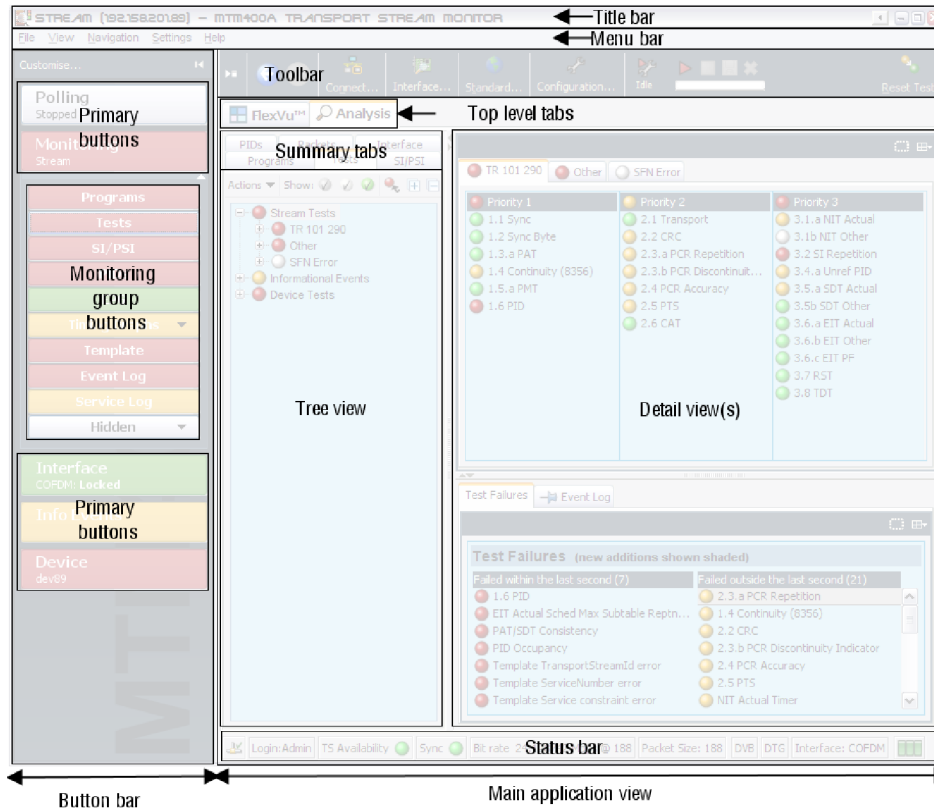


Figure 18: RUI display elements

Table 7: RUI display elements

Element	Description
Title bar	Displays the stream name (if specified) followed by the IP address or network name of the MTM400A monitor (for example: <i>Stream 95 (192.158.201.95) - MTM400A Transport Stream Monitor</i> ).
Menu bar	Provides access to a selection of system options using drop-down menus.
Toolbar	Provides shortcuts to often-used menu options.
Button bar	Provides shortcuts to major monitoring functions. You can hide the button bar if required.
Top-level tabs	Selects between the two major display views: FlexVu™ and Analysis.
Summary tabs	Selects which Analysis view to display. The Summary tabs are displayed in Analysis mode.
Status bar	Provides a summary of the monitoring status.

**Color Coding.** The buttons and icons in the RUI use the color-coding described in Table 8 to indicate their status.

**Table 8: Color coding**

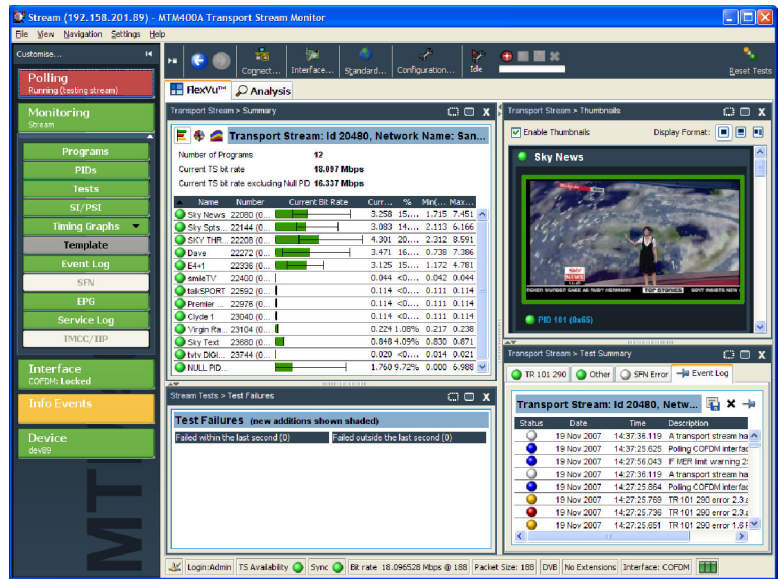
Color	Meaning
Green	Operation normal - no error detected
Red	Error detected and still present
Blue	Warning detected and still present
Yellow	Transient error, which has now corrected itself
Gray	The corresponding test has been disabled (or is unavailable). All buttons gray indicates that connection to a device has been lost.
White	Test not applicable
Black	Maintenance mode

## RUI Displays

### FlexVu™ Display

The FlexVu™ display enables the instrument to perform like a 4-in-1 monitor on a single incoming stream. The display allows you to select up to four concurrent views of a monitored stream and provides the ability to configure each of the four views independently. Each of the FlexVu™ views is selected from views that are available under the Analysis tab.

Refer to *Setting up the FlexVu™ Display* on page 34 for information about selecting views for the FlexVu™ display.



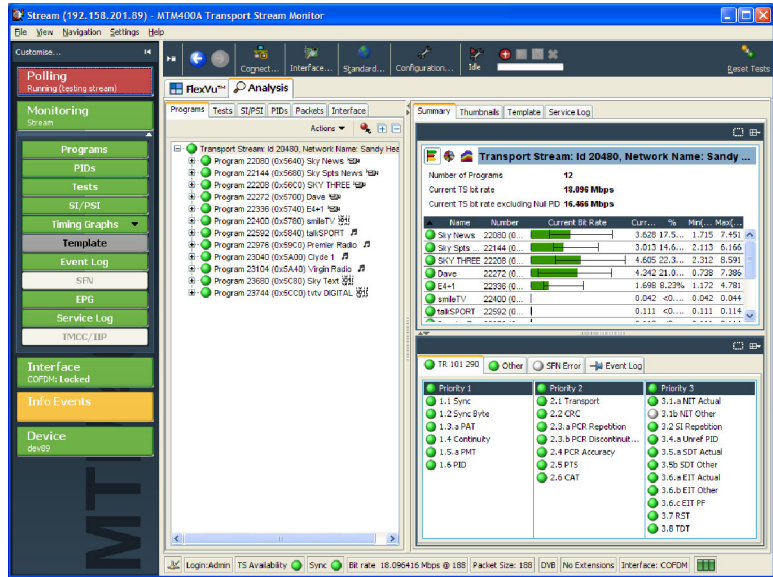
## Analysis View

The Analysis view provides a single main program summary window with different context sensitive views contained within tabbed frames. This view is intended to provide the maximum amount of useful information while keeping the screen from appearing cluttered. From the Analysis view window, you can access the following views: Programs, Tests, Tables, PID, Packets, and Interface.

**Analysis - Programs View.** The Programs view provides a fast overview of the transport stream contents in terms of program content, bit rate use by each program, and TR 101 290 test results.

Red, amber, and green LEDs highlight errors associated with each program, or element of a program, within the transport stream. Red LEDs indicate that there are errors occurring in the stream, amber LEDs indicate that errors have occurred but are now clear, and green LEDs indicate that no errors have been detected.

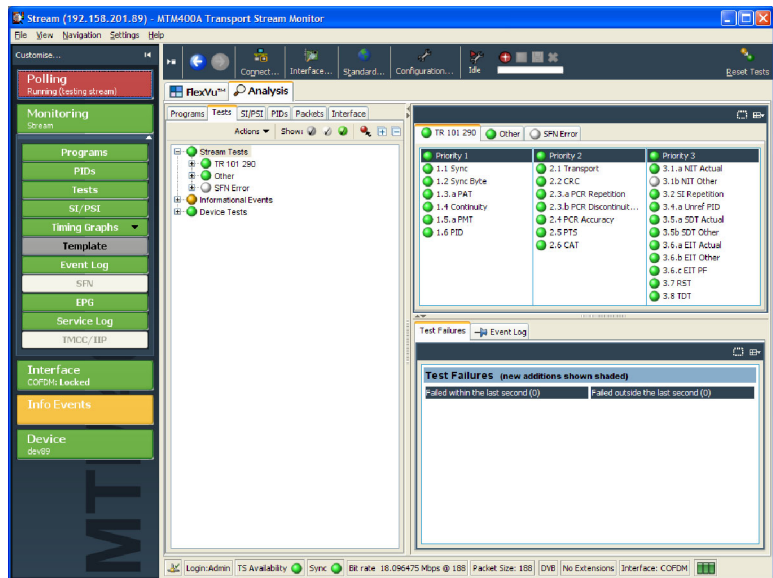
Errors that are detected at lower levels in the program stream hierarchy propagate up to the highest level. This allows you to monitor all of the programs in the stream at a high level, and then quickly go to lower levels as necessary to locate a problem.



**Analysis - Tests View.** The Tests view allows you to identify the tests that are indicating errors in a monitored stream. The error log is automatically filtered by the selected test, and can also be filtered by the Packet Identifier (PID).

In addition to the standard first, second, and third priority tests included in the TR 101 290 standard, tests are available for Program Clock Reference (PCR) jitter and program/PID bit rate. A variability test enables you to test the changes in the bit rate of a specific PID, and there are many tests that are specific to ISDB-T and ISDB-S streams.

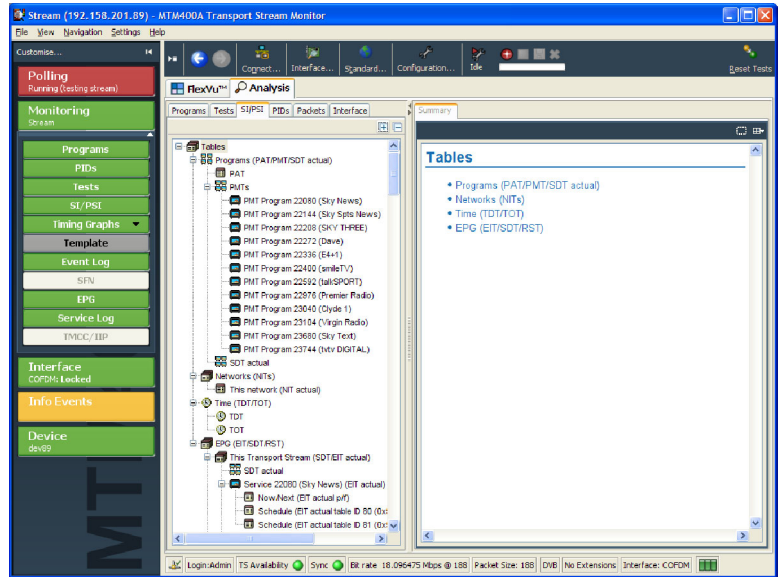
Also displayed in the Tests view are the results of tests related to the MTM400A monitor hardware. One example is the temperature of the system card.





**Analysis - SI/PSI (Tables) View.** The SI/PSI (Tables) view displays the service information tables from the analyzed stream that comply with the selected digital video standard. This includes MPEG-specific program information, DVB service information, and ATSC, ISDB program, and system protocol information.

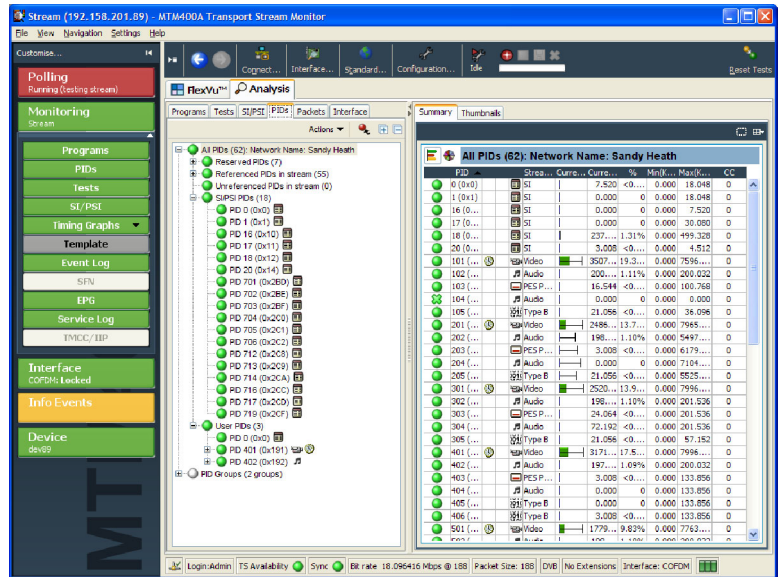
The tables are grouped together by function and hyperlinks enable you to quickly access related information within other tables.



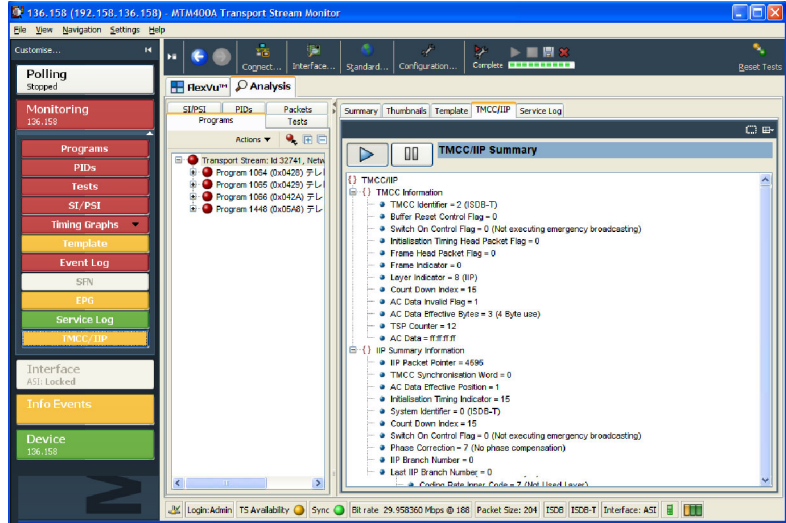
**Analysis - PIDs View.** The PIDs view displays information about all of the PIDs found in the transport stream. When you select the transport stream, the associated summary view provides a PID-oriented overview of the transport stream, displaying the relative data rates of all of the PIDs contained within the stream.

The information can be displayed either as a bar chart or as a pie chart. Pop-up menus enable limit selection and links.

Each PID is associated with a number of tests. When one or more tests fail, each failed test will be listed under the relevant PID. Select a specific PID to display a summary of all the associated tests. Select a specific test to display the Event Log and Parameters for only that test.



**Analysis - Packets View.** The Packets view displays SFN data when available in DVB mode, and information packets (IIPs) and TMCC data in ISDB-T mode.

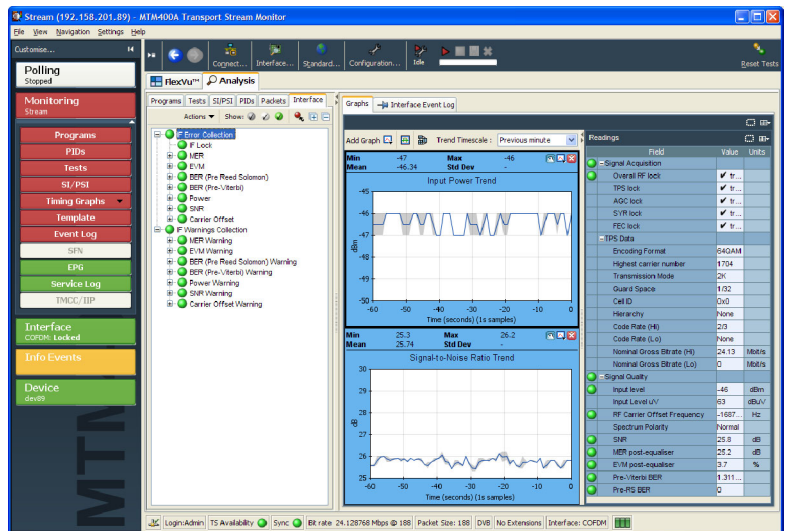


**Analysis - Interface View.** The Interface view tab and the Interface toolbar button are displayed only when the instrument detects that one of the optional RF interface cards is installed. When an RF interface card is not installed, you can use the Interface... toolbar button to access the non-RF interfaces.

The Interface view provides a central location for information related to the RF interface card. The display includes the following information:

- Test results
- Graphical representation of specific RF card measurements
- RF card readings and control settings

The graphical views display a selection of graphs of instantaneous measurements and measurement trends. Also available are an Event Log and a Parameter view.





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## WebMSM Monitoring Software

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**NOTE.** *The WebMSM Monitoring System Manager product is no longer available from Tektronix. If you have a copy of WebMSM, a software update is available on the Tektronix Web site ([www.tektronix.com/software](http://www.tektronix.com/software)) that enables the WebMSM software to operate with MTM400A monitors.*

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If you have a system consisting of several MTM400A monitors, you can expand your monitoring capabilities by using the Tektronix WebMSM Monitoring System Manager. The WebMSM software is effectively an installed version of the RUI. The WebMSM software 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.

For further information concerning installing and configuring the WebMSM, refer to the *WebMSM Monitoring System Manager User Manual* (Tektronix part number 071-1239-xx).

## Procedures

This section provides you with example procedures for performing basic instrument operations. Detailed operational information can be found in the *MTM400A MPEG Transport Stream Monitor Technical Reference*. The following procedures are provided:

- Starting the RUI
- Setting up the FlexVu™ display
- Configuring an optional RF Card
- Saving and using configuration files
- Capturing a recording

### Starting the RUI

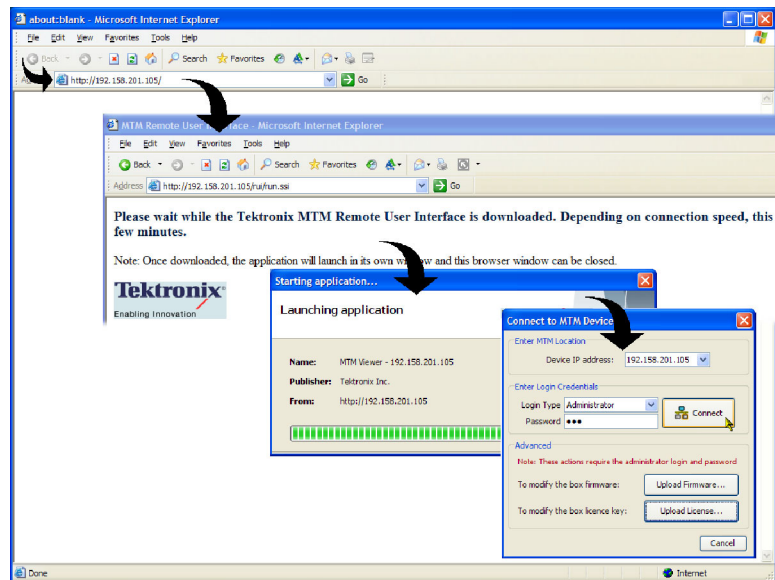
Using the RUI, you can monitor real-time transport streams from your networked personal computer (PC). The RUI software is downloaded from the MTM400A monitor to the PC each time the instrument is accessed. The RUI can be run on any PC that meets the minimum specifications (see Table 5 on page 19) and has networked access to the MTM400A monitor.

If your PC does not have the minimum version of Java Virtual Machine as listed in Table 5 on page 19, you must download the latest version from the Java Web site ([www.java.com](http://www.java.com)). When the instrument detects an older version, this process is started automatically during the RUI start-up. If necessary, consult your IT Administrator for further guidance. At the end of the Java update, you may need to close Internet Explorer and restart the RUI download.

Perform the following procedure to start the MTM400A monitor RUI:

1. On a networked PC, launch Microsoft Internet Explorer.
2. In the browser address bar, enter the network identity or IP address of the MTM400A monitor, for example:  
<http://TSMonitor01>  
<http://192.201.121.231>

When you press the Enter key, a Java applet is downloaded from the MTM400A monitor and launched. The file size is approximately 1.5 MB; the download time will depend on the network speed and traffic.





**CAUTION.** The Java applet will not run unless a temp directory is properly configured on the PC. A temp directory is set up by default in the Windows XP operating system; previous operating systems may require operator action.

The Java applet will not run unless the Sun Java Virtual Machine is installed. Type `java -version` at the command prompt to verify that it is installed and that the version is 1.6.0\_03 or greater. If it is not installed, you can download the latest version from the Sun Web site, [www.java.com/getjava](http://www.java.com/getjava).

3. In the Connect to MTM Device dialog box, select the Login Type, Administrator or User, from the drop-down list.

**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. You can also reset alarms.

4. Enter the password. The default password for Administrator is tek; no password is allocated to User. You can change the passwords; refer to the MTM400A Technical Reference manual.
5. Select **Connect** to accept the details. Select **Cancel** to close the dialog box and exit the start process.
6. Read the End User License Agreement and click **I Accept**.

- On start-up, the FlexVu™ view is displayed. For first use, a default set of views are displayed.

Thereafter, your arrangement of views will be remembered when you access the RUI the next time.

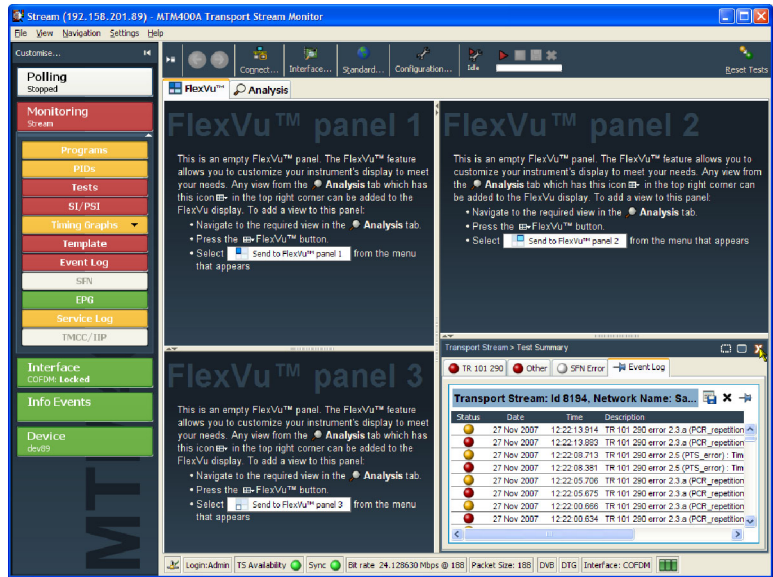


## Setting up the FlexVu™ Display

Using FlexVu™, you can select up to four views from the analysis detail views to be displayed together to facilitate basic transport stream monitoring or more detailed diagnostic monitoring, for example, monitoring the quality of an RF stream.

For this exercise, close each of the currently displayed FlexVu™ panels by clicking the X in the top right corner of each panel.

This is not necessary, but it may help you visualize the following procedure more easily as each panel is populated. Note that each of the four FlexVu™ panels are numbered.

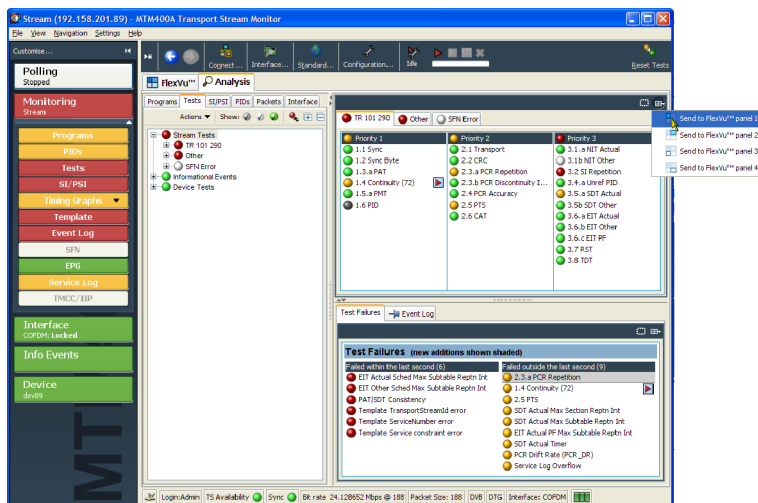


### Set up panel 1.

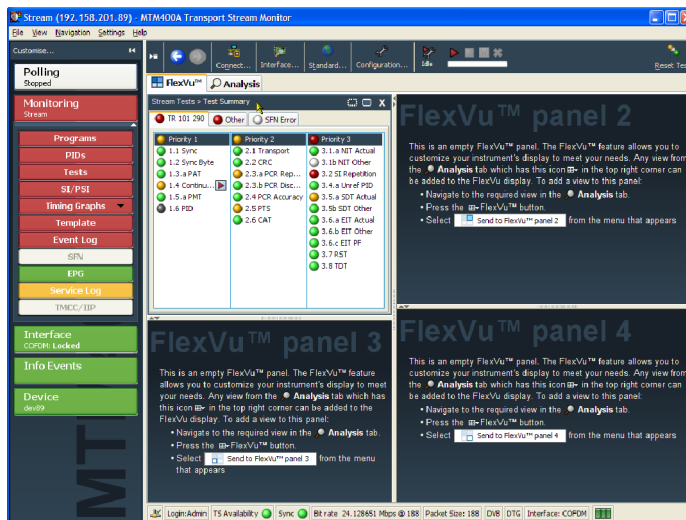
1. Select the **Analysis** tab and then the **Tests** tab.

In the top right corner of all detail views is a FlexVu™ panel select button. You can use this button to display a replica of the detail view in the selected FlexVu™ panel.

2. In the Test Summary view, use the FlexVu™ panel select button to replicate the view in panel 1.

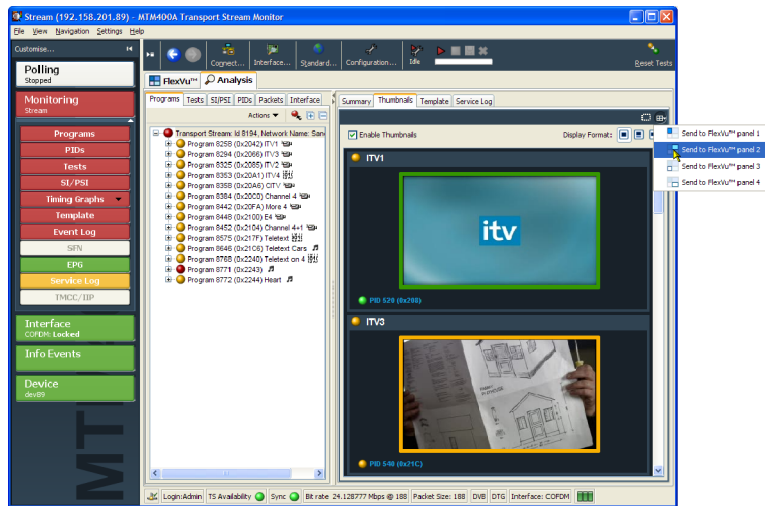


3. The FlexVu™ display now contains the Test Summary view in panel 1.

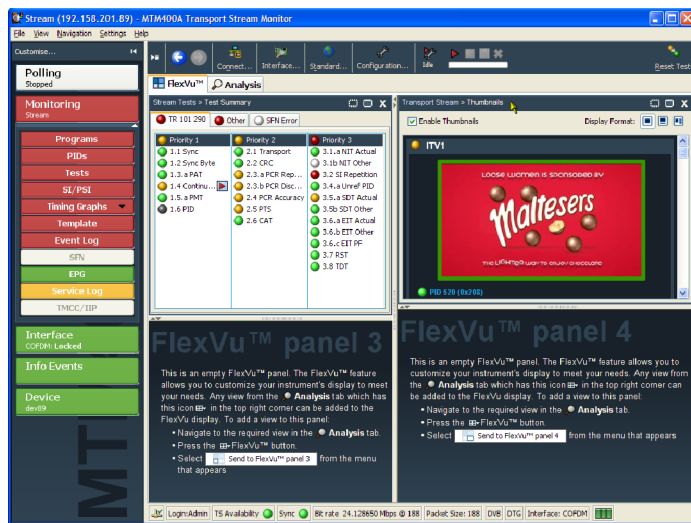


**Set up panel 2.**

4. Select **Analysis** tab and **Programs** tab.
5. In the **Thumbnails** view, use the **FlexVu™** panel select button to replicate the view in panel 2.

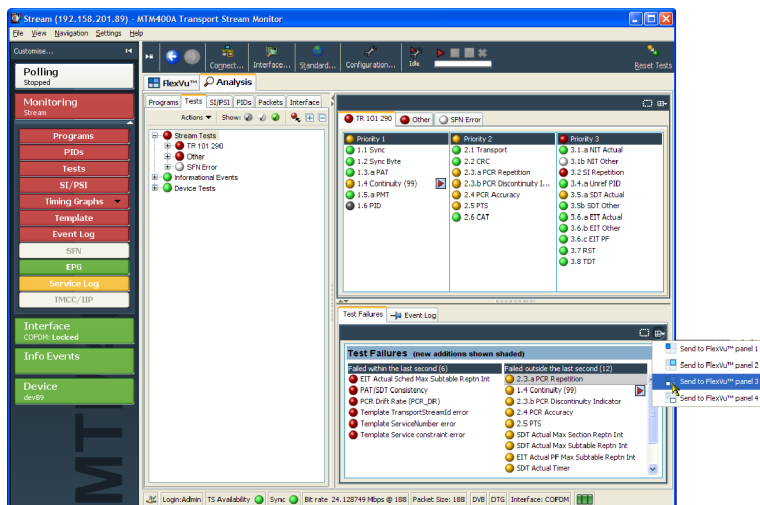


6. The **FlexVu™** display now contains the Thumbnail view in panel 2.

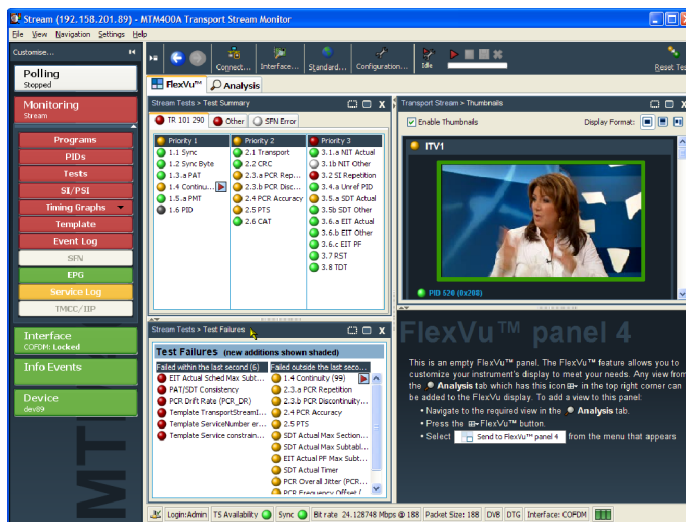


**Set up panel 3.**

7. Select **Analysis** tab and **Tests** tab.
8. In the **Test Failures** view, use the FlexVu™ panel select button to replicate the view in panel 3.



9. The FlexVu™ display now contains the **Test Failures** view in panel 3.

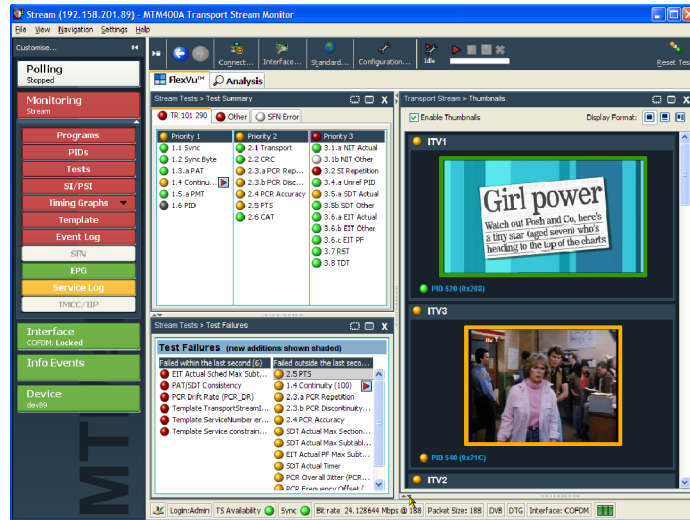
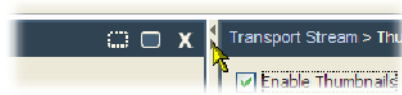


Since only three panels are used in this example, you can expand the thumbnails view to fill the right side of FlexVu™.

You can expand panel 2 vertically by selecting the panel expand button.

(Similarly, you can expand panels horizontally using the horizontal panel expand button.)

10. Expand panel 2 to display the complete FlexVu™ basic monitoring view.



To summarize, in this view you can immediately see the following:

- In the Tests Summary view (FlexVu™ panel 1), which tests have failed.
- In the Test Failures view (FlexVu™ panel 3), which tests have failed most recently.
- In the Thumbnails view (FlexVu™ panel 2), which elementary streams are currently carrying video content.



## Configuring an RF Card

If your instrument has one of the optional RF interface cards installed, use the following procedure to configure the RF interface card and save the settings for future use. Interface settings can be saved as Presets. Each Preset can contain a different set of interface values. In the Interface dialog box, the Preset name associated with the active set of values is displayed in bold text. The Preset can be directly modified or duplicated, modified and made active.

The following procedure uses a COFDM interface card as an example, and uses the setup frequency values listed in Table 9. The steps are similar for configuring the other RF interface card types. You will complete the following steps:

- Ensure that the interface card is selected
- Duplicate the currently active Preset
- Rename preset and enter settings
- Make preset active
- View Analysis > Interface

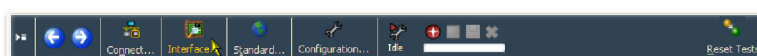
**Table 9: Example values for configuring an RF interface card**

Nominal tuner frequency (KHz)	Channel bandwidth (MHz)	Receiver mode	IF Filter	Stream priority	Carrier start	Carrier end
650000	8 MHz	Hi Sensitivity	Normal	High	0	1704

1. Check that the RF interface card is selected. This will be confirmed in the Status bar, for example, COFDM. If the interface card is not active, either ASI or SMPTE will be shown in the Status bar.

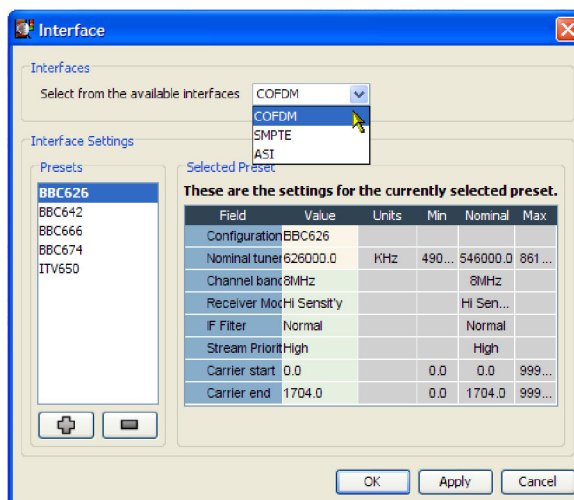


2. On the toolbar, select **Interface** to open the Interface dialog box.



The ASI and SMPTE selections will always be present in the Interface dialog box. The RF interface selection will appear only when one of the optional interface cards is installed.

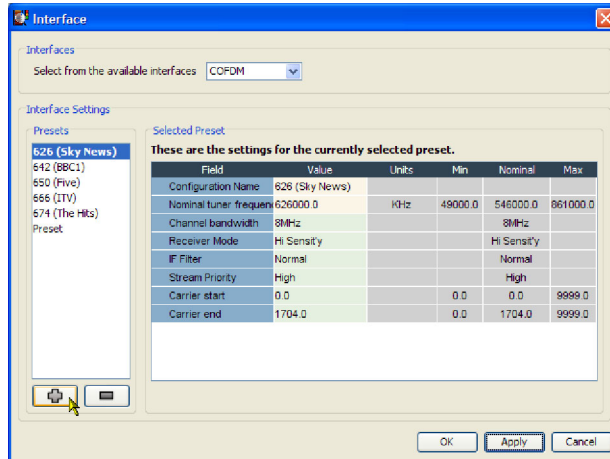
3. If the COFDM interface card is not active, select COFDM from the Interfaces drop-down menu in the Interfaces dialog box.
4. Allow the display to stabilize; this can take up to 30 seconds. An indication that the display has stabilized is that the correct interface name is displayed in the Status bar.



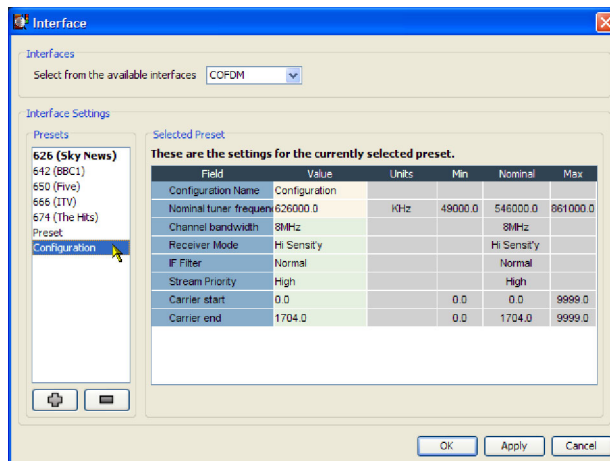
An Interface Settings Preset is a collection of preset values. The Preset name in bold text contains the active settings. The active preset can be modified directly or a duplicate preset can be made.

For this example procedure, you are going to duplicate the active preset, rename it, modify the settings, and make it the active preset.

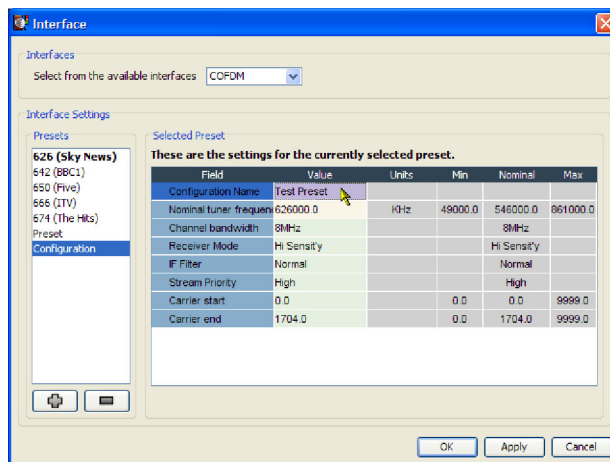
5. Click **Add** to duplicate the active preset.



6. The duplicated preset is named **Con-figuration**; select and highlight the **Configuration** preset.

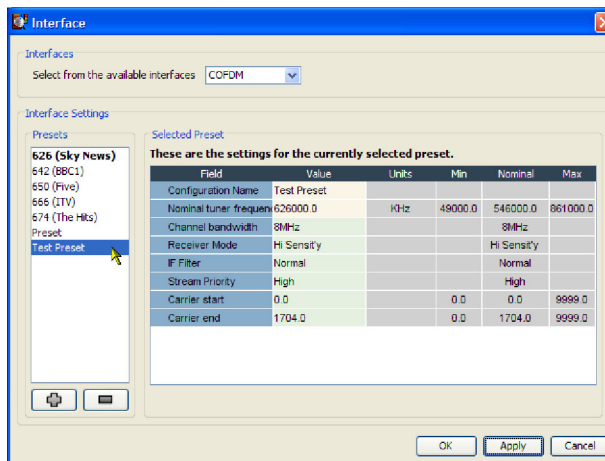


7. In the Configuration Value field change the name from **Configuration** to **Test Preset**.

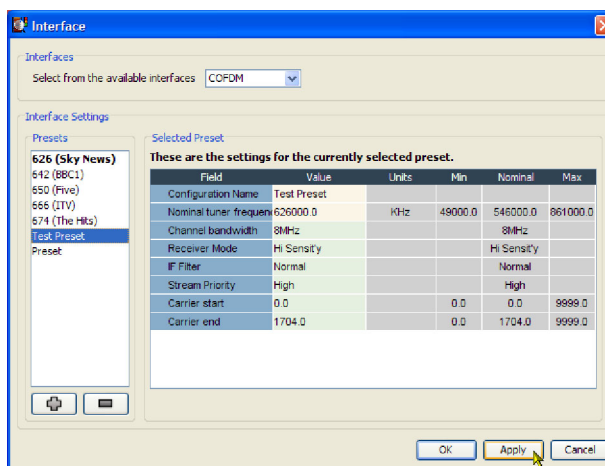


8. Change the rest of the settings. For this example, you can use the values listed in the the table on page 39.

- Click **Apply** to confirm the changed settings.

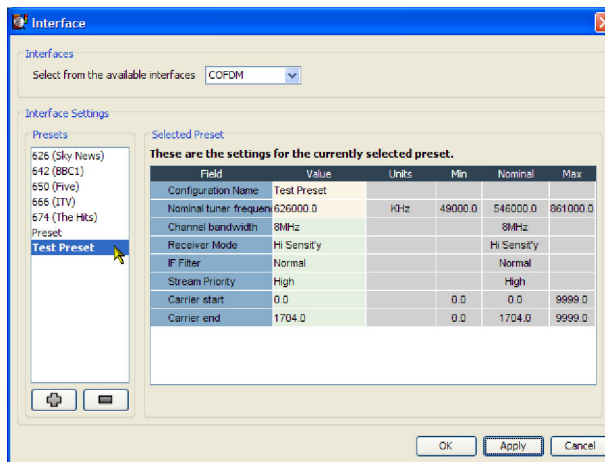


- Highlight the Preset and click **Apply**, to implement the newly created settings (or any of the other presets).



The selected and active preset name, **Test Preset**, is bolded.

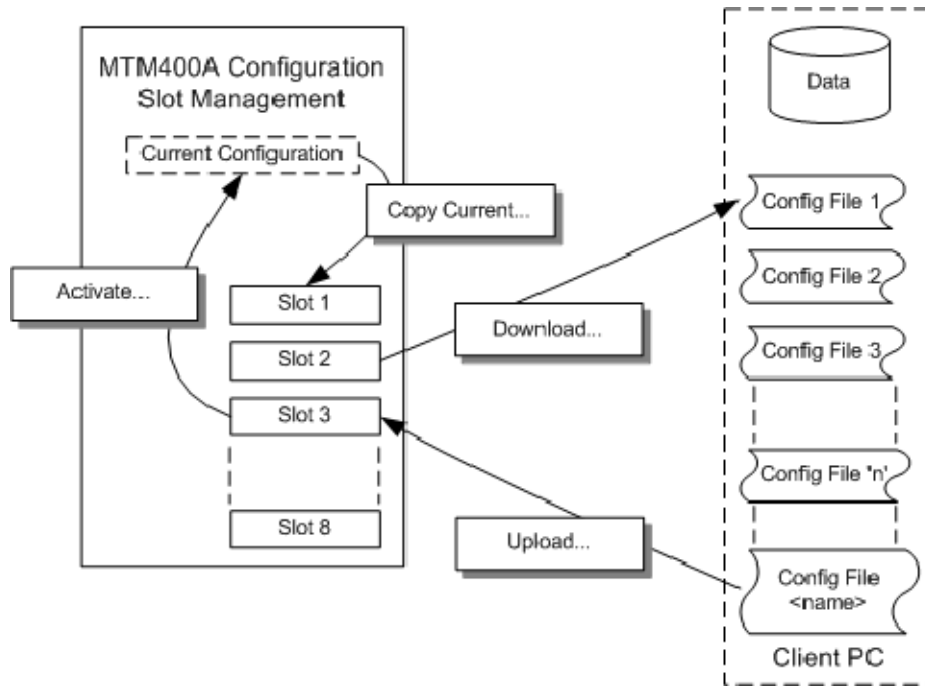
- Click **OK** to close the Interface dialog box. Verify that monitoring is continuing satisfactorily.



## Saving and Using Configuration Files

Configuration files provide a means of implementing and storing different monitoring configurations of the instrument. For example, a specific setup on one instrument can be saved and subsequently uploaded to other instruments. Refer to the *MTM400A MPEG Transport Stream Monitor Test Parameter and Configuration File Technical Reference* for more information.

In the MTM400A monitor, configuration settings files are held in storage slots; eight storage slots are available for each stream. Storage slots can be filled by either storing the current configuration or by uploading a configuration file from the client PC. To implement the setting held in a storage slot, the configuration file must be activated. The following diagram illustrates the handling of configuration files.



In the following procedure, you will complete the following steps:

- Save the current configuration
- Download a saved configuration file to your PC
- How to upload a configuration file from your PC
- How to activate a configuration file

1. Click **Configuration** on the toolbar to open the Configuration dialog box.
2. In the Configuration dialog box, select **Stream > Slot Management**.

The remainder of this procedure uses controls on the Configuration Slot Management page.

3. To save the active (current) configuration, highlight the slot that the file is to be saved into, for example, **Slot 7**.

(If you want to save the Current configuration, you must copy it to a slot first.)

4. Click **Copy Current**.

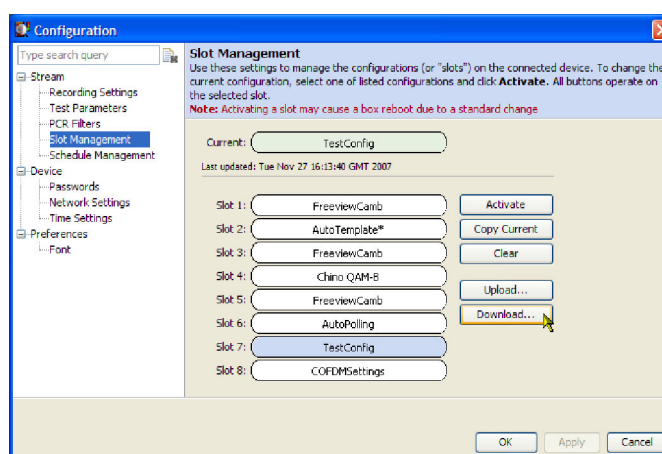
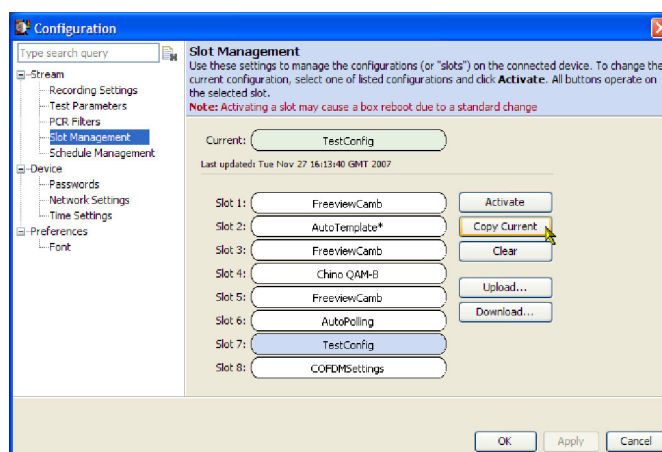
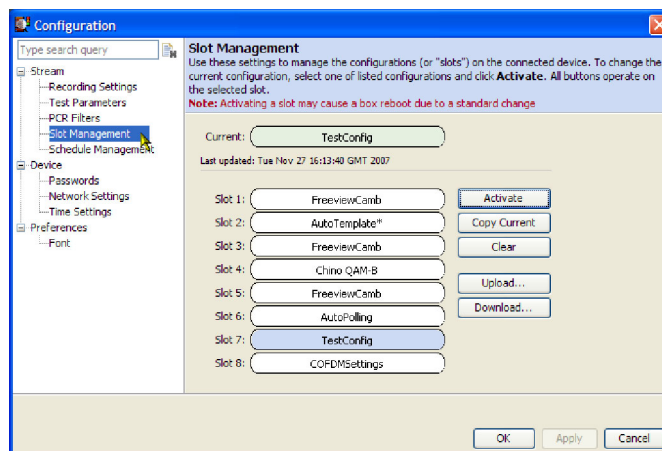
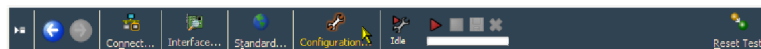
5. To download a configuration file from a slot to your PC (or the network), highlight the slot containing the file to be downloaded.

6. Click **Download**.

7. In the Save dialog box, specify the name and location of the saved file and click **Save**.

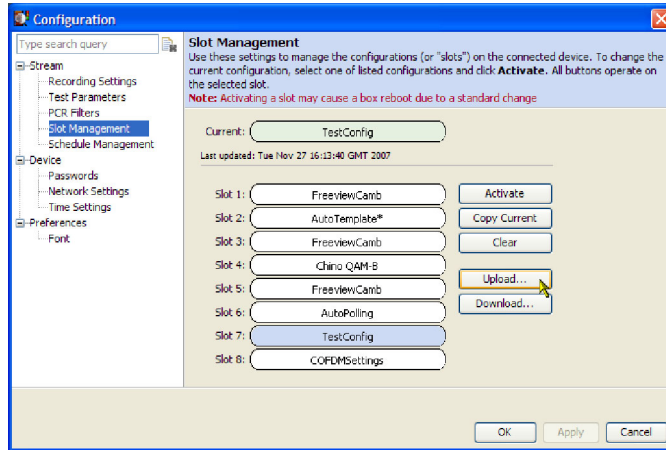
The name displayed in the Current and Slot fields is contained in the file header and does not necessarily correspond with the file name.

Downloaded configuration files can be modified using a text editor or an XML editing program.



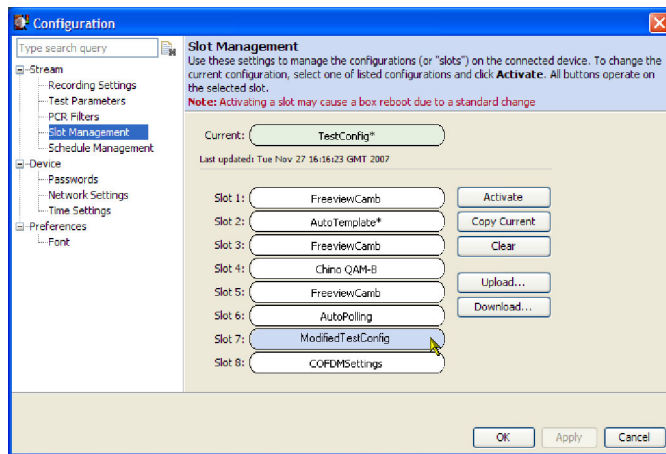
8. To upload a configuration file from your PC (or the network), highlight the slot containing the file to be uploaded, for example, **Slot 7**.

9. Click **Upload**.



10. In the **Open** dialog box, locate the configuration file to be uploaded and click **Open**.

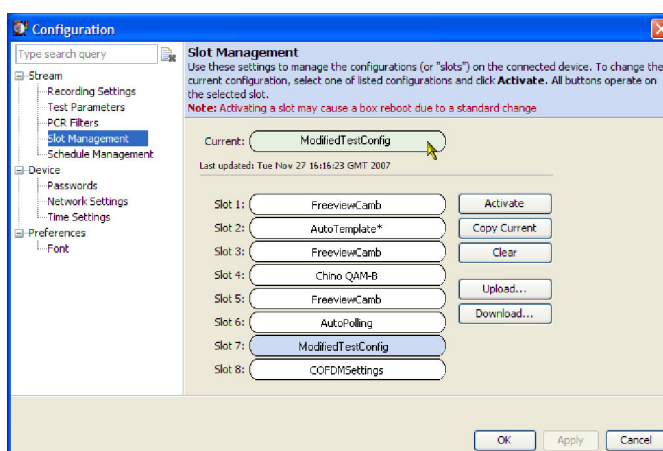
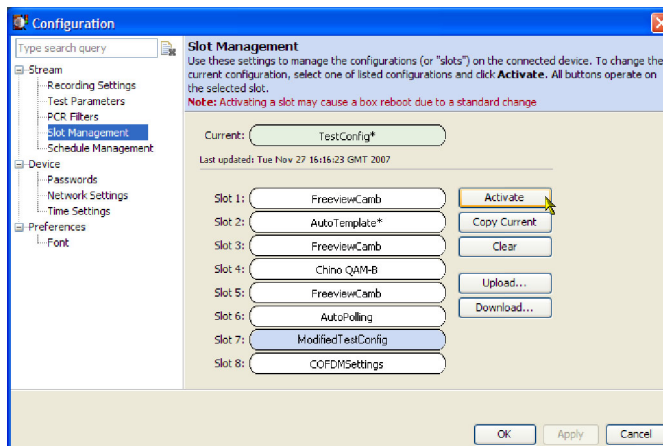
The file has been uploaded to the highlighted slot, that is, Slot 7.



11. To make a configuration file active, highlight the slot containing the file to be activated, for example, **Slot 7**.

12. Click **Activate**.

Note that the name in the highlighted slot, Slot 7, has been copied to the Current slot. The MTM400A monitor will be reconfigured in accord with the activated configuration file.





## Capturing a Recording

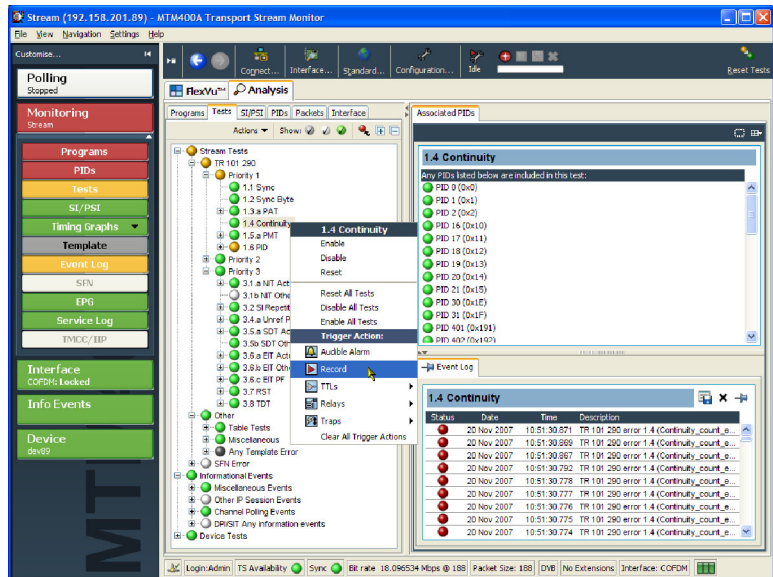
To be able to examine transport stream events in detail, you can make recordings. The onset of recording can be triggered by any of the following events:

- Manual - you start the recording
- External rising or falling signal edges - supplied via an external signal connection
- Test failures - you can specify which test failure will trigger recording

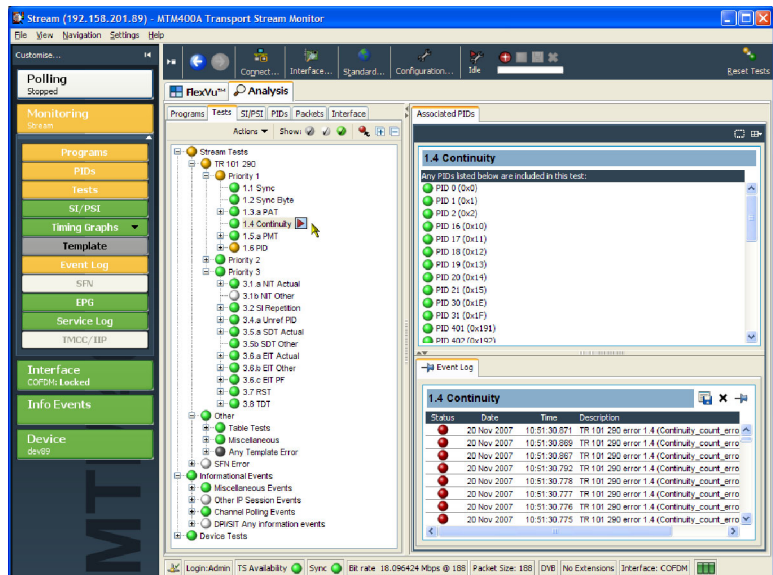
In this procedure, you will set up the MTM400A monitor to make a recording of the stream around the failure of a test, for example, the TR101 290, Priority 1, Continuity test.

Set a Record trigger action flag on the TR101 290, Priority 1, Continuity test.

1. Select **Analysis** tab and then the **Tests** tab.
2. In the Test tree view, highlight the Continuity test: Stream Tests > TR101 290 > Priority 1 > 1.4 Continuity.
3. From the context menu (hover the mouse over the test name and click the right mouse button) select the **Record** trigger action.



The Record trigger action icon is adjacent to the test name.





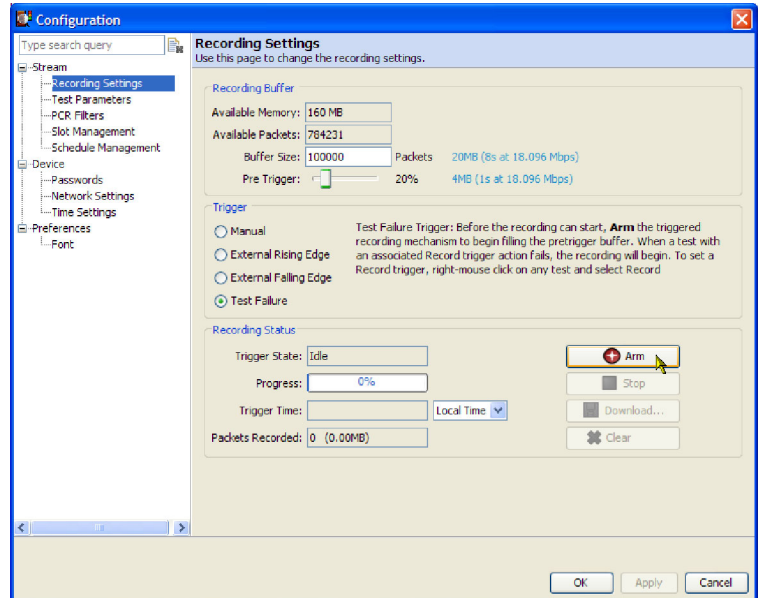
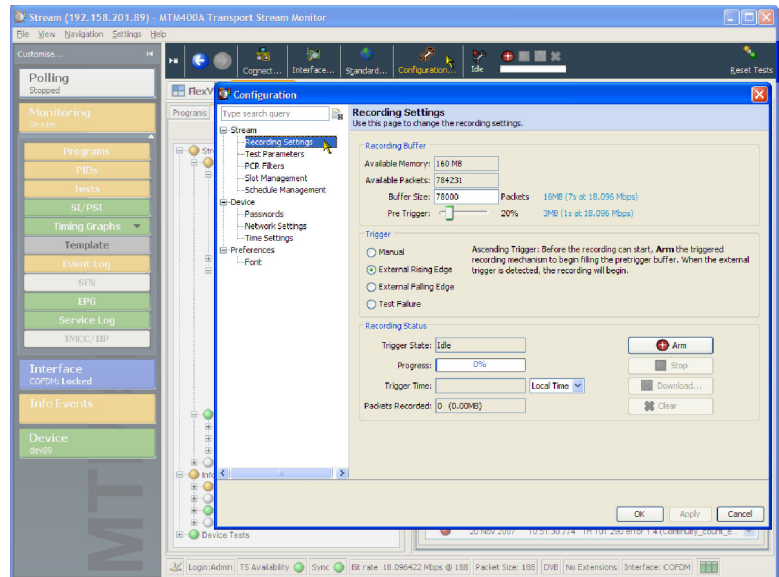
Open the Configuration dialog box and set the recording parameters.

4. On the toolbar, select **Configuration** to open the Configuration dialog box.
5. Select **Stream > Recording Settings** to open the Recording Settings panel.
6. In the Recording Buffer panel, you can set the size of the recording and the proportion of the total recording that is to be made before the trigger event occurs. For this example, set the **Buffer Size** to 100000 packets and the **Pre Trigger** value to 20% of the final recording.

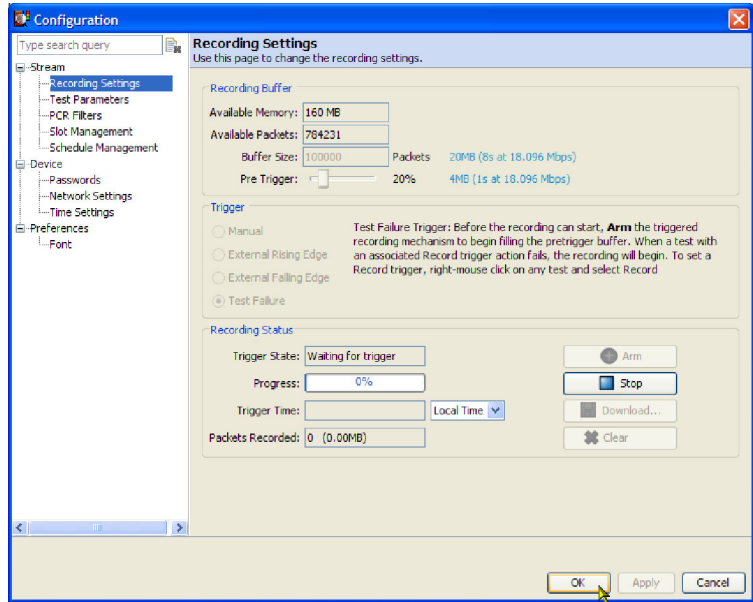
Setting the pretrigger value ensures that a percentage of the final recording is made before the trigger event occurs. You can then view the trigger event in context.

7. Select **Test Failure** as the recording trigger. Any test with a record trigger action set will initiate recording on failure.
8. Click **Arm** to arm the recording function.

From this point, the pretrigger buffer is kept constantly full in readiness for true recording to start when a trigger action (test failure) occurs.

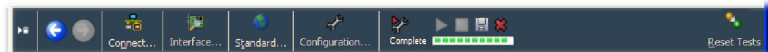
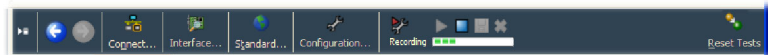
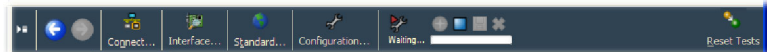


The **Trigger State** has changed from **Idle** to **Waiting**. The toolbar recording icons indicate the trigger state.



Recording will occur when the trigger event occurs. You can close the Configuration dialog box. The toolbar recording icons will indicate the recording status.

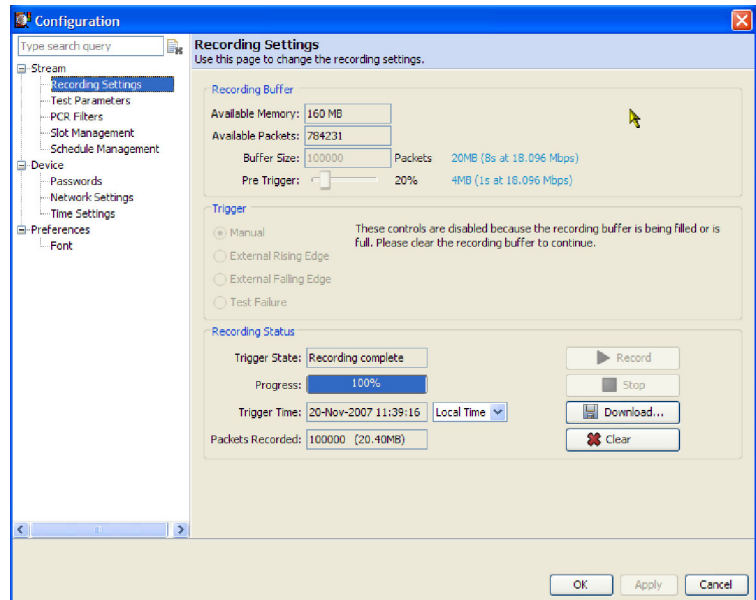
9. When the trigger event occurs, the recording will be made.



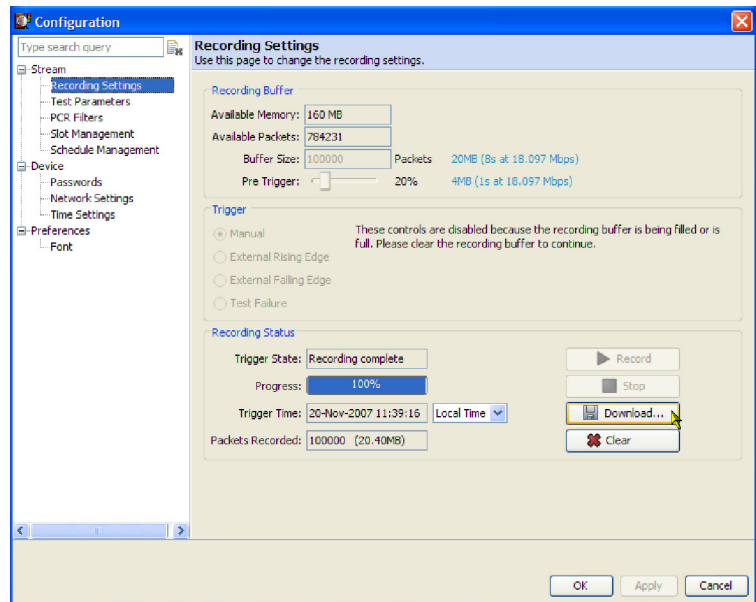
Save the recording when it is complete.

10. On the toolbar, select **Configuration** to open the Configuration dialog box.
11. Select **Stream > Recording Settings** to open the Recording Settings panel.

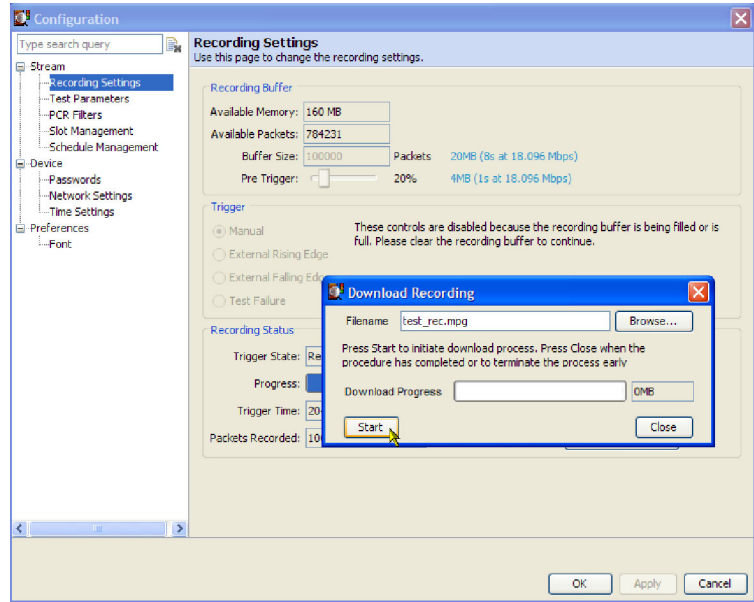
The Trigger State is now **Recording Complete**.



12. Click **Download** to save the recording to your PC (or the network).

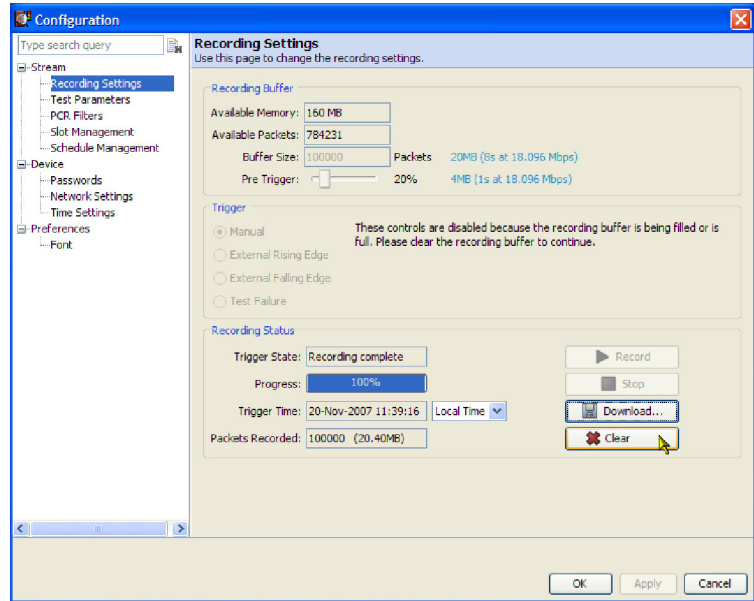


- In the **Download Recording** dialog box, specify the name and location of the recording.



You must clear the recording from the recording buffer. No further recordings can be made until this is done.

- Click **Clear** to clear the recording buffer. The Trigger State will return to **Idle** and the Progress bar will be cleared.



## Application Examples

This section contains procedures for monitoring application examples. The following procedures are included:

- Monitoring RF stream quality
- Monitoring RF off-air performance

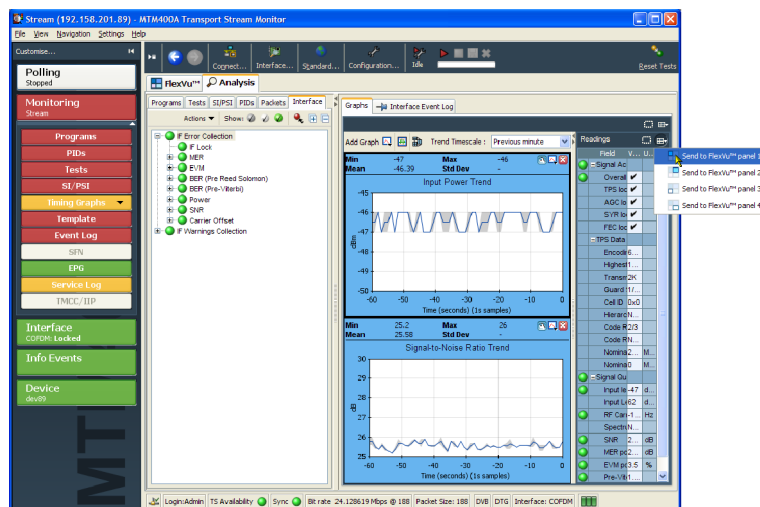
### Monitoring RF Stream Quality

The process of populating FlexVu™ is similar, whichever views you choose. This procedure uses elements from the Interface views. The selection and placement techniques are similar to those described in *Setting up the FlexVu™ Display* starting on page 34.

This procedure assumes that a COFDM RF interface card is installed in the MTM400A monitor. The Analysis Interface tab will not be displayed if an interface card is not installed.

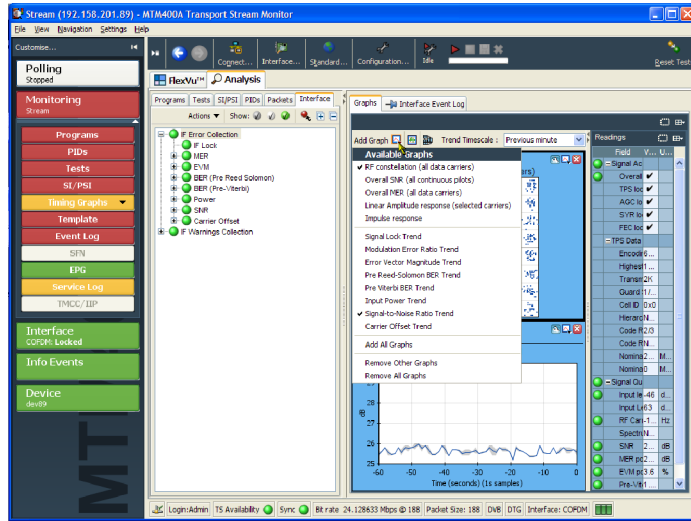
Select **Analysis** tab and then the **Interface** tab.

1. In the **Readings** section of the **Graphs** view, use the FlexVu™ panel select button to replicate the view in panel 1.

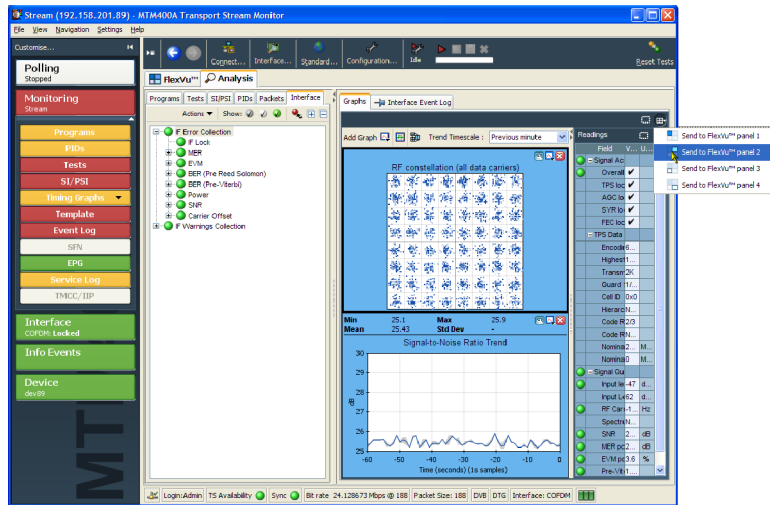


2. In the **Graphs** view, select **RF Constellation** from the **Add Graph** drop-down list.

3. Repeat the previous step, selecting the **Signal-to-Noise Ratio Trend** graph.

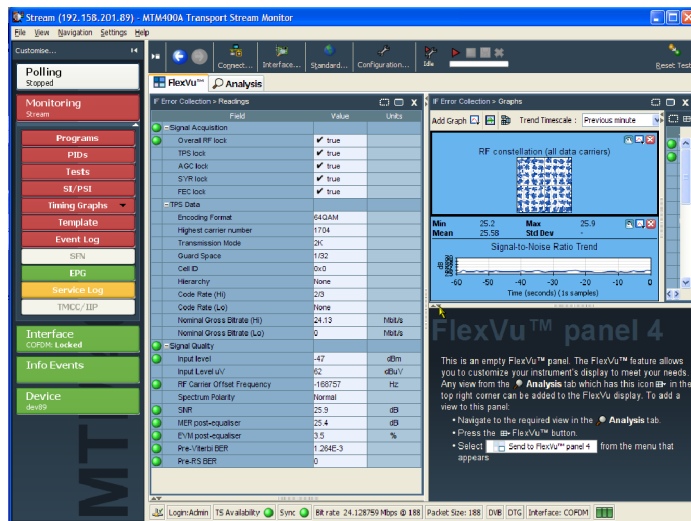


4. In the **Graphs** view, use the **FlexVu™** panel select button to replicate the view in panel 2.



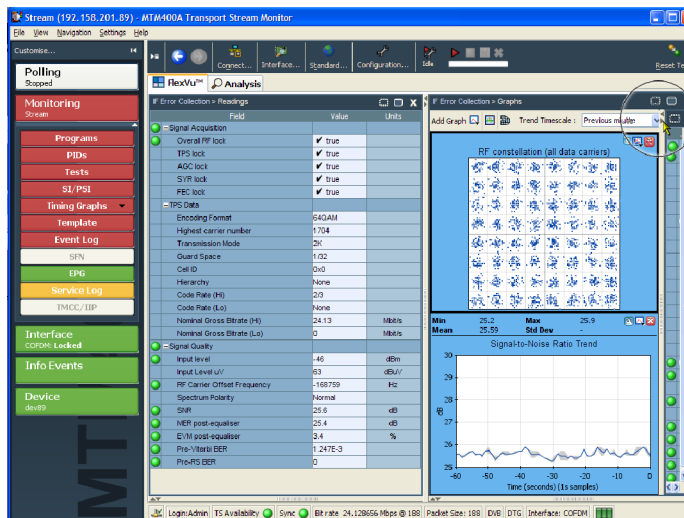
5. Select the **FlexVu™** tab to display FlexVu™.

Expand FlexVu™ panels 1 and 2 vertically to provide a full display.

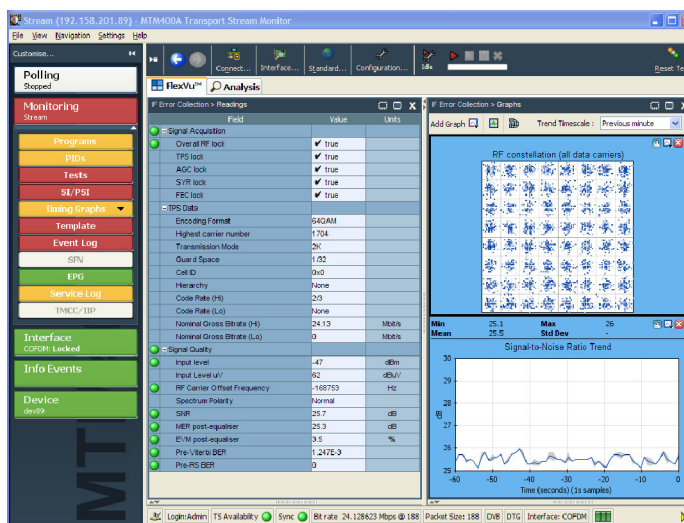


In FlexVu™ panel 2, Graphs and Readings form a single panel.

- Hide the readings panel in FlexVu™ panel 2 by horizontally expanding the Graphs panel.



The final layout should appear as shown.



To summarize, in this view you can see the following:

- In the Interface Readings view (FlexVu™ panel 1), interface error values and error states.
- In the Interface Graphs view (FlexVu™ panel 3), the RF constellation and signal-to-noise trends.

# RF Off-Air Performance Monitoring

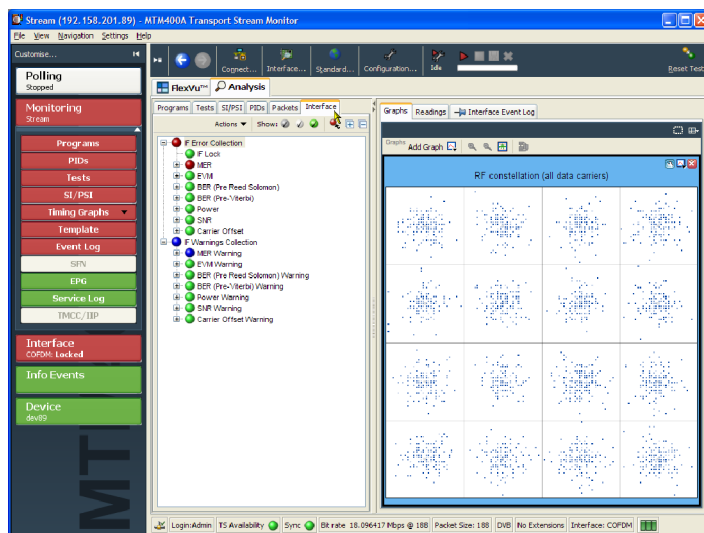
## Scenario

Heavy rain is forecast in your area. Previous experience suggests that this may cause problems with the RF performance. The power drop can cause the modulation error ratio (MER) and error vector magnitude (EVM) to increase. The net result can be an increase in bit error rate and the resultant continuity count errors in the transport stream.

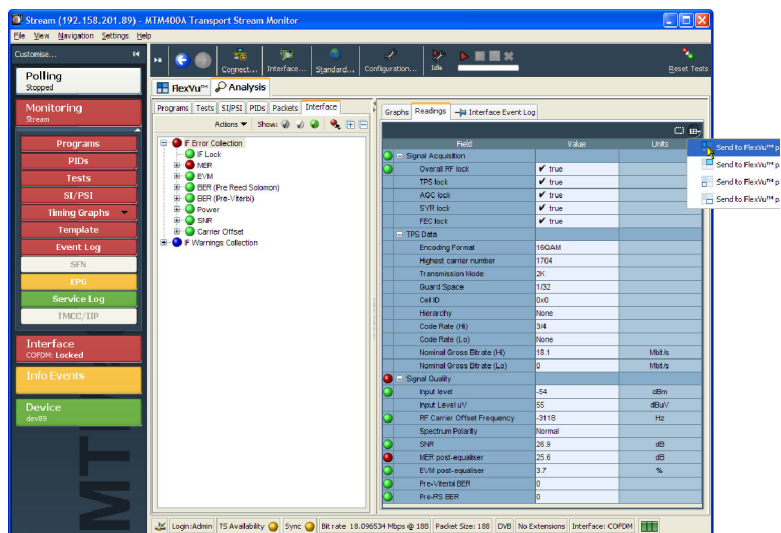
With this in mind, you can set up FlexVu™ to display views that will indicate any deterioration in the RF performance. The following procedure shows you how to set up FlexVu™ to monitor this scenario.

## Procedure

1. Select the **Analysis** tab and the **Interface** tab.

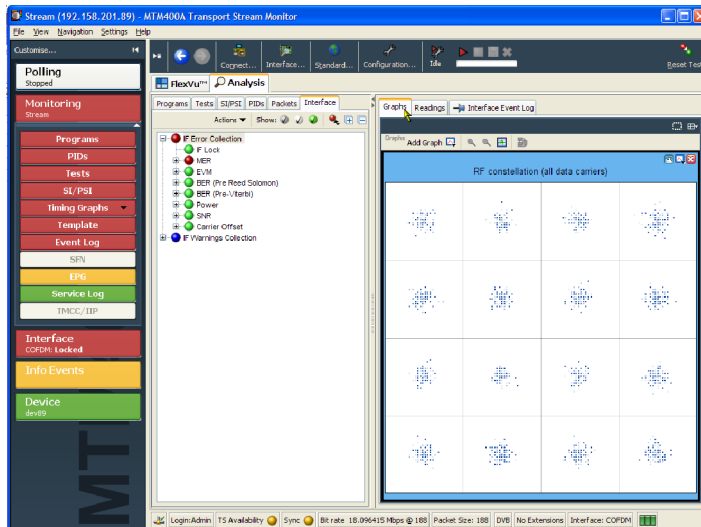


2. In the Interface view, select the Readings view and use the FlexVu™ panel select button to replicate the view in panel 1.

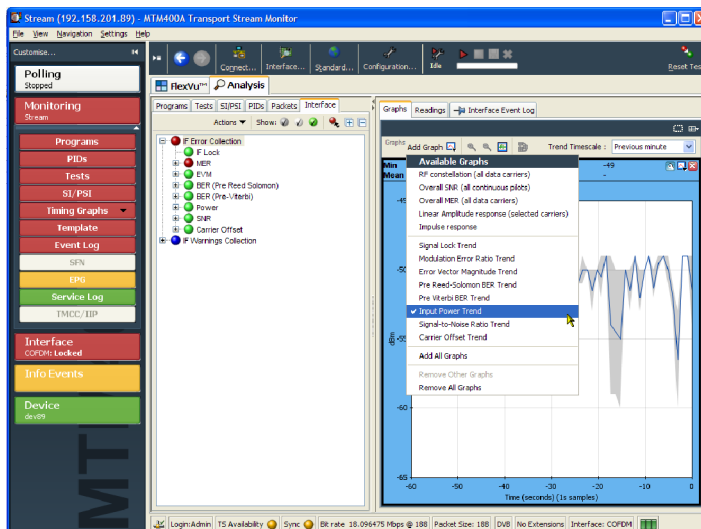




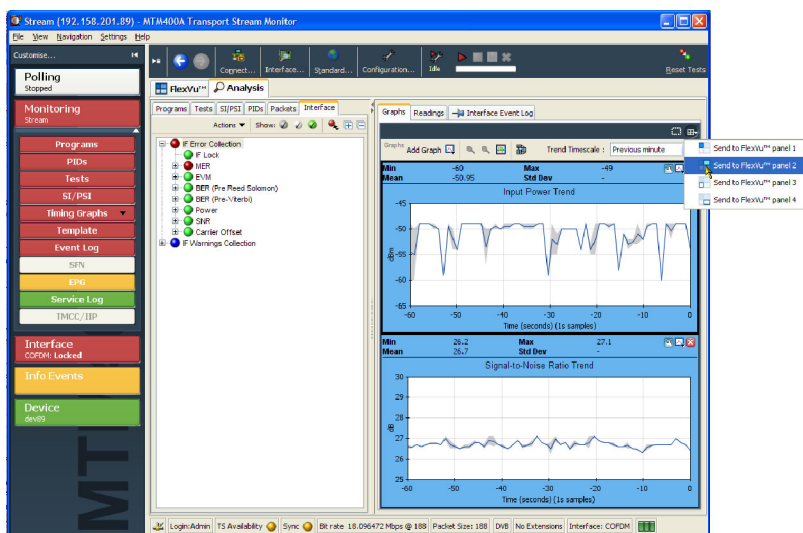
- In the Interface view, select the Graphs view.



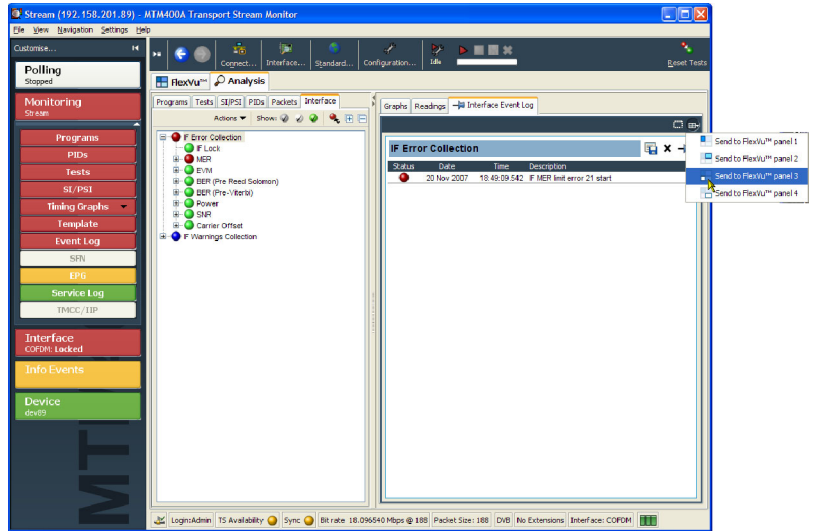
- From the Add Graph drop-down list, select the **RF constellation (all data carriers)**.
- Repeat the action twice more, selecting the **Input Power Trend** and **Signal-to-Noise Ratio Trend** graphs.



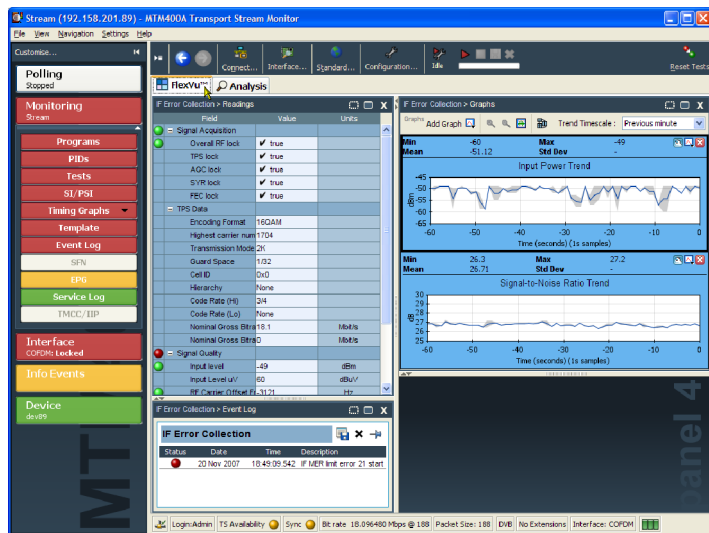
- Use the FlexVu™ panel select button to replicate the graphs view in panel 2.



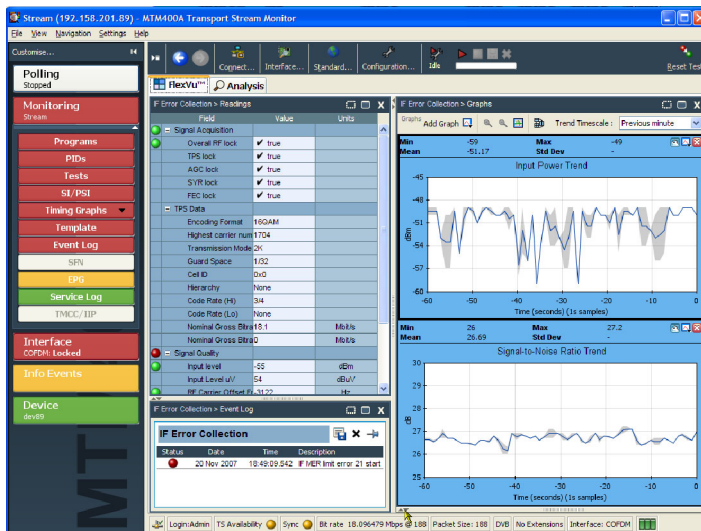
- In the Interface view, select the **IF Error Collection** view and use the FlexVu™ panel select button to replicate the view in panel 3.



- Select the **FlexVu™** tab to display the assembled views.

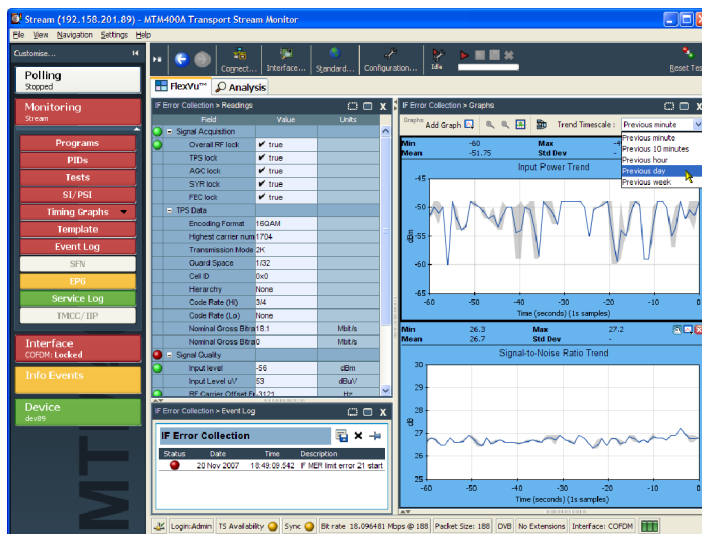


- You can expand panel 2 vertically by selecting the panel expand button.

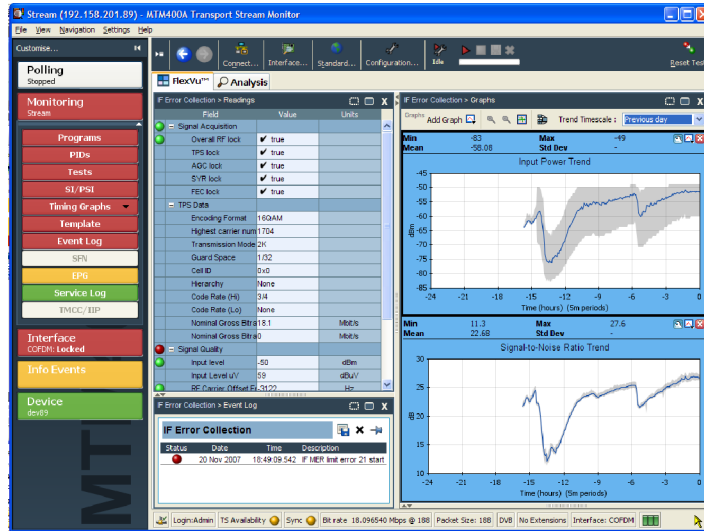


- To see a possible deterioration in the selected trend graphs, you can alter the sampling period (x-axis).

For this scenario, select a sampling period of one day.

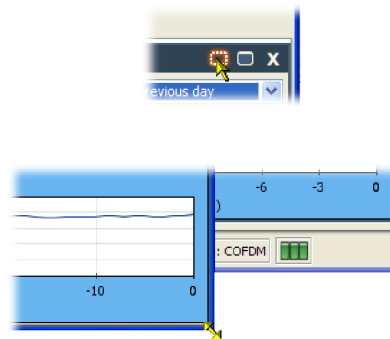


- The trend graphs (Input Power Trend and Signal-to-Noise Ratio Trend) now show values for the last 24 hours; note the change in the X-axis values.

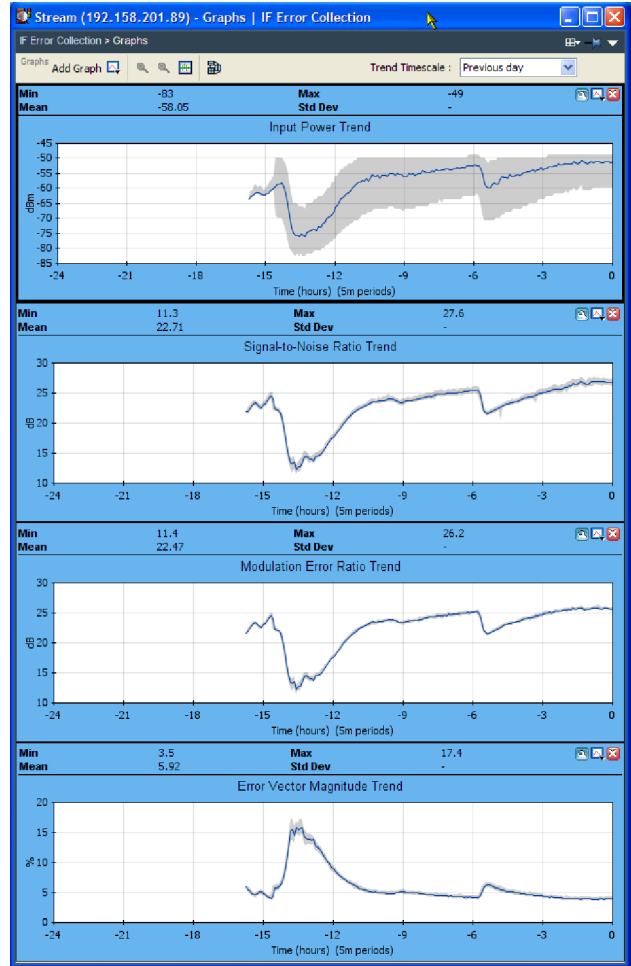


- To examine the graphs more closely, click the tear-off icon.

You can resize the tear-off window to make viewing the graphs easier.

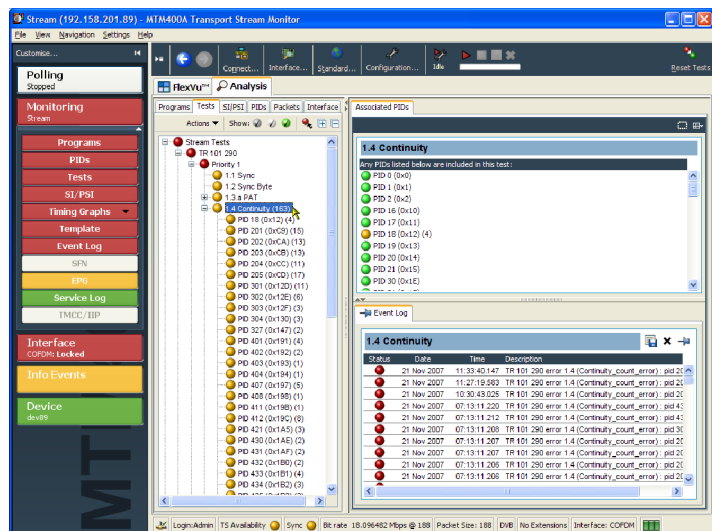


13. For this example, add the following graphs to the tear-off view:  
**Modulation Error Ratio Trend** and  
**Error Vector Magnitude Trend.**



14. Open the **Analysis > Tests** view and examine the **Event Log** for the Priority 1 test 1.4 Continuity.

For the period that input power was low, you might see a corresponding increase in the continuity count caused by out-of-order packets.



# Product Options and Upgrades

## Options

Table 10 lists the software and hardware options that you can order with the MTM400A monitor. Included are the part numbers of any accessories shipped with the options.

**Table 10: Options and optional accessories**

Option	Description	
Software options		
MTM400A	01	Recording Capability
	02	Transport Stream Service Information Analysis (PSI/SI/PSIP/ISDB structure view and repetition graphs)
	03	Template Testing with Template Scheduling (for user-defined service plan testing)
	04	PCR Analysis with Graphical Results views
	05	Bit-rate testing including PID groups and PID variability
	06	Service logging
	07	Automatic channel changing for polling multiple streams
Hardware options		
MTM400A	QA	QAM Annex A interface
	QB2	QAM Annex B2 interface, level 1 and level 2
		Cable assembly, RF, BNC to BNC, 75 ohm (Tektronix part number 174-5135-xx)
		Cable assembly, RF, Coaxial, RFD, 1, 75 ohm, RG179, 8.0 L (Tektronix part number 174-5063-xx)
	QC	QAM Annex C interface
	VS	8VSB interface
		Adapter, RF, BNC Jack to F Plug (Tektronix part number 015-0688-xx)
		Cable assembly, RF, BNC to BNC, 75 ohm (Tektronix part number 174-5135-xx)
		Cable assembly, RF, Coaxial, RFD, 1, 75 ohm, RG179, 8.0 L (Tektronix part number 174-5063-xx)
	CF	COFDM interface
		Adapter, RF, BNC Jack to F Plug (Tektronix part number 015-0688-xx)
		Cable assembly, RF, BNC to BNC, 75 ohm (Tektronix part number 174-5135-xx)
		Cable assembly, RF, Coaxial, RFD, 1, 75 ohm, RG179, 8.0 L (Tektronix part number 174-5063-xx)
	EP	8PSK/QPSK interface
		Cable assembly, RF, BNC to BNC, 75 ohm (Tektronix part number 174-5135-xx)
		Cable assembly, RF, Coaxial, RFD, 1, 75 ohm, RG179, 8.0 L (Tektronix part number 174-5063-xx)
	GE	GigE Ethernet interface with 10/100/1000Base-T RJ-45 electrical port
		Cable assembly, RF, BNC to BNC, 75 ohm (Tektronix part number 174-5135-xx)

**Table 10: Options and optional accessories (Cont.)**

Option		Description
MTM400A	SX	Optical gigabit Ethernet/fibre channel 850 nm SFP SFF, 1.25/1.0625 Gbaud, 3.3 V, safety controlled; for GigE interface (Tektronix part number 131-7834-xx)
	LX	Optical gigabit Ethernet/fibre channel 1310 nm SFP SFF, 1.25/1.0625 Gbaud, 3.3 V, safety controlled; for GigE interface (Tektronix part number 131-7957-xx)
	ZX	Optical gigabit Ethernet/fibre channel 1550 nm SFP SFF, 1.25/1.0625 Gbaud, 3.3 V, safety controlled; for GigE interface (Tektronix part number 131-7958-xx)

## Field Upgrade Kits

Field upgrade kits are hardware and software upgrades that you can install after you purchase the MTM400A monitor.

**Table 11: Field upgrade kits**

Option		Description
Licensed software options		
MTM4UP	01	Field upgrade to add Recording Capability.
	02	Field upgrade to add Transport Stream Service Information Analysis (PSI/SI/PSIP/ISDB structure view and repetition graphs).
	03	Field upgrade to add Template Testing With Template Scheduling (for user-defined service plan testing).
	04	Field upgrade to add PCR Analysis with Graphical Results views.
	05	Field upgrade to add Bit rate testing including PID groups and PID variability.
	06	Field upgrade to add Service Logging.
	07	Field upgrade to add automatic channel changing for polling multiple streams.
Hardware options		
MTM4UP	QA	Field upgrade to add QAM Annex A Interface.
	QB2	Field upgrade to add QAM Annex B (Level 1 and Level 2 interleave) Interface.
	QC	Field upgrade to add QAM Annex C Interface.
	VS	Field upgrade to add 8VSB Interface.
	CF	Field upgrade to add COFDM Interface.
	EP	Field upgrade to add 8PSK/QPSK Interface.
	GE	Field upgrade to add Gigabit Ethernet components.
	SX	Field upgrade to add 1000BASE-SX Short Wavelength Optical port with LC connector (Multi Mode 850nm) to GigE interface.
	LX	Field upgrade to add 1000BASE-LX Long Wavelength Optical port with LC connector (Single Mode 1310 nm) to GigE interface.
	ZX	Field upgrade to add 1000BASE-ZX Optical port with LC connector (Single Mode 1550 nm) to GigE interface.
IFC	One-time installation of all selected options and functional verification for one product.	

## Upgrading the Firmware Version

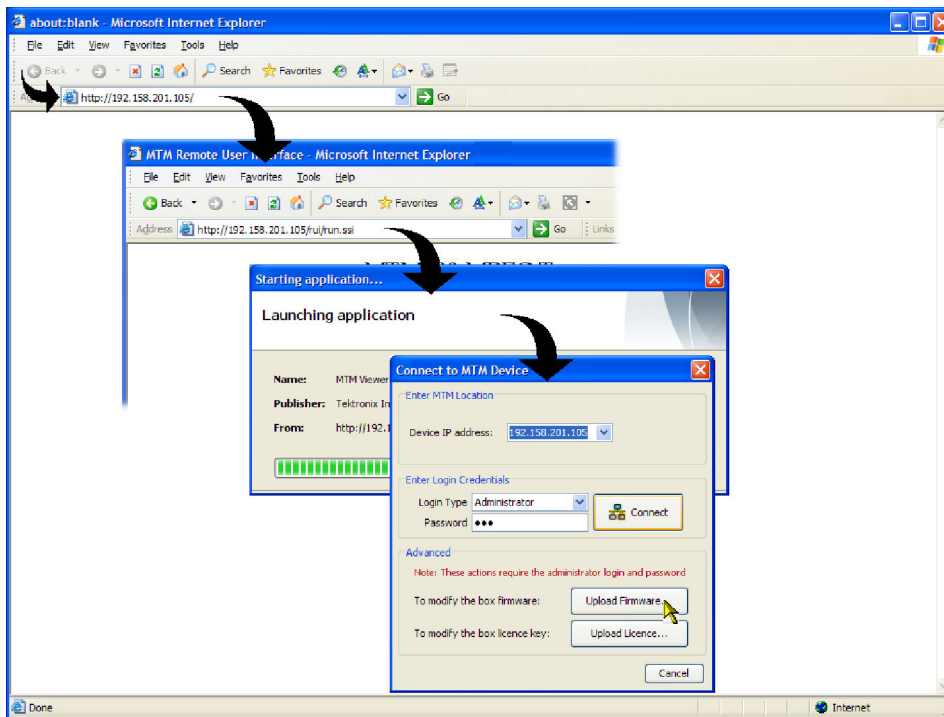
**NOTE.** The following procedure is for MTM400A monitors, or for MTM400 monitors that have been previously upgraded to firmware version 3.0 or higher.

Updates to the MTM400A monitor firmware are released to the Tektronix Web site ([www.tektronix.com/software](http://www.tektronix.com/software)) when software problems are fixed or when new product features are introduced. Perform the following steps to upgrade the firmware on your instrument to the latest version:

**NOTE.** It is recommended that you initiate the firmware upgrade process from the Connect to MTM Device dialog box that appears before the MTM400 or MTM400A monitor RUI is launched. Only advanced users should use the Connect to MTM Device dialog box accessed from the Connect button in the MTM400A monitor RUI toolbar.

1. Download the latest version of the MTM400A monitor firmware from the Tektronix Web site and save the file to a PC that is connected to the same network as the MTM400A monitor.
2. On the PC, launch the Microsoft Internet Explorer Web browser.
3. In the Web browser address bar (see Figure 19), enter the network name or IP address of the MTM400A monitor you are upgrading, for example: `http://TSMonitor01` or `http://192.158.201.105`.

After you press the Enter key, a Java applet is downloaded from the the MTM400A monitor and launched. The file size is approximately 1.5 MB; the download time will depend on the network speed and traffic.



**Figure 19: Connecting to the MTM400A monitor**



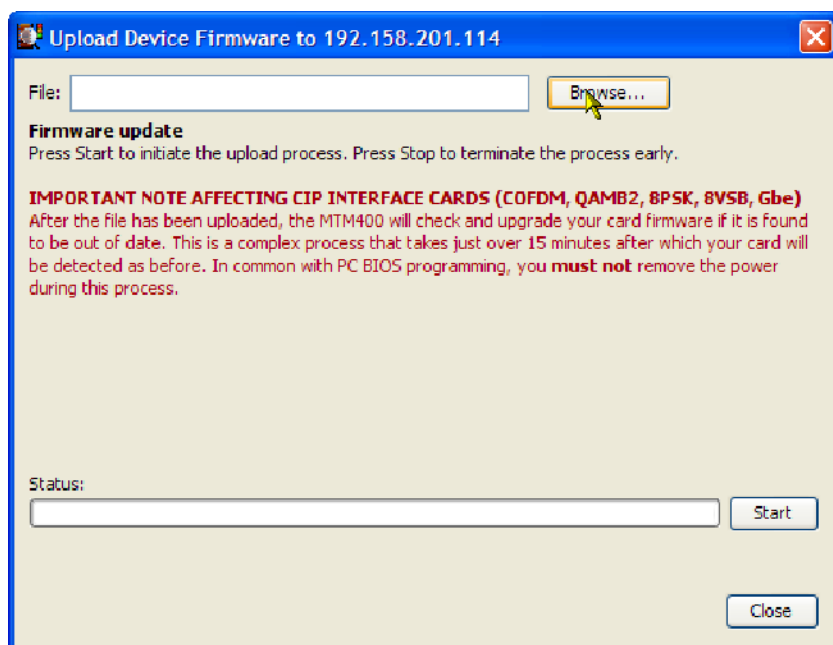
- In the Connect to MTM Device dialog box, select the **Administrator** Login Type from the drop-down list, and then enter the password. The default password is “tek” for Administrator.

---

**NOTE.** You must log in to the MTM400A monitor using the Administrator login type. The User login type does not have sufficient permissions to upgrade the instrument firmware.

---

- Click **Upload Firmware** to open the Upload Device Firmware dialog box.
- In the Upload Device Firmware dialog box (see Figure 20), enter the path and name of the firmware file or use the Browse button to locate and select the firmware file. Click **Start** to initiate the firmware installation.



**Figure 20: Upload Device Firmware dialog box**

- When the firmware upload is complete, a **Firmware upload complete** message is displayed in the Upload Device Firmware dialog box (see Figure 21).

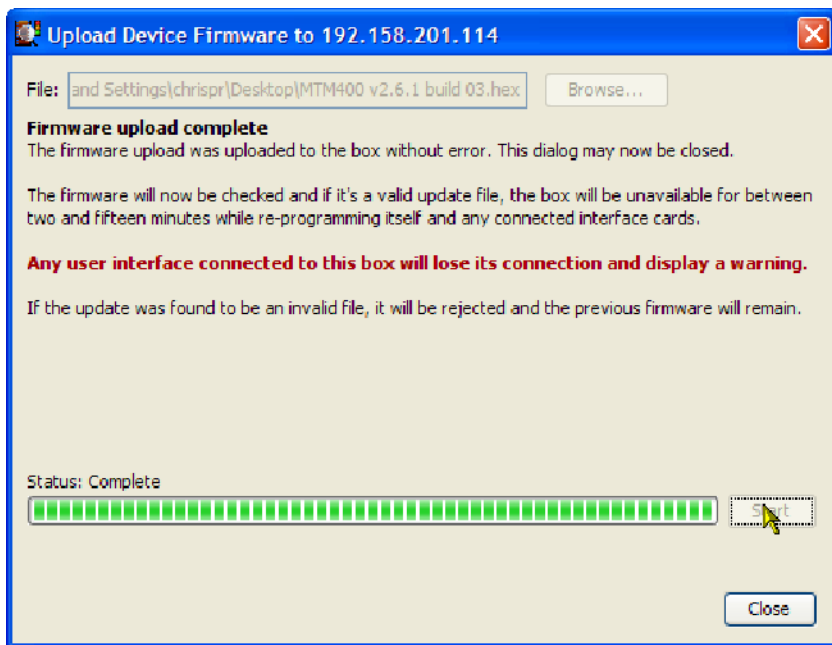
As stated in the message, the uploaded firmware will be checked, and if valid, reprogramming of the instrument will start. The reprogramming process can take up to fifteen minutes.



**CAUTION.** Do not remove power from the instrument during the reprogramming process. If power is removed during reprogramming, the instrument might be rendered unable to reboot, which will require that the instrument be returned to Tektronix for repair.

---

- When the reprogramming process is complete, close the RUI, and if necessary, close the associated Web browser window.



**Figure 21: Firmware upload complete message**

9. On the PC, launch the Microsoft Internet Explorer Web browser.
10. In the Web browser address bar (see Figure 19 on page 62), enter the network name or IP address of the MTM400A monitor that you upgraded. After you press the Enter key, a Java applet is downloaded from the the MTM400A monitor and launched. The file size is approximately 1.5 MB; the download time will depend on the network speed and traffic.
11. In the Connect to MTM Device dialog box, select the **Administrator** Login Type from the drop-down list, and then enter the password. The default password is “tek” for Administrator.
12. Click **Connect** in the Connect to MTM Device dialog box. The FlexVu™ display appears (see Figure 22).
13. Click **Device** in the button bar to open the Device Information view (see Figure 23).
14. Verify that the Application Firmware Version value matches the version of the upgrade file you used in step 6.

---

**NOTE.** The Device Information view details the software and hardware build state of the MTM400A monitor. The values shown in Figure 23 might differ from the values shown for your instrument.

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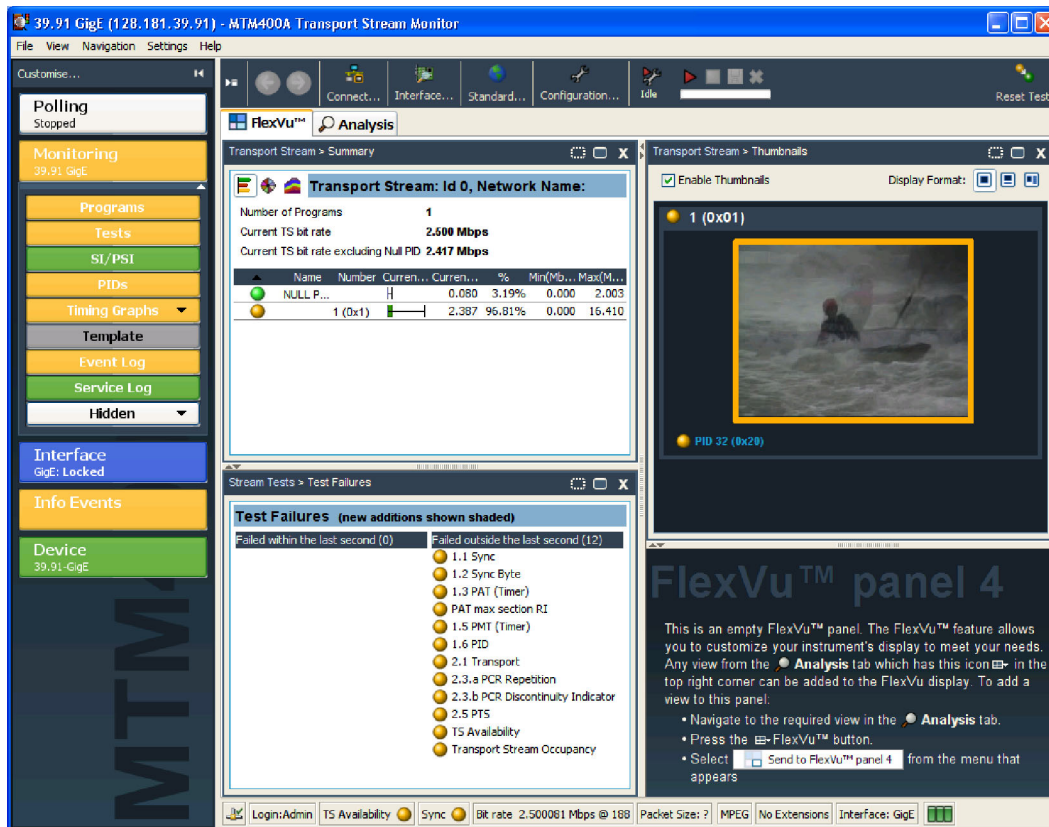


Figure 22: FlexVu™ display

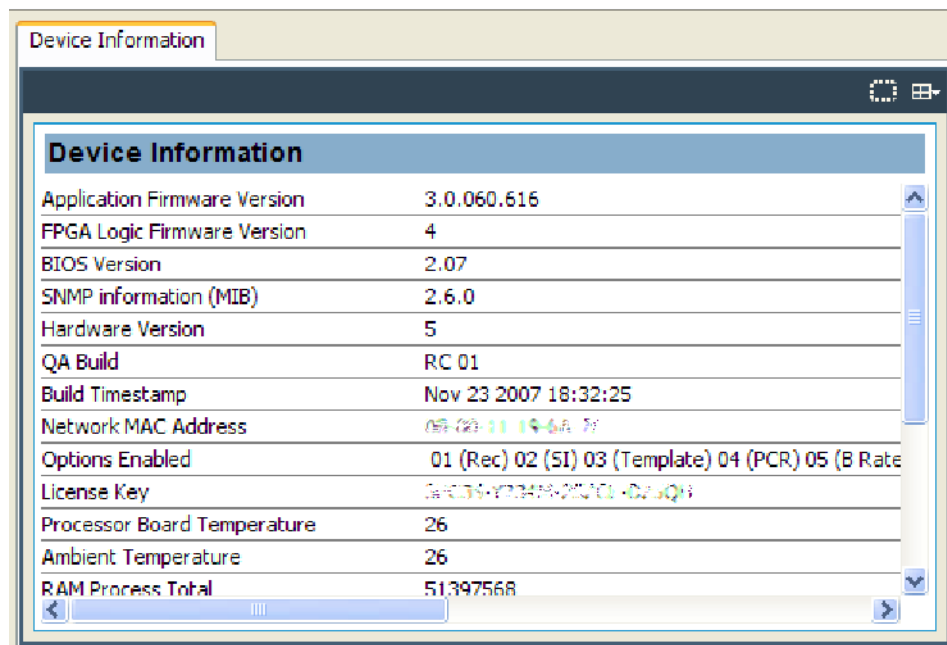


Figure 23: Device Information view

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