MTX100B
MPEG Recorder and Player

Quick Start User Manual

Tektronix

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Contacting Tektronix

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[W2 – 15AUG04]

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[W9b – 15AUG04]

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Table of Contents

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.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

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.

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, III, or IV circuits.

Connect the probe reference lead to earth ground only.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do not connect a current probe to any wire that carries voltages above the current probe voltage rating.

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 that 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 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 on the product:

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

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

- CAUTION indicates a hazard to property including the product.

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

⚠️ CAUTION Refer to Manual　　⏚ Protective Ground (Earth) Terminal　　⏻ Standby

Compliance

This section lists the EMC (electromagnetic compliance), safety, and environmental standards with which the instrument complies.

EMC Compliance

EC Declaration of Conformity – EMC

Meets intent of Directive 2004/108/EC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 61326-1 2006.   EMC requirements for electrical equipment for measurement, control, and laboratory use. [1], [2]

■   CISPR 11:2003. Radiated and conducted emissions, Group 1, Class A

■   IEC 61000-4-2:2001. Electrostatic discharge immunity

■   IEC 61000-4-3:2002. RF electromagnetic field immunity 6

■   IEC 61000-4-4:2004. Electrical fast transient / burst immunity

■   IEC 61000-4-5:2001. Power line surge immunity

■   IEC 61000-4-6:2003. Conducted RF immunity

■   IEC 61000-4-11:2004. Voltage dips and interruptions immunity

EN 61000-3-2:2006. AC power line harmonic emissions

EN 61000-3-3:1995. Voltage changes, fluctuations, and flicker

European Contact.
Tektronix UK, Ltd.
Western Peninsula
Western Road
Bracknell, RG12 1RF
United Kingdom

[1]   **This product is intended for use in nonresidential areas only. Use in residential areas may cause electromagnetic interference.**

[2]   **Emissions which exceed the levels required by this standard may occur when this equipment is connected to a test object.**

Australia / New Zealand Declaration of Conformity – EMC

Complies with the EMC provision of the Radiocommunications Act per the following standard, in accordance with ACMA:

■   CISPR 11:2003. Radiated and Conducted Emissions, Group 1, Class A, in accordance with EN 61326-1:2006.

Safety Compliance

EC Declaration of Conformity – Low Voltage

Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities:

Low Voltage Directive 2006/95/EC.

■ EN 61010-1: 2001. Safety requirements for electrical equipment for measurement control and laboratory use.

U.S. Nationally Recognized Testing Laboratory Listing

■ UL 61010-1:2004, 2nd Edition. Standard for electrical measuring and test equipment.

Canadian Certification

■ CAN/CSA C22.2 No. 61010-1:2004. Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1.

Additional Compliances

■ IEC 61010-1: 2001. Safety requirements for electrical equipment for measurement, control, and laboratory use.

Equipment Type

Test and measuring equipment.

Safety Class

Class 1 – grounded product.

Pollution Degree Description

A measure of the contaminants that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.

■ Pollution Degree 1. No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.

■ Pollution Degree 2. Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.

■ Pollution Degree 3. Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.

■ Pollution Degree 4. Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.

Pollution Degree

Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor use only.

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.

This symbol 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).

Mercury Notification. This product uses an LCD backlight lamp that contains mercury. Disposal may be regulated due to environmental considerations. Please contact your local authorities or, within the United States, the Electronics Industries Alliance (www.eiae.org) for disposal or recycling information.

Perchlorate Materials. This product contains one or more type CR lithium batteries. According to the state of California, CR lithium batteries are classified as perchlorate materials and require special handling. See 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

The MTX100B MPEG Recorder & Player records and plays MPEG-2 transport streams that are compliant with ATSC, DVB, and ARIB standards.

This manual contains the following sections:

- *Installation* briefly describes the MTX100B MPEG Recorder and Player and provides installation instructions, accessory lists, repacking instructions, and power on and off instructions.

- *Operating Basics* provides an overview of the front panel controls and rear panel connections, operating principles, basic operating procedures, and numeric input methods. This section also provides examples of basic data outputting and recording.

- *Application Examples* provides step by step procedures on some basic functions of the MTX100B.

- *Options* provides the Instrument and Service options for MTX100B.

Key Features

The MTX100B provides the following features:

- Data rate: 200 Mbps maximum (RAM mode); 256 Kbps minimum

- Hierarchy display of stored or captured transport stream

- 188, 204, 208 bytes packet size, S-TMCC, M-TMCC, non-transport stream, and partial transport stream output formats

- Real-time updating of stream parameters; continuity_counter, PCR/PTS/DTS, TOT/TDT/STT, NPT, and Reed Solomon (ISDB-T only)

- Continuous recording of captured streams

- PCR jitter insertion

- Triggered stream capture

- Full remote control using Ethernet interface

- Scheduler application for automated stream playout and record (Option SC only)

- IP, ASI, universal parallel/serial, IEEE1394/ASI, and SMPTE310M/ASI/SPI interfaces available

- Playout on one interface at a time, either IP or other interfaces

- Two IP versions namely IPv4 and IPv6 are supported

- Stream replication (IP) with some attributes of the stream incremented by a certain value

- IP stress generation capabilities

- Tclips MPEG Test Streams

The MTX100B includes the ReMux application software that provides TTS playout the capability to create a transport stream of super frame structure defined in the ISDB-S systems from an MPEG-2 transport stream.

NOTE. When the instrument sends or receives a stream for a long time, the stream may be intermittent because of a processing condition of the hard disk or the system process of Windows XP.

Documentation

The following related documentation is available:

Table i: Product documentation

Item	Purpose	Location
MTX100B Quick Start User Manual (071-2593-xx English, 071-2594-xx Japanese)	Provides installation and high-level operational overviews	
MTX100B Technical Reference (077-0189-xx)	Provides in-depth operating information	
MTX100B Specifications and Performance Verification Technical Reference (077-0190-xx)	Provides complete product specifications and a procedure for verifying the operation of the instrument	
MTX100B Service Manual (077-0191-xx)	Optional manual supporting module-level servicing of the instrument	
MTX100B Declassification and Security Instructions (077-0187-xx)	Provides instructions for removing your proprietary information from the instrument	
MTX/RTX Release Notes (077-0195-xx)		
Tclips Technical Reference (077-0074-xx)	Provides in-depth operating information	

Terms Used in This Manual

This manual uses the following terms:

- **Stream:** Generic term for transport streams and data streams of Non-TS format (data format other than transport stream format).

- **S-TMCC** (Single TMCC): Transport stream to which TMCC (Transmission and Multiplexing Configuration Control) information is inserted into the 8 bytes in its Reed-Solomon code area (16 bytes). It is defined in the ISDB-S (Integrated Services Digital Broadcasting-Satellite) system.

- **M-TMCC** (Multi TMCC): Transport stream to which TMCC information is inserted into the sync byte area, and has super frame structure. It is defined in the ISDB-S system.

Installation

Before Installation

Perform the following product inspection procedure when you receive your instrument:

1. Inspect the shipping carton for external damage, which indicates possible damage to the instrument.

2. Remove the MTX100B from the shipping carton.

3. Check that the instrument has not been damaged in transit. The exterior should not have any scratches or impact marks. Before shipment, the instrument is thoroughly inspected for mechanical defects.

NOTE. Save the shipping carton and packaging materials for instrument repackaging in case shipment becomes necessary. Refer to the MTX100B Technical Reference document for instructions on repackaging the instrument.

4. Verify whether you received the standard accessories and any optional accessories that you ordered. (See page 51, *Accessories*.)

5. Perform the functional check procedure after installing the instrument. (See page 5.)

Operating Considerations

Before you install the instrument, refer to the General Safety Summary section at the front of this manual for power source, grounding, and other safety information.

Environment Operating Requirements

Verify that the location of your installation has the proper operating environment.

⚠ *CAUTION. Damage to the instrument can occur if this instrument is powered on at temperatures outside the specified temperature range.*

Table 1: Environmental operating requirements

Characteristics	Specifications
MTX100B ambient temperatures	From +5 °C to +40 °C
Maximum Operating Altitude	3000 m
MTX100B relative humidity	From 20% to 80%
Clearance on top	5.0 cm (2 in)
Clearance on left side	5.0 cm (2 in)
Clearance on right side	5.0 cm (2 in)

Table 1: Environmental operating requirements (cont.)

Characteristics	Specifications
Clearance in rear (from the fan guard)	5.0 cm (2 in)

NOTE. If you are installing the instrument in a dedicated rack, refer to the instruction sheet that comes with the rackmounting kit for proper installation procedures.

When the MTX100B is mounted in a 19-inch rack, verify that there is at least one unit of clearance above the MTX100B.

AC Line Voltage Requirement

Check that your location provides the proper electrical power requirements. Refer to Table 2.

Table 2: AC line power requirement

Parameter	Description
Line voltage range	100 to 240 V
Line frequency	50/60 Hz
Maximum power	180 VA

⚠ *CAUTION. The instrument does not have a power switch, but does have an on/standby switch. When you connect the power cable to the AC line connector, power is applied to the power supply standby circuit of the instrument. Read the power application instructions before plugging the power cable into a power source. (See page 4, Powering On the Instrument.)*

Power Cord Requirement

Ensure that you are using the proper power cord for your location. Connect the power cord from the rear-panel power connector to the power system. (See Table 10 on page 52.)

⚠ *CAUTION. The instrument is shipped with a power cord appropriate for use with your power system (normal 115 V power system or 230 V power system). If the instrument is to be used with a power system other than that specified in the order, the power cord must be replaced with one appropriate for the power source used.*
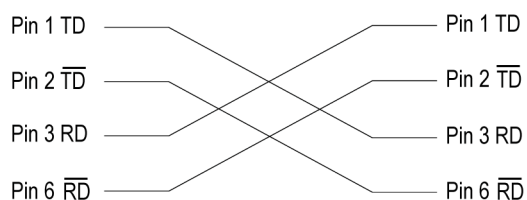
Connecting to the Instrument

Refer to *Rear Panel Connectors* for information about connecting to the instrument. (See page 9.)

Connecting the MTX100B to a PC

Use one of the following two methods to connect the MTX100B to your PC(s):

1. If you are connecting the MTX100B directly to a single PC, use a crossover Ethernet cable to connect between the LAN port on the MTX100B and the Ethernet port on the PC. If you need to construct your own crossover cable, change the pin connections on a straight cable as shown in the figure to product a crossover cable.

Pin 1 TD   Pin 1 TD

Pin 2 $\overline{\text{TD}}$ Pin 2 $\overline{\text{TD}}$

Pin 3 RD   Pin 3 RD

Pin 6 $\overline{\text{RD}}$ Pin 6 $\overline{\text{RD}}$

2. If you are connecting the MTX100B to your local Ethernet network, use a straight Ethernet cable to connect between the LAN port on the MTX100B and the Ethernet hub port of your local network. By connecting to an Ethernet network, you can access the MTX100B using any PC on the network.

Powering On the Instrument

1. After you have verified the operating environment, AC line, and power cord requirements, plug the power cord into the power connector on the rear panel, and then plug the power cord into the local power source.

Power connector
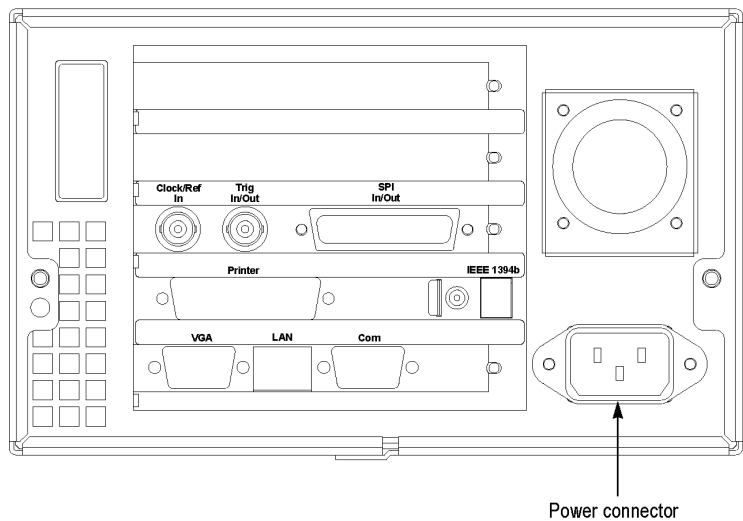
2. Press the **On/Standby** switch to power on the instrument. After you power on the instrument, verify that the fan on the rear panel is operating. To verify whether the fan is operating, place your hand behind the right side of the instrument. You should be able to feel the fan's air flow.

⚠ *CAUTION. Do not operate the instrument if the cooling fan does not operate when you turn on the instrument. Serious damage can occur to your instrument from overheating and if the cooling fan is not operating.*

On/Standby switch
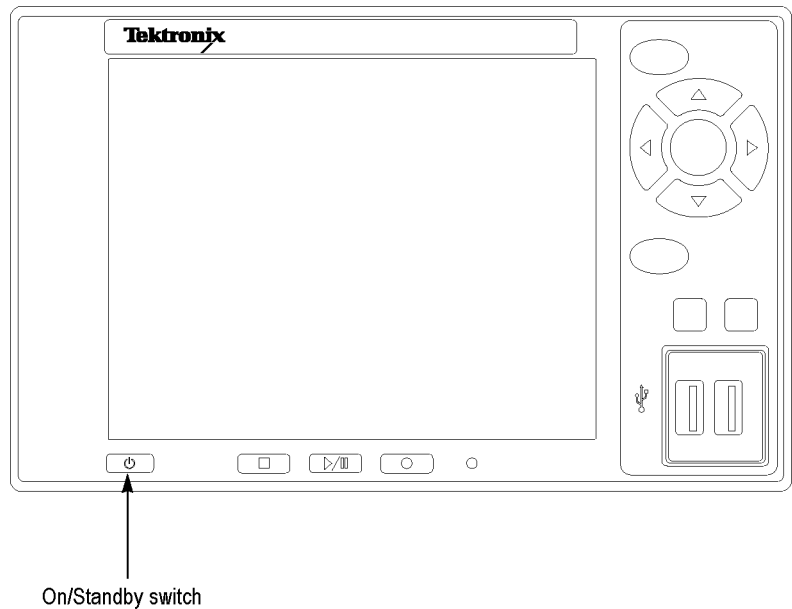
Powering Off the Instrument

Always power off the instrument using the Windows XP shutdown process (select **Start** > **Shut down...**or **Start** > **Turn off computer**). The system (including applications) will shut down automatically. When prompted, push the front panel On/Standby switch to remove power from the unit. Alternatively, push the front panel On/Standby switch for two seconds and release. The system will shut down and power off automatically with no further intervention.

Functional Check

Perform the following procedure if you are operating the instrument for the first time (to verify that the instrument shipped without damage) or if you suspect that the instrument is not working properly:

1. Connect the MTX100B to a power source, and then turn on the instrument using the **On/Standby** switch.

2. Press the front-panel **Menu** button to display the File menu command list.

3. Press the up (▲) or down (▼) arrow button to select **Open** from the list, and then press the **Enter** button to open the Select File dialog box.
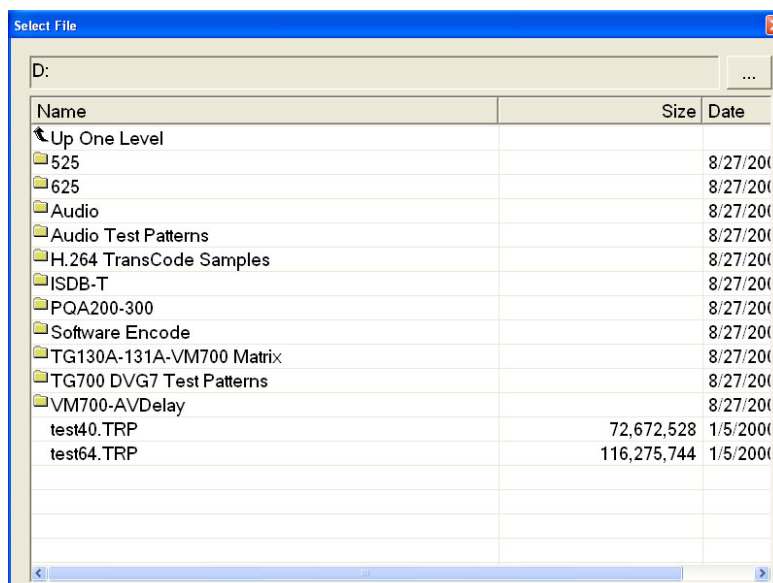
4. Press the up (▲) or down (▼) arrow button to select the **test64.TRP** file, and then press the **Enter** button. The hierarchy view of the transport stream file will be displayed on the screen.

NOTE. You can select the test40.TRP file in step 4 of this procedure if you need to decrease the bit rate of the transport stream due to performance restrictions in your decoder.

5. Connect the interface cable provided with the instrument between the **SPI In/Out** connector on the MTX100B rear panel and the **SPI In** connector on an MPEG decoder.

MTX100B rear panel

Interface cable

MPEG decoder

SPI in

Output

Picture monitor

Input
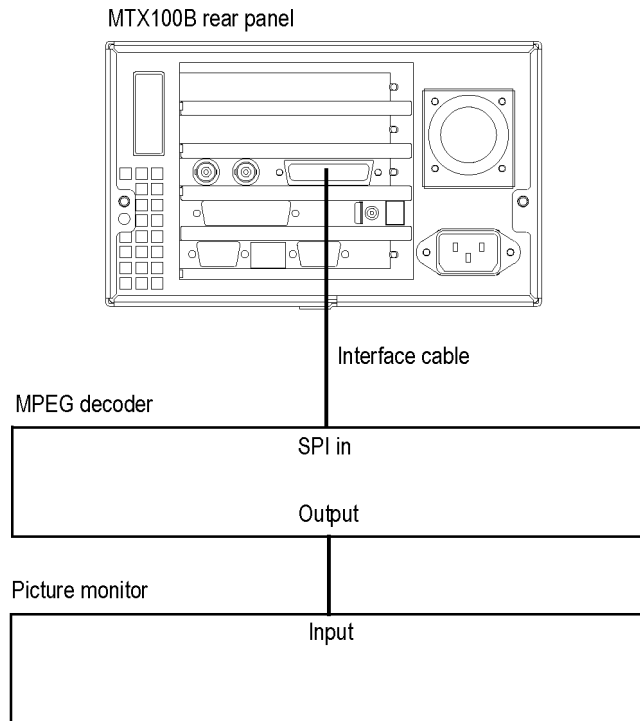
6. Connect the decoder to a picture monitor.

7. Press the MTX100B **Play/Pause** button to start the transport stream output. When the transport stream output is started, the Play Status indicator appears on the screen.

8. Check that the picture from the transport stream is displayed correctly on the picture monitor.

Operation

This section gives you a functional overview and provides descriptions of basic menu operations for the MTX100B MPEG Recorder and Player. For more detailed operating instructions and descriptions of the MTX100B interface and controls, refer to *MTX100B Technical Reference*.

Front Panel Controls and Connectors
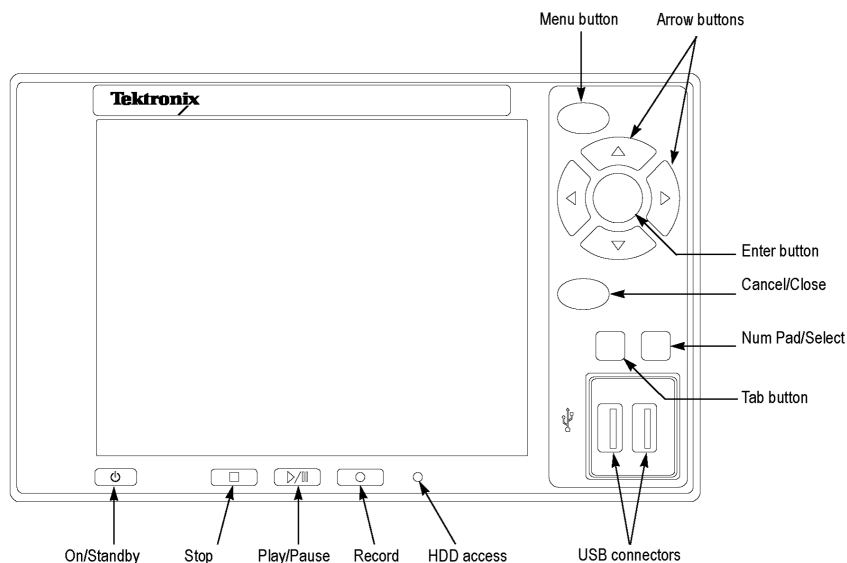
CAUTION. *If you power off the instrument using the On/Standby switch, the current instrument settings are not saved (this operation corresponds to an emergency shutdown in Windows XP). To prevent data loss, use the Shutdown command from the File menu to power off the instrument.*

Table 3: Front panel controls and connectors

Control	Function
On/Standby Switch	Use this button to power on or off the instrument.
Stop Button	This button performs the following functions:
	■ If this button is pressed while a stream data is being output, the data output stops.
	■ If this button is pressed while the pretrigger portion is filled and the instrument waits for a trigger event or the posttrigger portion is being recorded, the recorded data is stored in a file.
Enter Button	Use this button to execute the selected menu command or enable all setting changes in a dialog box.
Cancel/Close Button	Use this button to cancel the selected operation. When any menu command list is displayed, it closes the command list temporarily.

Table 3: Front panel controls and connectors (cont.)

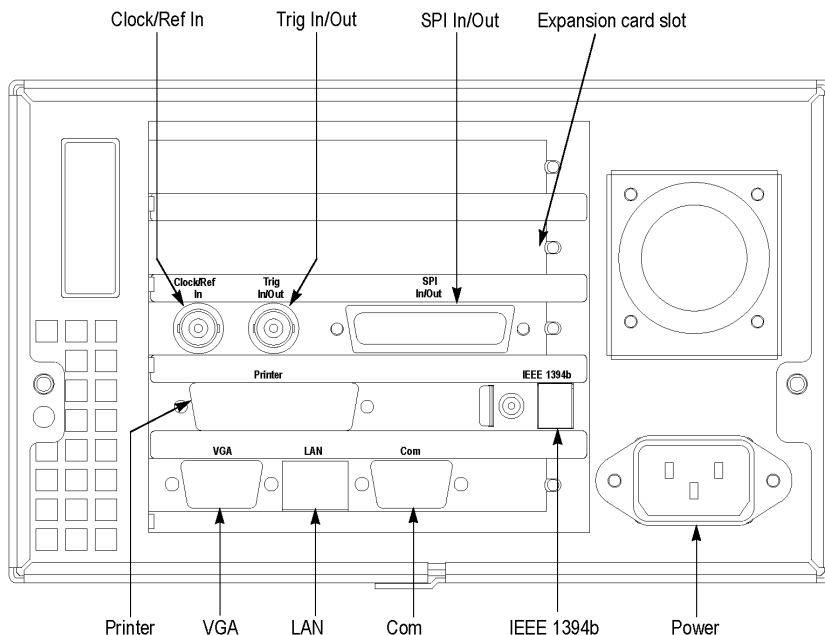| Control	Function
Play/Pause Button	This button performs the following functions:
	■ If this button is pressed, the data output starts.
	■ If this button is pressed while the Record screen is displayed, it switches to the Play screen.
	■ If this button is pressed while a stream data is being output, the data output pauses. Press the button again to start the stream output.
	When an M-TMCC transport stream is selected, MTX100B outputs the stream from the start packet in the super frame to the maximum number of packets that can be looped as an integral multiple of the number of super frames. When an ISDB-T transport stream is selected, MTX100B outputs the stream from the start packet in the OFDM (Orthogonal Frequency Division Multiplexing) frame to the maximum number of packets that can be looped as 2 X N of the number of OFDM frames. If any of the transport streams within the ISDB-T transport stream have different modulation parameters, select Non TS from the Packet Size command in the Play menu.
	The status indicator light in the button illuminates when stream data is being output. The light blinks when the stream output pauses.
Record Button	This button performs the following functions:
	■ Press this button to record the stream data that is being applied.
	■ If this button is pressed while the Play screen is displayed, it switches to the Record screen.
	The status indicator light in the button blinks when a sync word is being detected, or when the pretrigger portion of the stream data has been recorded.
HDD Access Indicator	This indicator illuminates when the hard disk drive is in operation.
Menu Button	Use this button to toggle the display of the menu command list on or off.
Arrow Buttons	Use the arrow buttons to maneuver on the LCD display. For example, you can use these buttons to move the Icon cursor or to move among the menu selections.
Num Pad/Select Button	Use this button to enable or disable any setting changes in a dialog box. It is also used to open the keypad, where you can enter numeric values for a text box.
	When an ISDB-T file is selected in the Play screen or an ISDB-T signal is captured in the Record screen, pressing this button causes the ISDB-T Information dialog box to appear.
USB Connectors	Use the USB 2.0 connectors to connect the keyboard and mouse provided with the instrument for Windows operations. You can also connect other USB devices.

Rear Panel Connectors

Table 4: Rear panel connectors

Control	Function
Expansion Card Slot	You can install one of the optional interface cards in this slot.
Clock/Ref In	Use this BNC connector to input an external reference signal or clock signal. Refer to the *MTX100B Specifications & Performance Verification Technical Reference* for detailed information about the signal specification. *NOTE. Use a continuous signal for an external reference or clock signal.*
Trig In/Out	Use this BNC connector to input an external trigger event for stream recording or output a 27 MHz reference clock signal or an ISDB-T frame pulse signal. You can change the configuration from the Play menu. Refer to the *MTX100B Specifications and Performance Verification Technical Reference* manual for detailed information about Trig In/Out signals.
SPI In/Out	Use this 25-pin D-sub connector to input or output an SPI (Synchronous Parallel Interface) signal.
Printer	Use this 25-pin D-sub connector to connect a printer. This interface supports the IEEE 1284 parallel port standard.
IEEE1394b	Use this connector to connect an IEEE1394b device such as an external hard disk drive.
LAN(10/100/1000 Base-T)	Use this connector to connect the MTX100B to your local Ethernet network.
Com	This 9-pin D-sub connector provides a serial interface for instrument control.

Table 4: Rear panel connectors (cont.)

Control	Function
VGA	Use this 9-pin D-sub connector to display the instrument screen to an external monitor.
	The VGA output is automatically enabled only when you power on the instrument with an external monitor connected. If you want to enable the VGA output after powering on the instrument, perform the following steps:
	1. Minimize the Play screen to display the Windows XP desktop.
	2. Click the **Intel(R) Extreme Graphics 2M** icon at the right side of the taskbar.
	3. Select **Graphic Options > Output To > Intel(R) Dual Display Clone > Monitor+Notebook** from the displayed menu.
Power	Use this connector to apply power to the instrument using the supplied power cord.

Optional Interface Cards

The MTX100B is equipped with a card slot on the rear panel to install one of the following optional interface cards:

- ASI interface (Option 01)

- Universal parallel/serial interface (Option 02)

- IEEE1394/ASI interface (Option 05)

- SMPTE310M/ASI/SPI interface (Option 07)

This subsection describes these interface options and their functions.

If your MTX100B has the optional IPTV Gig-E interface card installed, refer to the *MTS400P MPEG Test System Quick Start User Manual* for a description of connectors on the interface card (Tektronix part number 071-2610-xx).

ASI Interface (Option 01)

Refer to the *MTX100B Specifications and Performance Verification Technical Reference* for details about the ASI interface.
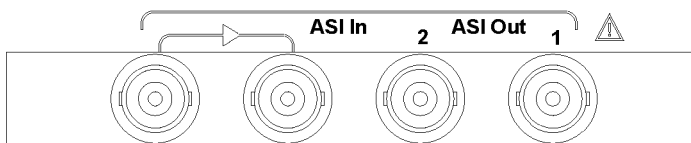
- **ASI In**: Use this BNC connector to input an ASI (Asynchronous Serial Interface) signal. The left side of the connector has a loopthrough output.

- **ASI Out**: Use this BNC connector to output an ASI (Asynchronous Serial Interface) signal.

Universal Parallel/Serial Interface (Option 02)

Refer to *MTX100B Specifications and Performance Verification Technical Reference* for details about the Universal Parallel/Serial interface.
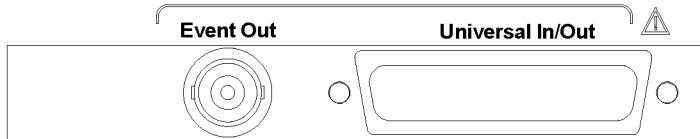
■ **Event Out**: Use this BNC connector to output an event signal. This signal is the same as the PSYNC signal of the parallel output.

■ **Universal In/Out**: Use this connector to input or output an ECL/TTL/LVDS signal in a parallel or serial format.

IEEE1394/ASI Interface (Option 05)

Refer to the *MTX100B Specifications and Performance Verification Technical Reference* for details about the IEEE1394/ASI interface.
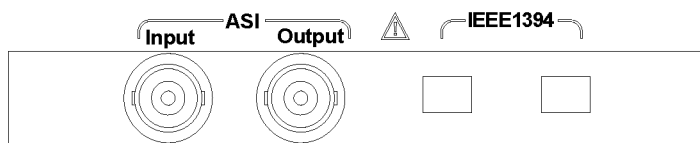
■ **ASI Input**: Use this BNC connector to input an ASI (Asynchronous Serial Interface) signal.

■ **ASI Output**: Use this BNC connector to output an ASI (Asynchronous Serial Interface) signal. This connector outputs a signal under the following conditions:

  ▬ While a stream is being output from the IEEE1394 connector.

  ▬ While a stream is being recorded using the IEEE1394 connector.

  ▬ While a stream is being recorded using the ASI Input connector.

■ **IEEE1394**: Use these 4-pin IEEE1394 connectors to connect IEEE1394 device(s) such as a BS/CS tuner or a D-VHS recorder.

SMPTE310M/ASI/SPI Interface (Option 07)

Refer to *MTX100B Specifications and Performance Verification Technical Reference* for details about the SMPTE310M/ASI/SPI interface.
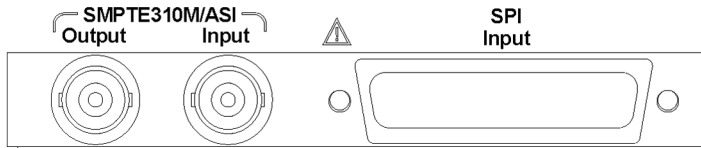
NOTE. The SMPTE310M interface supports data rates of 19.392658 Mbps (8 VSB, 188 bytes packet size).

- **SMPTE310M/ASI Output**: Use these BNC connectors to output a SMPTE310M or an ASI (Asynchronous Serial Interface) signal in Play mode of the Player. You can select the output signal format from the 310M/ASI/SPI menu.

- **SMPTE310M/ASI Input**: Use this BNC connector to input a SMPTE310M signal or an ASI (Asynchronous Serial Interface) signal in Record Mode of the Player. You can select the input signal format from the 310M/ASI/SPI menu.

- **SPI Input**: Use this 25-pin D-sub connector to input an SPI (Synchronous Parallel Interface) signal. You can select the source format as SPI/ASI/310M and input port from the 310M/ASI/SPI menu.

NOTE. The SPI Input connector can only be used to input a signal. Selecting SPI as a source, will enable the SPI on the SPI In/Out interface on the base card.

Windows Operations

All the functions of the MTX100B are performed as an application (MTX100B) on the Windows XP operating system. Therefore, if you connect the keyboard and mouse provided with the instrument to the front-panel USB connectors, you can operate the MTX100B system with the same environment as a Windows PC.

Operation on the Play/Record Screen

When you connect a keyboard and mouse to the instrument, you can use them to make menu selections and parameter settings in the Play/Record screen. These operations behave in the same manner as the other Windows applications.

Displaying the Windows Screen (Desktop)

To display the Windows screen (Desktop), select **Minimize** or **Exit** from the File menu in the Play screen or Record screen. When you click **Minimize**, the MTX100B application window minimizes and the Windows XP desktop appears. When you click **Exit**, the MTX100B application exits and the Windows XP desktop appears.

File Operation

There are no menu commands to manage file operations in the MTX100B application. Perform file operations such as copy, delete, or upload/download on Windows. Refer to Windows XP Online Help or other documentation about file operations.

The MTX100B application is placed in the C:\ProgramFiles\Tektronix\MpegPlayer folder. The sample transport stream files are placed on the D: drive (Volume D).

System Settings

This manual describes only the settings for connecting to an Ethernet network. Refer to Windows XP Online Help or other documentation for information about other system settings.

Display Elements

There are two types of display screens that you use to operate the MTX100B: the Play screen and the Record screen.

■ The Play screen is used to output the selected stream.

■ The Record screen is used to record the input stream.

When you press the Record/Play button or select the Record/Play command from the File menu while the Record/Play screen is displayed, the screen switches to the Record/ Play screen.

NOTE. The IP interface mode does not support the Record functionality and hence the Record option is disabled for IP.

```
File  View  Play  IP  Utility
     Open...
     Load Preset...
     Save Preset...
     ─────────────────────────
     1 D:\Test Streams\test64
     2 D:\Test Streams\dvb_625_mcpc3
     3 dvb_625_mcpc3_80Mbps
     4 D:\Sample Streams\test40
     ─────────────────────────
     Record
     ─────────────────────────
     Scheduler
     ─────────────────────────
     Minimize
     Exit
     ─────────────────────────
     Shutdown
```

Menu commands list

2593-002
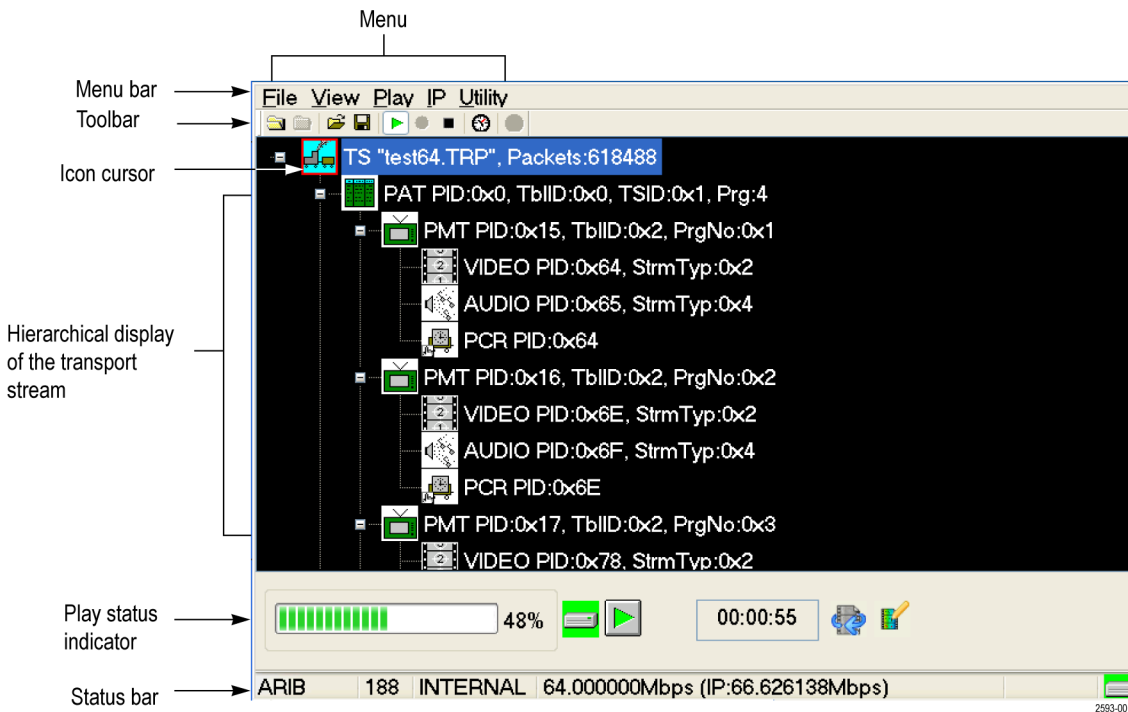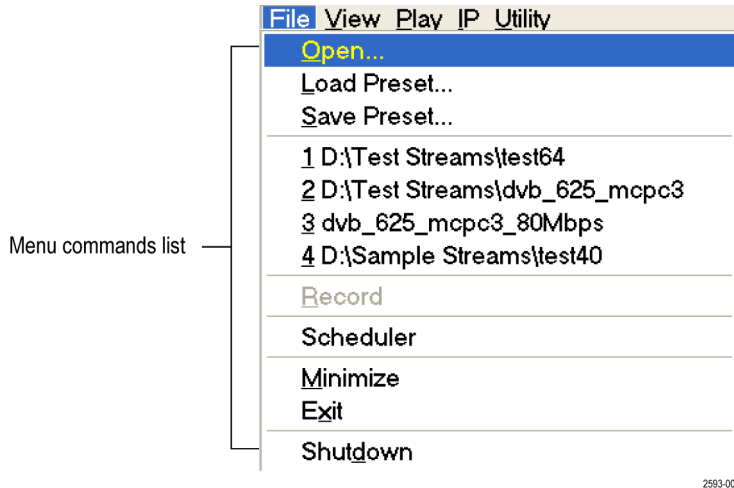
This subsection explains the display elements that make up the Play and Record screens.

Menu Bar

The Menu bar displays the names of the menus that can be used in the Play or Record screen. Press the **Menu** button to enable or disable the menus.

Toolbar

The toolbar provides shortcut buttons for most of the often used menu commands. Click a toolbar button to select the corresponding command. You can toggle the toolbar display on and off using the Toolbar command in the View menu.

Hierarchy Display

Each icon in the hierarchy display represents an element of the stream. The hierarchy text contains a description of the associated icon.

Icon Cursor

The icon cursor appears as a red box around an icon in the hierarchy to indicate the currently selected icon.

Use the up (▲) or down (▼) arrow button to move the icon cursor between icons. When the icon cursor is at the top or bottom of the hierarchy display, the hierarchy scrolls to show additional elements of the stream when applicable.

Play/Record Status Indicator

The play/record status indicator in the play mode and or in the record mode is displayed while the selected stream is being output as shown in the following figure. It shows the output status of the selected stream such as, the progress of the stream output, the output source, the operational status, and the elapsed time.

The record status indicator is displayed while the input stream is being recorded. It shows the record status of the input stream: the progress of the stream record, the record target, and the elapsed time.
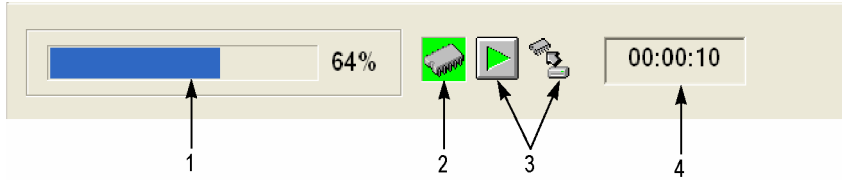
The first figure shows the operation status with the parametric settings disabled and the later shows with the parametric settings enabled.
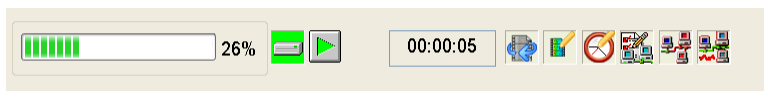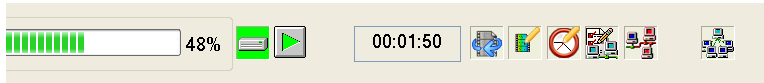
1. **Position Indicator.** In the Play screen, this indicator shows the progress of the stream output using the duration gauge. In the Record screen, this indicator shows the progress of the stream record using the duration gauge. The duration gauge is updated every 1 second. If you output a stream with a repetition rate of around 3 seconds, the gauge might not be displayed correctly.

2. **Output Source/Record Target**. In the Play screen, this indicator shows the output source used to output the selected stream. In the Record screen, this indicator shows the record target used to record the input stream. One of the icons mentioned under *Output Source/Record Target* in the following table is displayed according to the selected output source or record target: (See Table 5.)

3. **Operation Status.** Shows the current operation status of the instrument.

Table 5: Operation status icons

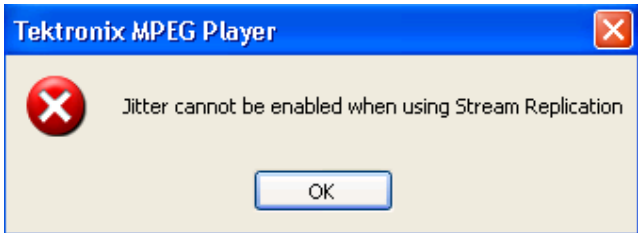| Icon	Description
Output Source/Record Target	
	This icon shows that the hard disk is the output source or record target.
	This icon shows that the RAM is the output source or record target.
Record Screen	
	This icon shows that the captured stream is being recorded.
	This icon shows that the stream record is stopped.
	This icon shows that the MTX100B is waiting for a trigger event.

Table 5: Operation status icons (cont.)

	This icon shows that a trigger event is occurring.
	This icon shows that the captured stream is being processed on the hard disk.
	This icon shows that the captured stream is being saved from the RAM to the hard disk.

Play Screen

	This icon shows that the selected stream is being output.
	This icon shows that the stream output is stopped.
	This icon shows that the selected stream is being read from the hard disk to the RAM.
	This icon shows that the stream is continuously output using the loop method.
	This icon indicates that the stream parameters are updated.
	This icon shows that the PCR accuracy is enabled.
	This icon (only in IP mode) shows that the Advanced Protocol Settings is enabled and applied to the stream.
	This icon (only in IP mode) shows that the Stream Replication Settings is enabled and applied to the stream.
	This icon (only in IP mode) shows that the errors are inserted in the stream.
	This icon (only in IP mode) shows that the parametric settings are enabled and applied to the stream. *NOTE. The transport stream cannot be played if the parametric settings and the stream replication settings are enabled at a time. It displays an error as shown in the following figure.*

4. **Elapsed Time.** In the Play screen, this box displays the elapsed time of the current stream data output.

    In the Record screen, this box displays the elapsed time since the input stream was recorded.

Scroll Bar. The scroll bar appears when there is a hierarchy display to show the relative position of the hierarchy of the stream.

NOTE. After you scroll a hierarchy display in the Record screen, the display may be out of focus. If this is the case, select an icon cursor on the display to refocus.

Status Bar. The status bar contains several indicators that display general information about the transport stream output or record status.
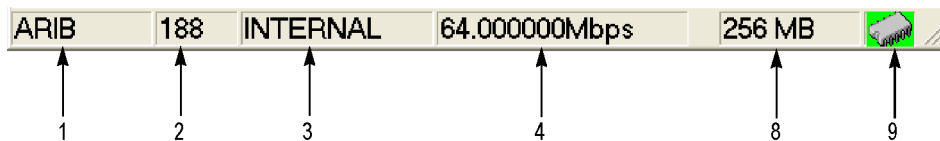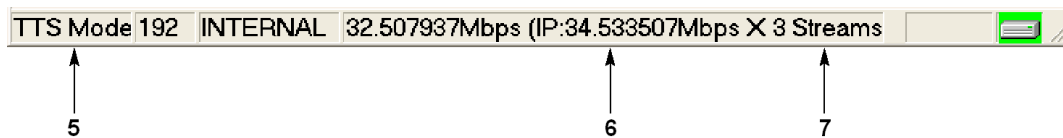

Figure 1: Status bar

Figure 2: Status bar in IP mode

The status bar shows the following information:

1. **Standard.** In the Play screen, this indicator shows the standard used to display the selected stream (MPEG-2, ARIB, DVB, ATSC, S-TMCC, M-TMCC, or Non-TS). In the Record screen, this indicator shows the standard used to display the input stream.

2. **Packet Size.** In the Play screen, this indicator displays the packet size in bytes (188, 204, 208, Non-TS, or Partial TS (Option 05 only)) of the stream output. In the Record screen, this indicator displays the packet size in bytes of the input stream.

3. **Clock Source.** This indicator displays the source of the reference clock (internal or external) used for the stream output.

4. **Bit Rate.** In the Play screen, this indicator displays the bit-rate (in Mbps) of the stream output. In the Record screen, this indicator displays the bit-rate (in Mbps) of the input stream.

5. **TTS Mode.** In the Play screen when IP interface option is selected with the TTS mode enabled, this indicator displays that the TTS mode is enabled for the playout. The Record screen is disabled for the IP interface option.

6. **IP Bit Rate.** In the Play screen when the IP interface option is selected, this indicator displays the bit rate (Mbps) of the IP stream output. The Record screen is disabled for the IP interface option.

7. **Free RAM space.** In the Play screen, this indicator shows the free RAM space that can be used to output the selected stream. In the Record screen, this indicator shows the free RAM space that can be used to record the input stream.

8. **Output Source/Record Target.** In the Play screen, this indicator shows the source used to output the selected stream. In the Record screen, this indicator shows the target used to record the input stream.

   This indicator is the same as the output source/record target indicator of the Play/Record Status indicator.

Remote Connection Status Icons. The remote connection status icons appear when a TCP/IP connection for remote control is established. The right icon shows the status of the TCP/IP connection (this icon is always displayed when the TCP/IP connection is established), and the left icon shows the lock status of the front-panel buttons and mouse input.

There are two display states:

Icon	Description
	This shows that the TCP/IP connection for remote control is established.
	This shows that the TCP/IP connection for remote control is established and the front-panel buttons and mouse input are locked by the `:SYSTem:KLOCk:STATeON` command.

To reset the lock status, send the `:SYSTem:KLOCk:STATe OFF` command or press the **Cancel/Close** button on the front panel (if a keyboard is connected, press the Esc key). When the TCP/IP connection is closed, the remote status icons disappear.

Toolbar Buttons

The toolbar provides shortcut buttons for many of the often used menu commands. Click the appropriate button to implement one of the functions described in Table 8.

NOTE. To access the toolbar buttons, you need to connect a USB mouse to the USB connector on the front panel.

Table 6: Toolbar button descriptions

Icon	Name	Function
	LOAD TS file	Opens the Select File dialog box. Equivalent to the **Open** command in the File menu. This button is available when the Play screen is displayed.
	SAVE TS file	Opens the Save as dialog box. Equivalent to the **Save** command in the File menu. This button is available when the Record screen is displayed.
	Load Preset	Opens the Open dialog box. Equivalent to the **Load Preset** command in the File menu.
	Save Preset	Opens the Save as dialog box. Equivalent to the **Save Preset** command in the File menu.
	Play	Outputs the selected stream. Equivalent to the **Play/Pause** button on the front panel.
	Record	Records the acquired stream. Equivalent to the **Record** button on the front panel.

Table 6: Toolbar button descriptions (cont.)

| Icon	Name	Function
	Stop	Stops the stream output or stream record. Equivalent to the **Stop** button on the front panel.
	Clock	Opens the Clock dialog box. Equivalent to the **Clock** command in the Play menu. This button is available when the Play screen is displayed.
	Target	Opens the Target dialog box. Equivalent to the **Target** command in the Record menu. This button is available when the Record screen is displayed.
Toolbar buttons available only for Option 05		
	Connect	Starts the connection to an IEEE1394 device. Equivalent to the **Connect** button in the IEEE1394 dialog box.
	PtoP Connect	Opens the IEEE1394 dialog box for a point-to-point connection. Equivalent to the **PtoP Connect** item from the 1394 Mode command in the ASI/1394 menu.
	Probe	Opens the IEEE1394 dialog box for data probing. Equivalent to the **Probe** item from the 1394 command in the ASI/1394 menu. This button is available when the Record screen is displayed.

Procedures

Accessing Menu Commands

1. To access any menu command, do the following:

   ■ Press the **Menu** button; the File menu command list opens. Use the up (▲) or down (▼) arrow button to move through the command list. Press the **Enter** button to execute the selected command. Use the left (◄) or right (►) arrow button to select the desired menu. Press the **Cancel/Close** button to close the command list temporarily.
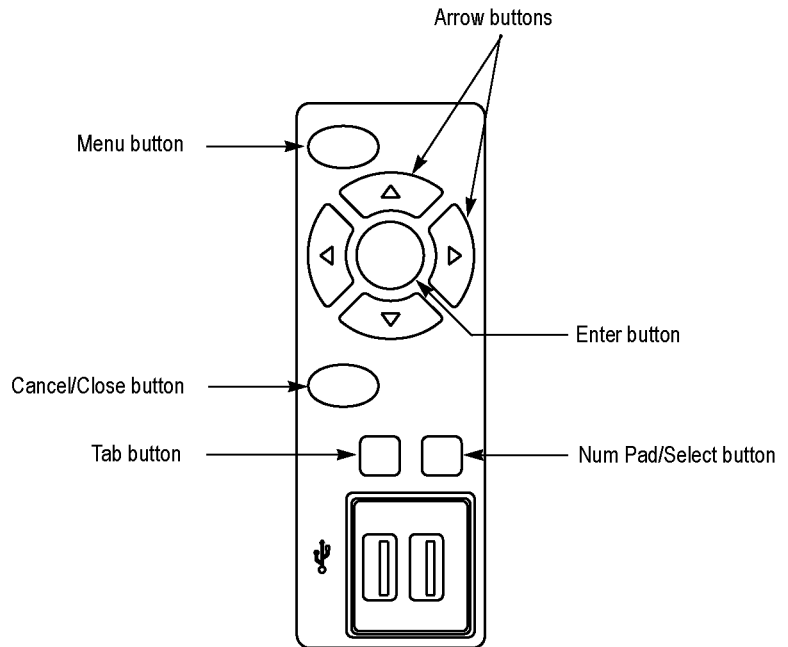

2. Press the **Menu** button again to close the menu command list.

NOTE. When you press the left arrow button while the File menu is displayed or when you press the right arrow button while the Utility menu is displayed, the Windows Control menu appears.

Display States of the Menu Commands

The menu commands can have the following three display states:

- ■ A command followed by ► indicates that a corresponding submenu will be displayed after you press the **Enter** button or the right (►) arrow button.

- ■ A command followed by an ellipsis (...) indicates that a corresponding dialog box will open after you press the **Enter** button.

- ■ A command name by itself will be executed after you press the **Enter** button.

Packet Size ► ← A corresponding submenu will be executed

Clock... ← A corresponding dialog box will be executed

Record ← The displayed command will be executed
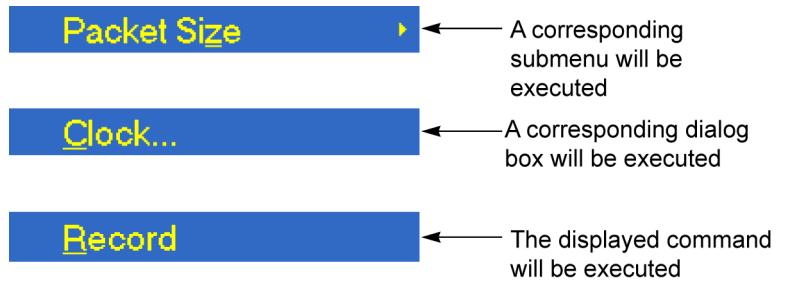
Entering Numeric Data

Using the Keypad

1. Open a dialog box in which you want to change a parameter.

2. Press the **Tab** button repeatedly to select (highlight) the numeric parameter that you want to change in the open dialog box.

3. Press the **Num Pad/Select** button to open the keypad.

4. Press the **Tab** button or the arrow buttons to move to the number you want to input (when the keypad first opens, the dotted line box is located on the ENT key).

5. Press the **Num Pad/Select** button. This displays the selected number in the numeric input box.

6. Repeat steps 4 and 5 to input the desired parameter value.

7. Press the **Enter** button (or select the ENT key and then press the **Num Pad/Select** button). This saves the new value in the numeric input box and closes the keypad.

Numeric input box

Clear key

Backspace

Cancel key

Enter key
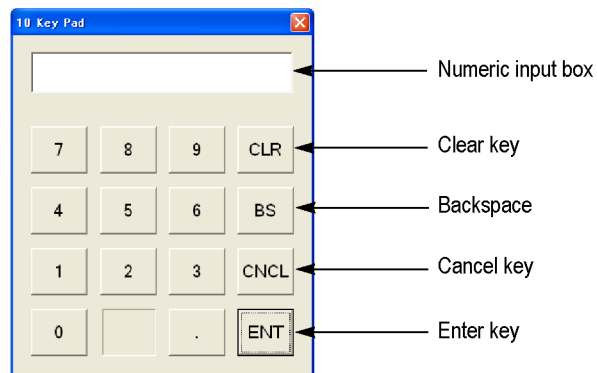
Using the Arrow Buttons

Perform the following procedure to change a value by using the arrow buttons:

1. Open the dialog box in which you want to change a parameter.

2. Press the **Tab** button repeatedly to select the numeric parameter that you want to change in the open dialog box.

3. Press the left (◄) arrow button to begin editing the parameter. This highlights the last digit.

4. Press the left (◄) or right (►) arrow button to move the highlighted cursor to the value you want to change.

5. Press the up (▲) or down (▼) arrow button to increase or decrease the value.

6. Repeat steps 4 and 5 to enter all of the desired values. To add a digit, press the left (◄) arrow button.

7. Press the **Enter** button to save the changed numeric values.

Selecting the Data Output Source

When you output the selected stream data, you can select either the RAM or the hard disk as the output source. This subsection describes the operation of the MTX100B when each output source is selected.

RAM

When you select the RAM as the output source, the MTX100B performs the following:

■ When the data output rate is less than or equal to 120 Mbps, the MTX100B outputs the first stream of data while transferring the data from the hard disk to the RAM and then continuously outputs the data from the RAM using looping methods.

■ When the data output rate is more than 120 Mbps, the MTX100B continuously outputs a stream of data from the RAM using looping methods after the data is completely transferred from the hard disk to the RAM.

If you select the RAM as the output source, you cannot output the data over the RAM free space (maximum 256 MB). This RAM free space is displayed on the status bar.

Hard Disk

If you select the hard disk (Disk) as the output source, the MTX100B always outputs the selected stream of data from the hard disk regardless of the data output rate. When the reading speed of the hard disk cannot overtake the data output rate, the message "Error: Output Buffer Empty" appears.

Use the Source command in the Play menu to select the output source.

You can see the currently selected output source in the status bar.

Adding Jitter to PCRs

The MTX100B provides the capability to add jitter to PCRs (Program Clock References). Adding jitter to PCRs allows you to simulate transmission delay variations and to test the robustness of decoders under various conditions.

The jitter function adds jitter to the program_clock_reference_base value and the program_clock_reference_extension value in the adaptation field of transport stream packets. You can use this function to modulate the data values of the PCRs away from their correct values.

NOTE. When you use this function, be sure to set PCR/PTS/DTS Update Method in the Select Update Item dialog box to Hardware.
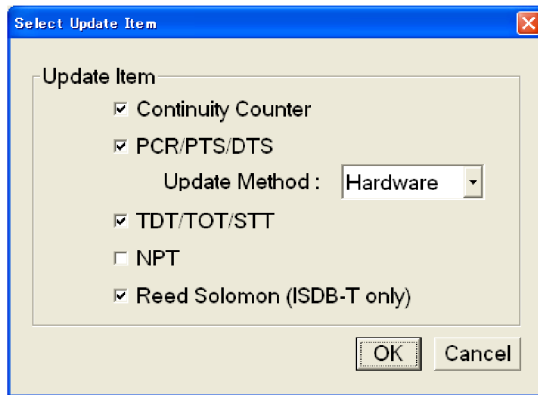

Perform the following procedure to add jitter to PCRs:

1. Use the Icon cursor to select the PCR item in the hierarchy display. If the Icon cursor is not available, press the **Menu** button to enable the Icon cursor.

2. Press the **Num Pad/Select** button to open the PCR Inaccuracy dialog box.
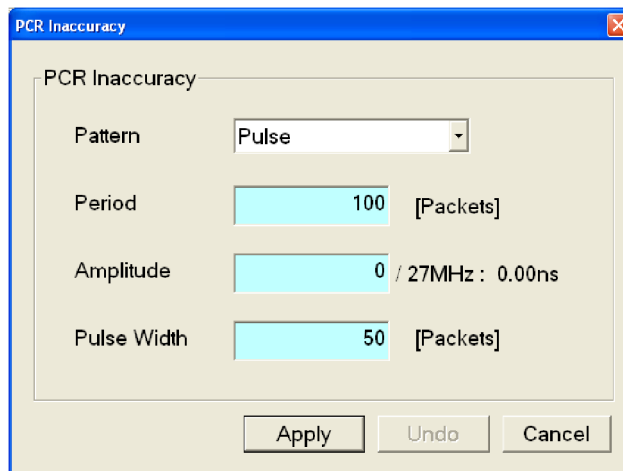
3. You can set the parameters in the PCR Inaccuracy dialog box.

   ■ **Pattern:** Selects the type of waveform used to add jitter. You can select Sine, Square, Triangle, Pulse, Sawtooth, Random, or Offset.

   ■ **Period:** Sets the period of the waveform used to add jitter. You can set the value from 5 to 3000 packets in 1 packet steps.

   ■ **Amplitude:** Sets the amplitude of the waveform used to add jitter. You can set the value from 0/27 MHz to 135000000/27 MHz (0 s to 5 s).

   ■ **Pulse Width:** Sets the pulse width of the waveform used to add jitter. You can set the value from 1 to (period–1) packet(s) in 1 packet steps. This Pulse Width parameter is available only when the Pattern parameter is set to Pulse.
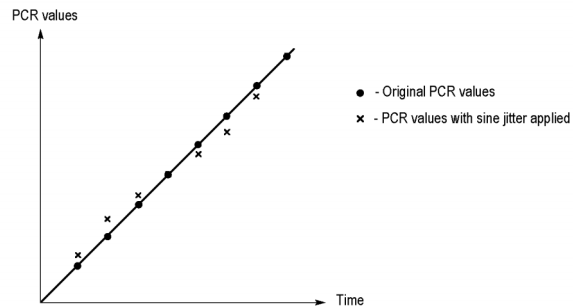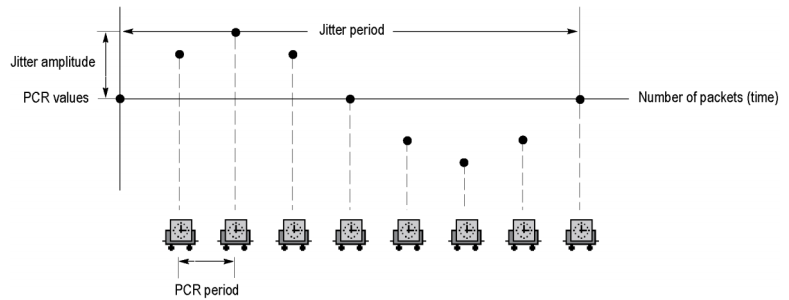
4. After you have set the parameters, press the **Enter** button to enable the jitter function.

   The figure on the right side shows the relationship among the parameters and how the PCR values (program_clock_reference_base value and program_clock_reference_extension) change when Sine is selected as a jitter-pattern waveform. The PCR values vary by the value of the sine waveform defined by the amplitude and period. The PCR period does not change.

Performing Continuous Recording

The Continuous recording feature allows you to record multiple stream files continuously on the hard disk or RAM. This section describes the features and basic actions of continuous recording, and tells how to use it to record stream files.

Overview

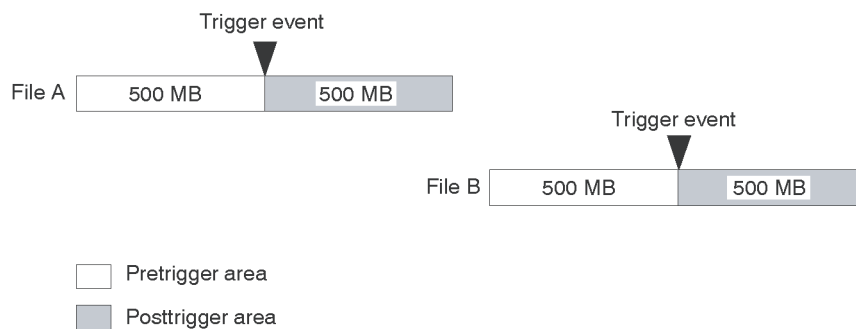Continuous recording has the following features:

- Records multiple stream files continuously on the hard disk

- Operates with variable file sizes

- Records the time stamp information of the first trigger event in a file as the updated date property of the file

- Records file in Disk or RAM recording mode
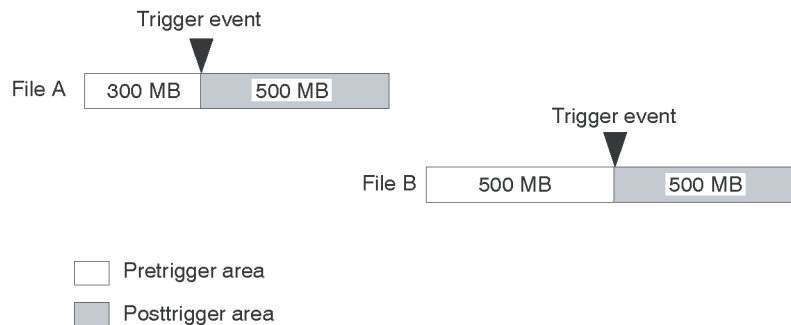
Basic Action of Continuous Recording

This section describes how files are recorded by locating the trigger events in continuous recording.

In the following explanation, both pretrigger and posttrigger sizes must be set to 500 MB.

- In general, each trigger event occurs intermittently. In this case, each file has one trigger event, and the pretrigger and posttrigger areas have the specified sizes.

```
                    Trigger event
                         ▼
File A  │  500 MB  │  500 MB  │

                              Trigger event
                                   ▼
              File B  │  500 MB  │  500 MB  │

        ▢  Pretrigger area
        ▨  Posttrigger area
```

- If a trigger event occurs while the pretrigger area is filled with data, the pretrigger area becomes smaller than the specified size. However, the posttrigger area stays the specified size. In this case, File A is smaller than the specified size.

```
                Trigger event
                     ▼
File A  │ 300 MB │  500 MB  │

                          Trigger event
                               ▼
          File B  │  500 MB  │  500 MB  │

        ▢  Pretrigger area
        ▨  Posttrigger area
```

■ If a second trigger event occurs while the posttrigger area is filled with data, the second trigger event is ignored.

Trigger events

File A | 500 MB | 500 MB |

Trigger event

File B | 500 MB | 500 MB |

☐ Pretrigger area

▨ Posttrigger area
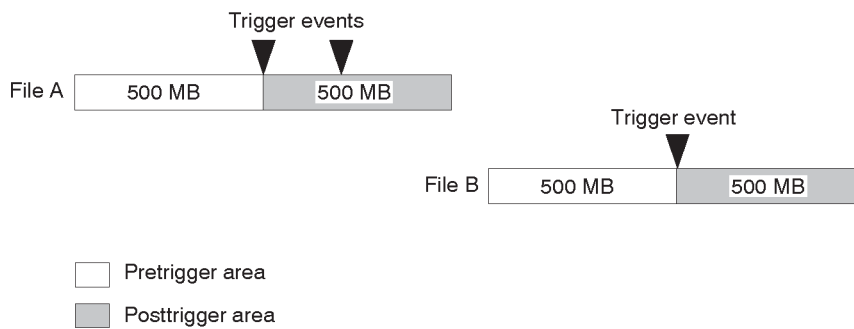
NOTE. If the trigger position is set to 0 (%), both files are created whenever a trigger event occurs.

Use the following procedure to perform continuous recording:

1. Press the front-panel **Record** button to display the Record screen.

2. Select **File > Save** to open the Save as dialog box.

3. In the dialog box, select the folder where stream files are to be saved.

4. Select **Record > Target** to open the Target dialog box.

NOTE. Ensure that the TS hierarchy of the recording stream is available before invoking the Target window.

5. In the dialog box, enable the **Continuous Recording** check box.

Continuous Recording
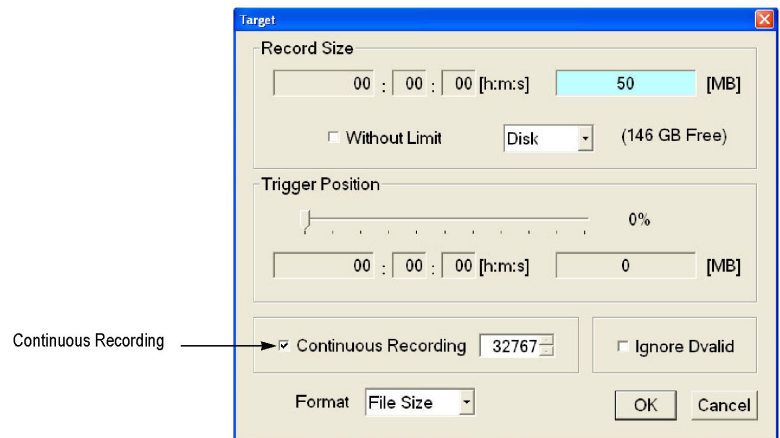
6. Set the number of files to record using continuous recording. After the specified number of files are created, stream capture stops automatically.

7. In the Record Size field, set the file size to be recorded.

8. In the Trigger Position field, set the trigger position.

9. If you want to start recording using a trigger signal on the Trig In/Out connector:

- Select **Record > Other** to open the Others dialog box.

- Select **Rise** or **Fall** in the **Ext Record Start** field.

10. Press the front-panel **Record** button to start continuous recording. While Continuous Recording is running, the total number of captured files are displayed in the file counter on the record status indicator.

File counter
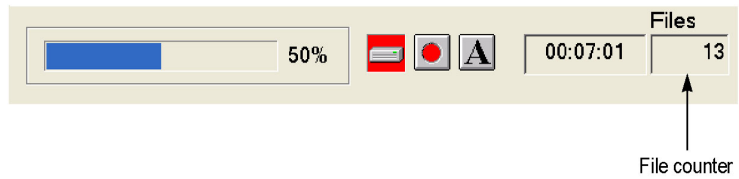
Saving and Loading a Preset File

The MTX100B provides the capability to save the user-defined instrument settings as a preset file and load the saved instrument settings. This section describes the contents of the instrument settings saved as a preset file and tells how to save and load a preset file.

Contents of the Preset File

The preset file can be created from either the Play screen or the Record screen. In the Play screen, you can save settings for stream output. In the Record screen, you can save settings for stream record.

■ In the Play screen, all the parameter settings available in the Play menu are saved as a preset file. If any of the interface options are installed, the output parameter settings of the module are also saved.

■ In the Record screen, all the parameter settings available in the Record menu are saved as a preset file. If any of the interface options are installed, the input parameter settings of the module are also saved.

Use this procedure to save the current instrument settings as a preset file:

1. Set the instrument settings that you want to save.

2. Select **File > Save Preset**, and then press **Enter**. In the File name text box, the following default file name is displayed automatically:

   ■ In the Play Screen, a two-digit serial number is added to the selected file name (for example, if the selected file name is Test_TS, the default file name becomes Test_TS00).

   ■ In the Record Screen, Preset## is used as a file name (## represents a two-digit serial number).

   When a keyboard is connected to the USB connector, you can enter the desired file name.

3. Press **Enter**. This saves the instrument settings as a preset file.
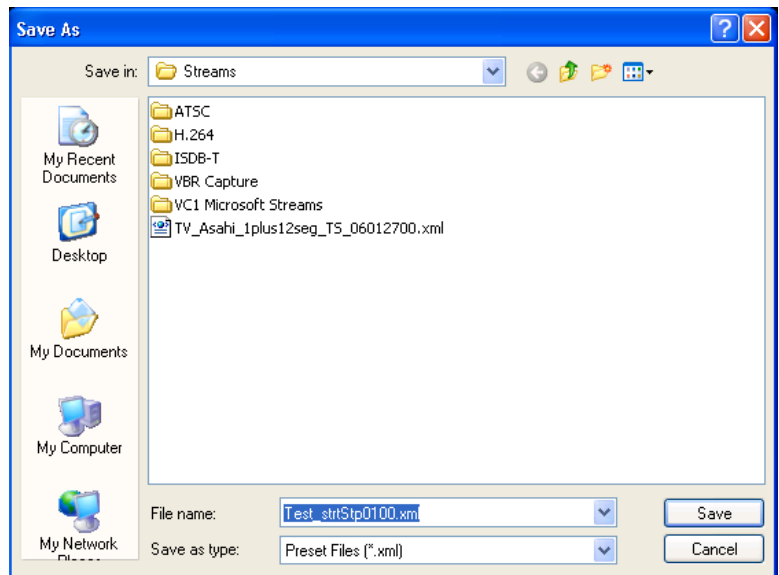
Use this procedure to load instrument settings saved as a preset file:

1. Select **File** > **Load Preset**, and then press the **Enter** button.
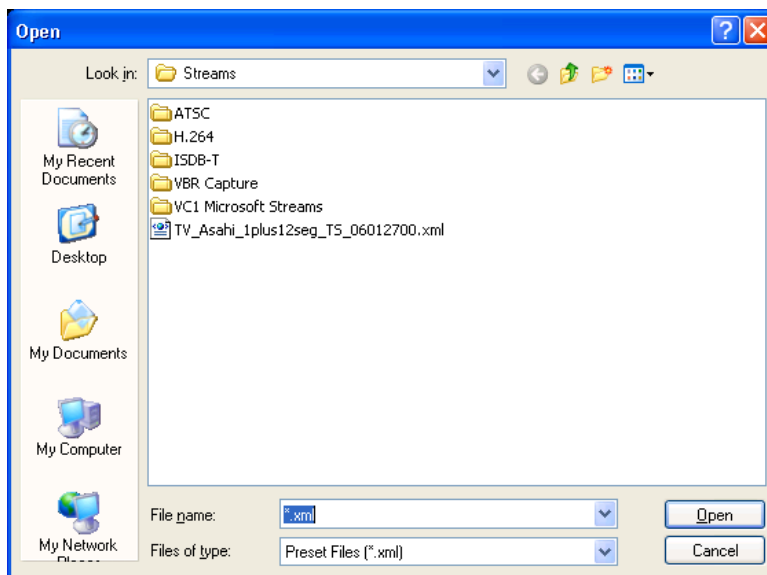

2. Press the **Tab** button repeatedly to select the file displayed at the top of the file list.

3. Press the up (▲) or down (▼) arrow button to select the preset file that you want to load. The selected file name is displayed in the File name text box.

4. Press the **Enter** button. This loads the preset file onto the instrument.

Setting Ethernet Network Parameters

Perform the following procedure to set the network parameters for the MTX100B:

1. Connect the keyboard and the mouse provided with the instrument to the USB connectors on the front panel. You can connect them to either of the connectors.

2. Select **File > Minimize** or **File > Exit** to close the Play (or Record) screen. The Windows XP desktop appears.

3. Select **Settings > Control Panel** from the Start menu. The Control Panel window appears.

4. Double-click the **Network Connections** icon in the window. The Network Connections window appears.
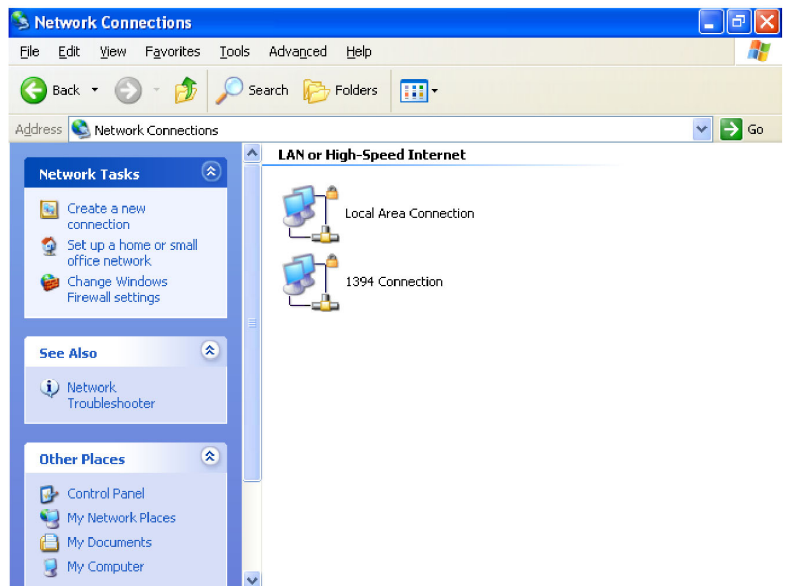
5. Double-click the **Local Area Connection** icon. The Local Area Connection Status dialog box appears.
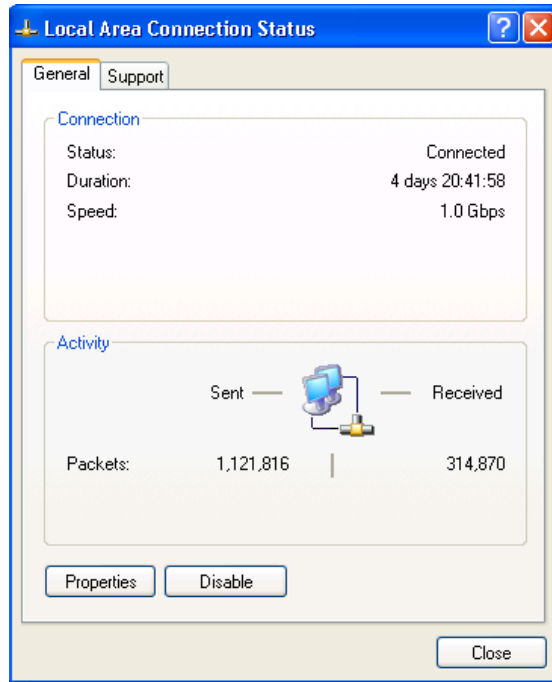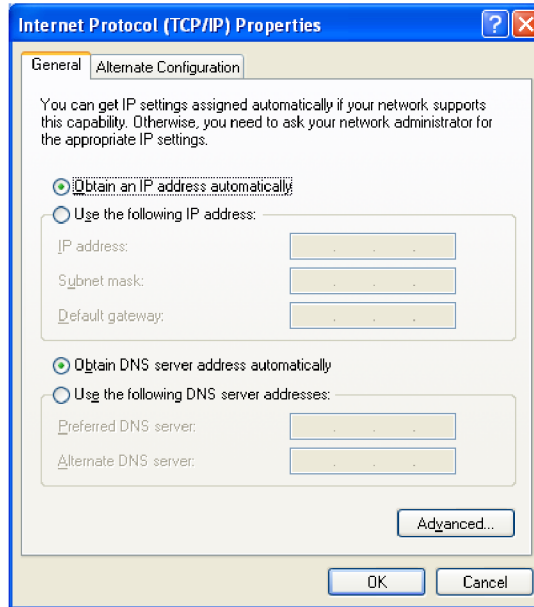
6. Click the **Properties** button. The Local Area Connection Properties dialog box appears.
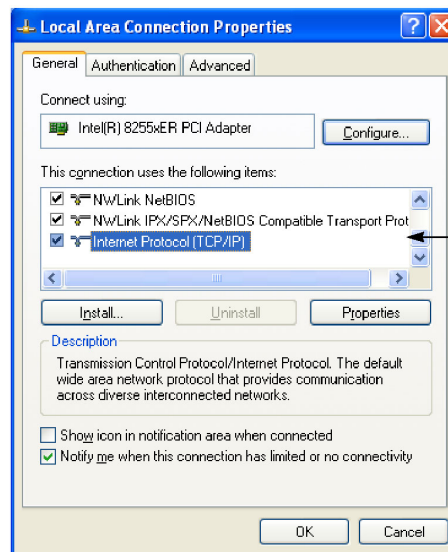
Network component field

7. In the network component field, click **Internet Protocol (TCP/IP)**.

8. Click the **Properties** button.

The settings in the dialog box depend on whether a DHCP (Dynamic Host Configuration Protocol) server is in the network connected to the MTX100B.

When the DHCP Server Is in the Network

If the DHCP server is in the network, perform steps 9 and 10, otherwise skip to step 11.

9. In the dialog box, select **Obtain an IP address automatically** and **Obtain DNS server address automatically**.

10. Click the **OK** button.

The MTX100B accesses the DHCP server and obtains the addresses automatically when connected to the network.

Refer to the user documentation supplied with your server OS for detailed information about DHCP server functions.

NOTE. In some network environments, the MTX100B may not be able to obtain the IP address automatically from a DHCP server. In this case, you need to enter the appropriate address value in each submenu item.

When the DHCP Server Is Not in the Network

If the DHCP server is not in the network, perform the following procedure to set the network parameters.

11. If you connect the MTX100B directory to a single PC:

- In the dialog box, select **Use the following IP address**.

- Set the **IP address** parameter to be the same IP address as the PC's address except for the last number. The last number must be different from the last number in the PC's IP address.

- Set the **Subnet mask** parameter to be the same net mask (subnet mask) used by the PC. Do not enter a number if the PC does not have a net mask.

- You do not need to enter a **Default gateway** if you are directly connected to a single PC.

12. If you connect the MTX100B to your local Ethernet network:

- In the dialog box, select **Use the following IP address**.

- Ask your local network administrator and set the appropriate addresses.

⚠ *CAUTION. To prevent communication conflicts on your Ethernet network, ask your local network administrator for the correct numbers to enter in the dialog box if you connect the MTX100B to your local Ethernet network.*

13. Verify the Ethernet connection by using a ping command from the PC.

Outputting an ISDB-T Transport Stream

This section describes how to set up the MTX100B and how to connect the MTX100B and a modulator when you output an ISDB-T (Integrated Services Digital Broadcasting for Terrestrial) transport stream.

Perform the following procedure to output an ISDB-T transport stream from the MTX100B:
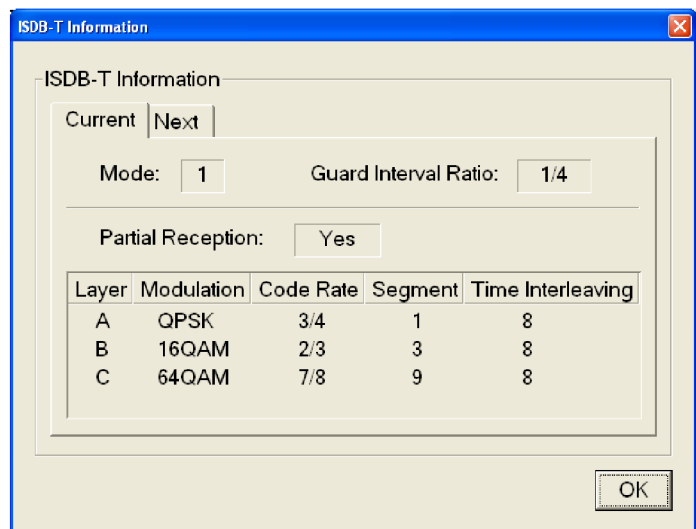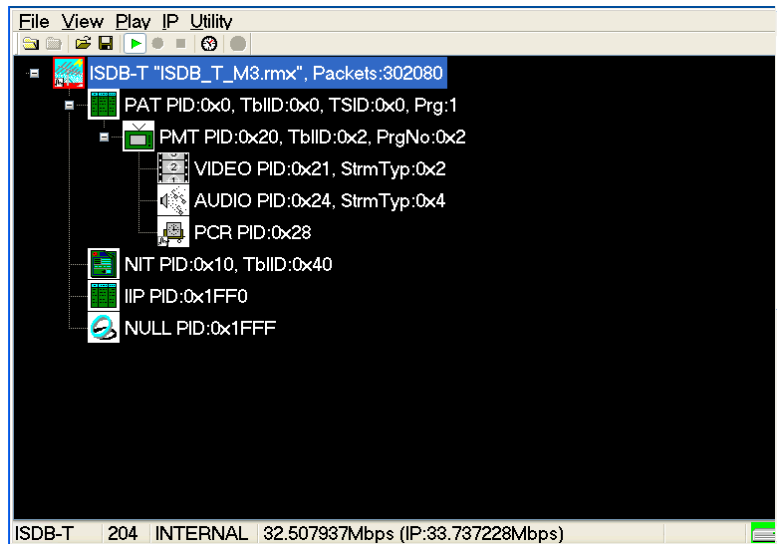
1. Press the **Play/Pause** button to display the Play screen.

2. Select **Play** > **Other** to open the Others dialog box.

3. In the dialog box, select **ARIB** in the Standard field.

NOTE. Before the MTX100B can recognize an ISDB-T transport stream file, ARIB must be selected in the Standard field.

4. Select the **Open command** from the File menu to open the Select File dialog box.

5. In the dialog box, select the ISDB-T transport stream file that you want to output.

6. Select the ISDB-T transport stream icon and press the front-panel **Num Pad/Select** button (or click the icon with the right mouse button) to open the ISDB-T Information dialog box.

NOTE. The ISDB-T transport stream is different from the typical transport stream, so the icon is not represented as a train.

Use this dialog box to check the transmission parameters of the ISDB-T transport stream.

For MTX100B other than Option 02

1. Use an interface cable to connect the SPI In/Out connector (or the output connector on the installed optional card) on the MTX100B and an ISDB-T modulator.

2. Press the **Play/Pause** button on the MTX100B to output the transport stream.

NOTE. For an ISDB-T transport stream, the MTX100B outputs the stream from the start packet in the OFDM frames to the maximum number of packets that can be looped as 2 N of the number of OFDM frames. If any transport stream within the ISDB-T transport stream has different modulation parameters, select Non TS from the Packet Size command in the Play menu.

For MTX100B Option 02.

1. Select **Univ I / F > PI Clock**. This menu item is available only when an ISDB-T file is loaded.

2. In the displayed submenu, select the scale factor of the Packet Information clock to that of the TS clock (4 MHz).

3. Use an interface cable to connect the SPI In/Out connector on the MTX100B Option 02 and the TSP input on the ISDB-T modulator.

4. Use an interface cable to connect the Universal In/Out connector on the MTX100B Option 02 and the PI input on the ISDB-T modulator.

5. In the Univ I/F menu on the MTX100B Option 02, make the following settings:

   - Set **Level** to **LVDS**

   - Set **Format** to **Parallel**

   - Set **Clock** to **Rise**

6. Press the **Play/Pause** button on the MTX100B Option 02 to output the transport stream.

   At this time, the transport stream data is output from the SPI In/Out connector and the control signals for the hierarchical multiplexing parameters are output from the Universal In/Out connector.

Refer to the *MTX100B Technical Reference* document for information about the pin assignments of the Universal In/Out connector and timing relationship of the output signals on the connector.
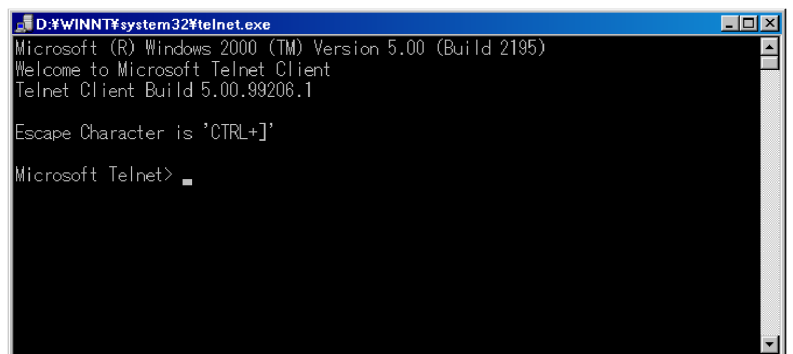
Checking Remote Command Operation

To check the remote command operation of the MTX100B, perform the following steps:

1. Connect the MTX100B to your PC using an Ethernet cable.

2. Click the Windows **Start** button and select **Run** from the start menu.
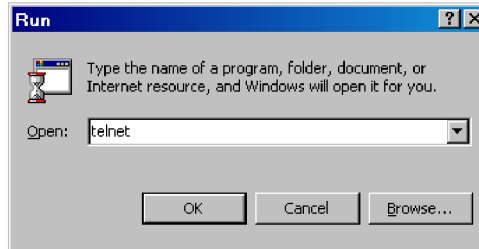
3. In the Open text box, type `telnet` and then click **OK**.

4. At the command line prompt, type `set local_echo` and press the **Enter** key. This sets the local echo mode to On.

5. At the command line prompt, type `open <host name> <port number>` and press the **Enter** key. `<host name>` is a computer name of the MTX100B to be connected and `<port number>` is the port number set in the Communication dialog box (default value:49152).

6. At the command line prompt, type `*IDN?` and press the **Enter** key.

7. Check that the following ID information of the MTX100B appears: `TEKTRONIX, MTX100B, Vx.xx, Hxx, Cxx`

Restoring the Operating System Software

If the MTX100B does not start or is corrupted, you can recover the system software by using this recovery procedure.

⚠ *CAUTION. Running the recovery procedure overwrites all the contents of the hard disk drive and resets the system to the factory defaults.*

Perform the following procedure to recover the Windows XP and the MTX100B application software:

1. Restart your system and press the **F5** key as soon as the BIOS tests are complete. This opens the Acronis True Image tool with the following options:

   - Restore

   - Windows

2. Click **Restore System** > **Yes**. Click **Windows** if you wish to keep your current configuration intact.

   The "skipped probe" messages are normal and can be ignored. Acronis is gathering information on your hardware.

⚠ *CAUTION. Do not power off the system once the recovery process is initiated. Cancelling the process will leave your hard disk drive in a partially recovered, unstable state. Immediately after the data is recovered, the system will let you know that the recovery was successful. When you select OK, the instrument restarts and the Windows XP setup wizard is displayed. You will need to install the latest version of the software that is available for your instrument.*

NOTE. The software that is already in the instrument must be reinstalled after the Operating System is restored, as the software is no longer available in the system.

Application Examples

This section provides the following examples to familiarize you with the basic functions of the MTX100B:

- Outputting a transport stream

- Recording a transport stream

Required Equipment

The following table lists the equipment required to perform the tutorials. If alternative equipment is used, its accuracy should equal or exceed that of the example instruments and accessories.

Table 7: Recommended test equipment and accessories

| Item	Qty	Requirement	Example
MPEG test system	1	Real-time transport stream analyzer	Tektronix MTS400 Series MPEG Test Systems or equivalent
Interface cable	1	D-sub, 25 pin	Tektronix part number 012-A022-00 (provided with the instrument)

Outputting a Transport Stream

Perform the following steps to select and output a stored transport stream:

1. Press the front-panel **Play/Pause** button to display the Play screen.

2. Press the **Menu** button to open the **File** menu.

3. Press the up (▲) or down (▼) arrow button to select **Open** from the menu, and then press the **Enter** button to open the Select File dialog box.
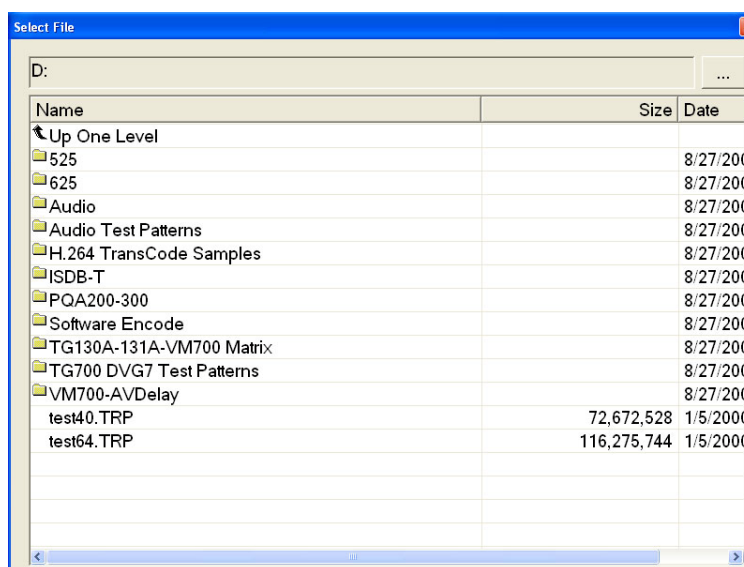
4. Press the up (▲) or down (▼) arrow button to select the required test stream file, and then press the **Enter** button. This displays the hierarchy view of the transport stream file.
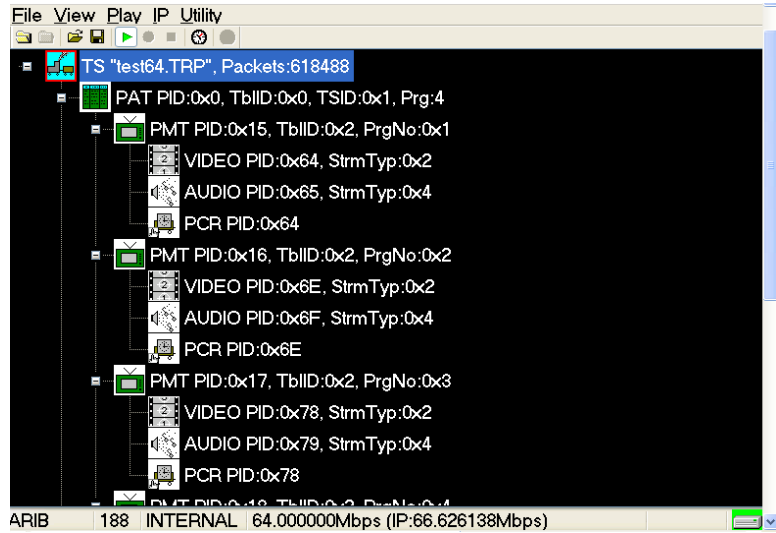
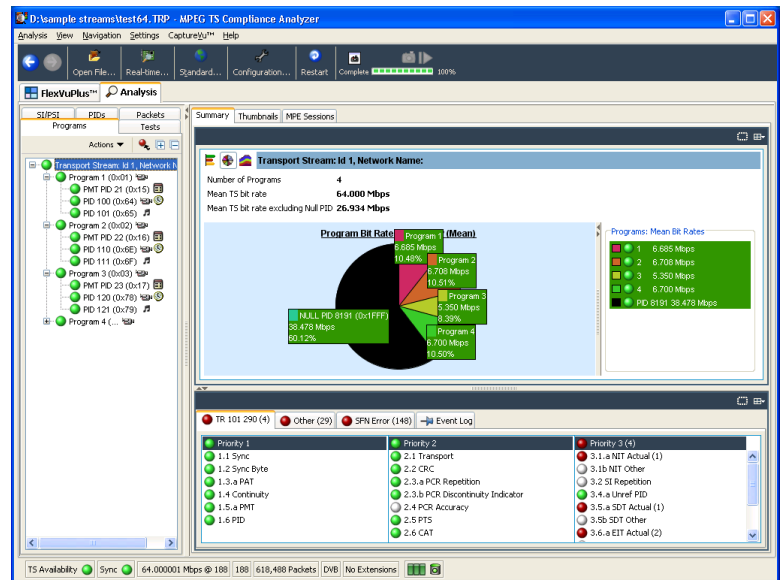**5.** Do one of the following to select the desired interface:

- ▪ Select **Play** > **Interface** > **IP**.

- ▪ Select **Play** > **Interface** > **SP1/ASI/310M**.

6. Connect the interface cable between the **SPI In/Out** connector on the MTX100B rear panel and the **SPI In** connector of the MPEG test system.
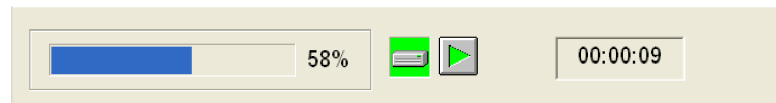
7. Press the MTX100B **Play/Pause** button to start the transport stream output. When transport stream output is started, the play status indicator appears and the indicator button lights.

8. Set up the MPEG test system to monitor the transport stream output from the MTX100B.

9. Press the **Stop** button on the MTX100B to stop the transport stream output. The Play Status indicator disappears.

Recording a Transport Stream

Perform the following steps to capture a transport stream and record it on the hard disk as a file:

1. Press the front-panel **Record** button to display the Record screen. Since no signal is being applied at this time, the No signal message appears at the top of the screen.

⚠ **CAUTION.** *Connect the interface cable before applying a signal to the SPI In/Out connector. If you connect the cable while a signal is being output, the MTX100B might not function correctly.*

2. Do the following to select the desired interface:

   ▪ Select **Play** > **Interface** > **IP**.

   ▪ Select **Play** > **Interface** > **SP1/ASI/310M**.

NOTE. The IP interface is common irrespective of the optional card installed. In this example, the optional card is A170.
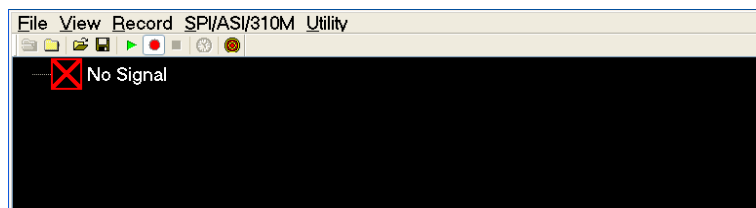
3. Connect the interface cable between the **SPI In/Out** connector on the MTX100B rear panel and the **SPI** connector of the MPEG test system.

4. Output a transport stream from the MPEG test system. When the transport stream output is started, the hierarchy view of the transport stream is displayed on the Record screen of the MTX100B.

5. Press the MTX100B **Record** button. The record status indicator appears and the indicator button illuminates.
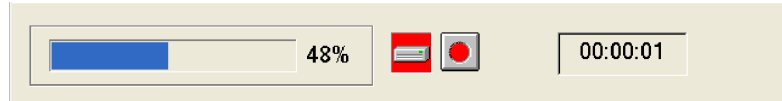
After the transport stream recording is completed, the record status indicator disappears, and the transport stream is saved with a file name that shows the current date (yy:mm:dd).

IP Stress Test

Perform the following steps to set up and to demonstrate the MTX100B IP stress generation capabilities using the portable PC.

NOTE. You can perform the IP stress test for the instruments only if the TSCA option is installed on the MTX100B instrument.

Set Up

1. Connect the Ethernet cable to the LAN port of the portable PC and the LAN port on the MTX100B.

2. Power on both the MTX100B and the portable PC.

3. Start the **MPEG Player** application on the MTX100B. Ensure that the security dongle is attached to the portable PC and start the TSCA application.

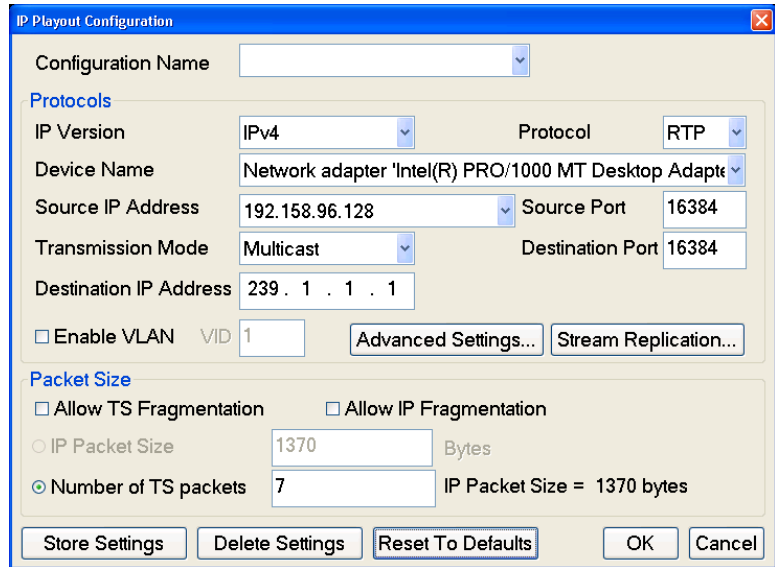**4.** In the MPEG Player application, select **Play** > **Interface >IP**.
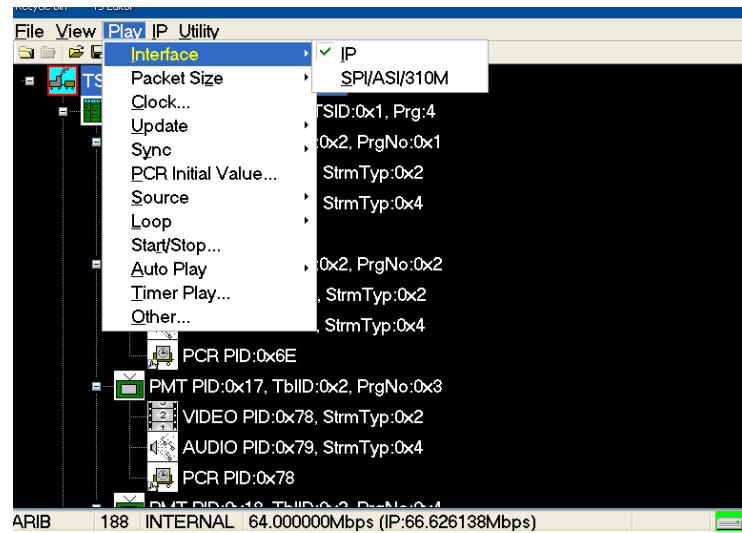
5. Select **IP** > **Configuration**.

Note the Source IP address and ensure that the **Transmission Mode** is set to **Multicast**.
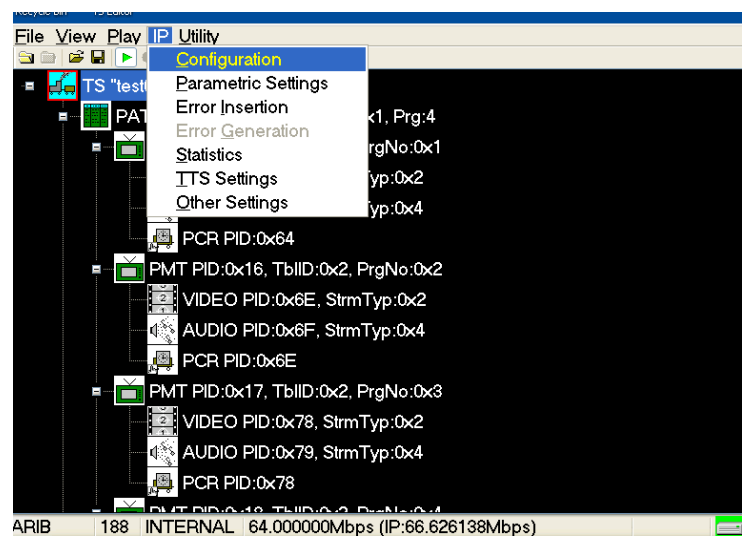
6. Select **OK** on the MTX100B configuration menu and select a test stream file from the D: drive.

**7.** Press the **PLAY** button on the MTX100B to start playing the selected stream file.

8. Open the **TSCA** application and verify that the Stream Interpretation is set appropriately for the demo.

9. In the TSCA, Select **Real-time**, and then select **Browse**.

A single flow should be seen with same source IP address as the MTX Configuration window showed. This means TSCA can see the MTX traffic.
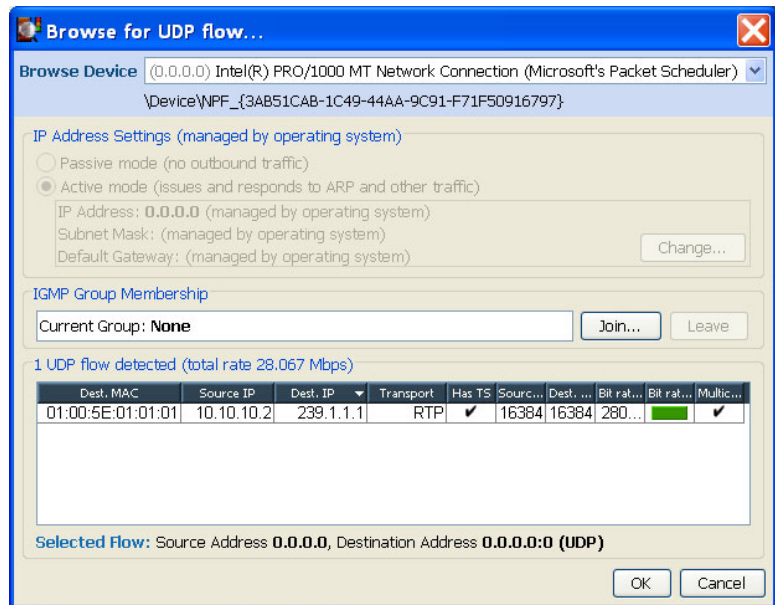
10. In the Browser for UDP flow dialog box, select the flow and click **OK**. Click **OK** in the Select Real time Interface dialog box.

The real time analysis of the stream will be displayed in TSCA. If the stream has no errors, then everything on the TSCA is green.

Outputting the IP Stress Test (Multicast)

This procedure involves playing the MPEG Player in IP mode and analyzing the output stream using a TSCA.

1. In the TSCA, select **Now Playing** and select the **Play** button under one of the thumbnails. This will start VLC to show decoded video.

This is analogous to the way an STB would decode the video.

2. To see cross-layer timing graphs, do the following:

- Select **PCR PID** in the left pane of the hierarchical view.

- Select **Timing Graphs** in the right pane, and then add **PCR Arrival Interval**, **PTS Arrival Interval**, **PCR Inaccuracy,** and **PIT**.

- Click on one of the graphs to see cursor and values displayed at the same time on all the three graphs.

3. Select **PCR PID** in the MTX100B hierarchy display and right-click. In the PCR Inaccuracy dialog box, do the following to add the jitter:

   ■ Set **Period** to **100** packets.

   ■ Set **Amplitude** to **5/27Mhz** (within 500ns limit).

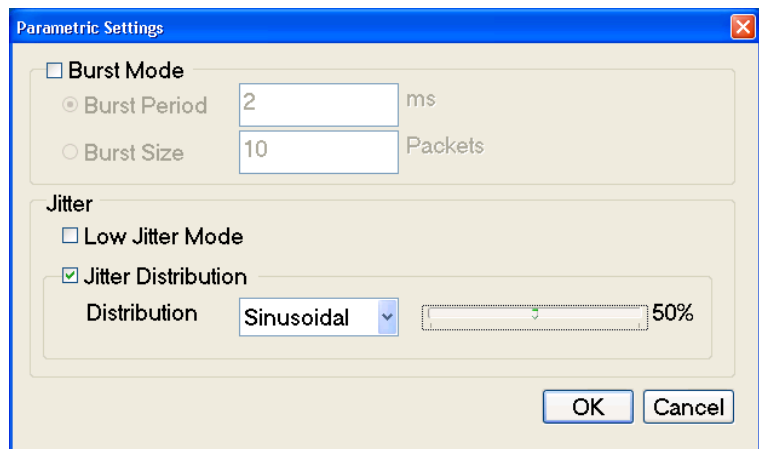   View the effects in the timing graphs.
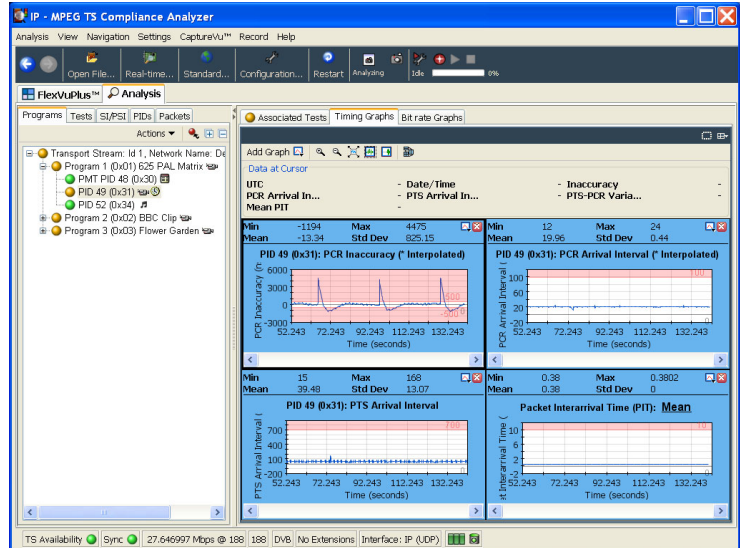
4. In the PCR Inaccuracy dialog box, change **Amplitude 20/27MHz** to **740 ns**.

   PCR Accuracy test 2.4 will fail but note that VLC video decode is largely unaffected by this level of PCR Inaccuracy.

   This is representative of a good video delivery network with IP packets being delivered by the network as they should be, but errors in the PCR values were introduced during the encoding and/or multiplexing process.

5. In the MTX application, do the following:

   ■ Select **IP** > **Parametric Settings**.

   ■ In the Parametric Settings dialog box, set Jitter Distribution to **Sinusoidal** and duration to **50%**.

   This represents 50% max variation from normal Ethernet inter packet gap.

6. Observe the effects in the timing graphs. The values for Min and Max PCR Arrival Interval, PTS Arrival Interval and Packet Inter-arrival time will be increased due to the varying timing of packets arriving.

This represents poor network performance and shows the effect that the network can have on MPEG stream timing.
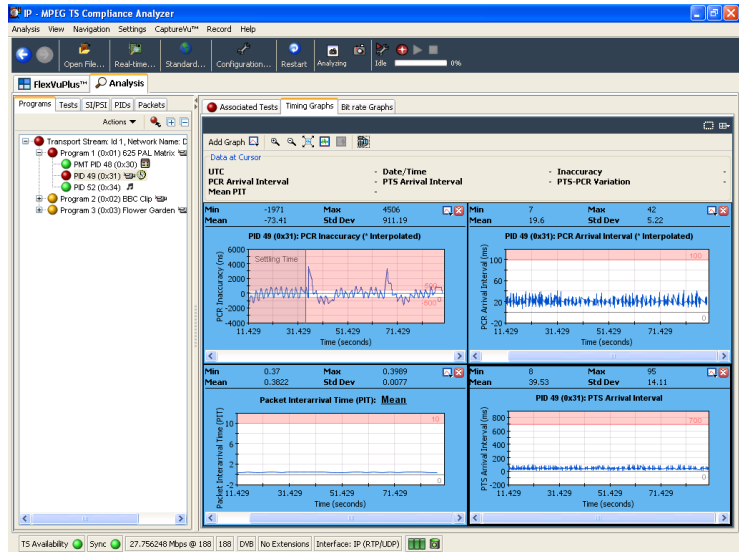
7. In the Parametric Settings dialog box, change the duration of Jitter Distribution from **50%** to **100%**.

The values for Min and Max PCR Arrival Interval, PTS Arrival Interval and Packet Inter-arrival time will increase.
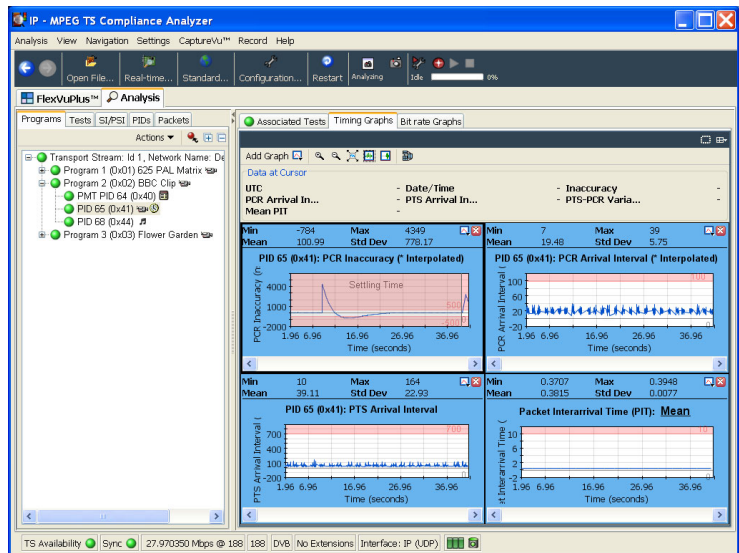
8. To observe the effects in VLC decoded video, do the following:

   ■ Select the **Program** tab, **Transport Stream** node on the left side and **Now Playing** tab on the right.

   ■ Click **play** to observe effects in VLC decoded video.

   Using these graphs, the you can determine the threshold at which IP packet jitter will cause the device under test to cease decoding the video. This is very important when designing for resilience against IP Network timing problems.

9. Select **IP** > **Error Generation** to select manual error generation from within the MTX100B IP menu. Click on the different types of errors and observe the effects of packet loss, checksum errors, and sequence errors in the TSCA tests view (Look at Other – IP node in the TSCA test tree and expand it.) Also, observe the effects in the VLC decoded video.

   These effects are typical of packet loss or corruption in IP video networks.
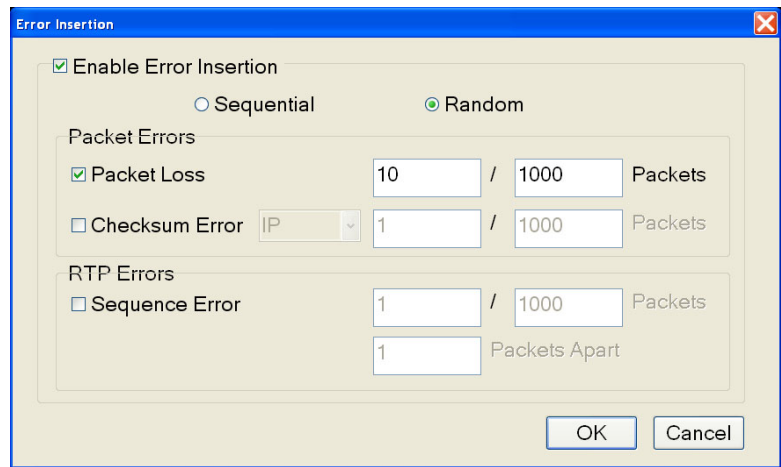
10. In the Error Insertion dialog box, select **Enable Error Insertion** check box, select **Packet Loss** and enter **10 packets/ 1000 packets**.

   This represents 1% packet loss and typical design criteria specifications for designers to ensure that the equipment can protect against. Show the effects in TSCA (look for priority 1 CC errors and IP dropped packet errors). Also, observe the effects in the VLC decoded video.
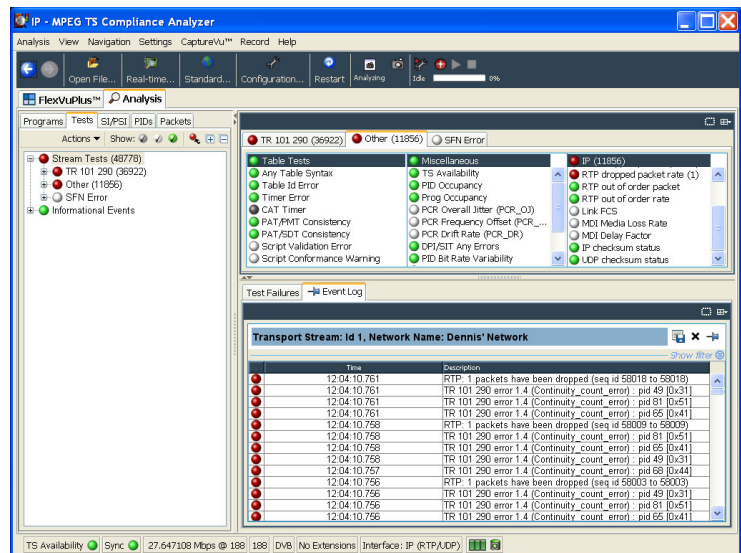
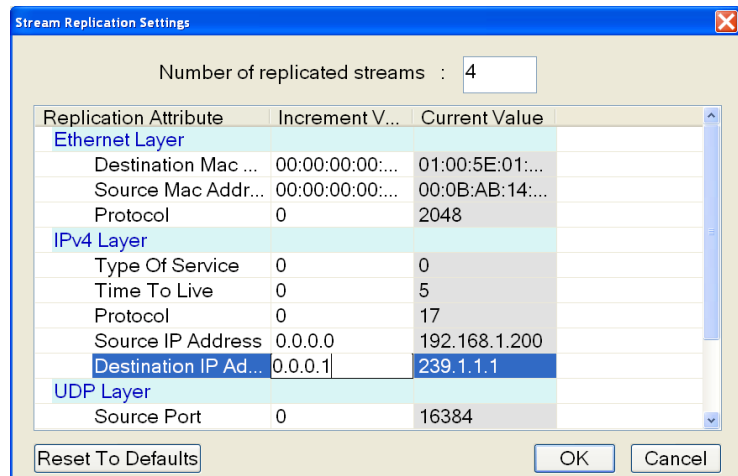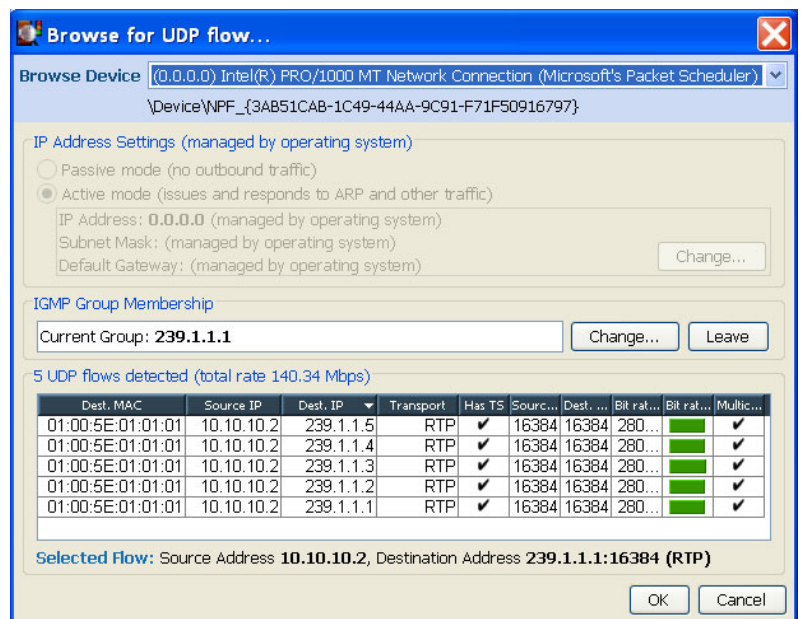**11.** Select **IP** > **Configuration** > **Stream replication**. In the Number of replicated streams field, enter **4**, change the destination address, and increment the value from 0.0.0.0 to 0.0.0.1. This will play the selected file out on 4 additional flows, each with a destination address incremented by 1.

Stream Replication Settings

Number of replicated streams : 4

Replication Attribute	Increment V...	Current Value
Ethernet Layer		
Destination Mac ...	00:00:00:00:...	01:00:5E:01:...
Source Mac Addr...	00:00:00:00:...	00:0B:AB:14:...
Protocol	0	2048
IPv4 Layer		
Type Of Service	0	0
Time To Live	0	5
Protocol	0	17
Source IP Address	0.0.0.0	192.168.1.200
Destination IP Ad...	0.0.0.1	239.1.1.1
UDP Layer		
Source Port	0	16384

Reset To Defaults   OK   Cancel

12. In the TSCA, select **Open File** > **Real-time** > **Browse**. Observe that there are now multiple flows available for selection.

Generating multiple flows in this way is representative of real world IPTV multicast environment where multiple SPTS are transmitted.

Jitter and packet errors that are introduced are distributed across the packet flow to have an equal chance of impacting any particular session. This effect can be demonstrated by selecting any one of the flows for analysis and the impact of the above MTX100B stress test cases for IP jitter and packet loss / corruption.

Browse for UDP flow...

Browse Device (0.0.0.0) Intel(R) PRO/1000 MT Network Connection (Microsoft's Packet Scheduler)
\Device\NPF_{3AB51CAB-1C49-44AA-9C91-F71F50916797}

IP Address Settings (managed by operating system)
○ Passive mode (no outbound traffic)
● Active mode (issues and responds to ARP and other traffic)
   IP Address: **0.0.0.0** (managed by operating system)
   Subnet Mask: (managed by operating system)
   Default Gateway: (managed by operating system)   Change...

IGMP Group Membership
Current Group: **239.1.1.1**   Change...   Leave

5 UDP flows detected (total rate 140.34 Mbps)

Dest. MAC	Source IP	Dest. IP ▼	Transport	Has TS	Sourc...	Dest. ...	Bit rat...	Bit rat...	Multic...
01:00:5E:01:01:01	10.10.10.2	239.1.1.5	RTP	✔	16384	16384	280...		✔
01:00:5E:01:01:01	10.10.10.2	239.1.1.4	RTP	✔	16384	16384	280...		✔
01:00:5E:01:01:01	10.10.10.2	239.1.1.3	RTP	✔	16384	16384	280...		✔
01:00:5E:01:01:01	10.10.10.2	239.1.1.2	RTP	✔	16384	16384	280...		✔
01:00:5E:01:01:01	10.10.10.2	239.1.1.1	RTP	✔	16384	16384	280...		✔

Selected Flow: Source Address **10.10.10.2**, Destination Address **239.1.1.1:16384 (RTP)**

OK   Cancel

Outputting the IP Stress Test (Unicast)

1. Perform steps 1 through 4 of *Set Up*. (See page 42.)

2. In step 5 of *Set Up*, set the **Transmission Mode** to **Unicast**.

3. Select **Control Panel** > **Network Connection** > **Local Area Connection** > **Properties** > **Internet Protocol**.

   The Internet Protocol (TCP/IP) Properties dialog box appears.

4. In the dialog box, select **Use the following IP address**.

5. Enter an IP address that is on the same segment as the generator Source IP address noted in step 5 of *Set Up*. (See page 42.) The easiest way is to increment the IP address by 1.
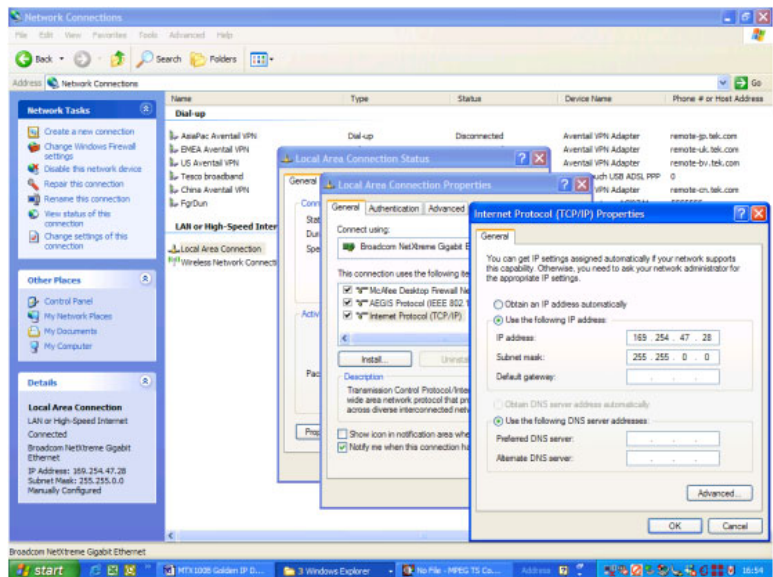
6. Perform steps 6 through 10 of *Set Up*. (See page 42.) This will set up the test and perform the steps listed in *Outputting the IP Stress Test (Multicast)* to demonstrate the test.

Accessories and Options

Accessories

Standard Accessories

Table 8: MTX100B standard accessories

Description		Tektronix part number
MTX100B Quick Start User Manual	English (Option L0)	071-2593-xx
	Japanese (Option L5)	071-2594-xx
Interface cable (D-sub 25-pin, twisted pair)		012-A220-00
USB keyboard		119-B146-00
USB mouse		119-6936-00
Front cover		200-4716-xx
Software option key document		NA
Parallel port option dongle		119-6962-xx
MTX100B and RTX100B Series Product Documentation CD-ROM		063-4114-xx
MTX100B and RTX100B Series Application Software USB flash drive		063-4085-xx
MTS400 Series MPEG Test Systems Product Documentation CD-ROM		063-4197-xx
Tclips MPEG Test Streams Software Media Kit		020-2965-xx

Power Cords. The MTX100B is shipped with one of the power cord options. (See Table 10.) 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.

Optional Accessories

Table 9: MTX100B optional accessories

Description	Tektronix part number
WFM7F05 Option NN rackmount kit	NA
1700F06 blank panel	333-4518-xx

Options

Table 10: MTX100B options

Options		Description
Instrument options		
MTX100B	01	Adds the ASI interface
	02	Adds the Universal Parallel/Serial interface
	05	Adds the IEEE1394/ASI interface
	07	Adds the SMPTE310M/ASI/SPI interface
	SC	Adds the Scheduler software
Service Options		
MTX100B	C3	Provides calibration services for 3 years
	C5	Provides calibration services for 5 years
	D1	Provides calibration data report
	D3	Provides calibration data report for 3 years (with option C3)
	D5	Provides calibration data report for 5 years (with option C5)
	R3	Repair Service 3 Years (including warranty)
	R5	Repair Service 5 Years (including warranty)
	CA1	Provides a single calibration event or coverage
	R1PW	Repair Service coverage 1 year post warranty
	R2PW	Repair service coverage 2 years post warranty
	R3DW	Repair service coverage 3 years (includes product warranty period); 3 year period starts at time of customer instrument purchase
	R5DW	Repair service coverage 5 years (includes product warranty period); 5 year period starts at time of customer instrument purchase
Power cord options		
MTX100B	A0 (Standard)	115 V, North America power
	A1	220 V, Universal Euro power
	A2	240 V, United Kingdom power
	A3	240 V, Australia power
	A4	240 V, North America power
	A5	240 V, Switzerland power
	A6	100 V, Japan power
	A10	240 V, China power
	A11	India
	A99	No Power Cord or AC Adapter

Table 10: MTX100B options (cont.)

Options		Description
MTS400 Series Software options		
MTX100B	MX	Adds Deferred Time Multiplexer
	ES	Adds ES Analyzer
	PB	Adds PES & Buffer Analyzer
	DB	Adds Carousel Analyzer
	CG	Adds Carousel Generator
	DBCG	Adds Carousel Analyzer and Carousel Generator
	TSCA	Adds Transport Stream Compliance Analyzer
	TSCX	Adds real-time Transport Stream Compliance Analyzer key to add real time TSCA to MTX100B
Hardware upgrades		
MTX10UP	IPTVP	Adds IPTVP gigabit Ethernet interface with 10/100/1000 base-t rj45 electrical port. requires option TSCX
	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)

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