

MTX100B
MPEG Recorder and Player
Technical Reference



077-0189-00

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MPEG Recorder and Player
Technical Reference

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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.

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

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.

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

Preface

This manual contains the following sections:

- **Introduction:** briefly describes the MTX100B MPEG Recorder & Player and provides some of its important features and repacking instructions.
- **Programming Information:** presents descriptions of all programming commands and the syntax used in command descriptions. This section also provides instructions for setting the network parameters for the Ethernet port.
- **Appendices:** provide product specifications, instructions for operating the ReMux and Scheduler applications, defragging the hard disk, recovering the system, and inspecting and cleaning the MTX100B MPEG Recorder & Player.

Related Documentation

The following related documentation is available:

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

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.

Introduction

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

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, nontransport 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

Windows Operations

All the functions of the MTX100B are performed as an application (MTX100B) on the Windows XP operating system. If you connect the keyboard and the 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 a 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.

Reference

The Reference section is divided into subsections that give you information on how to use the menus, adding jitters to PCRs, continuous recording feature, and about the preset file.

Using the Menus

This subsection describes the function of each selection that is available in the menus. This section is divided into the following subsections:

- *Menus in the Play Screen* describes all of the menu commands and their features available in the Record screen.
- *Menus in the Record Screen* describes all of the menu commands and their features available in the Record screen.
- *Toolbar Buttons* describes the toolbar buttons and their functions.
- *Menus in the Play Screen* describes all of the menu commands and their features available in the Record screen.
- *Menus in the Record Screen* describes all of the menu commands and their features available in the Record screen.
- *Toolbar Buttons* describes the toolbar buttons and their functions.

Refer to the *MTX100B Quick Start User Manual* for information on how to operate the menus.

Menus in the Play Screen

This subsection describes the menus available in the play screen.

File Menu The file menu in the play screen contains commands for selecting a stream file and for loading and saving a preset file. This menu also contains commands to exit the MTX100B application and the instrument. (See Table 1.)

Table 1: File menu commands (Play screen)

Command	Description
Open	Opens a stream file. When a file is selected, the MTX100B checks the packet size of the file. For a transport stream file, the data output is in packets. If an incomplete packet is included at the start or end of the file, that portion of the file is not output. The available minimum data size is 104 KB. When you select this command, the Select File dialog box appears.

Table 1: File menu commands (Play screen) (cont.)

Command	Description
Load Preset	Loads the specified preset file (*.set). When a preset file is loaded, the current instrument settings are replaced by the settings in the preset file.
Save Preset	Saves the current instrument settings as a preset file.
RECORD	Switches to the Record screen. The Record screen is disabled for IP interface.
Scheduler	Starts the Scheduler application when the Option SC is installed.
Minimize	Minimizes the MTX100B application window.
Exit	Quits the MTX100B application. The MTX100B application settings are saved.
Shutdown	Quits and shuts down the MTX100B.

Select File Dialog Box. When you select the **Open** command from the File menu, the Select File dialog box appears.

You can perform the following functions in Select File dialog box:

- Press the arrow buttons to select the desired file, and press the **Enter** button to load the selected file.
- Select Up One Level to move from the current directory to a directory one level higher.
- Click the “...” button at the upper right of the dialog box to select a file that is not listed.

View Menu

The View menu contains commands that control the display of the Toolbar and Status bar. (See Table 2.)

Table 2: View menu commands

Command	Description
Toolbar	Toggles the display of the Toolbar on and off in the Play screen. A check mark precedes the command in the menu when the Toolbar is selected for display.
Status Bar	Toggles the display of the Status bar on and off in the Play screen. A check mark precedes the command in the menu when the Status bar is selected for display.

Play Menu The Play menu contains commands for defining output parameters such as packet size, output clock rate, or output source. (See Table 3.)

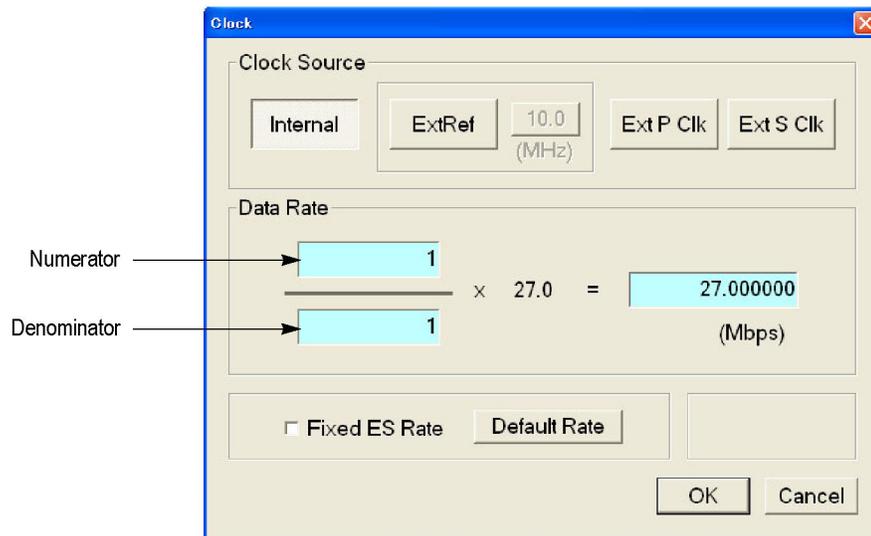
Table 3: 'Play menu commands

Command	Description
Interface	<p>Sets the interface to transmit and receive Ethernet packets.</p> <p>Two interface are available– the IP interface and the SPI/ASI/310M interface. IP interface is common for all the optional cards, but the SPI/ASI/310M interface varies depending upon the optional card. You can select only one interface at a time.</p>
Packet Size	<p>Sets the packet size (in bytes) for the stream. You can set the packet size to 188 (188 + 0), 204 (188 + 16), 208 (188 + 20) bytes, or Non-TS.</p> <p>These packet sizes can be set only for an MPEG-2 transport stream. For an S-TMCC or an M-TMCC transport stream, the packet size is fixed to 204. For a Non-TS stream, the packet size is fixed to Non-TS. In addition, if you select 8VSB for an output signal format in Option 07, the packet size is fixed to 188.</p> <p>When you select Non-TS, the MTX100B deals with stream data in a byte unit (not a packet unit) and outputs all of the data in a file. If a transport stream contains any error, you can output it by selecting Non-TS.</p>
Clock	<p>Opens the Clock dialog box where you can set the clock rate of the stream output. (See Figure 1 on page 6.)</p>
Update	<p>Sets whether to update parameters in the stream when looped. You can select On or Off. You cannot select On for a Non-TS stream.</p> <p>You can select which parameters in the stream are updated using the Others dialog box. (See Figure 6 on page 13.)</p>
Sync	<p>Sets the format of the PSYNC signal output from the SPI In/Out connector. You can select TS Packet, SF, or Non-TS. For TS Packet, a single pulse signal is output at the start of each packet. For SF, a single pulse is output at the start of the SF appearing every 204 X 48 X 8 bytes. For Non-TS, the Set Non-TS Sync dialog box appears, where you can enable the PSYNC and DVALID signals. (See Figure 2.)</p>
PCR Initial Value	<p>Opens the PCR Initial Value dialog box where you can set the initial value of the program_clock_reference_base and program_clock_reference_extension parameters when the transport stream is output. (See Figure 3.)</p>
Source	<p>Selects the source for stream output. You can select RAM or Disk.</p>

Table 3: 'Play menu commands (cont.)

Command	Description
Loop	Sets whether or not the stream is output using the looping method. You can select On or Off. If you select On, the selected stream is continuously output. If you select Off, the selected stream is output once.
Start/Stop	Opens the Start/Stop Position dialog box where you can set the start and stop positions of the stream, and the initial start position of the stream for loop output. (See Figure 4.)
Auto Play	Sets whether or not the transport stream is automatically output using the last power-off settings when you turn on the MTX100B. You can select On or Off.
Timer Play	Opens the Timer Play/Record dialog box where you can set the date and time used to output a stream automatically. (See Figure 5.)
Other	Opens the Other dialog box where you can set the standard used to display the selected stream and display radix for the text information. (See Figure 6.)

Clock Dialog Box. When you select the **Clock** command from the Play menu, the Clock dialog box appears. (See Figure 1.)

**Figure 1: Clock dialog box**

- **Clock Source:** Sets the clock that will be used as the reference for the stream output. You can select from the following settings:
 - **Internal** uses the internal clock of the MTX100B as the clock reference.

- **Ext Ref** allows you to input a signal on the Clock/Ref In connector for use as the clock reference. When you select the button to the right of the ExtRef box, the following External Reference dialog box appears.
 - **10 MHz** selects a 10 MHz signal on the Clock/Ref In connector.
 - **27 MHz** selects a 27 MHz signal on the Clock/Ref In connector.
 - **ISDB-T IFFT Clock** selects a signal corresponding to the IFFT sample clock rate (8.126984 MHz) on the Clock/Ref In connector.
- **Ext P Clk** (external parallel clock) allows you to input a clock signal on the Clock/Ref In connector for use as the parallel clock.
- **Ext S Clk** (external serial clock) allows you to input a clock signal on the Clock/Ref In connector for use as the serial clock.
- **Data Rate:** Sets the clock rate for the transport stream output. You can enter the clock rate using the following methods (the first method provides greater clock-rate precision):
 - Enter values into the numerator and denominator text boxes. The MTX100B will calculate the clock rate based on the ratio of the numerator and denominator values.
 - Enter a value into the clock rate text box. The MTX100B will calculate the numerator and denominator values based on the clock rate.

NOTE. *The IP data rate will be automatically calculated based on the available TS data rate. IP Data Rate is calculated as follows:*

$$IP\ Data\ Rate = (TS\ Data\ Rate \times IP\ Packet\ Size) / Payload\ Size$$

When you use the Ext P Clk or Ext S Clk mode, set the clock rate to the same value as the input clock signal. Also, when you use the Ext S Clk mode, you cannot set the value more than 32 Mbps.

- **IP Data Rate:** Sets the clock rate for the IP packet. In the IP mode, a change in the IP data rate will impact the TS data rate and a change in the TS data rate will impact the IP data rate. The packet length changes according to the selected protocol.

NOTE. *The TS data rate will be automatically calculated based on the available IP data rate and consequently influence the PCR/PTS/DTS update cycles. TS Data Rate is calculated as follows:*

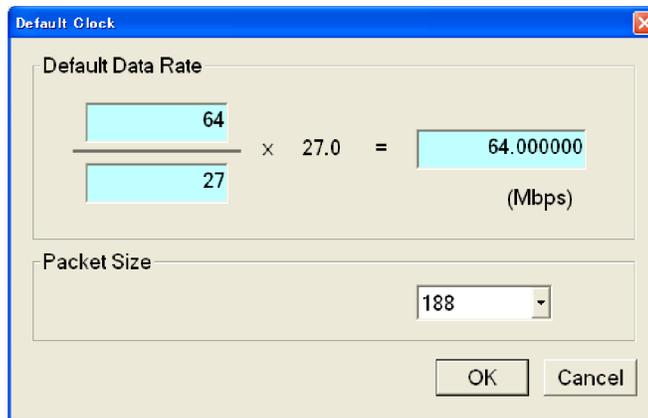
$$TS\ Data\ Rate = (IP\ Data\ Rate \times Payload\ Size) / IP\ Packet\ Size$$

When the IP data rate is more than 80 Mbps, a Recommended Settings dialog box is displayed asking you to modify the settings for optimal performance.

- **Fixed ES Rate:** Sets whether the elementary stream rate is fixed. When it is selected, the elementary stream rate becomes constant regardless of the clock rate setting. If you fix the elementary stream rate, you cannot set the output clock rate (Data Rate) to less than the data rate set when the stream file was downloaded.

When Fixed ES Rate is selected, PCR/PTS/DTS Update Method in the Select Update Item dialog box is set to **Hardware** automatically.

- **Default Rate:** Displays the default clock rate and packet size and then changes the values. When you select this button, the following Default Clock dialog box appears.



- **Default Data Rate:** Overwrites the scanned bit rate value of the stream file
Since the default clock rate is calculated based on the PCRs in the downloaded stream file, the value can be different from the original clock rate. When the elementary stream rate is fixed (refer to the Fixed ES Rate description), the instrument refers to the default clock rate. Therefore, if the default clock rate is different from the original clock rate, you need to set it to the appropriate value. If you change the value, the clock rate value in the Data Rate dialog box is also changed.
- **Packet Size:** Changes the default packet size when the selected stream file is downloaded. If you change the value, the Packet Size setting in the Play menu will also change.

Set Non-TS Sync Dialog Box. When you select Non-TS from the Sync command in the Play menu, the Set Non-TS Sync dialog box appears. (See Figure 2.)

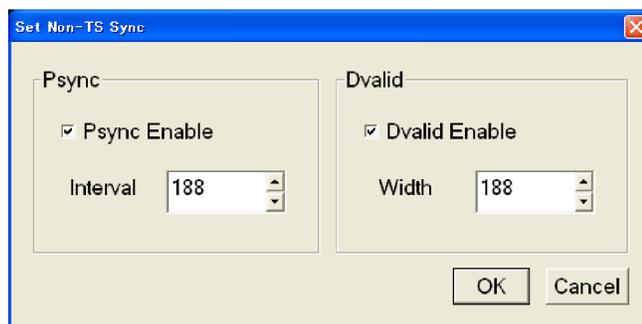


Figure 2: Set Non-TS Sync dialog box

- **Psync Enable:** Sets the status of the PSYNC signal output from the SPI In/Out connector.
- **Interval:** Enter the output period of the PSYNC signal in the range of 16 to 255 bytes. A value equal to or greater than the Width value can be entered in the Interval field.
- **Dvalid Enable:** Sets the status of the DVALID signal output from the SPI In/Out connector.
- **Width:** Enter the data width of the DVALID signal in the range of 16 to 255 bytes.

PCR Initial Value Dialog Box. When you select the PCR Initial Value command from the Play menu, the PCR Initial Value dialog box appears. (See Figure 3.)

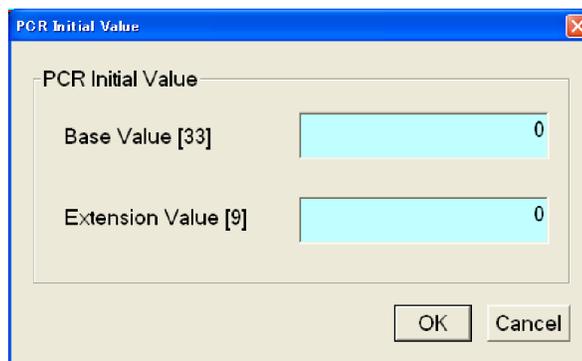


Figure 3: PCR Initial Value dialog box

- **Base Value:** Sets the initial value for the `program_clock_reference_base` value. You can enter a value from 0 to 8589934591. The bracketed number represents the number of bits for the `program_clock_reference_base` field.
- **Extension Value:** Sets the initial value for the `program_clock_reference_extension` value. You can enter a value from 0 to 299. The bracketed number represents the number of bits for the `program_clock_reference_extension` field.

Start/Stop Position Dialog Box. When you select the **Start/Stop** command from the Play menu, the Start/Stop dialog box appears. (See Figure 4.)

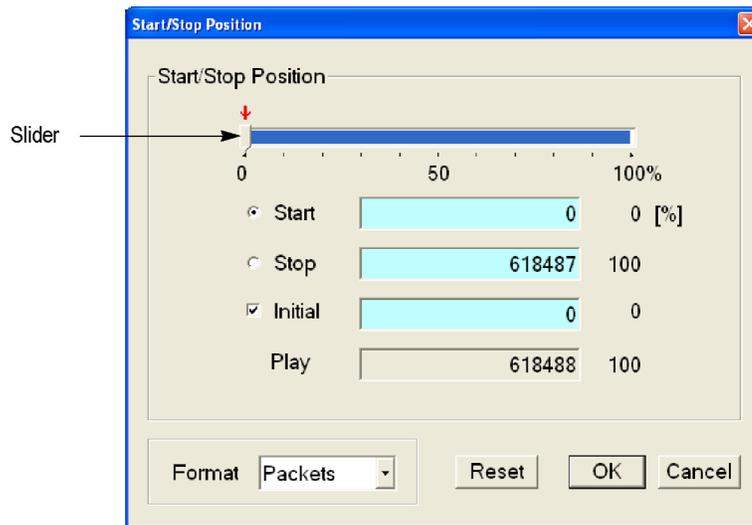


Figure 4: Start/Stop Position dialog box

- **Start:** Sets the start position of the stream by time (h:m:s) or the number of packets (the number of super frames for an M-TMCC file, or the number of bytes for a Non-TS file). Based on the format selected from the Format field, you can either enter the value or move the slider to set the position.
- **Stop:** Sets the stop position of the stream by time (h:m:s) or the number of packets (the number of super frames for an M-TMCC file, or the number of bytes for a Non-TS file). Based on the format selected from the Format field, you can either enter the value or move the slider to set the position.
- **Initial:** Sets the initial start position of the stream for loop output. You can set the value by time (h:m:s) or the number of packets (the number of super frames for an M-TMCC file, or the number of bytes for a Non-TS file). Based on the format selected from the Format field, you can either enter the value or move the slider to set the position.

- **Play:** Shows the actual time or number of packets (the number of super frames for an M-TMCC file, or the number of bytes for an Non-TS file) that is calculated by the values of the Start and Stop text boxes fields.
- **Format:** Specifies the way to set the start, stop, and initial positions of the stream. For a transport stream file, you can select Time or Packets. For an M-TMCC file, you can select Time or SF (super frame). For a Non TS file, you can select Time or Bytes.

For an ISDB-T file, the start packet is defined as the first-appearing packet including an OFDM frame start flag after the specified start position. The stop packet is defined as the packet before the last-appearing packet including an OFDM frame start flag before the specified stop position. If the number of OFDM frames between the start packet and stop packet is not an even number, the packet in the last OFDM frame becomes the stop packet.

To set the start, stop, and initial positions, either use the slider or enter the values directly in the text boxes. (See Figure 4.)

Using the slider.

1. For the start and stop positions:
 - a. Press the **Tab** button repeatedly to select the slider.
 - b. Press the left (◀) or right (▶) arrow button to move the slider to the place you want to set the start position.
 - c. Press the **Tab** button repeatedly to select the Stop option button, and then press the **Num Pad/Select** button. This moves the slider to the right end.
 - d. Repeat steps a and b to set the value for the Stop option.
 - e. Press the **Enter** button to enable the values.
2. For the initial start position for loop output:
 - a. Press the **Tab** button repeatedly to select the Initial check box, and then press the **Num Pad/Select** button. A red arrow appears on the slider.
 - b. Press the **Tab** button repeatedly to select the red arrow.
 - c. Press the left (◀) or right (▶) arrow button to move the slider to the place you want to set the initial start position.
 - d. Press the **Enter** button to enable the value.

Using the text boxes:

1. Press the **Tab** button repeatedly to select the Start text box. If you set a time, select one of the text boxes for setting the hour, minute, or second.
2. Press the **Num Pad/Select** button. The keypad appears.
3. Use the keypad to enter the value.
4. If you set a time, repeat step a through step 3 to set the hour, minute, and second.
5. Use the same procedure given in step 1 through step 4 to set the value in the **Stop** text box.
6. Press the **Enter** button to enable the values.

To reset all of the settings to the values when the dialog box was first displayed, press the Tab button repeatedly to select the Reset button, and then press the Num Pad/Select button.

Timer Play/Record Dialog Box. When you select the Timer Play command from the Play menu, the Timer Play/Record dialog box appears. (See Figure 5.)

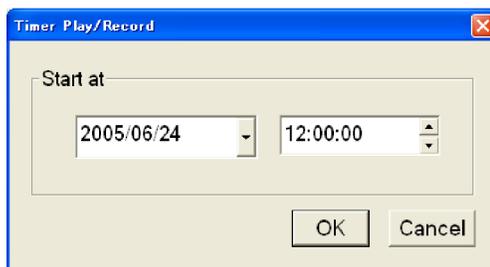


Figure 5: Timer Play/Record dialog box

- **Start at:** Sets the date and time when the stream output or record starts.

If a mouse is connected to the MTX100B, you can display a calendar for date setting by clicking the ▼ arrow button at the right of the date display.

When you press the **Enter** button after setting the date and time, a dialog box showing the current date and time, and set date and time is displayed. When the date and time arrives, the dialog box closes and stream output or stream record starts automatically.

If you want to cancel the operation, press the **Enter**, **Cancel/Close**, or **Num Pad/Select** button. When the dialog box that prompts you to confirm the operation is displayed, press the **Num Pad/Select** or **Enter** button to execute the operation.

Others Dialog Box. When you select the **Other** command from the Play menu, the Others dialog box appears. (See Figure 6.)

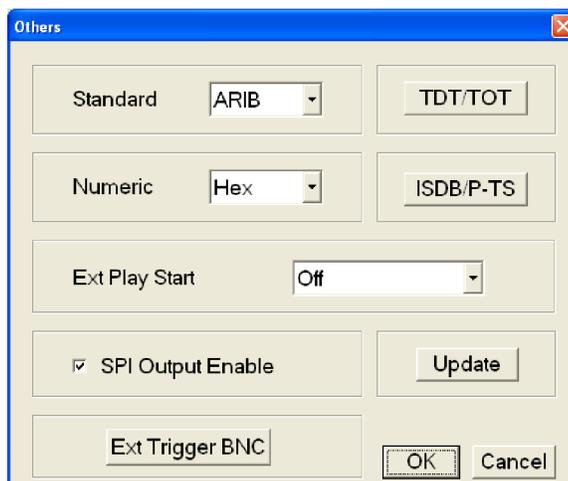
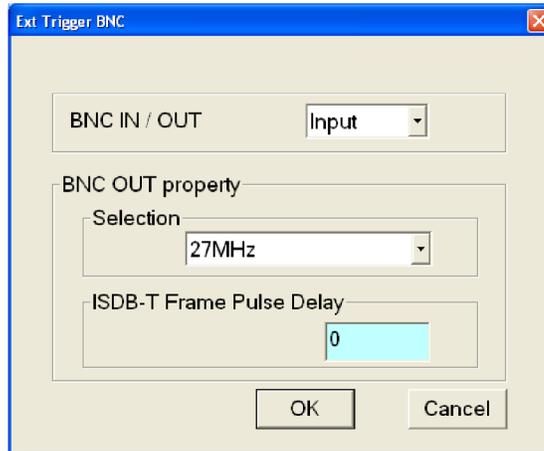


Figure 6: Others dialog box

- **Standard:** Sets the standard used on the hierarchical display screen. You can select ARIB, ATSC, DVB, or MPEG-2. For a transport stream (ARIB, ATSC, DVB, or MPEG-2), the standard is set to the previous setting as a default. For an S-TMCC, M-TMCC, or ISDB-T transport stream, you need to select ARIB for proper display.
- **Numeric:** Sets the base value used to describe the component information in the hierarchy display. You can select Decimal, Hex, or Octal.
- **Ext Play Start:** Sets whether or not to start stream output using a trigger signal applied to the Trig In/Out connector. You can select Off, Rise, or Fall. When you select Rise, the stream output is started at the rising edge of the applied trigger signal. When you select Fall, the stream output is started at the falling edge of the applied trigger signal.
- **SPI Output Enable:** Sets whether the signal output from the SPI In/Out connector is enabled or not. Use this function to set the SPI In/Out connector to input only and the Universal In/Out connector to output only when the universal parallel/serial interface option is installed. If the Source command in the Record menu is set to STD, the signal output from the SPI In/Out connector is disabled even if you have enabled the SPI Output Enable.

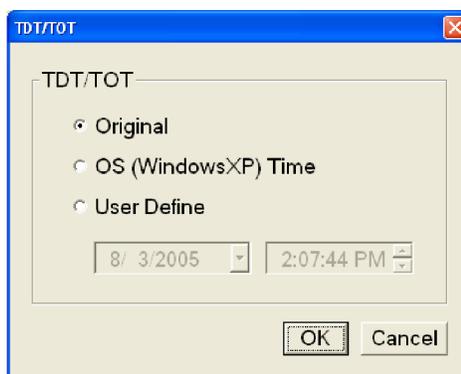
- **Ext Trigger BNC:** When you select this button, the following Ext Trigger BNC dialog box appears.



- **BNC IN/OUT:** Sets whether to use the rear panel Trig In/Out connector as a trigger signal input or as a reference clock/ISDB-T frame clock signal output. You can select Input or Output. For Input, the Trig In/Out connector can be used to input an external trigger event. For Output, the Trig In/Out connector can be used to output a 27 MHz reference clock or an ISDB-T frame pulse signal. Use the Selection list box to select which signal is output from the connector.
- **BNC OUT property:** Selects the output signal from the Trig In/Out connector when BNC IN/OUT is set to Output. You can select 27 MHz or ISDB-T Frame Pulse. If you select 27 MHz, a 27 MHz reference clock signal is output from the Trig In/Out connector. Use this option to check the clock frequency accuracy. If you select ISDB-T Frame Pulse, an ISDB-T frame pulse signal is output from the Trig In/Out connector.
- **ISDB-T Frame Pulse Delay:** Sets the amount of delay for the start packet pulse of the ISDB-T frame in 1-parallel clock of the SPI output. You can set the value from 0 to 15.

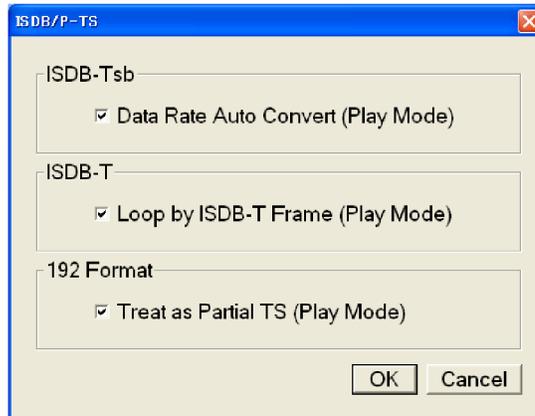
- **TDT/TOT or STT:** When you select this button, the following TDT/TOT dialog box appears. The name changes to the standard that is selected in the Standard list box: TDT/TOT for ARIB or DVB, and STT for ATSC. Use this dialog box to change the initial date and time of the TDT (Time and Data Table), TOT (Time Offset Table), or STT (System Time Table) in the selected stream.

The button is disabled when MPEG-2 is selected in the Standard list box.

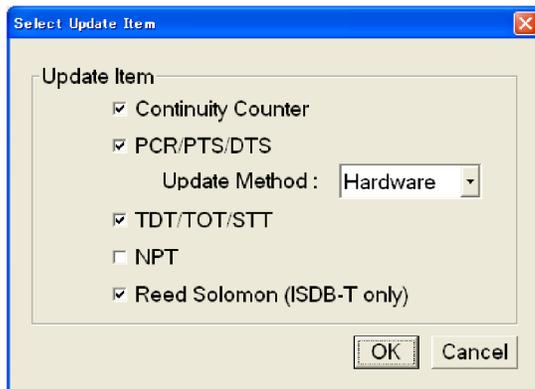


- **Original:** Uses the original (default) value that is already defined in the selected stream.
- **OS (Windows XP) Time:** Uses the clock/calendar of the operating system (Windows XP) to set the initial value. When you select this option, the date and time of all the TDTs, TOTs, or STTs in the selected stream are locked to the clock/calendar of the operating system.
- **User Define:** Uses a user defined value to set the initial value. When you select this option, the list boxes for setting the initial date and time of the TDT, TOT, or STT are available.

- **ISDB/P-TS**: When you select this button, the ISDB/P-TS dialog box appears.



- **Data Rate Auto Convert (Play Mode)**: Determines whether the clock rate is set automatically when the ISDB-TSB file is loaded. When selected, the clock rate is automatically set to $(2048/1701) \times 27$ MHz and the elementary stream rate becomes constant regardless of the Fixed ES Rate setting.
 - **Loop by ISDB-T Frame (Play Mode)**: When selected, sets to output the ISDB-T transport stream in OFDM frames when looped. When cleared, the ISDB-T transport stream is looped in packets.
 - **Treat as Partial TS (Play Mode)**: When selected, sets to output a stream file consisting of a 192-byte packet as a partial transport stream. When cleared, the stream is output in Non TS format.
- **Update**: When you click **Update**, the Select Update Item dialog box appears. Use this dialog box to select which parameters in a stream are updated when looped.



- **Continuity Counter**: When selected, sets whether to update the continuity_counter.

- **PCR/PTS/DTS:** Sets whether to update PCR (Program Clock Reference), PTS (Presentation Time Stamp), and DTS (Decoding Time-Stamp).
- **Update Method:** Specify the method to update PCR/PTS/DTS. The optional interface supports both **Software** or **Hardware** update methods but the IP interface supports only the software method.
 - **Hardware:** PCR/PTS/DTS are updated using the counter values of the 27 MHz clock on the output board. Since data output and PCRs are completely locked, the continuity of PCRs is maintained at the loop point even when playing long stream loops. However, timing errors occur in PTS/DTS.
 - **Software:** PCR/PTS/DTS are updated by adding the actual looping time (defined by the start and stop positions) to the stream every time it is looped. However if there are no timing errors in PTS/DTS, it is difficult to maintain the continuity of PCRs at the loop point because the update is not synchronized with the 27 MHz clock on the output board. Since this method is used to update NPT, if you enable the NPT option, Software is selected automatically.
- **TDT/TOT/STT:** Sets whether to update TDT (Time & Data Table), TOT (Time Offset Table), and STT (System Time Table).
- **NPT:** Sets whether to update NPT (Normal Play Time; STC_Reference field in NPT Reference Descriptor defined by ISO/IEC 18318-6). The NPT check box is available only when PCR/PTS/DTS is enabled and the Update Method is set to Software. When selected, PCR/PTS/DTS is enabled and the Update Method is set to Software. In addition, the Fixed ES Rate option in the Clock dialog box is disabled.
- **Reed Solomon (ISDB-T only):** Sets whether to update Reed-Solomon codes in an ISDB-T transport stream.

ASI I/F Menu (Option 01 Only)

The ASI I/F menu is displayed when the ASI interface option is installed. This menu contains commands for setting an ASI output format and output status. (See Table 4.)

Table 4: ASI I/F menu commands (Play screen)

Command	Description
Format	Sets the output format of the ASI signal. You can select Byte or Packet. For Byte, valid data is output using a burst transmission mode. For Packet, valid data is output in each transport stream packet.
Through Out	Sets whether the signal supplied to the ASI In connector is output from the ASI Out connector when a stream is not output. You can select On or Off.

Univ I/F Menu (Option 02 Only)

The Univ I/F menu is displayed when the universal parallel/serial interface option is installed. This menu contains commands for setting the output signal level, output format, and polarity of the clock signal. (See Table 5.)

Table 5: Univ I/F menu commands (Play screen)

Command	Description
Level	Sets the signal level for the Universal In/Out connector. You can select TTL, ECL, or LVDS. Refer to the specifications for more detailed electrical characteristics.
Format	Sets the output format for the Universal In/Out connector. You can select Parallel or Serial.
Clock	Sets the polarity of the output clock signal. You can select Rise or Fall.

ASI/1394 Menu (Option 05 Only)

The ASI/1394 menu is displayed when the IEEE1394/ASI interface option is installed. This menu contains commands for setting an output format of the ASI signal and the operation mode for the IEEE1394 interface. (See Table 6.)

Table 6: ASI/1394 menu commands (Play screen)

Command	Description
ASI Format	Sets the output format of the ASI signal. You can select Byte or Packet. For Byte, valid data is output using a burst transmission mode. For Packet, valid data is output in each transport stream packet.
1394 Mode	Opens the IEEE1394 dialog box where you can set connection mode when using the IEEE1394 interface. You can select only PtoP Connect (point-to-point connection).
Bus Reset	Resets the IEEE1394 bus. Use this command to reset the connection when the MTX100B Option 05 does not recognize an IEEE1394 device or when an IEEE1394 device does not recognize the MTX100B Option 05. NOTE. If you reset the IEEE1394 bus while the MTX100B Option 05 sends or receives data, the operation is stopped. In addition, the IEEE1394 connection is terminated.

IEEE1394 Dialog Box

When you select the PtoP Connect from the 1394 Mode command in the ASI/1394 menu, the IEEE1394 dialog box appears. (See Figure 7.)

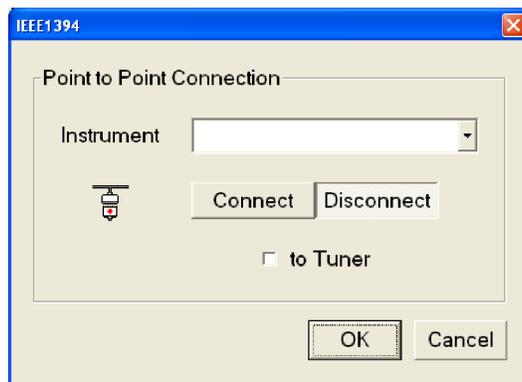


Figure 7: IEEE1394 dialog box (Play screen)

- **Instrument:** Selects the IEEE1394 device for the point-to-point connection.
- **Connect** or **Disconnect** Connects or disconnects the selected IEEE1394 device.

NOTE. *If bus reset occurs by disconnecting an IEEE1394 cable when the point-to-point connection is established, the connection is terminated.*

- **to Tuner:** Sets whether the connection setting is made by the IEEE1394 device in connecting the MTX100B Option 05 and an IEEE1394 device.

Some IEEE1394 devices do not recognize the MTX100B Option 05 when you connect them. In this case, when you select the **to Tuner** option, the IEEE1394 device takes initiative for the connection. You need to select this option when you connect a BS/CS tuner to the MTX100B Option 05.

310M/ASI/SPI Menu (Option 07 Only)

The 310M/ASI/SPI menu is displayed when the SMPTE310M/ASI/SPI interface option is installed. This menu contains commands for setting a signal format output from the BNC connector and an output format of the ASI signal.

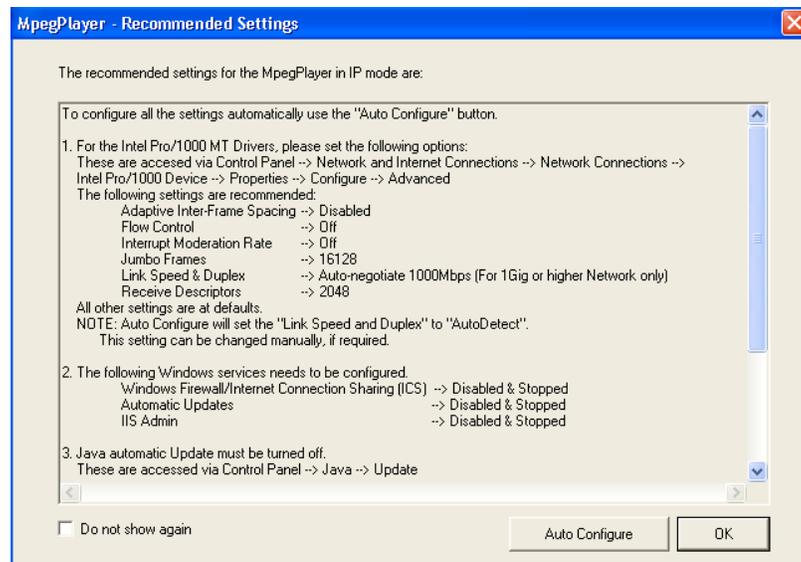
(See Table 7.)

Table 7: 310M/ASI/SPI menu commands (Play screen)

Command	Description
BNC Port	Sets the signal format output from the SMPTE310M/ASI Output connector. You can select ASI or 310M 8VSB (SMPTE310M signal with data rate of 8 VSB).
Through Out	Sets whether or not the signal supplied to the SMPTE310M/ASI Input connector is output from the SMPTE310M/ASI Output connector. You can select On or Off.
ASI Format	Sets the output format of the ASI signal. You can select Byte or Packet. For Byte, valid data is output using a burst transmission mode. For Packet, valid data is output in each transport stream packet.

IP Menu

The IP Playout is capable of transmitting TS streams on both IPv4 and IPv6 network. Select the **IP** option from the **Play > Interface** menu. A Recommended Settings dialog box is displayed which allows you to automatically configure the settings for improved IP playout performance. (See Table 8.)



NOTE. The CPU is used 100 % when the MPEG Player plays in IP mode with TS bit rate more than 10 Mbps. During this playout, duplex operation is not possible, so TSCA cannot be run.

NOTE. *Playing the MPEG Player at high bit rates in IP mode could saturate the network.*

Table 8: IP menu commands

Commands	Description
Configuration	Configures the IP interface and the IP version. You can set the packet size, device name, protocol, ports, and the transmission mode of the interface.
Parametric Settings	Sets the burst mode parameters, low jitter mode, and jitter parameters.
Error Insertion	Inserts errors like packet loss, checksum, and sequence errors in the transmitted stream.
Error Generation	Manually generates errors like packet loss, checksum, and sequence in the transmitted stream.
Statistics	Displays details about parameter names, current stream values, and the history of the previous transmission.
TTS Settings	Enables whether to play out a TS file as a TTS file by prefixing a 4byte time stamp to each TS packet.
Other Settings	Sets the player process priority and transmitter thread priority.

Configuration. When you select Configuration from the IP menu, the IP Playout Configuration dialog box is displayed as shown in the following figures.

Figure 8: IP Configuration for IPv4

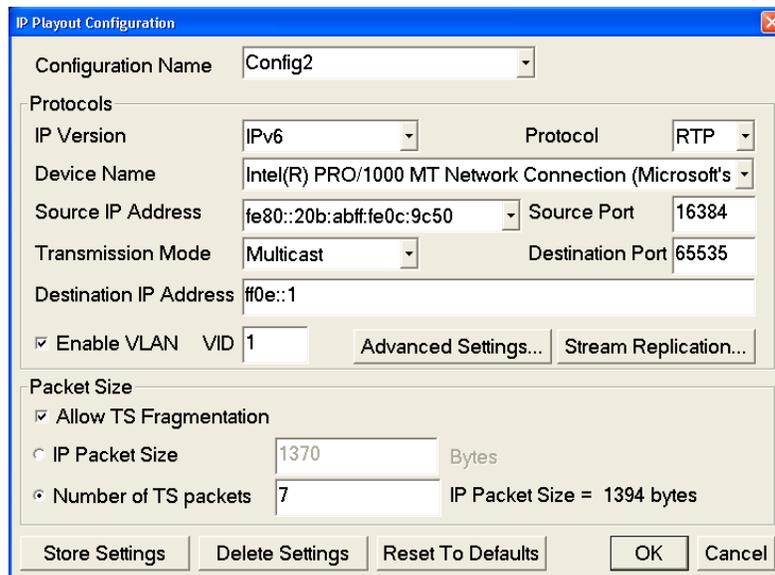


Figure 9: IP Configuration for IPv6

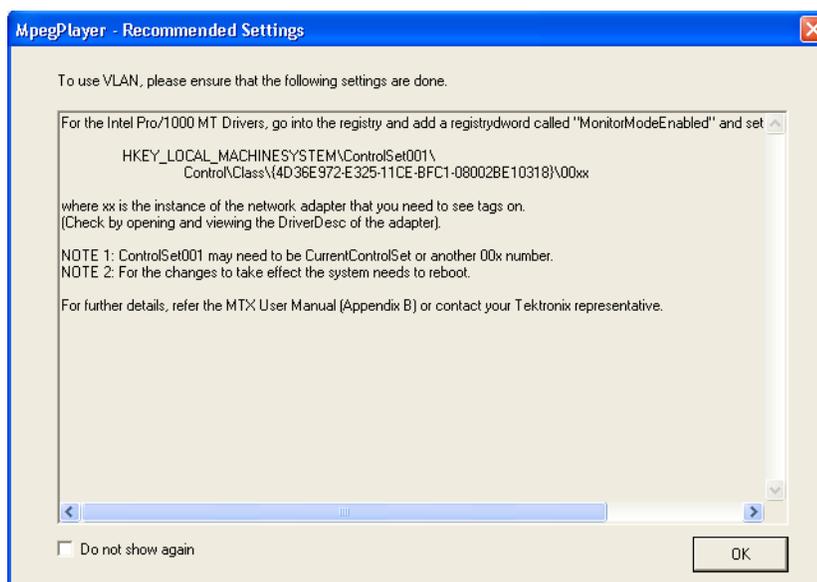
This dialog box allows you to configure the following settings:

- **Configuration name:** Allows you to enter or select a configuration name from the drop-down list. The configuration will include all the settings of the Configuration dialog box, Advanced Protocol Settings, and Stream Replication Settings. This list can store up to ten configuration names. The default value is blank.
- **IP Version:** Allows you to select the IP version (IPv4, IPv6) for the IP payout. IPv4 is set as the default value.
- **Protocol:** Allows you to set the protocol (UDP, RTP) for the IP payout. RTP is set as the default value.
- **Device Name:** Allows you to select the device for the IP payout. The Device Name lists all the active Network Interface Cards (NIC) in the system based on the selected IP version. The first interface card that has a valid IP address assigned to it is always automatically selected as the default value for both IPv4 and IPv6 versions.
- **Source IP Address:** Sets the source IP address for the IP payout. The first valid IP address of the selected device will be set as the default. A customized value can be selected only if a different source address is first set in the Advanced Protocol Settings dialog box.

Based on the selected IP version, the source addresses will be listed in the drop-down list.

- **Source Port:** Allows you to set the source port for the IP payout. The port value ranges from 0 to 65535. The default value for UDP and RTP protocol is 16384.

- **Transmission Mode:** Allows you to set the transmission mode of the protocol. Unicast and Multicast transmission modes are supported by both IP versions. Broadcast transmission mode is supported only by the IPv4 version. Multicast is set as the default value for both the versions.
 - **Unicast Range:** Any IP address that does not fall into the Multicast or the Broadcast range is the Unicast address. This range holds good only for IPv4 version.
 - **Multicast Range:** 224.0.0.0 to 239.255.255.255 for IPv4 and FFxx:Y:Y:Y:Y:Y:Y (where x is 0 to F and Y is 0000 to FFFF) for IPv6.
 - **Broadcast Range:** The Network or node portion of an IP address will be set to “1”s or “0”s for IPv4 version.
- **Destination IP Address:** Sets the destination IP address for the IP ployout. 239.1.1.1 is set as the default value for IPv4 and ff0e::1 is set as the default value for IPv6. Depending on the selected transmission mode, the system validates the entry based on the following rules:
- **Destination Port:** Allows you to set the destination port for the IP ployout. The port value ranges from 0 to 65535. 16384 is set as the default value.
- **Enable VLAN:** Allows you to enable the VLAN headers in the protocol headers of an IP packet as per the 802.1Q standard. VLAN ID identifies the VLAN that ranges from 0 to 4095. When you click OK with VLAN enabled on the IP Ployout Configuration dialog box, a Recommended Settings dialog box is displayed asking you to do the required settings for using VLAN.



- **Advanced Settings:** Click **Advanced Settings** to view or customize the protocol settings of active protocols in the current configuration. As per the IP version selected, the IPv4 and IPv6 layer attributes are displayed in the

Settings screen. The RTP layer attributes are displayed only for RTP protocol selection. If VLAN is enabled, the Advanced Settings dialog box displays all the VLAN attributes under 802.1Q VLAN Layer header. (See page 135, *Settings for VLAN.*)

The parameters displayed in the Advanced Protocol Settings dialog box are as follows:

- Ethernet Layer: Destination Mac Address, Source Mac Address, Protocol
- 802.1Q VLAN Layer: Tag Protocol Identifier, Priority Levels, Canonical Format Indicator, VLAN Identifier
- IPv4 Layer: Version (read only), Header Length (read only), Type Of Service, Total Length (read only), Time To Live, Protocol, Source IP Address, Destination IP Address
- IPv6 Layer: Version (read only), Traffic Class, Flow Label, Payload Length (read only), Next Header, Hop Limit, Source IP Address, Destination IP Address
- UDP Layer: Source Port, Destination Port, Length (read only)
- RTP Layer: Version (read only), Payload Type, Sequence Number, SSRC

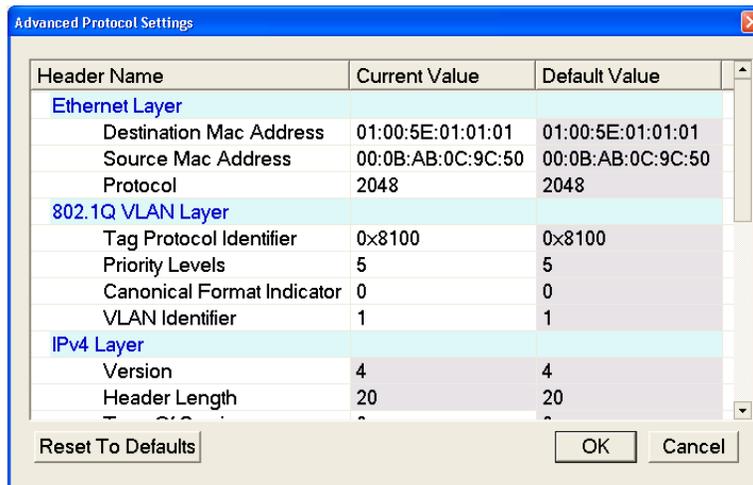


Figure 10: Advanced Protocol Settings for IPv4

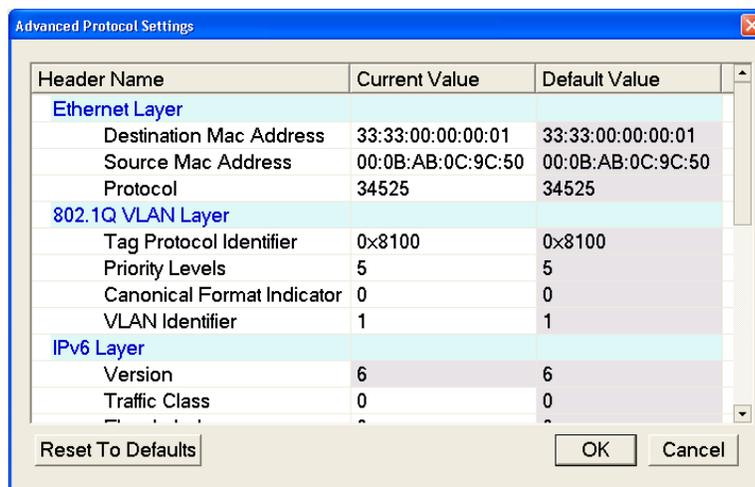


Figure 11: Advanced Protocol Settings for IPv6

The Header Name and Default Value are read-only options. The protocol headers displayed are limited to headers common to all packets except for the RTP Sequence Number. The Current Value attributes of all the protocol layers that are specified at packet creation can be customized. The customized valid values are displayed in lavender and the customized invalid values are displayed in pink. If any of the attributes are customized, the status bar displays an icon during playback.

The Reset To Defaults button resets the customized values of the active (selected) IP version to the default values.

NOTE. A condition where multicast is selected as the transmission mode and a unicast destination address is entered in the Advanced Protocol Settings dialog box will not be validated.

NOTE. If the destination IP address is changed in the Advanced Protocol Settings dialog box, the application will not check for the accessibility of the address. A change in the source and the destination IP address will not change the source and the destination MAC address of the Advanced Screen Settings.

- **Stream Replication Settings:** click **Stream Replication Settings** to set the number of replicated streams and customize the attributes accordingly.

As per the selected IP version, the IPv4 and IPv6 layer attributes are displayed in the Stream Replication Settings screen. The RTP layer attributes are displayed only for RTP protocol selection. If VLAN is enabled, the Stream Replication Settings dialog box displays only the VLAN identifier. (See page 135, *Settings for VLAN*.)

You can specify the increment value for the following attributes:

- Ethernet Layer: Destination Mac Address, Source Mac Address, Protocol
- 802.1Q VLAN Layer: VLAN Identifier
- IPv4 Layer: Type Of Service, Time To Live, Protocol, Source IP Address, Destination IP Address
- IPv6 Layer: Traffic Class, Flow Label, Next Header, Hop Limit, Source IP Address, Destination IP Address
- UDP Layer: Source Port, Destination Port
- RTP Layer: Payload Type, SSRC

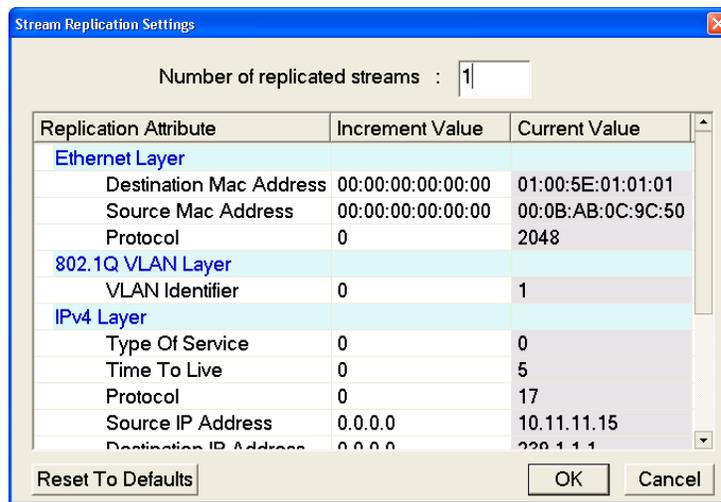


Figure 12: Stream Replication Settings for IPv4

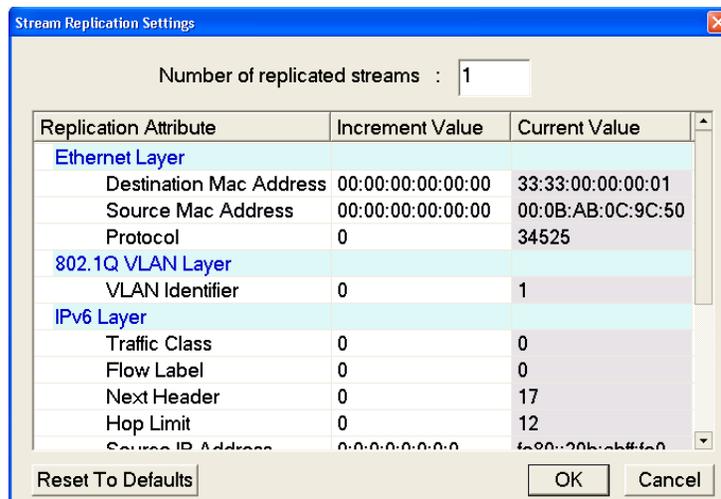


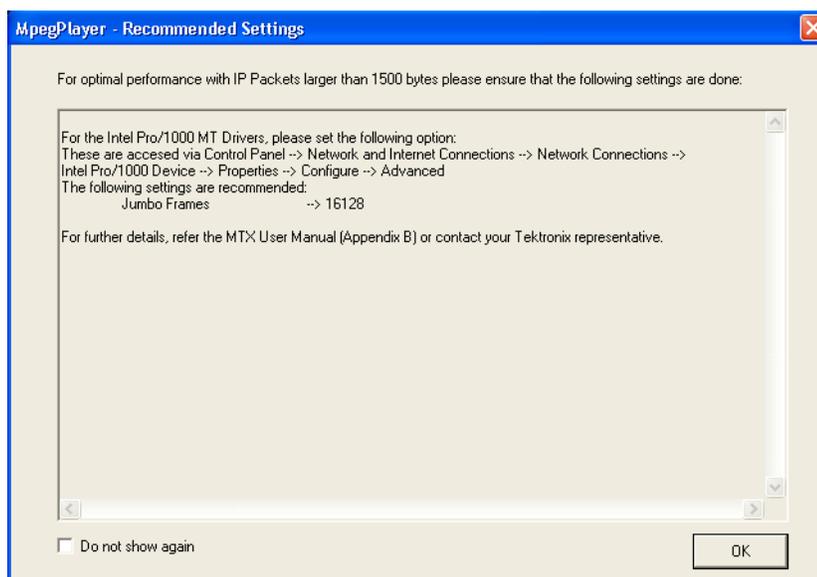
Figure 13: Stream Replication Settings for IPv6

Stream Replication Settings are used to replicate the streams n times with certain attributes of the stream incremented by a value within the n replicated streams. You can enter the number of replications in the **Number of replicated streams** text box.

The dialog box lists the attributes which can be incremented by entering a number in the Increment Value column. All attributes except for MACs and IP addresses accept an integer. The customized valid values are displayed in lavender and customized invalid values are displayed in pink.

The Reset to Defaults button resets the increment values of the active (selected) IP version to the default values. Whenever stream replication is active, an icon is displayed in the status bar during playout.

- **Allow TS Fragmentation:** Controls the fragmentation of the transport stream packets. If this option is selected, the IP packet can have fragmented transport stream packets (last or first TS packet of an IP packet). When **Allow TS fragmentation** is selected, both IP Packet size and Number of TS packets option are enabled. Allow TS Fragmentation option is not selected by default.
- **Allow IP Fragmentation:** Controls the fragmentation of the IP packets for IPv4 version only. This option is applicable to packet sizes which are greater than the MTU size (typically 1500 bytes). If this option is selected, the IP packets will be fragmented during transmission else they will be retained with the same size. When IP fragmentation is selected, the maximum packet size is 16128 bytes. If the IP packet size is more than 1500 bytes, a Recommended Settings dialog box is displayed asking you to do the required settings for optimal performance.



- **IP Packet Size:** Allows you to set the size of the IP packet for playout. This option is enabled only when Allow TS fragmentation is selected. The maximum size of the IP packet for IPv6 version is 16128 bytes and for IPv4 version is 1500 bytes.

The IP packet size includes the headers and hence the payload size is calculated at runtime using the following equation:

$$IP\ Packet = Payload\ Size + Header\ Size$$

For IPv4 version, the header size is 54 (58 with VLAN enabled) for RTP and 42 (46 with VLAN enabled) for UDP. For IPv6 version, the header size is 74 (78 with VLAN enabled) for RTP and 62 (66 with VLAN enabled) for UDP.

- **Number of TS Packets:** Allows you to enter the number (integers) of TS packets that needs to be embedded into an IP packet. Seven is set as the default value. The maximum value of the number of TS packets depends on the maximum allowed IP packet size and the minimum value is 1.

A read only text field showing the IP packet size is displayed next to this option. The IP packet size will be calculated automatically and displayed in bytes. Based on the number of TS packets, the IP packet size is calculated using the following equation:

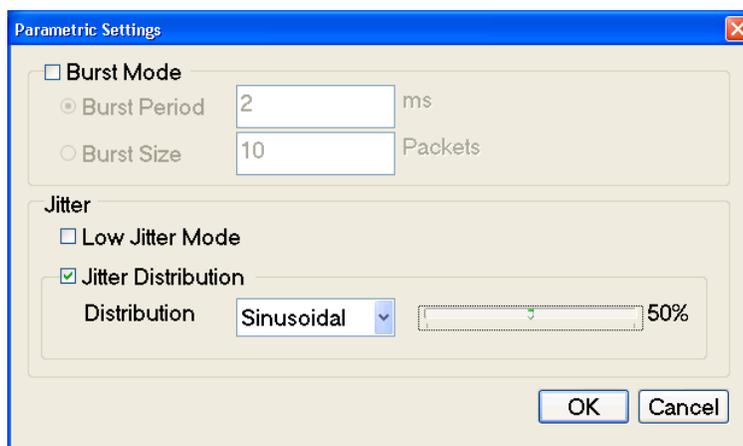
$$IP\ Packet = Payload\ Size + Header\ Size$$

where payload size is calculated as follows:

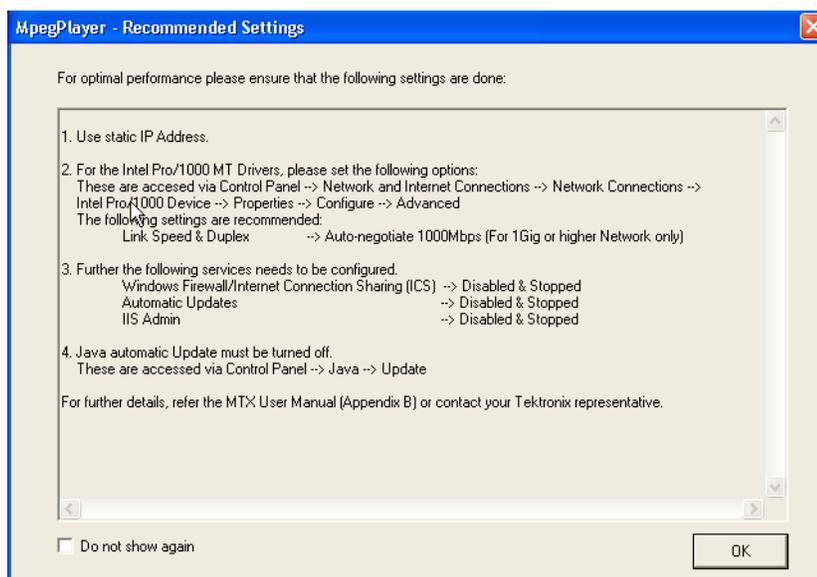
$$Payload\ Size = Number\ of\ TS\ Packets \times TS\ Packet\ Size$$

- **Store Settings:** Creates or updates the entire configuration settings including the Advanced Protocol Settings and Stream Replication Settings. All these settings will be stored in a name that is listed in the Configuration Name drop-down list.
- **Delete Settings:** Deletes the selected configuration settings from the Configuration Name drop-down list and displays the next configuration. If there are no more configurations stored in the list, the values in the configuration dialog box will be reset to the default values.
- **Reset to Defaults:** Resets the selected configuration settings, Advanced Protocol Settings, and Stream Replication Settings to the default values. It clears the selected configuration name also.

Parametric Settings. When you select Parametric Settings from the IP menu, the Parametric Settings dialog box is displayed as shown.



When you click **OK** with Low Jitter Mode selected, a Recommended Settings dialog box is displayed asking you to do the required settings for optimal performance. Refer to the *Recommended Settings for MPEG Player in IP Mode* section for additional information. (See page 129.)



The Parametric Settings dialog box allows you to set the following parameters:

- **Burst Mode:** Allows you to transmit the stream in the form of bursts. The player does not support Burst in stream replication mode.
 - **Burst Period:** You can set the time during which the packets will be transmitted in the burst mode. Burst period is set as the default.
 - **Burst Size:** You can set the burst size which determines the number of packets being transmitted in every burst.
- **Jitter:** Configures jitter during the IP payout.
 - **Low Jitter Mode:** This mode is selected when you want the jitter to be very low. Low Jitter Mode text will be displayed instead of the progress bar and the elapsed time in the status indicator. The Statistics dialog box will be disabled for this mode.



Figure 14: Low Jitter Mode Status Indicator

- **Jitter Distribution:** Inserts jitter during IP payout. The player does not support jitter insertion in stream replication mode. The overall bit rate is not affected by the inserted jitter. There are four types of jitter distribution namely Fixed, Laplacian, Gaussian, and Sinusoidal. Fixed is set as the default distribution. When Fixed is selected, a Duration text box is displayed where you can enter the jitter in microseconds. When Laplacian, Gaussian, or Sinusoidal is selected, a slider is displayed which can be moved to set the jitter as a percentage of the interpacket time. The interpacket gap will follow the selected jitter distribution.

Error Insertion. When you select Error Insertion from the IP menu, the Error Insertion dialog box is displayed. (See Figure 15.)

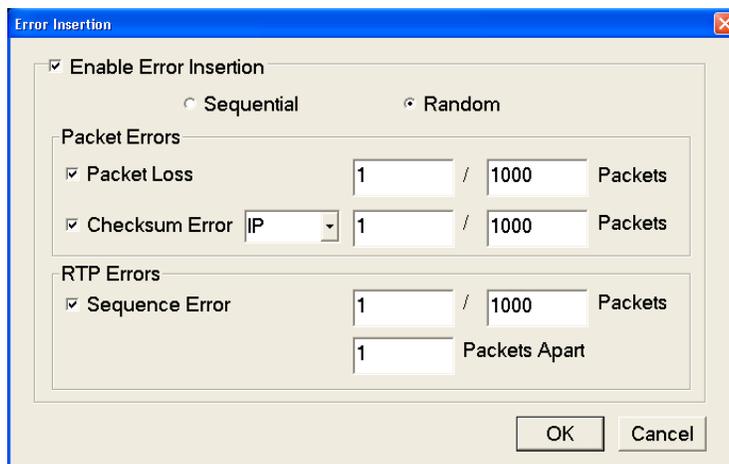


Figure 15: Error Insertion

This dialog box allows you to insert errors during playout. For UDP playout the error insertions are limited to packet drop and checksum errors.

- **Enable Error Insertion:** Enables error insertion. The errors can be inserted in sequential or random order. Random is set as the default insertion order. All error insertions are specified as X errors per Y packets.
 - **Sequential:** The errors are inserted in sequential packets, that is for every Y packets the first X packets have errors inserted in them.
 - **Random:** The errors are inserted in random packets, that is for every Y packets X random packets have errors inserted in them. Random mode is set as the default.
- **Packet Loss:** Inserts packet loss in random or sequential order. The packets are dropped at a frequency you specify. The rate can be specified as X packets within Y packets.
- **Checksum Error:** Inserts checksum error. The checksum error can be inserted in the UDP layer of both IPv4 and IPv6 versions but only in IP layer of IPv4 version. The CRC errors are generated in packets at a frequency you specify. The rate can be specified as X packets within Y packets.
- **Sequence Error:** Inserts packet sequence errors. This option is enabled only if RTP protocol is selected in the IP configuration Playout dialog box. The packets will be reordered at a specified frequency.

You can enter the number of packets after which you want the reordering to happen in the Packets Apart text box. The rate can be specified as X packets per Y packets reordered after every Z number of packets.

Error Generation.

When you select Error Generation (enabled only during playout) from the IP menu, the Error Generation dialog box is displayed as shown. (See Figure 16.)

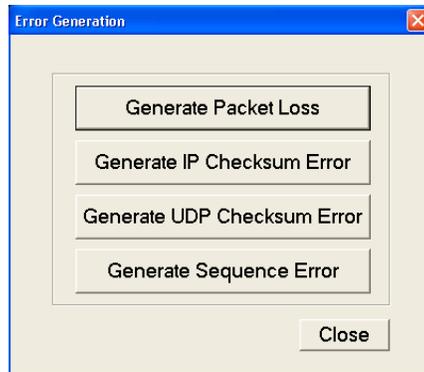
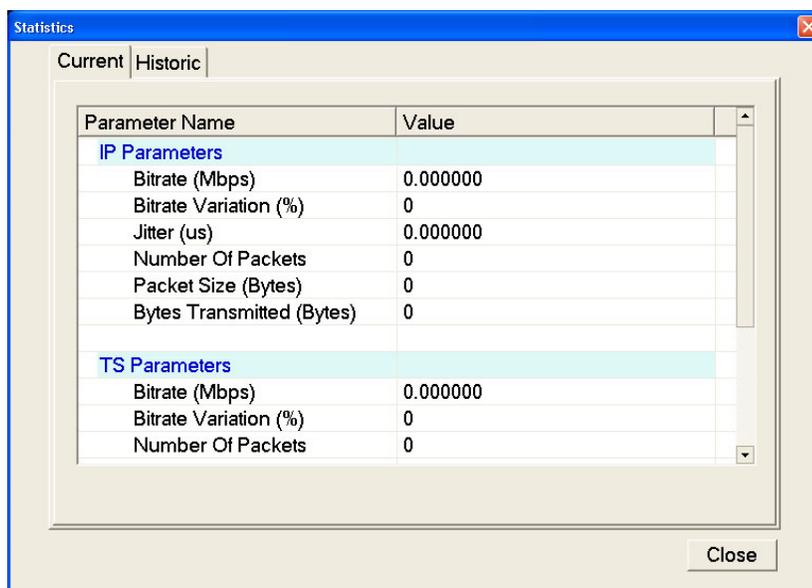


Figure 16: Error Generation

This dialog box allows you to insert the following errors manually in real time:

- **Generate Packet Loss:** Drops an IP packet during the IP playout. The number of packets dropped will be equal to the number of times you click the button.
- **Generate IP Checksum Error:** Generates checksum errors manually in the IP layer (IPv4 version).
- **Generate UDP Checksum Error:** Generates checksum errors manually in the UDP layer.
- **Generate Sequence Error:** Generates sequence error manually. When you click this button the packet will be sent after x number of packets where x is a number between 1 and 100.

Statistics. When you select Statistics from the IP menu, the Statistics dialog box is displayed.



The screenshot shows a dialog box titled "Statistics" with two tabs: "Current" and "Historic". The "Current" tab is selected. The dialog contains a table with two columns: "Parameter Name" and "Value". The table is divided into two sections: "IP Parameters" and "TS Parameters".

Parameter Name	Value
IP Parameters	
Bitrate (Mbps)	0.000000
Bitrate Variation (%)	0
Jitter (us)	0.000000
Number Of Packets	0
Packet Size (Bytes)	0
Bytes Transmitted (Bytes)	0
TS Parameters	
Bitrate (Mbps)	0.000000
Bitrate Variation (%)	0
Number Of Packets	0

A "Close" button is located at the bottom right of the dialog box.

Figure 17: Statistics

The player displays the current and historic statistics of IP parameters, TS parameters, and errors. These statistics are cleared at the start of the next play, when a new file is opened, or when the player is restarted. In Low Jit mode the Statistics option is disabled and when the player switches back to the normal mode it displays the statistics of the previous TS packet that was played out.

- **Current:** Displays the instantaneous statistics of parameters at that time. Once the play starts, this dialog box is refreshed every second.
- **IP Parameters:** The current bit rate, percentage variation of this current bit rate from the nominal (set) bit rate, number of IP packets transmitted, and the IP packet size used for playout are displayed. The jitter value which reflects the insertions performed at run time is also displayed.
- **TS Parameters:** The TS bit rate, TS packet size, and the number of TS packets of the currently played MPEG file are displayed. When TTS Playout settings is enabled, the packet size displays the actual packet size (188 bytes) along with the extra 4-byte time stamp. If the player is in the NonTS mode, all the statistics will display NonTS playout.

- **Errors:** The number of packets dropped, packet loss rate, sequential errors, UDP checksum errors, and IP checksum errors are all displayed.
 - **Value (per stream):** When stream replication is enabled, the Current tab displays the Value column. (See Figure 17.) This column gives the value of each parameter per stream.
 - **Total Value (in n streams):** When stream replication is enabled, the Current tab displays the Total Value column. (See Figure 17.) This column gives the total value of each parameter for the set number of streams. Here n is equal to the sum of the replicated streams and the actual stream.
- **Historic:** Displays the minimum, maximum, and average value of parameters (IP, TS) for the current play. When stream replication is enabled, the Historic tab signifies that the statistics displayed is per flow.
 - **IP Parameters:** The current bit rate, percentage variation of this current bit rate from the nominal (set) bit rate, and the jitter value are displayed.
 - **TS Parameters:** The bit rate and the percentage variation from this bit rate are displayed.

Timestamped TS Playout Settings. When you select TTS Settings from the IP menu, the TTS Settings dialog box is displayed. The TTS Settings option is only supported by IP mode.

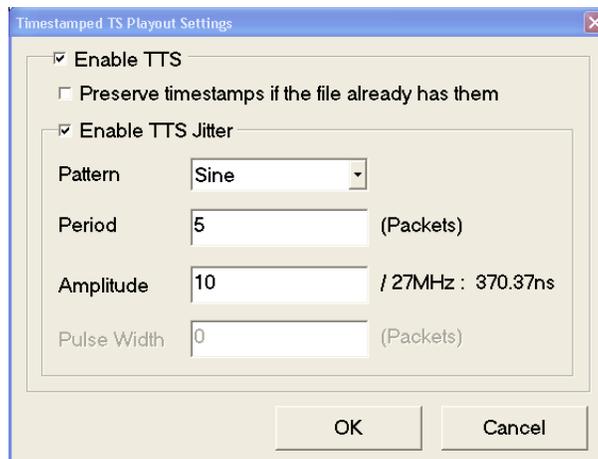


Figure 18: Timestamped TS Playout Settings

When TTS is enabled, each packet (188 bytes) of TS file is prefixed by a 4-byte time stamp and converted into a TTS stream. If the TS packet size is more than 188 bytes (192, 204, 208), the extra bytes following the 188th byte are truncated and 4-bytes of time stamp will be transmitted along with it. For a partial TS file with the TTS settings selected (with Preserve timestamp not selected), the submenus namely the Update mode, Clock dialog box, and the PCR initial value of the Play menu are all enabled.

- **Preserve timestamps if the file already has them:** By selecting this option, you can preserve the time stamps of the TTS file if it already exists or add 4-bytes of time stamp to the TS packet.
- **Enable TTS Jitter:** By selecting this option, you can insert jitter to the time stamps that gets appended to the TS packets.
- **Pattern:** You can select the distribution of jitter that is inserted to time stamp from the Pattern list. The various patterns listed are Sine, Pulse, Triangle, Square, Saw, Random, and Offset. Sine is set as the default pattern.
- **Period:** You can set the period for the time stamp as number of packets. Based on the selected pattern, the **Period** text box is enabled or disabled. 100 packets is set as default period value.
- **Amplitude:** You can enter the amplitude of the time stamp in the Amplitude text box. Based on the selected pattern the **Amplitude** text box is enabled or disabled. 0.00 ns is set as the default amplitude.
- **Pulse Width:** You can set the pulse width as the number of packets. Based on the selected pattern, the **Pulse width** is enabled or disabled. 50 packets is the default pulse width.

In the TTS mode, the Packet size option of the Play menu is disabled with 188 bytes selected. When the TTS mode is selected, the status bar displays TTS mode as the standard with 192 packet size.

The displayed IP bit rate changes because there will be four extra bytes that is added to each TS packet. When TTS Playout settings is enabled, the packet size in the Statistics screen displays the actual packet size (188 bytes) with the four time-stamped bytes.

Utility Menu

The Utility menu contains commands to set the parameters for remote control with the Ethernet interface and to display the system information such as software and hardware versions. (See Table 9.)

Table 9: Utility menu commands

Command	Description
Communication	Opens the Communication dialog box where you can set the port number needed to remotely control the MTX100B over an Ethernet network and the terminator used to communicate with a controller. (See Figure 19 on page 36.)
Status	Opens the Status dialog box where you can check general system information including the software and hardware versions.

Communication Dialog Box. When you select the Communication command from the Utility menu, the Communication dialog box appears. (See Figure 19.)

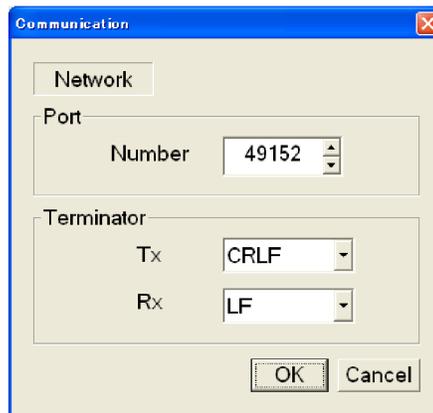


Figure 19: Communication dialog box

- **Port Number:** Sets the port number needed to remotely control the MTX100B over an Ethernet network. You can set the value from 1024 to 65535.
- **Terminator Tx:** Sets the terminator used when the MTX100B sends information to a controller. You can select LF (linefeed), CR (carriage return), CRLF (carriage return and linefeed), or LFCR (linefeed and carriage return).
- **Terminator Rx:** Sets the terminator used when the MTX100B receives commands from a controller. You can select LF (linefeed) or CR (carriage return).

Status Dialog Box. When you select the Status command from the Utility menu, the Status dialog box appears. (See Figure 20.)

This dialog box shows the version of the MTX100B application and hardware version of the main and installed interface modules.

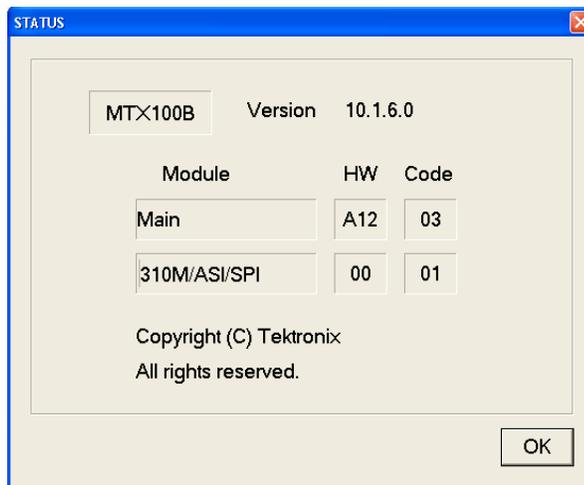


Figure 20: Status dialog box

Menus in the Record Screen

This subsection describes the menus in the Record screen.

NOTE. *The IP interface mode does not support the Record function, so the Record option is disabled for IP.*

File Menu

The File menu in the Record screen contains commands for setting the save mode and for saving and loading a preset file. This menu also contains commands for exiting the MTX100B application and for shutting down of the instrument. (See Table 10.)

Table 10: File menu commands (Record screen)

Command	Description
Save	Specifies the file name used when you save stream data. When you select this command, the Save as dialog box appears. By default, the current date (yymmdd) is used as a file name.
Save Preset	Saves the current instrument settings as a preset file.
PLAY	Switches to the Play screen.
Scheduler	Starts the Scheduler application when Option SC is installed.
Minimize	Minimizes the MTX100B application window.

Table 10: File menu commands (Record screen) (cont.)

Command	Description
Save Mode	Sets the save mode when you save stream data. You can select Over Write or New File. In the Over Write mode, the existing file is overwritten by the new file with the name specified in the Save command whenever you save a stream data. In the New File mode, a new file is created whenever you save a stream file. The file name is the name specified by the Save commands + # (1,2,3,4...).
Load Preset	Loads the specified preset file (*.set). When a preset file is loaded, the current instrument settings are replaced by the preset file's settings.
Exit	Quits the MTX100B application. The MTX100B application settings are saved.
Shutdown	Quits the MTX100B application and shuts down the MTX100B.

View Menu

The View menu contains commands that control the display of the Toolbar and Status bar. The View menu in the Record screen is the same as the View menu in the Play screen. (See page 4, *View Menu*.)

Record Menu

The Record menu contains commands for setting the input interface, record size, trigger position, and target source. (See Table 11.)

Table 11: Record menu commands

Command	Description
Source	Sets the interface used to input a stream data. You can select SPI (standard) or the name of the interface option currently installed (Univ I/F, ASI, ASI/1394, or ASI/310M). For SPI, use the SPI In/Out connector.
Target	Opens the Target Dialog box where you can set the record size, trigger position, and target source to record the input stream.
Timer Record	Opens the Timer Play/Record dialog box where you can set the time used to record the input stream automatically.
Other	Opens the Others dialog box where you can set the standard used to display the input stream, display radix for the text information, and external trigger status.

Target Dialog Box. When you select the Target command from the Record menu, the Target dialog box appears. (See Figure 21.)

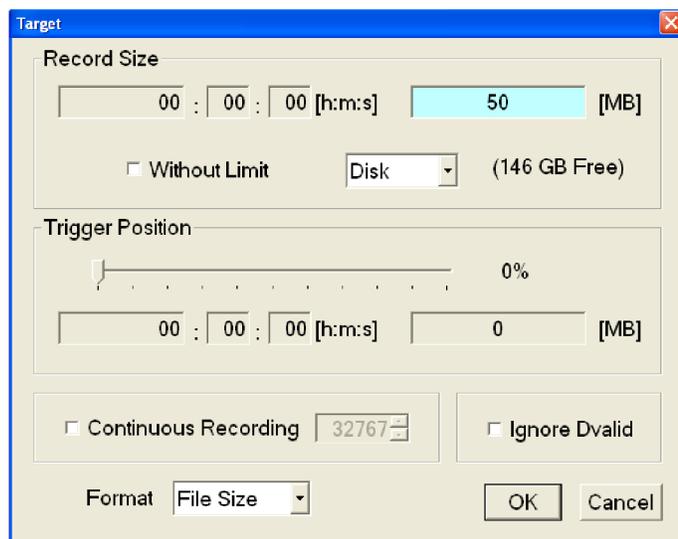


Figure 21: Target dialog box

- **Record Size:** Sets the recording time (h:m:s) or file size (MB) to record the input stream. Use the Format list box to select the method to set the record size.

The amount of free space available for the RAM or hard disk is displayed below the data size text box. You cannot set the record size beyond this value.

- Use the **Without Limit** check box to record the input stream to the full free space in the hard disk or RAM. When it is checked, the available recording time and data size are automatically set. In addition, when the check box is enabled, the Continuous Recording check box becomes disabled. A list box in the Record Size field is available to select the record target (RAM or hard disk) that is used to record the input stream.

NOTE. When you set the pretrigger portion, the same free space as the record size is required.

- **Trigger Position:** Sets the trigger position used to record the input stream. You can set the trigger position by specifying the time (h:m:s) or the file size (MB).
- **Format:** Specifies how to set the record size and trigger position. You can select Time or File Size.

- **Continuous Recording:** Sets whether to enable Continuous Recording. With Continuous Recording, you can record multiple stream files continuously on the hard disk.

When selected, the Continuous Recording box (to the right of the check box) becomes available. Use this box to set the number of files after which to stop Continuous Recording. After the specified number of files are created, stream capture stops automatically. You can set the value from 2 to 32767.

When this option is selected, the Without Limit check box is disabled.

- **Ignore Dvalid:** Sets whether the MTX100B ignores the DVALID signal from the selected interface or not when a stream data is acquired. When it is checked, the MTX100B ignores the DVALID signal, and the stream data is acquired according to the internal clock signal. This option is not available for the ASI interface option.

Others Dialog Box. When you select the Other command from the Record menu, the Others dialog box appears.

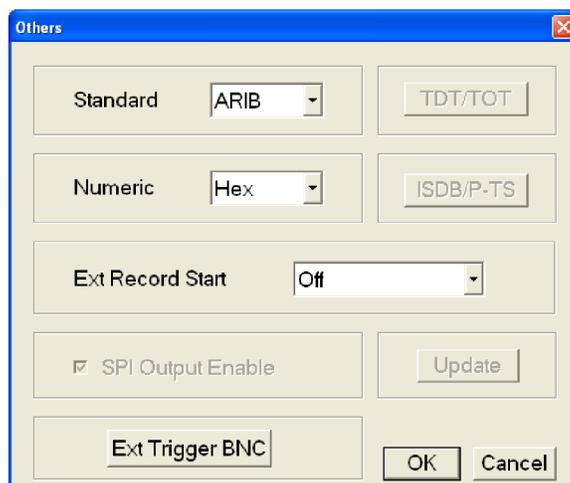


Figure 22: Others dialog box

- **Standard:** Sets the standard used to display the input stream. You can select ARIB, ATSC, DVB, or MPEG-2.
- **Numeric:** Sets the base value used to describe the component information in the hierarchy display. You can select Decimal, Hex, or Octal.

- **Ext Record Start:** Sets whether or not to start input stream record using a trigger signal applied to the Trig In/Out connector. You can select Off, Rise, or Fall. When you select Rise, the input stream record is started at the rising edge of the applied trigger signal. When you select Fall, the input stream record is started at the falling edge of the applied trigger signal.

When you use the external trigger signal with the pretrigger portion defined to record the input stream, the MTX100B acquires pretrigger data when a valid trigger signal occurs and waits for the trigger. When a valid trigger signal occurs again, the MTX100B acquires posttrigger data and creates a stream file.

- **Ext Trigger BNC:** This item is common to the Play screen.

ASI I/F Menu (Option 01 Only)

The ASI I/F menu is displayed when the ASI interface option is installed. This menu contains a command for setting the input status. (See Table 12.)

Table 12: ASI I/F menu command (Record screen)

Command	Description
Through Out	Sets whether or not the signal applied to the ASI In connector is output from the ASI Out connector. You can select On or Off.

Univ I/F Menu (Option 02 Only)

The Univ I/F menu is displayed when the universal parallel/serial interface option is installed. This menu contains commands for setting the input status such as output signal level, output format, and polarity of the EVENT signal.

(See Table 13.)

Table 13: Univ I/F menu commands (Record screen)

Command	Description
Level	Sets the signal level applied to the Universal In/Out connector. You can select TTL, ECL, or LVDS. Refer to the specifications for more detailed electrical characteristics.
Format	Sets the signal format applied to the Universal In/Out connector. You can select Parallel or Serial.
Clock	Sets the polarity of the input clock signal. You can select Rise or Fall.
Use Psync	Sets whether the PSYNC signal is used for serial input. You can select On or Off. When you select On, the MSB is determined from the PSYNC signal. When you select Off, the MSB is determined from the bit pattern of the sync byte.
Receive	Sets the input mode for the parallel interface. You can select Differential or Single End.
Termination	Sets the internal termination either On or Off. When you have selected Single End from the Receive command, you cannot select Off.

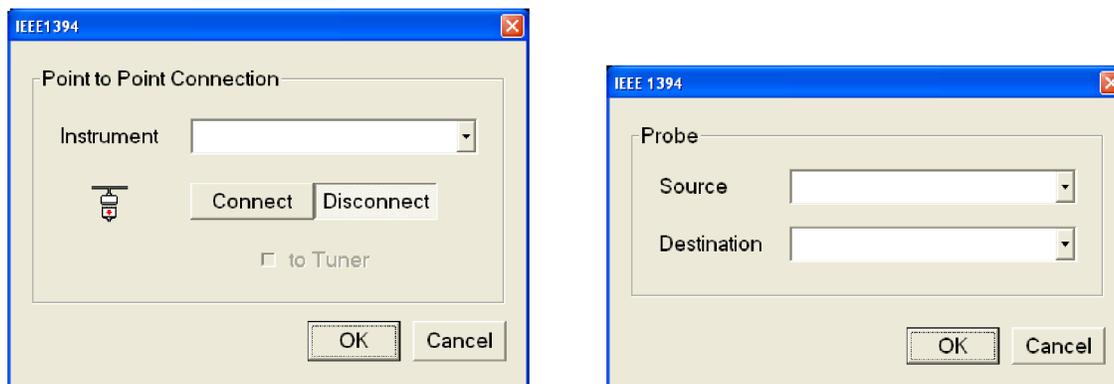
ASI/1394 Menu (Option 05 Only)

The ASI/1394 menu is displayed when the IEEE1394/ASI interface option is installed. This menu contains commands for selecting the connector used to capture a stream and setting the operation mode for the IEEE1394 interface.

Table 14: ASI/1394 menu commands (Record screen)

Command	Description
Input Port	Sets the connector used to capture a stream. You can select ASI (ASI Input connector) or 1394 (IEEE1394 connector).
Partial TS	<p>Sets whether the input transport stream from the IEEE1394 connector is recorded in the partial transport stream (TS) format. You can select On or Off. When you record a partial transport stream, be sure to set this command to On.</p> <p>NOTE. When this command is set to On, you cannot capture a transport stream of packet size other than 188 bytes. The No Signal message appears on the Record screen.</p>
1394 Mode	<p>Sets the connection mode when using the IEEE1394 interface. You can select PtoP Connect (point-to-point connection) or Probe (data probing).</p> <p>In the PtoP Connect mode, you can connect the MTX100B Option 05 and an IEEE1394 device using a point-to-point line configuration. In the Probe mode, when the connection between two IEEE1394 devices is established, you can capture the transport stream transmitting between them by the MTX100B Option 05.</p> <p>When you select these modes, the IEEE1394 dialog box appears.</p>
Bus Reset	<p>Resets the IEEE1394 bus. Use this command to reset the connection when the MTX100B Option 05 does not recognize the IEEE1394 device or when the IEEE1394 device does not recognize the MTX100B Option 05.</p> <p>NOTE. If you reset the IEEE1394 bus while the MTX100B Option 05 sends or receives data, the operation is stopped. In addition, the IEEE1394 connection is terminated.</p>

IEEE1394 Dialog Box. When you select PtoP Connect or Probe from the 1394 Mode command in the ASI/1394 menu, the IEEE1394 dialog box appears. (See Figure 23.)



When PtoP Connect is selected.

When Probe is selected.

Figure 23: IEEE1394 dialog box (Record screen)

- **When PtoP Connect is selected**
 - **Instrument:** Selects the IEEE1394 device for the point-to-point connection.
 - **Connect or Disconnect:** Connects or disconnects the selected IEEE1394 device.

NOTE. *If bus reset occurs by disconnecting an IEEE1394 cable when the point-to-point connection is established, the connection is terminated.*

- **to Tuner:** Sets whether the connection setting is made by the IEEE1394 device in connecting the MTX100B Option 05 and an IEEE1394 device.

Some IEEE1394 devices do not recognize the MTX100B Option 05 when you connect them. When selected, the IEEE1394 device takes the initiative for the connection. You need to enable this option when you connect a BS/CS tuner to the MTX100B Option 05.

- **When Probe is selected**
 - **Source:** Select the IEEE1394 device for the source.
 - **Destination:** Select the IEEE1394 device for the destination.

Another section of this manual contains detailed information on how to connect the MTX100B Option 05 and an IEEE1394 device(s), and how to set up the MTX100B Option 05 when using the PtoP Connect and Probe modes. (See page 121.)

310M/ASI/SPI Menu (Option 07 Only)

The 310M/ASI/SPI menu is displayed when the SMPTE310M/ASI/SPI interface option is installed. This menu contains a command for selecting the connector used to capture a stream and setting a signal format applied to the BNC connector. (See Table 15.)

Table 15: 310M/ASI/SPI menu command (Record screen)

Command	Description
Input Port	Sets the connector used to capture a stream. You can select BNC (SMPTE310M/ASI Input connector) or SPI (SPI Input connector).
BNC Port	Sets the signal format applied to the SMPTE310M/ASI Input connector. You can select ASI or 310M 8VSB (SMPTE310M signal with data rate of 8VSB).
Time Stamp	<p>Sets whether or not the time stamp function is enabled. You can select On or Off. If you select On, packet arrival time information is stored in each packet in a transport stream.</p> <p>In this feature, 8-byte data including 5-byte time stamp are added at the end of each 204-byte packet in a transport stream. For 188-byte packet data, each packet size is increased to 204 bytes to accommodate the time stamp data. For 204-byte packet data, the last eight bytes are overwritten with the 8-byte data.</p>

Utility Menu

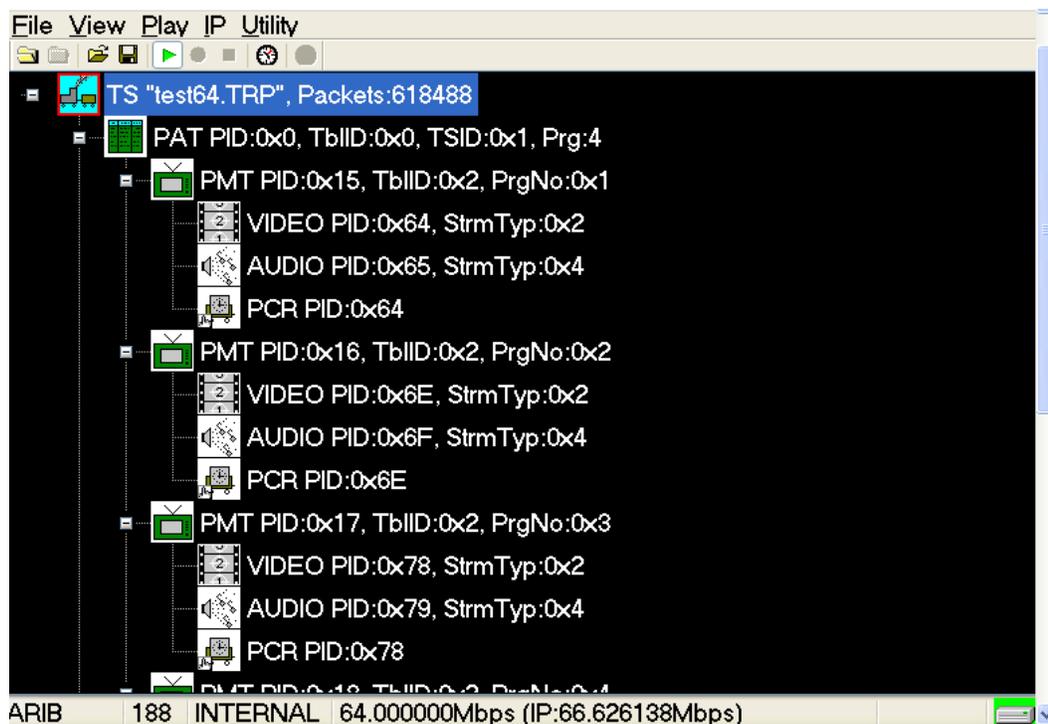
The Utility menu contains commands for displaying the system information such as software and hardware versions. The Utility menu in the Record screen is the same as the Utility menu of the Play screen. (See Table 9.)

Hierarchy Display

The MTX100B displays the selected transport stream using a hierarchy structure. This section describes the hierarchy display and defines each icon you might encounter in the display.

Overview of the Hierarchy Display

The MTX100B uses icons displayed in a hierarchical structure to show the interrelationship of transport stream components. Additional information about each stream component such as PID and Table ID numbers, is displayed next to each icon.



The “+” symbol displayed to the left of some icons indicates that the item includes lower-level transport stream components that are not displayed. The symbol changes to “-” when the lower level components are displayed. To expand the hierarchy, select the desired upper-level icon and press the right control button. To collapse the selected upper-level icon press the left control button.

When a transport stream contains more items than displayed on the screen at one time, a scroll bar appears at the right of the screen.

The icon cursor is used to select individual transport stream components as represented by the icons. The icon cursor is displayed as a red square (border) surrounding a hierarchy icon. Use the arrow buttons to move the icon cursor through the hierarchy. The hierarchical display scrolls (if applicable) when the icon cursor reaches the top or bottom of the displayed portion of the hierarchy.

When the menus are enabled, the icon cursor is disabled. Press the front-panel Menu button to toggle control between the icon cursor and the menus.

Hierarchy Display Icons

The hierarchy display contains icons. The specific icons you may encounter depend on the format of the transport stream, as shown in the following four tables. The text next to each icon describes each transport stream component. (See page 51.)

Table 16: Icons used for MPEG-2, ARIB, DVB, and ATSC formats

Icon	Element type
	ISDB-T Broadcast transport stream that is defined ARIB STD-B31.
	S-TMCC Transport stream into which TMCC information is inserted into 8 bytes in its Reed-Solomon area (16 bytes).
	M-TMCC Transport stream into which TMCC information is inserted into its sync byte area, and having super frame structure.
	Non-TS Data stream other than transport stream format.
	Transport Stream (TS) This icon represents all transport stream packets that make up the stream.
	Program Association Table (PAT) One or more transport packets with a PID value and table_id value of 0x00.
	Transport Stream Description Table (TSMT) One or more transport packets with a PID value of 0x02 and a table_id value of 0x03.
	Network Information Table (NIT) One or more transport packets with a PID value specified by the network_PID in the PAT.
	Conditional Access Table (CAT) One or more transport packets with a PID value of 0x01 and a table_id value of 0x0001.
	Program Map Table (PMT) One or more transport packets with a PID value specified by the program_map_PID in the PAT and a table_id value of 0x02.
	Program Clock Reference (PCR) One or more transport packets with a PID value specified by the PCR_PID in the PMT and a PCR_flag value of 1.
	Video elementary stream One or more transport packets with a PID value specified by the elementary_PID in the PMT and a stream_type value of 0x01 or 0x02.
	A lock symbol appears in the icon when the transport_scrambling_control value is set to 01.
	H264 Video elementary stream One or more transport packets with a PID value specified by the elementary_PID in the PMT and a stream_type value of 0x1B.
	A lock symbol appears in the icon when the transport_scrambling_control value is set to 01.

Table 16: Icons used for MPEG-2, ARIB, DVB, and ATSC formats (cont.)

Icon	Element type
	MPEG-4 Video elementary stream
	One or more transport packets with a PID value specified by the elementary_PID in the PMT and a stream_type value of 0x10. A lock symbol appears in the icon when the transport_scrambling_control value is set to 01.
	Audio elementary stream
	One or more transport packets with a PID value specified by the elementary_PID in the PMT and a stream_type value of 0x03, 0x04, or 0x11. A lock symbol appears in the icon when the transport_scrambling_control value is set to 01.
	Audio AAC, Audio AC3 (ATSC format)
	One or more transport packets with a PID value specified by the elementary_PID in the PMT and a stream_type value of 0x0F or 0x81 (ATSC format). A lock symbol appears in the icon when the transport_scrambling_control value is set to 01.
	Data stream
	One or more transport packets with a PID value specified by the elementary_PID in the PMT and a stream_type value of other than 0x01-0x05, 0x08, and 0x0F (in ATSC format, 0x81). A lock symbol appears in the icon when the transport_scrambling_control value is set to 01.
	Private Section
	One or more transport packets with a PID value specified by the elementary_PID in the PMT and a stream_type value of 0x05. A lock symbol appears in the icon when the transport_scrambling_control value is set to 01.
	Digital Storage Media Command and Control (DSM-CC)
	One or more transport packets with a PID value specified by the elementary_PID in the PMT and a stream_type value of 0x08. A lock symbol appears in the icon when the transport_scrambling_control value is set to 01.
	Entitlement Control Message (ECM)
	One or more transport packets with a PID value specified by the CA_PID of the CA_descriptor in the PMT, a payload_start_unit_indicator value of 1, and the payload does not start 000001 (section) or the payload starts 000001 (PES).
	Entitlement Management Message (EMM)
	One or more transport packets with a PID value specified by the CA_PID of the CA_descriptor in the CAT, a payload_start_unit_indicator value of 1, and the payload does not start 000001 (section) or the payload starts 000001 (PES).
	GHOST
	One or more transport packets with a PID value not specified in the PSI or Private Section PID file when the transport stream is downloaded.

Table 16: Icons used for MPEG-2, ARIB, DVB, and ATSC formats (cont.)

Icon	Element type
	<p>NULL</p> <p>One or more transport packets with a PID value of 0x1FFF.</p>
	<p>GARBAGE</p> <p>One or more transport packets in the section-data structure at the beginning of the section are not complete.</p>
	<p>Adaptation Field Error (ADFERR)</p> <p>One or more transport packets with an adaptation_field_control value of 0x00.</p>

Table 17: Icons specific to DVB format

Icon	Element type
	<p>Service Description Table (SDT)</p> <p>One or more transport packets with a PID value of 0x0011 and a table_id value of 0x42.</p>
	<p>Bouquet Association Table (BAT)</p> <p>One or more transport packets with a PID value of 0x0011 and a table_id value of 0x4A.</p>
	<p>Event Information Table (EIT)</p> <p>One or more transport packets with a PID value of 0x0012 and a table_id value of 0x4E-0x6F.</p>
	<p>Running Status Table (RST)</p> <p>One or more transport packets with a PID value of 0x0013 and a table_id value of 0x4E-0x71.</p>
	<p>Stuffing Table (ST)</p> <p>One or more transport packets with a PID value of 0x0010-0x0013 and a table_id value of 0x72.</p>
	<p>Discontinuity Information Table (DIT)</p> <p>One or more transport packets with a PID value of 0x1E and a table_id value of 0x7E.</p>
	<p>Selection Information Table (SIT)</p> <p>One or more transport packets with a PID value of 0x1F and a table_id value of 0x7F.</p>
	<p>Time and Data Table (TDT)</p> <p>One or more transport packets with a PID value of 0x0014 and a table_id value of 0x72.</p>
	<p>Time Offset Table (TOT)</p> <p>One or more transport packets with a PID value of 0x0014 and a table_id value of 0x73.</p>

Table 18: Icons specific to ARIB format

Icon	Element type
	<p>Service Description Table (SDT)</p> <p>One or more transport packets with a PID value of 0x0011 and a table_id value of 0x42.</p>
	<p>Bouquet Association Table (BAT)</p> <p>One or more transport packets with a PID value of 0x0011 and a table_id value of 0x4A.</p>
	<p>Event Information Table (EIT)</p> <p>One or more transport packets with a PID value of 0x0012 and a table_id value of 0x4E-0x6F.</p>
	<p>Running Status Table (RST)</p> <p>One or more transport packets with a PID value of 0x0013 and a table_id value of 0x4E-0x71.</p>
	<p>Stuffing Table (ST)</p> <p>One or more transport packets with a PID value of 0x0010-0x0013 and a table_id value of 0x72.</p>
	<p>Discontinuity Information Table (DIT)</p> <p>One or more transport packets with a PID value of 0x1E and a table_id value of 0x7E.</p>
	<p>Selection Information Table (SIT)</p> <p>One or more transport packets with a PID value of 0x1F and a table_id value of 0x7F.</p>
	<p>Local event Information Table (LIT)</p> <p>One or more transport packets with a PID value of 0x0020 and a table_id value of 0xD0. One or more transport packets with a PID value specified by the elementary_PID in the PMT and a table_id value of 0xD0 when a stream type value is 0x05.</p>
	<p>Event Relation Table (ERT)</p> <p>One or more transport packets with a PID value of 0x0021 and a table_id value of 0xD1. One or more transport packets with a PID value specified by the elementary_PID in the PMT and a table_id value of 0xD1 when a stream type value is 0x05.</p>
	<p>Index Transmission Table (ITT)</p> <p>One or more transport packets with a PID value specified by the elementary_PID in the PMT and a table_id value of 0xD2.</p>
	<p>Partial Content Announcement Table (PCAT)</p> <p>One or more transport packets with a PID value of 0x22 and a table_id value of 0xC2.</p>

Table 18: Icons specific to ARIB format (cont.)

Icon	Element type
	Software Download Trigger Table (SDTT) One or more transport packets with a PID value of 0x23 and a table_id value of 0xC3.
	Download Control Table (DCT) One or more transport packets with a PID value of 0x17 and a table_id value of 0xC0.
	DownLoad Table (DLT) One or more transport packets with a PID value specified by the DL_PID in the DCT and a stream_type value of 0xC1. A lock symbol appears in the icon when the transport_scrambling_control value is set to 01.
	Broadcaster Information Table (BIT) One or more transport packets with a PID value of 0x24 and a table_id value of 0xC4.
	Network Board Information Table (NBIT) One or more transport packets with a PID value of 0x25 and a table_id value of 0xC5 or 0xC6.
	Linked Description Table (LDT) One or more transport packets with a PID value of 0x25 and a table_id value of 0xC7.
	Time and Data Table (TDT) One or more transport packets with a PID value of 0x0014 and a table_id value of 0x72.
	Time Offset Table (TOT) One or more transport packets with a PID value of 0x0014 and a table_id value of 0x73.

Table 19: Icons specific to ATSC format

Icon	Element type	
	<p>Master Guide Table (MGT)</p> <p>One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC7.</p>	
	<p>Terrestrial Virtual Channel Table (TVCT)</p> <p>One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC8.</p>	
	<p>Cable Virtual Channel Table (CVCT)</p> <p>One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC9.</p>	
	<p>Rating Region Table (RRT)</p> <p>One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xCA.</p>	
	<p>Event Information Table (EIT)</p> <p>One or more transport packets with a PID value specified by the table_type_PID in the MGT and a table_id value of 0xCB.</p>	
	<p>Channel Extended Text Table (CETT)</p> <p>One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC8.</p>	
	<p>Event Extended Text Table (EETT)</p> <p>One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC9.</p>	
	<p>Program Identifier Table (PIT)</p> <p>One or more transport packets with a PID value specified by the elementary_PID in the PMT and a table_id value of 0xD0 when a stream_type value is 0x85.</p>	
		<p>System Time Table (STT)</p> <p>One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xCD.</p>

Icon Text and Dialog Box

To the right of each icon, the MTX100B displays text that describes each transport stream component. In addition, for the PCR icon, you can display a dialog box to change the parameters for the component.

This subsection describes the text information for each icon type and the dialog box available for the PCR icon.

ISDB-T Icon.

The following text information is displayed for the ISDB-T icon:

- “xxx.rmx”: Shows the file name.
- Packets: Shows the total number of packets in the broadcast transport stream.

S-TMCC Icon.

The following text information is displayed for the M-TMCC icon:

- “xxx.trp”: Shows the file name.
- SF: Shows the number of super frames.

M-TMCC Icon.

The following text information is displayed for the M-TMCC icon:

- “xxx.trp”: Shows the file name.
- SF: Shows the number of super frames.

Non TS Icon.

The following text information is displayed for the Non Transport Stream (Non TS) icon:

- “xxx.xx”: Shows the file name.
- FileSize: Shows the file size in bytes.

Transport Stream (TS) Icon.

The following text information is displayed for the Transport Stream (TS) icon:

- “xxx.trp”: Shows the file name of the transport stream.
- Packets: Shows the total number of packets in the transport stream.

When this icon is used with the S-TMCC or M-TMCC icon, the following text information is displayed:

- TSID: Shows the ID number for the transport stream.
- TC8PSK/xx, BPSK/xx, or QPSK/xx: Shows the modulation system and the number of contract slots (xx).

Program Association Table (PAT) Icon.

The following text information is displayed for the Program Association Table (PAT) icon:

- PID: Shows the PID value of the PAT.
- TblID: Shows the table_id value of the PAT.
- TSID: Shows the transport_stream_id value of the PAT.
- Prg: Shows the number of programs contained in the transport stream.

Transport Stream Description Table (TSDT) Icon.

The following text information is displayed for the Transport Stream Description Table (TSDT) icon:

- PID: Shows the PID value of the TSDT.
- TblID: Shows the table_id value of the TSDT.

Network Information Table (NIT) Icon.

The following text information is displayed for the Network Information Table (NIT) icon:

- PID: Shows the PID value of the NIT.
- TblID: Shows the table_id value of the NIT.

Conditional Access Table (CAT) Icon.

The following text information is displayed for the Conditional Access Table (CAT) icon:

- PID: Shows the PID value of the CAT.
- TblID: Shows the table_id value of the CAT.

Program Map Table (PMT) Icon.

The following text information is displayed for the Program Map Table (PMT) icon:

- PID: Shows the PID value of the PMT.
- TblID: Shows the table_id value of the PMT.
- PrgNo: Shows the program number associated with the PMT.

Program Clock Reference (PCR) Icon.

The following text information is displayed for the Program Clock Reference (PCR) icon:

- PID: Shows the PID value of the PCR.

PCR Inaccuracy Dialog Box

If you press the Num Pad/Select button when the PCR icon is selected, the PCR Inaccuracy dialog box appears. (See Figure 24.) This dialog box allows you to add jitter to the program_clock_reference_base value and the program_clock_reference_extension value.

The PCR Inaccuracy dialog box contains four parameters that you can use to specify the jitter. (See Table 20.)

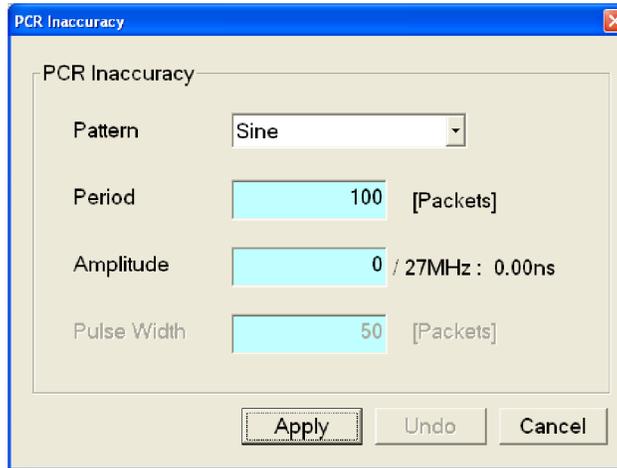


Figure 24: PCR Inaccuracy dialog box

Table 20: PCR Inaccuracy dialog box parameters

Parameter	Description
Pattern	Selects the waveform type of the 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 step. This Pulse Width parameter is available only when the Pattern parameter is set to Pulse.

Video Elementary Stream (VIDEO) Icon.

The following text information is displayed for the video elementary stream (VIDEO) icon:

- PID: Shows the PID value of the video elementary stream.
- StrmTyp: Shows the type of the video elementary stream (0x01 or 0x02).

VIDEO_H264 Icon.

The following text information is displayed for the H264 video elementary stream (VIDEO_H264) icon:

- PID: Shows the PID value of the H264 video elementary stream.
- StrmTyp: Shows the type of the H264 video elementary stream (0x1B).

VIDEO_MP4 Icon.

The following text information is displayed for the MPEG-4 video elementary stream (VIDEO_MP4) icon:

- PID: Shows the PID value of the MPEG-4 video elementary stream.
- StrmTyp: Shows the type of the MPEG-4 video elementary stream (0x10).

Audio Elementary Stream (AUDIO) Icon.

The following text information is displayed for the audio elementary stream (AUDIO) icon:

- PID: Shows the PID value of the audio elementary stream.
- StrmTyp: Shows the type of the audio elementary stream (0x03 or 0x04).

AUDIO_AAC and AUDIO_AC3 Icons.

The following text information is displayed for the AUDIO_AAC and AUDIO_AC3 (ATSC only) icons:

- PID: Shows the PID value of the audio elementary stream.
- StrmTyp: Shows the type of the audio elementary stream (0x0F or 0x81).

Data Stream (DATA) Icon.

The following text information is displayed for the data stream (DATA) icon:

- PID: Shows the PID value of the data stream.
- StrmTyp: Shows the type of the data stream.

Private Section (DATA_SECT) Icon.

The following text information is displayed for the private section (DATA_SECT) icon:

- PID: Shows the PID value of the private section.
- TblID: Shows the table_id value of the private section.
- StrmTyp: Shows the type of the private section.

DSM_CC Icon.

The following text information is displayed for the digital storage media command and control (DSM_CC) icon:

- PID: Shows the PID value of the data DSM-CC.
- StrmTyp: Shows the type of the DSM-CC.

Entitlement Control Message (ECM) Icon.

The following text information is displayed for the Entitlement Control Message (ECM) icon:

- PID: Shows the PID value of the ECM.
- TblID: Shows the table_id value of the ECM.

Entitlement Management Message (EMM) Icon.

The following text information is displayed for the Entitlement Management Message (EMM) icon:

- PID: Shows the PID value of the EMM.
- TblID: Shows the table_id value of the EMM.

GHOST Icon.

- PID: Shows the PID value of the GHOST.

Adaptation Field Error (ADFERR) Icon.

The following text information is displayed for the Adaptation Field Error (ADFERR) icon:

- PID: Shows the PID value of the ADFERR.

NULL Icon.

The following text information is displayed for the NULL icon:

- PID: Shows the PID value of the NULL.

GARBAGE Icon.

The following text information is displayed for the GARBAGE icon:

- PID: Shows the PID value of the GARBAGE.

SDT, BAT, EIT, RST, ST, DIT, SIT, LIT, ERT, ITT, PCAT, SDTT, DCT, DLT, BIT, NBIT, and LDT Icons.

The following text information is displayed for the Service Description Table (SDT), Bouquet Association Table (BAT), Event Information Table (EIT), Running Status Table (RST), Stuffing Table (ST), Discontinuity Information Table (DIT), Selection Information Table (SIT), Local event Information Table (LIT), Event Relation Table (ERT), Index Transmission Table (ITT), Partial Content Announcement Table (PCAT), Software Download Trigger Table (SDTT), Download Control Table (DCT), DownLoad Table (DLT), Broadcaster Information Table (BIT), Network Board Information Table (NBIT), and Linked Description Table (LDT) icons:

- PID: Shows the PID value of the SDT, BAT, EIT, RST, ST, DIT, SIT, LIT, ERT, ITT, PCAT, SDTT, DCT, DLT, BIT, NBIT, or LDT.
- TblID: Shows the table_id value of the SDT, BAT, EIT, RST, ST, DIT, SIT, LIT, ERT, ITT, PCAT, SDTT, DCT, DLT, BIT, NBIT, or LDT.

TDT and TOT Icons.

The following text information is displayed for the Time and Data Table (TDT) and Time Offset Table (TOT) icons:

- PID: Shows the PID value of the TDT or TOT.
- TblID: Shows the table_id value of the TDT or TOT.

MGT and PIT Icons.

The following text information is displayed for the Master Guide Table (MGT) and Program Identifier Table (PIT) icons:

- PID: Shows the PID value of the MGT or PIT.
- TblID: Shows the table_id value of the MGT or PIT.

TVCT, CVCT, RRT, EIT, CETT, and EETT Icons.

The following text information is displayed for the Terrestrial Virtual Channel Table (TVCT), Cable Virtual Channel Table (CVCT), Rating Region Table (RRT), Event Information Table (EIT), Channel Extended Text Table (CETT), and Event Extended Text Table (EETT) icons:

- PID: Shows the PID value of the TVCT, CVCT, RRT, EIT, CETT, or EETT.
- TblID: Shows the table_id value of the TVCT, CVCT, RRT, EIT, CETT, or EETT.
- TblType: Shows the table_type value of the TVCT, CVCT, RRT, EIT, CETT, or EETT.

System Time Table (STT) Icon.

The following text information is displayed for the System Time Table (STT) icon:

- PID: Shows the PID value of the STT.
- TblID: Shows the table_id value of the STT.

Programming Information

This section contains information on the Standard Commands for Programmable Instruments (SCPI) and IEEE 488.2 Common Commands you can use to program your MTX100B.

Syntax

This section contains information on the Standard Commands for Programmable Instruments (SCPI) and IEEE 488.2 Common Commands you can use to program your MTX100B.

SCPI Commands and Queries

SCPI is a standard created by a consortium that provides guidelines for remote programming of instruments. These guidelines provide a consistent programming environment for instrument control and data transfer. This environment uses defined programming messages, instrument responses, and data format across all SCPI instruments, regardless of the manufacturer. The MTX100B uses a command language based on the SCPI standard.

The SCPI language is based on a hierarchical or tree structure that represents a subsystem. The top level of the tree is the root node; it is followed by one or more lower-level nodes. (See Figure 25.)

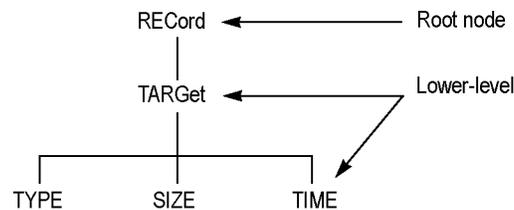


Figure 25: Example of SCPI subsystem hierarchy tree

You can create commands and queries from these subsystem hierarchy trees. Commands specify actions for the instrument to perform. Queries return measurement data and information about parameter settings.

Creating Commands

SCPI commands are created by stringing together the nodes of a subsystem hierarchy and separating each node by a colon.

In Figure 342, RECOrd is the root node and TARGet, TYPE, SIZE, and TIME are lower-level nodes. To create a SCPI command, start with the root node RECOrd and move down the tree structure adding nodes until you reach the end of a branch. Most commands and some queries have parameters; you must include a value for these parameters. If you specify a parameter value that is out of range, the parameter will be set to a default value.

For example, RECOrd:TARGeT:TYPE DISK is a valid SCPI command created from the hierarchy tree in this example.

Creating Queries

To create a query, start at the root node of a tree structure, move down to the end of a branch, and add a question mark. RECOrd:TARGeT:TYPE? is an example of a valid SCPI query using the hierarchy tree. (See Figure 25.)

Parameter Types

Every parameter in the command and query descriptions is of a specified type. The parameters are enclosed in brackets, such as <pattern>. The parameter type is listed after the parameter and is enclosed in parentheses, for example, (discrete). Some parameter types are defined specifically for the MTX100B command set and some are defined by ANSI/IEEE 488.2-1987. (See Table 21.)

Table 21: Parameter types used in syntax descriptions

Parameter type	Description	Example
binary	Binary numbers	#B0110
arbitrary block ¹	A specified length of arbitrary data	#512234xxxx . . . where 5 indicates that the following 5 digits (12234) specify the length of the data in bytes; xxxx ... indicates the data
boolean	Boolean numbers or values	ON or 1, OFF or 0
discrete	A list of specific value	MIN, MAX, UP, DOWN
hexadecimal	Hexadecimal numbers (0-9, A, B, C, D, E, F)	#HAA, #H1
NR1 ^{2,3} numeric	Integers	0, 1, 15, -1
NR2 ² numeric	Decimal numbers	1.2, 3.141516, -6.5
NR3 ² numeric	Floating point numbers	3.1415E-9, -16.1E5
NRf ² numeric	Flexible decimal number that may be type NR1, NR2, or NR3	See NR1, NR2, NR3 examples
string ⁴	Alphanumeric characters (must be within quotation marks)	"Testing 1,2,3"

¹ Defined in ANSI/IEEE 488.2 as "Definite Length Arbitrary Block Response Data."

² An ANSI/IEEE 488.2-1992-defined parameter type.

³ Some commands and queries will accept a hexadecimal value even though the parameter type is defined as NR1.

⁴ Defined in ANSI/IEEE 488.2 as "String Response Data."

Abbreviating Commands, Queries, and Parameters

You can abbreviate most SCPI commands, queries, and parameters to an accepted short form. This manual shows these short forms as a combination of upper and lower case letters. The upper case letters indicate the accepted short form of a command. You can create a short form by using only the upper case letters. (See

Figure 26.) The accepted short form and the long form are equivalent and request the same action of the instrument.

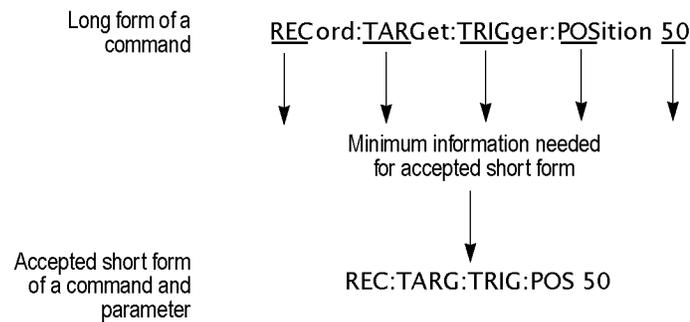
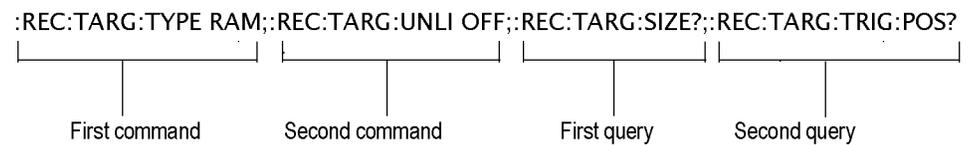


Figure 26: Example of abbreviating a command

Chaining Commands and Queries

You can chain several commands or queries together into a single message. To create a chained message, first create a command or query, add a semicolon (;), and then add more commands or queries and semicolons until you are done. If the command following a semicolon is a root node, precede it with a colon (:). The following figure illustrates a chained message consisting of several commands and queries. The single chained message should end in a command or query, not a semicolon. Responses to any queries in your message are separated by semicolons.



The response from this chained message might be

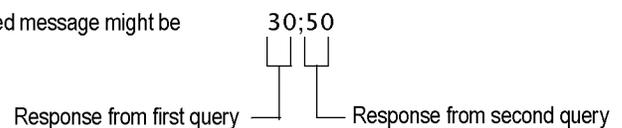


Figure 27: Example of chaining commands and queries

If a command has the same root and lower-level nodes as the previous command, you can omit these nodes. For example, the second command has the same root node (REC) and lower level node (TARG) as the first command, so these nodes can be omitted. (See Figure 28.)

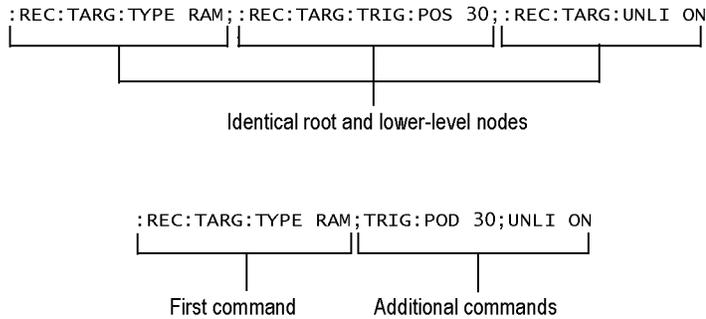


Figure 28: Example of omitting root and lower-level nodes in a chained message

General Rules

Here are three general rules for using SCPI commands, queries, and parameters:

- You can use single (‘ ’) or double (“ ”) quotation marks for quoted strings, but you cannot use both types of quotation marks for the same string.
 correct: “This string uses quotation marks correctly.”
 correct: ‘This string also uses quotation marks correctly.’
 incorrect: “This string does not use quotation marks correctly.’
- You can use upper case, lower case, or a mixture of both cases for all commands, queries, and parameters.

RECORD:TARGET:TRIGGER:POSITION 50
 is the same as
 record::position target:trigger50
 and
 RECORD:target:trigger:POSITION 50

NOTE. *Literal strings (quoted) are case sensitive. For example: file names.*

- No embedded spaces are allowed between or within nodes.
 correct: RECORD:TARGET:TRIGGER:POSITION 50
 incorrect: RECORD: TARGET: TRIGGER: POSI TION 50

IEEE 488.2 Common Commands

Description. ANSI/IEEE Standard 488.2 defines the codes, formats, protocols, and usage of common commands and queries used on the interface between the controller and the instruments. The MTX100B complies with this standard.

Command and Query Structure. The syntax for an IEEE 488.2 common command is an asterisk (*) followed by a command and, optionally, a space and parameter

value. The syntax for an IEEE 488.2 common query is an asterisk (*) followed by a query and a question mark. All of the common commands and queries are listed in the last part of the Syntax and Commands section. The following are examples of common commands:

- *ESE 16
- *CLS

The following are examples of common queries:

- *ESR?
- *IDN?

Backus-Naur Form Definition. This manual may describe commands and queries using the Backus-Naur Form (BNF) notation. (See Table 22.)

Table 22: BNF symbols and meanings

Symbol	Meaning
< >	Defined element
: :=	Is defined as
	Exclusive OR
{ }	Group; one element is required
[]	Optional; can be omitted
. . .	Previous element(s) may be repeated
()	Comment

Remote Commands

This section describes the remote command set that is used in the MTX100B. The commands for the MTX100B are divided into the following six groups:

- Common commands
- DISPLAY commands
- MASS MEMORY commands
- PLAY commands
- RECORD commands
- SYSTEM commands

This section also contains commands that are used to control the optional interface cards.

You can connect and set up the MTX100B for remote operation through the LAN port on the rear panel.

Common Commands

The Common commands have a “*” prefix and address of all the instruments that support IEEE 488.2.

Command Tree.

*CLS
*ESE(?)
*ESR?
*IDN?
*LRN?
*OPC(?)
*OPT?
*RST
*SRE(?)
*STB?
*TRG
*TST?
*WAI

Command Description. *CLS

Clears SESR (Standard Event Status Register), the SBR (Status Byte Register), and Event Queue, which are used in the instrument status and event reporting system.

*ESE

Sets the bits of the ESER (Event Status Enable Register) used in the status and events reporting system.

*ESE?

Returns the contents of the ESER.

*ESR?

Returns the contents of SESR (Standard Event Status Register) used in the status and events reporting system.

*IDN?

Returns the ID information of the instrument. The ID information contains manufacturer, model, firmware version, hardware version, and FPGA code version.

*LRN?

Returns the current instrument settings.

***OPC**

Causes bit 0 in the SESR (Standard Event Status Register) to be set, and the operation complete message to be issued, when all pending operations are finished. This command is only available just after the :PLAY:START or :RECORD:START command is executed.

***OPC?**

Waits until all pending operations are finished and returns a "1" ASCII character. This query is only available just after the :PLAY:START or :RECORD:START command is executed.

***OPT?**

Returns the installed interface option.

***RST**

Resets the instrument to the factory default state. This command has the same effect when the :SYSTEM:PRESET and *CLS commands are executed successively.

***SRE**

Sets the bits of the SRER (Service Request Enable Register).

***SRE?**

Returns the contents of SRER.

***STB?**

Returns the value of the SBR (Status Byte Register). Bit 6 of the SBR is read as an MSS (Master Status Summary) bit.

***TRG**

Generates a trigger event.

***TST?**

Performs the self test and returns its result. The MTX100B always returns 1.

***WAI**

Wait-to-continue command. This command is not necessary because the MTX100B handles commands sequentially.

DISPLAY Commands

Use these commands to select a display format of the base value in the hierarchy display.

Command Tree.

```
:DISPlay
  :VIEW
    :FORMat                HEXadecimal|DECimal|OCTal
```

Command Description. :DISPlay:VIEW:FORMat?

Returns the current display format of the base value in the hierarchy display.

```
:DISPlay:VIEW:FORMat HEXadecimal|DECimal|OCTal
```

Sets the base value used to describe the component information in the hierarchy display. The choices are HEXadecimal, DECimal, and OCTal. The default value is HEXadecimal.

MASS MEMORY Commands

Use these commands to perform file related operations such as changing and moving a directory, and loading and saving a preset.

Command Tree.

```
:MMEMory
  :CATalog?                [<di rectory_path>]
  :CDIRECTory
    [:DATA]                <di rectory_path>
    :STATE                 <di rectory_path>
  :LOAD
    :STATE                 <preset_name>
  :MDIRECTory              <di rectory_path>
  :STORE
    :STATE                 <preset_name>
```

Command Description.

```
:MMEMory:CATalog? [<di rectory_path>]
```

Lists the files in the specified directory. The query response is as follows: <used_bytes>, <available_bytes>, "<file_name>, <directory_flag>, <file_size>, <date>, <time>"...

```
:MMEMory:CDIRECTory[:DATA] [<di rectory_path>]
```

Changes the current directory for data files. <directory_path> is a quoted string that defines the directory path. The default value is D:.

```
:MMEMory:CDIRECTory[:DATA]?
```

Returns the current directory for data files.

:MMEMory:CDIRECTory:STATe <directory_path>

Changes the current directory for setting files. <directory_path> is a quoted string that defines the directory path. The default value is D:.

:MMEMory:CDIRECTory:STATe?

Returns the current directory for setting files.

:MMEMory:LOAD:STATe <preset_name>

Loads the specified preset. <preset_name> is a quoted string that defines the preset name. This command accepts the name of a previously saved preset. Current instrument settings are overwritten by this command.

:MMEMory:MDIRECTory <directory_path>

Creates a subdirectory. The command is invalid if a directory with the specified name already exists.

:MMEMory:STORE:STATe <preset_name>

Saves the instrument settings with the specified preset name. <preset_name> is a quoted string that defines the preset name.

PLAY Commands

Use these commands to set parameters related to the stream output. These include packet size, output clock rate, data output source, and PCR jitter insertion.

Command Tree.

```

:PLAY
  :AUTOpLay          ON|OFF
  :PROGress
  :CLOCK
    :DEFault
      :RATE          <numeric_value>
      :RATE
        :RATIo      <numeric_value>,<numeric_value>
    :ESRAtEfIxed     ON|OFF
    :ISDBT
      :CONVert       ON|OFF
    :RATE            <numeric_value>
    :RATE
      :RATIo        <numeric_value>,<numeric_value>
    :SOURce          INTernaL|EXT10M|EXT27M|EXTIfft|
                    EXTParallel|EXTSerial
  :EXTernaL         RISE|FALL|OFF
  :EXTTrigger

```

```

:BNc          INPUT|OUTPUT
:OUTPut
  :DELAY      <numeric_value>
  :SELEct     C27M|ISDBT
:LOAD
  :FILE       <file_name>
:LOOP
  :ISDBT
    :FRAMe    ON|OFF
:PACKet       188|204|208|NONTs
:PCR
  :INITial    <numeric_value>,<numeric_value>
  :INAccuracy NONE|SINE|SQUare|TRIangle|PULSe|SAW|
             RANDom|OFFSet[,,<numeric_value>,<numeric_value>[,<numeric_value>[,<numeric_value>]]]
:s192F
  :PARTialts  ON|OFF
:SOURCE       RAM|DISK
:SPIOutput    ON|OFF
:SSPosition
  :INITial
    :ENABle   ON|OFF
              [:POSITION}numeric_value>
    :TIME     <string>
              [:POSITION] <numeric_value>,<numeric_value>
    :TIME     <string>,<string>
:STANDARD?
:START
:STOP
:SYNC
  :PSync      TSPacket|SF|NONTs
    :INTERval NONE|<numeric_value>
  :DVALid
    :WIDth    NONE|<numeric_value>
:TIMEpacket
  :DEFine     <numeric_value>,<numeric_value>,<numeric_value>,<numeric_value>,<numeric_value>
  :MODE       ORIGINAl|OS|USER
:UPDate      ON|OFF

```

```

:ITEM
  :CC          ON|OFF
  :NPT         ON|OFF
  :PCR         ON|OFF
  :METHOD      HARDware|SOFTware
  :REEDSoLomon ON|OFF
  :TIMEpacket  ON|OFF

```

Command Description.

```
:PLAY:AUTOPlay ON|OFF
```

Sets whether the selected stream is automatically output using the last power-off settings when you turn the MTX100B on. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

```
:PLAY:AUTOPlay?
```

Returns the current auto play mode status.

```
:PLAY:PROGress?
```

Returns the current percentage of progress of the play.

```
:PLAY:CLOCK:DEFault:RATE <numeric_value>
```

Sets the default clock rate that is automatically set when the selected stream file is downloaded. Since the clock rate is calculated based on the PCRs in the file, the value may be different from the original clock rate. If this happens, you can set the appropriate value by this command. You can set the rate from 0.001 MHz to 250.0 MHz. If you change the value, the `:PLAY:CLOCK:RATE` command setting will set to the same value. The default value is 56.61.

```
:PLAY:CLOCK:DEFault:RATE?
```

Returns the default clock rate that is automatically set when the selected stream file was downloaded.

```
:PLAY:CLOCK:DEFault:RATE:RATIO
<numeric_value>,<numeric_value>
```

Sets the default clock rate that is automatically set when the selected stream file is downloaded using a fraction. Since the clock rate is calculated based on the PCRs in the file, the value may be different from the original clock rate. If this happens, you can set the appropriate value by this command. The first argument represents a numerator and the second represents a denominator. You can set both values from 0 to 2000000000. If you change the value, the `:PLAY:CLOCK:RATE:RATIO` command setting will set to the same value. The default values are 629 for the numerator and 300 for the denominator.

`:PLAY:CLOCK:DEFault:RATE:RATIo?`

Returns the default clock rate that is automatically set when the selected stream file is downloaded using a fraction.

`:PLAY:CLOCK:ESRatefixed ON|OFF`

Sets whether the elementary stream rate is fixed. When you select ON, the elementary stream rate becomes constant regardless of the clock rate setting. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

`:PLAY:CLOCK:ISDBT:CONVert ON|OFF`

Sets whether the clock rate is automatically set when the data file for ISDB-TSB is loaded. When you select ON, the clock rate is automatically set to $(2048/1701) \times 27$ MHz and the elementary stream rate becomes constant regardless of the `:PLAY:CLOCK:ESRatefixed` command setting. You can use 1 or 0 instead of ON or OFF. The default value is ON.

`:PLAY:CLOCK:ISDBT:CONVert?`

Returns whether the clock rate is automatically set when the data file for ISDB-TSB is loaded.

`:PLAY:CLOCK:ESRatefixed?`

Returns the current elementary stream rate status.

`:PLAY:CLOCK:RATE <numeric_value>`

Sets the clock rate for the stream output. You can set the rate from 0.001 MHz to 250.0 MHz. The default value is 56.61.

`:PLAY:CLOCK:RATE?`

Returns the current clock rate for the stream output.

`:PLAY:CLOCK:RATE:RATIo <numeric_value>, <numeric_value>`

Sets the clock rate for the stream output using a fraction. The first argument represents a numerator and the second represents a denominator. You can set both values from 0 to 2000000000. The default values are 629 for the numerator and 300 for the denominator.

`:PLAY:CLOCK:RATE:RATIo?`

Returns the current clock rate for the stream output using a fraction.

`:PLAY:CLOCK:SOURce INTERNAL|EXT10M|EXT27M|EXTIfft|EXTParallel|EXTSerial`

Sets which clock to use as the reference for the stream output. The choices are:

INTERNAL: uses the internal clock.

EXT10M: uses a 10 MHz signal on the Clock/Ref In connector.

EXT27M: uses a 27 MHz signal on the Clock/Ref In connector.

EXTIfft: uses an IFFT sample clock signal (8.126984 MHz) on the Clock/Ref In connector.

EXTParallel: uses a clock signal on the Clock/Ref In connector as a parallel clock.

EXTSerial: uses a clock signal on the Clock/Ref In connector as a serial clock.

:PLAY:CLOCK:SOURce?

Returns the current reference clock for the stream output.

:PLAY:EXTerna1 RISE|FALL|OFF

Sets whether to start stream output using a trigger signal applied to the Trig In/Out connector. The choices are RISE, FALL, and OFF. When you select RISE, the stream output is started at the rising edge of the applied trigger signal. When you select FALL, the stream output is started at the falling edge of the applied trigger signal. The default value is OFF.

:PLAY:EXTerna1?

Returns whether to start stream output using a trigger signal applied to the Trig In/Out connector.

:PLAY:EXTTrigger:BNC INPUT|OUTPUT

Sets whether to use the rear-panel Trig In/Out connector as an input or an output. For INPUT, the connector can be used to input an external trigger signal. For OUTPUT, the connector can be used to output a 27 MHz reference clock or an ISDB-T frame pulse signal. Use the **:PLAY:EXTTrigger:OUTPUT:SELECT** command to select which signal is output from the connector. The default value is INPUT.

:PLAY:EXTTrigger:BNC?

Returns the current input/output status of the Trig In/Out connector.

:PLAY:EXTTrigger:OUTPUT:DELAy <numeric_value>

Sets the amount of delay for the start packet pulse of the ISDB-T frame in 1-parallel clocks of the SPI output. You can set the value from 0 to 15. The default value is 0.

:PLAY:EXTTrigger:OUTPUT:DELAy?

Returns the current delay for the start packet pulse of the ISDB-T frame.

:PLAY:EXTTrigger:OUTPUT:SELEcT C27M|ISDBT

Selects which signal to output from the Trig In/Out connector when the **:PLAY:EXTTrigger:BNC** command is set to OUTPUT. The choices are C27M and ISDBT. For C27M, a 27 MHz reference clock signal is output. For ISDBT, an ISDB-T frame pulse signal is output. The default value is C27M.

:PLAY:EXTTrigger:OUTPut:SELEct?

Returns the current output signal selection when the Trig In/Out connector is used as an output.

:PLAY:LOAD:FILE <file_name>

Loads the specified stream file. <file_name> is a quoted string that defines the file name.

:PLAY:LOAD:FILE?

Returns the name of the file currently loaded.

:PLAY:LOOP ON|OFF

Sets whether the selected stream is output using the looping method. When you select ON, the stream is continuously output. The default value is ON.

:PLAY:LOOP?

Returns the current output loop mode status.

:PLAY:LOOP:ISDBT:FRAMe ON|OFF

Sets whether to output an ISDB-T transport stream in OFDM frames when looped. When you select OFF, an ISDB-T transport stream is looped in packets. You can use 1 or 0 instead of ON or OFF. The default value is ON.

:PLAY:LOOP:ISDBT:FRAMe?

Returns whether to output an ISDB-T transport stream in OFDM frames when looped.

:PLAY:PACKet 188|204|208|NONTs

Sets the packet size for the selected stream file. The choices are 188, 204, 208, and NONTs (Non-TS). The default value is 188.

:PLAY:PACKet?

Returns the current packet size setting for the selected stream file.

:PLAY:PCR:INITiaL <numeric_value>,<numeric_value>

Sets the initial value of the program_clock_reference_base and program_clock_reference_extension parameters. You can set the program_clock_reference_base value from 0 to 8589934591 and set the program_clock_reference_extension value from 0 to 299. The default values for both are 0.

:PLAY:PCR:INITiaL?

Returns the current initial value of the program_clock_reference_base and program_clock_reference_extension parameters.

```
:PLAY:PCR:INACcuracy
NONE|SINE|SQUare|TRIangle|PULSe|SAW|RANdOm|OFFSet
[,<PID>,<amplitude> [<period>[,<pulse_width>]]];
```

Sets the PCR jitter insertion. Use the first argument to set the waveform type used to add jitter. When NONE is selected, the jitter insertion is disabled. Use the SINE, SQUare, TRIangle, PULSe, and SAW arguments to set the PID of the PCRs, the amplitude of the waveform, the period of the waveform, and pulse width of the waveform. The pulse width is available only when the waveform is set to PULSe. The ranges of each argument are as follows:

```
PID: 0 to 8191
Amplitude: 0 to 135000000
Period: 5 to 3000
Pulse width: 1 to (period -1)
```

```
:PLAY:PCR:INACcuracy?
```

Returns the current PCR jitter insertion settings.

```
:PLAY:S192F:PARTialts ON|OFF
```

Sets whether to output a stream file consisting of a 192-byte packet as a partial transport stream. When you select OFF, the stream is output in Non TS format. You can use 1 or 0 instead of ON or OFF. The default value is ON.

```
:PLAY:S192F:PARTialts?
```

Returns whether to output a stream file consisting of a 192-byte packet as a partial transport stream.

```
:PLAY:SOURce RAM|DISK
```

Sets the source for stream output. The choices are RAM (system RAM) and DISK (hard disk). The default value is DISK.

```
:PLAY:SOURce?
```

Returns the current source setting for stream output.

```
:PLAY:SPIOOutput ON|OFF
```

Sets whether the signal output from the SPI In/Out connector is enabled. You can use 1 or 0 instead of ON or OFF. The default value is ON.

```
:PLAY:SPIOOutput?
```

Returns the current output status of the SPI In/Out connector.

```
:PLAY:SSPOsition:INITial:ENABle ON|OFF
```

Sets whether to enable the initial start position setting of the selected stream to be looped. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

`:PLAY:SSPosition:INITial:ENABle?`

Returns the current state of the initial start position setting.

`:PLAY:SSPosition:INITial[:POSition] <numeric_value>`

Sets the initial start position of the selected stream to be looped by the number of packets (the number of super frames for M-TMCC file, or the number of bytes for a Non-TS file). The setting range depends on the `:PLAY:SSPosition[:POSition]` command settings. The default value is 0.

`:PLAY:SSPosition:INITial[:POSition]?`

Returns the current initial start position of the selected stream by the number of packets.

`:PLAY:SSPosition:INITial:TIME <string>`

Sets the initial start position of the selected stream to be looped by time (hh:mm:ss). The setting range depends on the `:PLAY:SSPosition:TIME` command settings. The default value is 00:00:00.

`:PLAY:SSPosition:INITial:TIME?`

Returns the current initial start position of the selected stream by time.

`:PLAY:SSPosition[:POSition]<numeric_value>, <numeric_value>`

Sets the loop start and stop positions of the selected stream to be looped by the number of packets (the number of super frames for M-TMCC file, or the number of bytes for a Non-TS file). Specify the start position in the first argument and specify the stop position in the second argument. You can set the positions from 0 to (available maximum value of the selected stream file). The default values for both are 0.

`:PLAY:SSPosition[:POSition]?`

Returns the current loop start and stop position settings of the selected stream by the number of packets.

`:PLAY:SSPosition:TIME <string>, <string>`

Sets the loop start and stop positions of the selected stream to be looped by time (hh:mm:ss). Specify the start time in the first argument and specify the stop time in the second argument. You can set the time from 0 to available maximum value of the selected stream file. The default values for both are 00:00:00.

`:PLAY:SSPosition:TIME?`

Returns the current loop start and stop position settings of the selected stream by time (hh:mm:ss).

:PLAY:STANDARD?

Returns the standard of the loaded stream file. The available responses are MPEG, ARIB, ATSC, DVB, NONTs, MTMCc, STMCc, or ISDBT. The MTMCc, STMCc, and ISDBT standards are checked only when the :SYSTEM:STANDARD command is set to ARIB.

:PLAY:START

Starts outputting the selected stream. There are no arguments.

:PLAY:STOP

Stops outputting the selected stream. There are no arguments.

:PLAY:SYNC TSPacket|SF|NONTs

Sets the format of the PSYNC signal output from the SPI In/Out connector. For TSPacket, a single pulse signal is output at the start point of each packet. For SF, a single pulse is output at the start point of the SF appearing every 204x48x8 bytes. For NONTs, you can set the output period and data width of the PSYNC signal using the :PLAY:SYNC:PSYNC:INTERVAL command and :PLAY:SYNC:PSYNC:WIDTH commands. SF is available only when MTMCc is returned by the :PLAY:STANDARD? query. The default value is TSPacket.

:PLAY:SYNC?

Returns the current format setting of the PSYNC signal.

:PLAY:SYNC:DVALID:WIDTH NONE|<numeric_value>

Sets the status and data width of the DVALID signal when NONTs is selected in the :PLAY:SYNC command. When you select NONE, the DVALID signal is disabled. You can set the width from 16 bytes to 255 bytes. This value cannot be set more than the value set by the :PLAY:SYNC:PSYNC:INTERVAL command. The default value is 188.

:PLAY:SYNC:DVALID:WIDTH?

Returns the current status and data width of the DVALID signal.

:PLAY:SYNC:PSYNC:INTERVAL NONE|<numeric_value>

Sets the status and output period of the PSYNC signal when NONTs is selected in the :PLAY:SYNC command. When you select NONE, the PSYNC signal is disabled. You can set the interval from 16 bytes to 255 bytes. This value needs to be set equal to or greater than the value in the :PLAY:SYNC:DVALID:WIDTH command. The default value is 188.

:PLAY:SYNC:PSYNC:INTERVAL?

Returns the current status and output period of the PSYNC signal.

:PLAY:TIMEpacket:DEFine <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>

Sets the initial values of the TDT, TOT, or STT when USER is selected in the **:PLAY:TIMEpacket:MODE** command. The arguments are <year>, <month>, <date>, <hour>, <minute>, and <second>. You can set the values from 1900,3,1,0,0,0 to 2038,4,22,23,59,59 for the TDT and TOT and from 1980,1,6,0,0,0 to 2116,2,12,6,28,15 for the STT. The default values are the current date and time.

:PLAY:TIMEpacket:DEFine?

Returns the current data and time settings of the TDT, TOT, or STT.

:PLAY:TIMEpacket:MODE ORIGINAL|OS|USER

Selects the reference time used to set the initial value of the TDT, TOT, or STT when the **:PLAY:UPDATE** command is set to ON. The choices are ORIGINAL, SYSTEM, and USER. For ORIGINAL, the original (default) value defined in the selected stream is used. For OS, the clock/calendar of the operating system is used. For USER, you can set any value in the **:PLAY:TIMEpacket:DEFine** command. The default value is ORIGINAL.

:PLAY:TIMEpacket:MODE?

Returns the current reference time selection used to set the initial value of the TDT, TOT, or STT.

:PLAY:UPDATE ON|OFF

Sets whether to update parameters in a stream when looped. You can select which parameters are updated using the **:PLAY:UPDATE:ITEM** commands. You can use 1 or 0 instead of ON or OFF. The default value is ON.

:PLAY:UPDATE?

Returns the current update mode status.

:PLAY:UPDATE:ITEM:CC ON|OFF

Sets whether to update continuity_counter values when the **:PLAY:UPDATE** command is set to ON. You can use 1 or 0 instead of ON or OFF. The default value is ON.

:PLAY:UPDATE:ITEM:CC?

Returns whether to update continuity_counter values when the **:PLAY:UPDATE** command is set to ON.

:PLAY:UPDATE:ITEM:NPT ON|OFF

Sets whether to update NPT values when the **:PLAY:UPDATE** command is set to ON. You can use 1 or 0 instead of ON or OFF. This command is only available when the **:PLAY:UPDATE:PCR** command is set to ON and the

`:PLAY:UPDATE:ITEM:PCR:METHOD` command is set to `SOFTWARE`. The default value is `OFF`.

`:PLAY:UPDATE:ITEM:NPT?`

Returns whether to update NPT values when the `:PLAY:UPDATE` command is set to `ON`.

`:PLAY:UPDATE:ITEM:PCR ON|OFF`

Sets whether to update PCR/PTS/DTS values when the `:PLAY:UPDATE` command is set to `ON`. You can use 1 or 0 instead of `ON` or `OFF`. The default value is `ON`.

`:PLAY:UPDATE:ITEM:PCR?`

Returns whether to update PCR/PTS/DTS values when the `:PLAY:UPDATE` command is set to `ON`.

`:PLAY:UPDATE:ITEM:PCR:METHOD HARDWARE|SOFTWARE`

Sets the method to update PCR/PTS/DTS values. The choices are `HARDWARE` and `SOFTWARE`. The default value is `HARDWARE`.

`:PLAY:UPDATE:ITEM:PCR:METHOD?`

Returns the update method for PCR/PTS/DTS values.

`:PLAY:UPDATE:ITEM:REEDSolomon ON|OFF`

Sets whether to update Reed-Solomon symbols in an ISDB-T transport stream when the `:PLAY:UPDATE` command is set to `ON`. You can use 1 or 0 instead of `ON` or `OFF`. The default value is `ON`.

`:PLAY:UPDATE:ITEM:REEDSolomon?`

Returns whether to update Reed-Solomon symbols in an ISDB-T transport stream when the `:PLAY:UPDATE` command is set to `ON`.

`:PLAY:UPDATE:ITEM:TIMEpacket ON|OFF`

Sets whether to update TDT/TOT/STT values when the `:PLAY:UPDATE` command is set to `ON`. You can use 1 or 0 instead of `ON` or `OFF`. The default value is `ON`.

`:PLAY:UPDATE:ITEM:TIMEpacket?`

Returns whether to update TDT/TOT/STT values when the `:PLAY:UPDATE` command is set to `ON`.

RECORD Commands Use these commands to set parameters related to the data record. These include input interface, record size, and trigger position.

Command Tree.

```

:RECOrd
  :ACQUIre
    :START
    :STOP
  :PROGress
  :CLOCK
    :RATE?
  :EXTerna]      RISE|FALL|OFF
  :PACKet?
  :SOURCE        SPI|ASI|UNIVERSal|I1394I|S310M|
                STANDARD|OPTION
  :STANDARD?
  :START
  :STOP
  :STORE
    :FILE        <file_name>
    :MODE        NEWfile|OVERwrite
  :TARGET
    :IGNOredvalid ON|OFF
    :SIZE        <numeric_value>
    :TIME        <string>
    :TRIGGER
      :CONTInuous ON|OFF
      :LIMIT     <numeric_value>
      :POSITION  <numeric_value>
    :TYPE        RAM|DISK
    :UNLIMIT     ON|OFF
  
```

Command Description.

:RECOrd:ACQUIre:START

Starts input stream acquisition. When two or more record commands are sent to the instrument successively, the instrument stops stream acquisition and then starts stream acquisition for each command. Therefore, when many commands are sent to the instrument, it takes a long time to complete all settings. If you send the **:RECOrd:ACQUIre:STOP** command before sending record commands and send the **:RECOrd:ACQUIre:START** command after sending record commands, you can shorten the setting time.

:RECORD:ACQUIRE:STOP

Stops input stream acquisition. Refer to the **:RECORD:ACQUIRE:START** command description on how to use this command.

:RECORD:PROGRESS?

Returns the current percentage of progress of the record.

:RECORD:CLOCK:RATE?

Returns the clock rate of the input stream in MHz.

:RECORD:EXTERNAL RISE|FALL|OFF

Sets whether to start input stream record using a trigger signal applied to the Trig In/Out connector. The choices are RISE, FALL, and OFF. When you select RISE, the input stream record is started at the rising edge of the applied trigger signal. When you select FALL, the input stream record is started at the falling edge of the applied trigger signal. The default value is OFF.

:RECORD:EXTERNAL?

Returns whether to start input stream record using a trigger signal applied to the Trig In/Out connector.

:RECORD:PACKET?

Returns the packet size of the input stream. The available responses are 188, 204, 208, or NONTs. When the **:RECORD:I1394I:PARTIALTS** command is set to ON, the response is 192.

:RECORD:SOURCE SPI|ASI|UNIVERSAL|I1394I|S310M|STANDARD|OPTION

Sets the interface used to capture a stream data. The choices are SPI, ASI, UNIVERSAL, I1394I (IEEE1394), S310M (SMPTE310M), STANDARD (same as SPI), and OPTION (optional interface currently installed). The default value is SPI.

:RECORD:SOURCE?

Returns the current interface used to capture a stream data.

:RECORD:STORE:FILE <file_name>

Specifies the file name used when the input stream is saved.

:RECORD:STANDARD?

Returns the current standard used to display the input stream. The available responses are MPEG, ARIB, ATSC, DVB, NONTs, MTMCc, STMCc, or ISDBT. The MTMCc, STMCc, and ISDBT standard are checked only when the **:SYSTEM:STANDARD** command is set to ARIB. When the **RECORD:I1394I PARTIALTS** command is set to ON, the response is P_TS.

:RECOrd:START

Starts recording the input stream.

:RECOrd:STOP

Stops recording the input stream.

:RECOrd:STORe:FILE?

Returns the current file name used when the input stream is saved.

:RECOrd:STORe:MODE NEWfile|OVERwrite

Sets the save mode when the input stream is saved. The choices are NEWfile and OVERwrite. For NEWfile, a new file is created whenever you save a stream file. The file name is the name specified by the **:RECOrd:STORe:FILE** command + # (1, 2, 3, 4...). For OVERwrite, the existing file is overwritten by the new file with the name specified in the **:RECOrd:STORe:FILE** command. The default value is OVERwrite.

:RECOrd:STORe:MODE?

Returns the current save mode setting when the input stream is saved.

:RECOrd:TARGet:IGNORedvalid ON|OFF

Sets whether the instrument ignores the DVALID signal from the selected interface when a stream data is acquired. When you select ON, the instrument ignores the DVALID signal, and the stream data is acquired according to the internal clock signal. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

:RECOrd:TARGet:IGNORedvalid?

Returns whether the instrument ignores the DVALID signal from the selected interface when a stream data is acquired.

:RECOrd:TARGet:SIZE <numeric_value>

Sets the file size to record the input stream in MB. You can set the file size from 1 to free space of the system RAM or hard disk. This setting changes the **:RECOrd:TARGet:TIME** command setting. The default value is 50 MB.

:RECOrd:TARGet:SIZE?

Returns the current file size setting to record the input stream.

:RECOrd:TARGet:TIME <string>

Sets the recording time (hh:mm:ss) to record the input stream. The minimum value of the setting range depends on the clock rate of the input stream. The maximum value of the setting range depends on the free space of the RAM or hard disk, or the clock rate of the input stream. This setting changes the **:RECOrd:TARGet:SIZE** command setting. The default value is 00:00:00.

`:RECORD:TARGET:TIME?`

Returns the current recording time (hh:mm:ss) to record the input stream.

`:RECORD:TARGET:TRIGGER:CONTINUOUS ON|OFF`

Turns continuous recording on or off. When you select ON, you can record multiple stream files continuously on the hard disk. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

`:RECORD:TARGET:TRIGGER:CONTINUOUS?`

Returns the current continuous recording state.

`:RECORD:TARGET:TRIGGER:CONTINUOUS:LIMIT <numeric_value>`

Sets the number of files to stop continuous recording. You can set the value from 2 to 32767. The default value is 32767.

`:RECORD:TARGET:TRIGGER:CONTINUOUS:LIMIT?`

Returns the number of files to stop continuous recording.

`:RECORD:TARGET:TRIGGER:POSITION <numeric_value>`

Sets the trigger position used to record the input stream. You can set the trigger position from 0% to 100%. The default value is 0%.

`:RECORD:TARGET:TRIGGER:POSITION?`

Returns the current trigger position setting.

`:RECORD:TARGET:TYPE RAM|DISK`

Sets the record target used to record the input stream. The choices are RAM and DISK (hard disk). The default value is DISK.

`:RECORD:TARGET:TYPE?`

Returns the current record target used to record the input stream.

`:RECORD:TARGET:TRIGGER:UNLIMIT ON|OFF`

Sets whether to record the input stream to the full free space in the hard disk or RAM. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

`:RECORD:TARGET:TRIGGER:UNLIMIT?`

Returns whether to record the input stream to the full free space in the hard disk or RAM.

SYSTEM Commands Use these commands to set or query the system related functions.

Command Tree.

```

:SYSTem
  :COMMunicate
    :SOCKet
      :PORT          <numeric_value>
      :RXTERM        CR|LF
      :TXTERM        CR|LF|CRLF|LFCR
    :ERRor[:NEXT]?
    :KLOCK[:STATe]   ON|OFF
    :MODE            PLAY|RECOrd
    :OPTions?
    :PRESet
    :STANDard        MPEG|ARIB|ATSC|DVB
    :STATus?
  
```

Command Description.

:SYSTem:COMMunicate:SOCKet:PORT <numeric_value>

Sets the port number needed to remotely control the instrument over an Ethernet network. You can set the value from 1024 to 65535. When you change the value, the current network connection is disconnected.

:SYSTem:COMMunicate:SOCKet:PORT?

Returns the current port number setting.

:SYSTem:COMMunicate:SOCKet:RXTERM CR|LF

Sets the terminator used when the MTX100B receives commands from a controller. The choices are CR (carriage return) and LF (linefeed). The default value is LF.

:SYSTem:COMMunicate:SOCKet:RXTERM?

Returns the terminator used when the MTX100B receives commands from a controller.

:SYSTem:COMMunicate:SOCKet:TXTERM CR|LF|CRLF|LFCR

Sets the terminator used when the MTX100B sends information to a controller. The choices are CR (carriage return), LF (linefeed), CRLF, and LFCR. The default value is CRLF.

:SYSTem:COMMunicate:SOCKet:TXTERM?

Returns the terminator used when the MTX100B sends information to a controller.

:SYSTem:ERROr[:NEXT]?

Returns an error message from the error/event queue. The response format is as follows:

<error_code>,"<error_message>"

Another section of this manual describes the error messages. (See page 115, *Error Messages and Codes*.)

:SYSTem:KLOCK[:STATE] ON|OFF

Locks or unlocks the front-panel buttons and mouse operation. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

:SYSTem:KLOCK[:STATE]?

Returns the current status of the lock function.

:SYSTem:MODE PLAY|RECOrd

Sets the operation mode of the instrument. The choices are PLAY and RECOrd. The default value is PLAY.

:SYSTem:MODE?

Returns the current operation mode of the instrument.

:SYSTem:OPTions?

Returns the option number, hardware version, and code version of the installed interface card.

:SYSTem:PRESet

Resets the instrument to the factory default settings.

:SYSTem:STANDard MPEG|ARIB|ATSC|DVB

Sets the standard used to display the input stream. The choices are MPEG, ARIB, ATSC, and DVB. The default value is ARIB.

:SYSTem:STANDard?

Returns the current standard used to display the input stream.

:SYSTem:STATus?

Returns the current operation status of the instrument. The available responses are:

- 0: the instrument stops any operations
- 1: the instrument is outputting a data
- 2: the instrument is acquiring a data
- 3: the instrument is recording a data

Optional Commands

This subsection describes the commands that are used to control the optional interface cards. These commands are available only when the appropriate interface card is installed into the MTX100B.

Option 01 ASI Interface. :PLAY:ASI:FORMat BYTE|PACKet

Sets the output format of the ASI signal. The choices are BYTE and PACKet. For BYTE, valid data is output using a burst transmission mode. For PACKet, valid data is output in each transport stream packet. The default value is PACKet.

:PLAY:ASI:FORMat?

Returns the current output format setting of the ASI signal.

:PLAY:ASI:THROUGHout ON|OFF

Sets the throughout mode; whether the signal applied to the ASI In connector is output from the ASI Out connector when a stream is not output. You can use 1 or 0 instead of ON or OFF. This setting changes the :RECOrd:ASI:THROUGHout command setting. The default value is ON.

:PLAY:ASI:THROUGHout?

Returns the current throughout mode status when a stream is not output.

:RECOrd:ASI:THROUGHout ON|OFF

Sets the throughout mode; whether the signal applied to the ASI In connector is output from the ASI Out connector. You can use 1 or 0 instead of ON or OFF. This setting changes the :PLAY:ASI:THROUGHout command setting. The default value is ON.

:RECOrd:ASI:THROUGHout?

Returns the current throughout mode status.

Option 02 Universal Parallel/Serial Interface.

:PLAY:UNIVERSal:CLOCK RISE|FALL

Sets the output clock edge of the universal parallel/serial interface. The choices are RISE (rising edge) and FALL (falling edge). The default value is RISE.

:PLAY:UNIVERSal:CLOCK?

Returns the current output clock edge setting of the universal parallel/serial interface.

:PLAY:UNIVERSal:FORMat PARAllel|SERial

Sets the output format of the universal parallel/serial interface. The choices are PARAllel and SERial. The default value is PARAllel.

`:PLAY:UNIVERSal:FORMat?`

Returns the current output format setting of the universal parallel/serial interface.

`:PLAY:UNIVERSal:LEVEL ECL|TTL|LVDS`

Sets the output level of the universal parallel/serial interface. The choices are ECL, TTL, and LVDS. The default value is ECL.

`:PLAY:UNIVERSal:LEVEL?`

Returns the current output level setting of the universal parallel/serial interface.

`:RECOrd:UNIVERSal:CLOCK RISE|FALL`

Sets the input clock edge of the universal parallel/serial interface. The choices are RISE (rising edge) and FALL (falling edge). This setting changes the `:PLAY:UNIVERSal:CLOCK` command setting. The default value is RISE.

`:RECOrd:UNIVERSal:CLOCK?`

Returns the current input clock edge setting of the universal parallel/serial interface.

`:RECOrd:UNIVERSal:FORMat PARAllel|SERial`

Sets the input format of the universal parallel/serial interface. The choices are PARAllel and SERial. This setting changes the `:PLAY:UNIVERSal:FORMat` command setting. If the `:RECOrd:UNIVERSal:TERMination` command is set to OFF, you cannot set the format to SERial. The default value is PARAllel.

`:RECOrd:UNIVERSal:FORMat?`

Returns the current input format setting of the universal parallel/serial interface.

`:RECOrd:UNIVERSal:LEVEL ECL|TTL|LVDS`

Sets the input level of the universal parallel/serial interface. The choices are ECL, TTL, and LVDS. This setting changes the `:PLAY:UNIVERSal:LEVEL` command setting. If the `:RECOrd:UNIVERSal:RECEive` command is set to SINGleend, you cannot set the level to LVDS. The default value is ECL.

`:RECOrd:UNIVERSal:LEVEL?`

Returns the current input level setting of the universal parallel/serial interface.

`:RECOrd:UNIVERSal:PSYNC ON|OFF`

Sets whether the PSYNC signal is used for serial input. When you select ON, the MSB is determined from the PSYNC signal. When you select OFF, the MSB is determined from the bit pattern of the sync byte. You can use 1 or 0 instead of ON or OFF. The default value is ON.

:RECOrd:UNIVersal:PSYnc?

Returns whether the PSYNC signal is used for serial input.

:RECOrd:UNIVersal:RECEive SINGLeend|DIFFerential

Sets the input type for the parallel interface mode. The choices are SINGLeend (single end) and DIFFerential. If the **:RECOrd:UNIVersal:LEVEL** command is set to LVDS, or the **:RECOrd:UNIVersal:TERMination** command is set to OFF, you cannot set the input type to SINGLeend. The default value is SINGLeend.

:RECOrd:UNIVersal:RECEive?

Returns the current input type setting for the parallel interface mode.

:RECOrd:UNIVersal:TERMination ON|OFF

Turns on or off the internal termination of the universal parallel/serial interface. You can use 1 or 0 instead of ON or OFF. If the **:RECOrd:UNIVersal:FORMat** command is set to SERial, or the **:RECOrd:UNIVersal:RECEive** command is set to SINGLeend, you cannot set the internal termination to OFF. The default value is ON.

:RECOrd:UNIVersal:TERMination?

Returns the current internal termination setting of the universal parallel/serial interface.

Option 05 IEEE1394/ASI Interface.

:I1394I:CONNECT <numeric_value>[,<numeric_value>]

Starts the connection between the MTX100B Option 05 and an IEEE1394 device(s). Specify the node ID of the device(s) in the argument(s). Refer to the **:I1394I:NODE:CaTalog** command. When the **:I1394I:MODE** command is set to PTOp, specify the destination device. When the **:I1394I:MODE** command is set to PRObe, specify the source and destination devices.

:I1394I:CONNECT?

Returns the node ID of the IEEE1394 device(s) currently connected to the MTX100B Option 05.

:I1394I:DISConnect

Disconnects the IEEE1394 device(s) connected to the MTX100B Option 05.

:I1394I:MODE PTOp|PRObe

Sets the connection mode when using the IEEE1394 interface. The choices are PTOp (point to point connection) and PRObe (data probing). The default value is PTOp.

:I1394I:MODE?

Returns the current connection mode when using the IEEE1394 interface.

:I1394I:NODe:CATalog?

Lists all the nodes that are connected to the IEEE1394 interface. The response format is as follows:

“node ID, vender ID, serial number, vendor name, device name”

:I1394I:NODe:ID?

Returns the node information of the MTX100B Option 05. The response format is as follows:

“node ID, vender ID, serial number, vendor name, device name”

The node ID is always 0.

:I1394I:STATus?

Returns the current connection status to an IEEE1394 device. The available responses are:

0: an IEEE1394 device is not connected

1: an IEEE1394 device is connected

:I1394I:TOTuner ON|OFF

Sets whether the connection setting is made by the IEEE1394 device in connecting the MTX100B Option 05 to an IEEE1394 device. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

:I1394I:TOTuner?

Returns whether the connection setting is made by the IEEE1394 device in connecting the MTX100B Option 05 to an IEEE1394 device.

:PLAY:ASI:FORMat BYTE|PACKet

Sets the output format of the ASI signal. The choices are BYTE and PACKet. For BYTE, valid data is output using a burst transmission mode. For PACKet, valid data is output in each transport stream packet. The default value is PACKet.

:PLAY:ASI:FORMat?

Returns the current output format setting of the ASI signal.

:RECOrd:I1394I:INPUtport ASI|I1394I

Sets the connector used to capture a stream. The choices are ASI and I1394I (IEEE1394). The default value is I1394I.

:RECOrd:I1394I:INPUtport?

Returns the current input connector.

`:RECORD:I1394I:PARTIALts ON|OFF`

Sets whether the input transport stream is recorded in the partial transport stream format. You can use 1 or 0 instead of ON or OFF. The default value is ON.

`:RECORD:I1394I:PARTIALts?`

Returns whether the input transport stream is recorded in the partial transport stream format.

Option 07 SMPTE310M/ASI/SPI Interface.

`:PLAY:ASI:FORMAT BYTE|PACKet`

Sets the output format of the ASI signal. The choices are BYTE and PACKet. For BYTE, valid data is output using a burst transmission mode. For PACKet, valid data is output in each transport stream packet. The default value is PACKet.

`:PLAY:ASI:FORMAT?`

Returns the current output format setting of the ASI signal.

`:PLAY:OP07AS:PORT:TYPE ASI|S310M`

Selects which signal to output from the SMPTE310M/ASI Output connector. The choices are ASI and S310M (SMPTE310M). The default value is S310M.

`:PLAY:OP07AS:PORT:TYPE?`

Returns the current output signal selection.

`:RECORD:OP07AS:INPUTport BNC|SPI`

Sets the connector used to capture a stream. The choices are BNC (SMPTE310M/ASI Input) and SPI. The default value is BNC.

`:RECORD:OP07AS:INPUTport?`

Returns the current input connector.

`:RECORD:OP07AS:PORT:THROUGHout ON|OFF`

Sets the throughout mode; whether the signal applied to the SMPTE310M/ASI Input connector is output from the SMPTE310M/ASI Output connector. You can use 1 or 0 instead of ON or OFF. The default value is ON.

`:RECORD:OP07AS:PORT:THROUGHout?`

Returns the current throughout mode status.

`:RECORD:OP07AS:PORT:TYPE ASI|S310M`

Selects the input signal expected from the SMPTE310M/ASI Input connector. The choices are ASI and S310M (SMPTE310M). The default value is S310M.

:RECO:OP07AS:PORT:TYPE?

Returns the current input signal selection.

:RECO:TIMESTamp ON|OFF

Sets whether to enable the timestamp feature. When you select ON, packet arrival time information is stored in each packet in a transport stream. You can use 1 or 0 instead of ON or OFF. The default value is ON.

:RECO:TIMESTamp?

Returns the current time-stamp status.

IP Interface

General Settings.

:PLAY:IPAVailable?

Returns whether the IP interface is available.

:PLAY:IPENable ON|OFF

Enables the IP interface when set to ON. You can use 1 or 0 instead of ON or OFF.

:PLAY:IPENable?

Returns whether the IP interface is enabled.

:PLAY:OPCARDenb1 ON|OFF

Enables the optional card when set to ON. You can use 1 or 0 instead of ON or OFF.

:PLAY:OPCARDenb1?

Returns whether the optional card is enabled.

:PLAY:IP:PARAMeters:DEFAu1t

Resets the configuration settings to the default values.

IP Configuration Settings

:PLAY:IP:PARAMeters:IPLAyrvr IPVFOUR|IPVSIX

Selects the IP player version for the payout. The choices are IPVFOUR and IPVSIX. The default value is IPVFOUR.

:PLAY:IP:PARAMeters:IPLAyrvr?

Returns the IP player version of the payout.

:PLAY:IP:PARAMeters:DVCName?

Returns the current device name for the IP payout.

`:PLAY:IP:PARAMeters:DVINDEX <numeric_value>`

Sets the index value of the network interface card. You can set the index value from 0 to N-1 where N is the number of available network interface cards.

`:PLAY:IP:PARAMeters:DVINDEX?`

Returns the current index value of the selected network interface card.

`:PLAY:IP:PARAMeters:TRANsmode UNICAST|MULTICAST|BROADCAST`

Sets the transmission mode of the protocol. The choices are UNICAST, MULTICAST, and BROADCAST. The default value is MULTICAST.

`:PLAY:IP:PARAMeters:TRANsmode?`

Returns the current transmission mode of the protocol.

`:PLAY:IP:PARAMeters:PACKetszmode IPPKSZMD|TSPKCTMD`

Sets the packet size mode for the IP ployout. The choices are IPPKSZMD and TSPKCTMD. The default value is TSPKCTMD.

`:PLAY:IP:PARAMeters:PACKetszmode?`

Returns the current packet size mode.

`:PLAY:IP:PARAMeters:IPPKtsize <numeric_value>`

Sets the size of the IP packet. You can set the IPv4 packet size from 55-1500 bytes (TS fragmentation) and from 55-16128 bytes (both TS and IP fragmentation). The default value is 1370 bytes.

`:PLAY:IP:PARAMeters:IPPKtsize?`

Returns the current size of the IP packet.

`:PLAY:IP:PARAMeters:TSPKtcount <numeric_value>`

Sets the number of TS packets that needs to be embedded into an IP packet. You can set the TS packets from 1-7 (TS Fragmentation) and from 1-85 (both TS and IP fragmentation). The default value is 7.

`:PLAY:IP:PARAMeters:TSPKtcount?`

Returns the current number of TS packets that is embedded into an IP packet.

`:PLAY:IP:PARAMeters:TSFRagment ON|OFF`

Allows fragmentation of TS packets. When set to ON, the TS packets will be split across the IP packets. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

`:PLAY:IP:PARAMeters:TSFRagment?`

Returns whether to allow TS fragmentation across IP packets.

`:PLAY:IP:PARAMeters:IPFRagment ON|OFF`

Allows fragmentation of IP packets. When set to ON, the IP packets will be fragmented else they will retain the same size. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

`:PLAY:IP:PARAMeters:IPFRagment?`

Returns whether to allow IP fragmentation during IP ployout.

`:PLAY:IP:PARAMeters:BITRate <numeric_value>`

Sets the IP bit rate value for the ployout. You can set the values from 0.250 Mbps to 250.000 Mbps.

`:PLAY:IP:PARAMeters:BITRate?`

Returns the current value of the IP bit rate.

Protocol Settings

`:PLAY:IP:PARAMeters:PRTOCOL:SETTings:MODE UDP|RTP`

Sets the protocol mode for IP ployout. The choices are UDP and RTP. The default mode is RTP.

`:PLAY:IP:PARAMeters:PRTOCOL:SETTings:MODE?`

Returns the current protocol mode for IP ployout.

`:PLAY:IP:PARAMeters:PRTOCOL:SETTings:SRCIpadd <IP address of the instrument>`

Sets the source IP address for the IPv4 version of the ployout.

`:PLAY:IP:PARAMeters:PRTOCOL:SETTings:SRCIpadd?`

Returns the current value of the source IP address for the IPv4 version.

`:PLAY:IP:PARAMeters:PRTOCOL:SETTings:DSTIpadd <IP address of the destination>`

Sets the destination IP address for the IPv4 version of the ployout. The default value is 239.1.1.1.

`:PLAY:IP:PARAMeters:PRTOCOL:SETTings:DSTIpadd?`

Returns the current value of the destination IP address for the IPv4 version.

`:PLAY:IP:PARAMeters:PRTOCOL:SETTings:SRC6Ipadd <IP address of the instrument>`

Sets the source IP address for the IPv6 version of the ployout.

`:PLAY:IP:PARAMeters:PRTOCOL:SETTings:SRC6Ipadd?`

Returns the current value of the source IP address for the IPv6 version.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:DST6ipadd <IP address of the destination>`

Sets the destination IP address for the IPv6 version of the playout.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:DST6ipadd?`

Returns the current value of the destination IP address for the IPv6 version.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:SRCPort <numeric_value>`

Sets the source port for the IP playout. You can set the source port value from 0 to 65535. The default value is 16384.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:SRCPort?`

Returns the current source port value.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:DSTPort <numeric_value>`

Sets the destination port value. You can set the destination port value from 0 to 65535. The default value is 16384.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:SRCPort?`

Returns the current source port value.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:DSTPort <numeric_value>`

Sets the destination port value. You can set the destination port value from 0 to 65535. The default value is 16384.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:DSTPort?`

Returns the current destination port value.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:VLAN ON|OFF`

Enables the VLAN settings. When set to on, displays the VLAN parameters in the Advanced settings screen. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:VLAN?`

Returns whether the VLAN settings is enabled.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:VLNid <numeric_value>`

Sets the VLAN identification number to allow the identification of 4096 VLANs that is basically used by the 802.1Q standard. You can set the values from 0 to 4095. The default value is 1.

`:PLAY:IP:PARAMeters:PRTOcol:SETTings:VLNid?`

Returns the current VLAN identification number.

Protocol Settings-Advanced Settings

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:DESTmac
<string>

Sets the destination MAC address of the Ethernet layer, where <string> is of the format “xx:xx:xx:xx:xx:xx”.

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:DESTmac?

Returns the current destination MAC address of the Ethernet layer.

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:SRCEmac
<string>

Sets the source MAC address of the Ethernet layer, where <string> is of the format “xx:xx:xx:xx:xx:xx”.

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:SRCEmac?

Returns the current source MAC address of the Ethernet layer.

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:
PROTOcol<numeric_value>

Sets the value of the protocol field in the ethernet layer. You can set the values from 0 to 65535. The default value is 2048 which corresponds to IP.

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:PROTOcol?

Returns the current value of the protocol field in the Ethernet layer.

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:VLAN:TPID
<string>

Sets the TPID value of the VLAN in the Ethernet layer. You can set the values from 0 to FFFF. The default value is 0X8100.

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:VLAN:TPID?

Returns the current TPID value of the VLAN.

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:VLAN:
PRIOrity <numeric_value>

Sets the priority level of the VLAN in the Ethernet layer. You can set the values from 0 to 7. The default value is 5.

:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:ETHERnet:
VLAN:PRIOrity?

Returns the current priority value of the VLAN.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:ETHERnet:VLAN:CFI
ON|OFF

Sets the canonical format indicator for the VLAN. When set to on (1), non-canonical MAC is selected. The default value is OFF.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:ETHERnet:VLAN:CFI?

Returns the current status of the CFI.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:ETHERnet:VLAN:VID
<numeric_value>

Sets the identification for the VLAN. The VID values can range from 0 to 4095. The default value is 1.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:ETHERnet:VLAN:VID?

Returns the current VID value of the VLAN.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:IP:VERSION?

Returns the IP version.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:IP:TOS
<numeric_value>

Sets the type of service that indicates the desired parameters. The parameters are delay, throughput, and reliability. You can set the type of service value from 0 to 255. The default value is 0.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:IP:TOS?

Returns the current type of service.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:IP:PROTocol
<numeric_value>

Sets the value of the protocol field in the IP layer. You can set the values from 0 to 255. The default value is 17 which corresponds to UDP.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:IP:PROTocol?

Returns the current value of the protocol field.

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:IP:SRCIpadd
<string>

Sets the source IP address for the IP layer, where <string> is of the format "xx:xx:xx:xx:xx:xx".

:PLAY:IP:PARAMeters:PRTocol:CUSTOMize:HEADers:IP:SRCIpadd?

Returns the current source IP address for the IP layer.

- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IP:DSTIpadd`
<string>
- Sets the destination IP address for the IP layer, where <string> is of the format “XX:XX:XX:XX:XX:XX”.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IP:DSTIpadd?`
- Returns the current destination IP address for the IP layer.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IP:HEADerlngth?`
- Returns the current length of the IP header.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IP:TOTALlngth?`
- Returns the current total length of the IP packet.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IP:TTL`
<numeric_value>
- Sets the value of Time to Live in the IP layer. You can set the value from 0 to 255. The default value is 5.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IP:TTL?`
- Returns the current value of Time to Live in the IP layer.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:UDP:SRCPort`
<numeric_value>
- Sets the source port value of the UDP layer. You can set the value from 0 to 65535. The default value is 16384.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:UDP:SRCPort?`
- Returns the current source port value of the UDP layer.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:UDP:DSTPort`
<numeric_value>
- Sets the destination port value of the UDP layer. You can set the value from 0 to 65535. The default value is 16384.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:UDP:DSTPort?`
- Returns the current destination port value of the UDP layer.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:UDP:LENGth?`
- Returns the current length of the UDP packets.
- `:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:RTP:VERSion?`
- Returns the current version of the RTP.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:RTP:SQNCnumber
<numeric_value>`

Sets the first value of the sequence number field in RTP header. You can set the value from 0 to 65535.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:RTP:SQNCnumber?`

Returns the first value of the sequence number field.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:RTP:SSRC
<numeric_value>`

Sets the SSRC value for the RTP layer. You can set the value from 0 to 65535.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:RTP:SSRC?`

Returns the SSRC value for the RTP layer.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:RTP:PYLoadtype
<numeric_value>`

Sets the value of the payload type for the RTP layer. You can set the value from 0 to 255. The default value is 33.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:RTP:PYLoadtype?`

Returns the current value of the payload type for the RTP layer.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:IPV6:VERSion?`

Returns the version number of the IPv6 protocol.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:IPV6:TRFCCls
<numeric_value>`

Sets the value of the traffic class for the IPv6 layer. You can set the value from 0 to 255. The default value is 0.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:IPV6:TRFCCls?`

Returns the current value of the traffic class for the IPv6 layer.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:IPV6:FLOWlbl
<numeric_value>`

Sets the value of the flow label for the IPv6 layer. The default value is 0.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:IPV6:FLOWlbl?`

Returns the current value of the flow label for the IPv6 layer.

`:PLAY:IP:PARAMeters:PRTOco1:CUSTOMize:HEADers:IPV6:PYLDlen?`

Returns the current value of the payload length.

`:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IPV6:NXTHdr
<numeric_value>`

Sets the value of the next header for the IPv6 layer. You can set the values from 0 to 255. The default value is 17.

`:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IPV6:NXTHdr?`

Returns the current value of the next header for the IPv6 layer.

`:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IPV6:HOPLimit
<numeric_value>`

Sets the value of the hop limit for the IPv6 layer. You can set the value from 0 to 255. The default value is 12.

`:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IPV6:HOPLimit?`

Returns the current value of the hop limit for the IPv6 layer.

`:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IPV6:SRCIpadd
<numeric_value>`

Sets the source address of the IPv6 layer.

`:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IPV6:SRCIpadd?`

Returns the source address of the IPv6 layer.

`:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IPV6:DSTIpadd
<numeric_value>`

Sets the destination address of the IPv6 layer.

`:PLAY:IP:PARAMeters:PRTOcol:CUSTOMize:HEADers:IPV6:DSTIpadd?`

Returns the destination address of the IPv6 layer.

Protocol Settings-Stream Replication Settings

`:PLAY:IP:PARAMeters:REPLication:COUNT <numeric_value>`

Sets the number of replications for a stream. You can set the value from 0 to 65535. The default value is 0.

`:PLAY:IP:PARAMeters:REPLication:COUNT?`

Returns the number of stream replications.

`:PLAY:IP:PARAMeters:REPLication:INCREMENT:ETHERnet:SRcMac
<string>`

Sets the increment value for the source MAC address, where <string> is of the format “xx:xx:xx:xx:xx:xx” and xx is hexadecimal. The increments for these addresses can be specified for each node. The value of the next node will be rolled over when the value of the incremented node reaches the maximum.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:SRCMac?

Returns the current increment value of the source MAC address.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:DSTMac
<string>

Sets the increment value for the destination MAC address, where <string> is of the format “xx:xx:xx:xx:xx:xx” and xx is hexadecimal. The increments for these addresses can be specified per node. The value of the next node will be rolled over when the value of the incremented node reaches the maximum.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:DSTMac?

Returns the current increment value of the destination MAC address.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:EPRotocol
<numeric_value>

Sets the increment value for the Ethernet protocol. You can set the value from 0 to 65535.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:EPRotocol?

Returns the current increment value of the Ethernet protocol.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:VLANid
<numeric_value>

Sets the identification of the VLAN. The values can range from 0 to 4095.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:VLANid?

Returns the current identification value of the VLAN.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:IP:TOS
<numeric_value>

Sets the increment value for the type of service of the IP protocol. You can set the value from 0 to 255.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:IP:TOS?

Returns the current increment value of the type of service.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:IP:TTL
<numeric_value>

Sets the increment value for time to live of the IP protocol. You can set the value from 0 to 255.

:PLAY:IP:PARAMeters:REPLiCation:INCRement:IP:TTL?

Returns the current increment value of the time to live attribute.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:IP:SRCIpadd`
`<string>`

Sets the increment value for the source IP address, where `<string>` is of the format “xx:xx:xx:xx:xx:xx” and xx is hexadecimal. The increments for IP addresses can be specified for each node. The value of the next node will be rolled over when the value of the incremented node reaches the maximum.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:IP:SRCIpadd?`

Returns the current increment value of the source IP address.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:IP:DSTIpadd`
`<string>`

Sets the increment value for the destination IP address, where `<string>` is of the format “xx:xx:xx:xx:xx:xx” and xx is hexadecimal. The increments for IP addresses can be specified for each node. The value of the next node will be rolled over when the value of the incremented node reaches the maximum.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:IP:DSTIpadd?`

Returns the current increment value of destination IP address.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:IP:`
`IPROtocol<numeric_value>`

Sets the increment value for the IP protocol. You can set the value from 0 to 255.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:IP:IPROtocol?`

Returns the current increment value of the IP protocol.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:UDP:SRCPort`
`<numeric_value>`

Sets the increment value for the source port of the UDP layer. You can set the value from 0 to 65535.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:UDP:SRCPort?`

Returns the current increment value of the source port.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:UDP:DSTPort`
`<numeric_value>`

Sets the increment value for the destination port of the UDP layer. You can set the value from 0 to 65535.

`:PLAY:IP:PARAMeters:REPLIcation:INCRement:UDP:DSTPort?`

Returns the current increment value of the destination port.

`:PLAY:IP:PARAMeters:REPLication:INCRement:RTP:PAYLoad`
`<numeric_value>`

Sets the increment value for the payload of the RTP layer. You can set the value from 0 to 127.

`:PLAY:IP:PARAMeters:REPLication:INCRement:RTP:PAYLoad?`

Returns the current increment value of the payload.

`:PLAY:IP:PARAMeters:REPLication:INCRement:RTP:SSRC`
`<numeric_value>`

Sets the increment value for the SSRC of the RTP layer. You can set the value from 0 to 65535.

`:PLAY:IP:PARAMeters:REPLication:INCRement:RTP:SSRC?`

Returns the current increment value of the SSRC.

`:PLAY:IP:PARAMeters:REPLication:INCRement:IPV6:TRFCCls`

Sets the increment value for the traffic class of the IPv6 layer. You can set the value from 0 to 255. The default value is 0.

`:PLAY:IP:PARAMeters:REPLication:INCRement:IPV6:TRFCCls?`

Returns the current increment value of the traffic class.

`:PLAY:IP:PARAMeters:REPLication:INCRement:IPV6:FLOWlbl`

Sets the increment value for the flow label of the IPv6 layer. The default value is 0.

`:PLAY:IP:PARAMeters:REPLication:INCRement:IPV6:FLOWlbl?`

Returns the current increment value of the flow label.

`:PLAY:IP:PARAMeters:REPLication:INCRement:IPV6:NXTHdr`

Sets the increment value for the next header of the IPv6 layer. You can set the value from 0 to 255. The default value is 17.

`:PLAY:IP:PARAMeters:REPLication:INCRement:IPV6:NXTHdr?`

Returns the current increment value of the next header.

`:PLAY:IP:PARAMeters:REPLication:INCRement:IPV6:HOPLimit`

Sets the increment value for the hop limit of the IPv6 layer. You can set the value from 0 to 255. The default value is 12.

`:PLAY:IP:PARAMeters:REPLication:INCRement:IPV6:HOPLimit?`

Returns the current increment value of the hop limit.

`:PLAY:IP:PARAMeters:REPLication:INCRement:IPV6:SRCIpadd`

Sets the increment value for the source IPv6 address of the IPv6 layer.

`:PLAY:IP:PARAMeters:REPLiCation:INCRement:IPV6:SRCIpadd?`

Returns the current increment value of the source IPv6 address.

`:PLAY:IP:PARAMeters:REPLiCation:INCRement:IPV6:DSTIpadd`

Sets the increment value for the destination IPv6 address of the IPv6 layer. The default value is ff0e::1.

`:PLAY:IP:PARAMeters:REPLiCation:INCRement:IPV6:DSTIpadd?`

Returns the current increment value of the destination IPv6 address.

Error Insertion

`:PLAY:IP:ERRIns:ENBLed ON|OFF`

Enables error insertion in real time when the value is set to ON. You can use 1 or 0 instead of ON or OFF.

`:PLAY:IP:ERRIns:ENBLed?`

Returns whether the error insertion is enabled.

`:PLAY:IP:ERRIns:PARAMeters:PLENbled ON|OFF`

Enables packet loss when the value is set to ON. You can use 1 or 0 instead of ON or OFF.

`:PLAY:IP:ERRIns:PARAMeters:PLENbled?`

Returns whether the packet loss is enabled.

`:PLAY:IP:ERRIns:PARAMeters:PLVAlue <numeric_value>`

Sets the number of packets that will be dropped. You can set the value from 0 to 65535.

`:PLAY:IP:ERRIns:PARAMeters:PLVAlue?`

Returns the current number of dropped packets.

`:PLAY:IP:ERRIns:PARAMeters:PLRAnge <numeric_value>`

Sets the packet loss range. You can set the value from 0 to 65535.

`:PLAY:IP:ERRIns:PARAMeters:PLRAnge?`

Returns the current packet loss range.

`:PLAY:IP:ERRIns:PARAMeters:SQEEnbled ON|OFF`

Enables sequence error when the value is set to ON. You can use 1 or 0 instead of ON or OFF.

`:PLAY:IP:ERRIns:PARAMeters:SQEEnbled?`

Returns whether the sequence error is enabled.

`:PLAY:IP:ERRIns:PARAMeters:SQEVaLue <numeric_vaLue>`

Sets the frequency value at which the packets will be reordered. You can set the value from 0 to 65535.

`:PLAY:IP:ERRIns:PARAMeters:SQEVaLue?`

Returns the current frequency value at which the packets are reordered.

`:PLAY:IP:ERRIns:PARAMeters:SQERaNgE <numeric_vaLue>`

Sets the sequence error range. You can set the value from 0 to 65535

`:PLAY:IP:ERRIns:PARAMeters:SQERaNgE?`

Returns the current sequence error range value.

`:PLAY:IP:ERRIns:PARAMeters:SQEDistance <numeric_vaLue>`

Sets the distance value after which you want the reordering to happen. You can set the value from 0 to 65535

`:PLAY:IP:ERRIns:PARAMeters:SQEDistance?`

Returns the current distance value.

`:PLAY:IP:ERRIns:PARAMeters:CSEnblEd ON|OFF`

Enables checksum error when the value is set to ON. You can use 1 or 0 instead of ON or OFF.

`:PLAY:IP:ERRIns:PARAMeters:CSEnblEd?`

Returns whether the checksum error has been enabled.

`:PLAY:IP:ERRIns:PARAMeters:CSEType IP|UDP`

Sets the checksum error type. The choices are IP and UDP layer.

`:PLAY:IP:ERRIns:PARAMeters:CSEType?`

Returns the current value of the checksum error type.

`:PLAY:IP:ERRIns:PARAMeters:CSEVaLue <numeric_vaLue>`

Sets the frequency value at which the checksum error will be inserted. You can set the value from 0 to 65535.

`:PLAY:IP:ERRIns:PARAMeters:CSEVaLue?`

Returns the current frequency value at which the checksum errors are inserted.

`:PLAY:IP:ERRIns:PARAMeters:CSEraNgE <numeric_vaLue>`

Sets the checksum error range. You can set the value from 0 to 65535.

`:PLAY:IP:ERRIns:PARAMeters:CSEraNgE?`

Returns the current checksum error range value.

:PLAY:IP:ERRIns:PARAMeters:RANDomizerr ON|OFF

Sets the error insertion type. When set to ON, the random type is enabled. You can use 1 or 0 instead of ON or OFF.

:PLAY:IP:ERRIns:PARAMeters:RANDomizerr?

Returns the current value of the randomizer.

Error Generation

:PLAY:IP:ERRGen:GPKTlOs

Generates packet loss by dropping one packet during the IP ployout.

:PLAY:IP:ERRGen:GSQNerr

Generates sequence error by re-sequencing a packet with another packet within a 100packet boundary.

:PLAY:IP:ERRGen:GCHIper

Generates checksum error in the IP layer.

:PLAY:IP:ERRGen:GCHUdperr

Generates checksum error in the UDP layer.

Statistics

:PLAY:IP:STATistics:IP:BITRate?

Returns the IP bit rate value for the play.

:PLAY:IP:STATistics:IP:BRVArIation?

Returns the percentage of IP bit rate variation from the set bit rate.

:PLAY:IP:STATistics:IP:BITRate:MIN?

Returns the minimum IP bit rate value for the play.

:PLAY:IP:STATistics:IP:BITRate:MINVArIation?

Returns the minimum variation value from the set bit rate value.

:PLAY:IP:STATistics:IP:BITRate:MAX?

Returns the maximum IP bit rate value for the play.

:PLAY:IP:STATistics:IP:BITRate:MAXVArIation?

Returns the maximum IP bit rate variation value from the set bit rate value.

:PLAY:IP:STATistics:IP:BITRate:AVG?

Returns the average bit rate value for the play.

:PLAY:IP:STATistics:IP:BITRate:AVGVariation?

Returns the average variation value from the set bit rate value.

:PLAY:IP:STATistics:IP:JITer?

Returns the jitter value for the play.

:PLAY:IP:STATistics:IP:JITter:MIN?

Returns the minimum jitter value for the play.

:PLAY:IP:STATistics:IP:JITter:MAX?

Returns the maximum jitter value for the play.

:PLAY:IP:STATistics:IP:JITter:AVG?

Returns the average jitter value for the play.

:PLAY:IP:STATistics:IP:PKTSize?

Returns the IP packet size for the play.

:PLAY:IP:STATistics:IP:PKTCount?

Returns the IP packet count for the play.

:PLAY:IP:STATistics:IP:BYTRansmitted?

Returns the number of IP bytes transmitted during the play.

:PLAY:IP:STATistics:TS:BITRate?

Returns the TS bit rate value for the play.

:PLAY:IP:STATistics:TS:BRVArIation?

Returns the TS bit rate variation value from the set bit rate value.

:PLAY:IP:STATistics:TS:BITRate:MIN?

Returns the minimum TS bit rate value for the play.

:PLAY:IP:STATistics:TS:BITRate:MINVArIation?

Returns the minimum TS bit rate variation value from the set bit rate value.

:PLAY:IP:STATistics:TS:BITRate:MAX?

Returns the maximum TS bit rate value for the play.

:PLAY:IP:STATistics:TS:BITRate:MAXVArIation?

Returns the maximum TS bit rate variation value from the set bit rate value.

:PLAY:IP:STATistics:TS:BITRate:AVG?

Returns the average TS bit rate value for the play.

:PLAY:IP:STATISTICS:TS:BITRATE:AVGVARIATION?

Returns the average TS bit rate variation value from the set bit rate value.

:PLAY:IP:STATISTICS:TS:PKTSIZE?

Returns the TS packet size for the play.

:PLAY:IP:STATISTICS:TS:PKTCOUNT?

Returns the TS packet count for the play.

:PLAY:IP:STATISTICS:ERRORS:PKTDROPPED?

Returns the number of packets dropped during the play.

:PLAY:IP:STATISTICS:ERRORS:SQNErrs?

Returns the number of sequence errors inserted during the play.

:PLAY:IP:STATISTICS:ERRORS:CSIPerrS?

Returns the number of IP checksum errors inserted during the play.

:PLAY:IP:STATISTICS:ERRORS:CSUDPerrS?

Returns the number of UDP checksum errors inserted during the play.

:PLAY:IP:STATISTICS:REPLICATION:IP:BITRATE?

Returns the total IP bit rate of all the streams.

:PLAY:IP:STATISTICS:REPLICATION:IP:PKTCOUNT?

Returns the total IP packet count of all the streams.

:PLAY:IP:STATISTICS:REPLICATION:IP:BYTRANSMITTED?

Returns the total bytes transmitted in all the streams.

:PLAY:IP:STATISTICS:REPLICATION:TS:BITRATE?

Returns the total TS bit rate of all the streams.

:PLAY:IP:STATISTICS:REPLICATION:TS:PKTCOUNT?

Returns the total count of TS packets of all the streams.

:PLAY:IP:STATISTICS:REPLICATION:ERRORS:PKTDROPPED?

Returns the total packets dropped of all the streams.

:PLAY:IP:STATISTICS:REPLICATION:ERRORS:SQNErrs?

Returns the total number of sequential errors of all the streams.

:PLAY:IP:STATISTICS:REPLICATION:ERRORS:CSIPerrS?

Returns the total number of IP checksum errors of all the streams.

`:PLAY:IP:STATistics:REPLication:ERRors:CSUDPerrs?`

Returns the total number of UDP checksum errors of all the streams.

Other Settings

`:PLAY:IP:OTHSttngs:PROCpriority`

`NORMAL | ABOVE_NORMAL | HIGHEST | REAL_TIME`

Sets the process priority for the player. The choices are `NORMAL`, `ABOVE_NORMAL`, `HIGHEST`, and `REAL_TIME`. The default value is `REAL_TIME`.

`:PLAY:IP:OTHSttngs:THRPriority`

`IDLE | BELOW_NORMAL | NORMAL | ABOVE_NORMAL | HIGHEST | REAL_TIME`

Sets the thread priority for the player. The choices are `IDLE`, `BELOW_NORMAL`, `NORMAL`, `ABOVE_NORMAL`, `HIGHEST`, and `REAL_TIME`. The default value is `NORMAL`.

`:PLAY:IP:OTHSttngs:THRPriority?`

Returns the current thread priority value of the play.

Parametric Settings

`:PLAY:IP:PRMetric:BSTEnabled ON|OFF`

Enables the burst mode when the value is set to `ON`. You can use `1` or `0` instead of `ON` or `OFF`.

`:PLAY:IP:PRMetric:BSTEnabled?`

Returns whether the burst mode has been enabled.

`:PLAY:IP:PRMetric:BSTType BURST_PERIOD|BURST_SIZE`

Sets the burst mode for the IP playout. The choices are `BURST_PERIOD` and `BURST_SIZE`. The default is `BURST_PERIOD`.

`:PLAY:IP:PRMetric:BSTType?`

Returns the current value of the burst mode.

`:PLAY:IP:PRMetric:BPERiod <numeric_value>`

Sets the burst period for the IP playout. The value can range from `1 ms` to `1000 ms`.

`:PLAY:IP:PRMetric:BPERiod?`

Returns the current value of the burst period.

`:PLAY:IP:PRMetric:BSIZE <numeric_value>`

Sets the burst size for the IP playout. The values can range from `1` to `65535`.

`:PLAY:IP:PRMetric:BSIZE?`

Returns the current value of the burst size.

`:PLAY:IP:PRMetric:JITEnabled ON|OFF`

Enables jitter when the value is set to ON. You can use 1 or 0 instead of ON or OFF.

`:PLAY:IP:PRMetric:JITEnabled?`

Returns whether the jitter has been enabled.

`:PLAY:IP:PRMetric:LOWJitmd ON|OFF`

Enables the low jitter mode when set to ON. You can use 1 or 0 instead of ON or OFF.

`:PLAY:IP:PRMetric:LOWJitmd?`

Returns whether the low jitter mode has been enabled.

`:PLAY:IP:PRMetric:JITType LAPLACE|GAUSSIAN|SINE|FIXED`

Sets the jitter type for IP ployout. The options are LAPLACE, GAUSSIAN, SINE, and FIXED. The default value is FIXED.

`:PLAY:IP:PRMetric:JITType?`

Returns the current jitter type for IP ployout.

`:PLAY:IP:PRMetric:JITPeriod <numeric_value>`

Sets the jitter period value for IP ployout. You can set numeric value in micro seconds for FIXED jitter type and percentage value for all the other jitter types.

`:PLAY:IP:ERRIns:PARAMeters:JITPeriod?`

Returns the current value of jitter period for IP ployout.

Timestamped TS Ployout Settings

`:PLAY:IP:TTSttns:TTSEnabled ON|OFF`

Enables the timestamped TS (TTS) settings for the ployout when set to ON. You can use 1 or 0 instead of ON or OFF. The default is set to OFF.

`:PLAY:IP:TTSttns:TTSEnabled?`

Returns whether the TTS settings has been enabled for the ployout.

`:PLAY:IP:TTSttns:PRSRvts ON|OFF`

Enables the preservation of the file that stores the TS settings.

`:PLAY:IP:TTSttns:PRSRvts?`

Returns whether the preserve TTS settings option is enabled for the player.

`:PLAY:IP:TTSStngs:TTSJitter:JTREnable ON|OFF`

Enables the TTS jitter settings for the payout. You can use 1 or 0 instead of ON or OFF. The default is set to OFF.

`:PLAY:IP:TTSStngs:TTSJitter:JTREnable?`

Returns whether the TTS jitter settings is enabled for the payout.

`:PLAY:IP:TTSStngs:TTSJitter:PATtern`
`SINE|SQUARE|TRIANGLE|PULSE|SAW|RANDOM|OFFSET`

Sets the TTS jitter pattern for the payout. The various options are SINE, SQUARE, TRIANGLE, PULSE, SAW, RANDOM, and OFFSET. The default option is SINE.

`:PLAY:IP:TTSStngs:TTSJitter:PATtern?`

Returns the TTS jitter pattern of the payout.

`:PLAY:IP:TTSStngs:TTSJitter:PERIod <numeric_value>`

Sets the TTS jitter period for the payout. You cannot set the period for random and offset jitter patterns. The default value is 0.

`:PLAY:IP:TTSStngs:TTSJitter:PERIod?`

Returns the TTS jitter period of the payout.

`:PLAY:IP:TTSStngs:TTSJitter:AMPLitude <numeric_value>`

Sets the TTS jitter amplitude for the payout. You can set the amplitude for all the jitter patterns. The default value is 0.

`:PLAY:IP:TTSStngs:TTSJitter:AMPLitude?`

Returns the TTS jitter amplitude of the payout.

`:PLAY:IP:TTSStngs:TTSJitter:PLSwidth <numeric_value>`

Sets the TTS jitter pulse width for the payout. You can set the width of only pulse pattern. The default value is 0.

`:PLAY:IP:TTSStngs:TTSJitter:PLSwidth?`

Returns the TTS jitter pulse width of the payout.

Default Settings

The following table lists the default settings of the remote commands.

These default settings can be set by using the *RST command, except for the :SYSTEM:COMMUNICATE:SOCKET command settings.

Table 23: Default Settings

Header	Default settings
DISPLAY commands	
:DISPlay:VIEW:FORMat	HEXadecima1
PLAY commands	
:PLAY:AUTOplay	OFF (0)
:PLAY:CLOCK:DEFau1t:RATE	5.6610E+001
:PLAY:CLOCKDEFau1t:RATE:RATIO	629,300
:PLAY:CLOCK:ESRatefixed	OFF (0)
:PLAY:CLOCKISDBT:CONVert	ON (1)
:PLAY:CLOCK:RATE	5.6610E+001
:PLAY:CLOCK:RATE:RATIO	0, 0
:PLAY:CLOCK:SOURce	INTerna1
:PLAY:EXTerna1	OFF (0)
:PLAY:EXTTrigger:BNC	INPUT
:PLAY:EXTTrigger:OUTPut:DELAy	0
:PLAY:EXTTrigger:OUTPut:SELEct	C27M
:PLAY:LOOP	ON (1)
:PLAY:LOOP:ISDBT:FRAME	ON (1)
:PLAY:PACKet	188
:PLAY:PCR:INACcuracy	NONE
:PLAY:PCR:INITia1	0, 0
:PLAY:S192F:PARTia1ts	ON (1)
:PLAY:SOURce	DISK
:PLAY:SPIOoutput	ON (1)
:PLAY:SSPosition:INITia1:ENABLe	ON (1)
:PLAY:SSPosition:INITia1[:POSition]	0
:PLAY:SSPosition:INITia1:TIME	00:00:00
:PLAY:SSPosition[:POSition]	0, 0
:PLAY:SSPosition:TIME	00:00:00, 00:00:00
:PLAY:SYNC	TSPacket
:PLAY:SYNC:DVALid:WIDTh	NONE
:PLAY:SYNC:PSYNc:INTerva1	NONE

Table 23: Default Settings (cont.)

Header	Default settings
:PLAY:TIMEpacket:DEFine	Current data and time
:PLAY:TIMEpacket:MODE	ORIGina1
:PLAY:UPDAte	ON (1)
:PLAY:ITEM:CC	ON (1)
:PLAY:ITEM:NPT	OFF (1)
:PLAY:ITEM:PCR	ON (1)
:PLAY:ITEM:PCR:METhod	HARDware
:PLAY:ITEM:REEDSolomon	ON (1)
:PLAY:ITEM:TIMEpacket	ON (1)
RECORD commands	
:RECORD:EXTerna1	OFF (0)
:RECORD:SOURce	SPI
:RECORD:STORE:MODE	OVERwrite
:RECORD:TARGET:IGNOredvalid	OFF (0)
:RECORD:TARGET:SIZE	50 [MB}
:RECORD:TARGET:TIME	00:00:00
:RECORD:TARGET:TRIGger:CONTInuous	OFF (0)
:RECORD:TARGET:TRIGger:CONTInuous:LIMit	32767
:RECORD:TARGET:TRIGger:POSition	0 [%]
:RECORD:TARGET:TYPE	DISK
:RECORD:TARGET:UNLIMit	OFF (0)
SYSTEM commands	
:SYSTEM:COMMUnicate:SOCKet:PORT	49152
:SYSTEM:COMMUnicate:SOCKet:RXTERM	LF
:SYSTEM:COMMUnicate:SOCKet:TXTERM	CRLF
:SYSTEM:KLOCK[:STATE]	OFF (0)
:SYSTEM:MODE	PLAY
:SYSTEM:STANDard	ARIB
Optional commands	
Option 01 ASI Interface	
:PLAY:ASI:FORMat	PACKet
:PLAY:ASI:THROughout	ON (1)
:RECORD:ASI:THROughout	ON (1)
Option 02 Universal Parallel/Serial Interface	
:PLAY:UNIVersa1:CLOCK	RISE
:PLAY:UNIVersa1:FORMat	PARa11e1
:PLAY:UNIVersa1:LEVE1	ECL

Table 23: Default Settings (cont.)

Header	Default settings
:PLAY:UNIVERSAL:PICLOCK	1
:RECORD:UNIVERSAL:CLOCK	RISE
:RECORD:UNIVERSAL:FORMAT	PARALLEL
:RECORD:UNIVERSAL:LEVEL	ECL
:RECORD:UNIVERSAL:PSYNC	ON (1)
:RECORD:UNIVERSAL:RECEIVE	SINGLEEND
:RECORD:UNIVERSAL:TERMINATION	ON (1)
Option 05 IEEE1394/ASI Interface	
:I1394I:MODE	PTOP
:I1394I:TOTUNER	OFF (0)
:PLAY:ASI:FORMAT	PACKET
:RECORD:I1394I:INPUTPORT	I1394I
:RECORD:I1394I:PARTIALTS	ON (1)
Option 07 SMPTE310M//ASI/SPI Interface	
:PLAY:ASI:FORMAT	PACKET
:PLAY:OP07AS:PORT:TYPE	S310M
:RECORD:OP07AS:INPUTPORT	BNC
:RECORD:OP07AS:PORT:THROUGHOUT	ON (1)
:RECORD:OP07AS:PORT:TYPE	S310M
:RECORD:TIMESTAMP	ON (1)
IP Interface: General Settings	
:PLAY:IPENABLE	OFF
:PLAY:OPCARDENBL	ON
:PLAY:IP:PARAMETERS:DEFAULT	No parameters
:PLAY:IP:PARAMETERS:DVINDEX	0
:PLAY:IP:PARAMETERS:TRANSMODE	MULTICAST
:PLAY:IP:PARAMETERS:PACKETSMODE	TSPKTZMODE
:PLAY:IP:PARAMETERS:IPPKTSIZE	1370
:PLAY:IP:PARAMETERS:TSPKTCOUNT	7
:PLAY:IP:PARAMETERS:TSPKTFRAGMENT	OFF (0)
:PLAY:IP:PARAMETERS:IPFRAGMENT	OFF (0)
:PLAY:IP:PARAMETERS:BITRATE	28.107902 Mbps
IP Interface: Protocol Settings	
:PLAY:IP:PARAMETERS:PROTOCOL:SETTINGS:MODE	RTP
:PLAY:IP:PARAMETERS:PROTOCOL:SETTINGS:SRCIPADD	Automatically detected from the active Network interface Card (NIC interface)
:PLAY:IP:PARAMETERS:PROTOCOL:SETTINGS:DSTIPADD	239.1.1.1
:PLAY:IP:PARAMETERS:PROTOCOL:SETTINGS:SRCPORT	16384

Table 23: Default Settings (cont.)

Header	Default settings
:PLAY:IP:PARAMeters:PRTOcol:SETTings:DSTPort	16384
:PLAY:IP:PARAMeters:PRTOcol:SETTings:VLAN	OFF
IP Interface: Protocol Settings: Advanced Screen Settings	
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:ETHERnet:DESTmac	01:00:5E:01:01:01
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:ETHERnet:SRCEmac	Automatically detected from the active Network Interface Card (NIC interface)
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:ETHERnet:PROTOcol	2048
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:ETHERnet:VLAN:TPID	0x8100
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:ETHERnet:VLAN:PRIORity	5
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:ETHERnet:VLAN:CFI	OFF (0)
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:ETHERnet:VLAN:VID	1
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IP:TOS	0
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IP:PROTOcol	17
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IP:SRCIpadd	Automatically detected from the active Network Interface Card (NIC interface)
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IP:DSTIpadd	239.1.1.1
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IP:TTL	5
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:UDP:SRCPort	16384
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:UDP:DSTPort	16384
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:RTP:SQNCnumber	Randomly generated
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:RTP:SSRC	Randomly generated
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:RTP:PYLOadtype	33
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IPV6:VERSion	6
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IPV6:TRFCcls	0
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IPV6:FLOWlbl	0
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IPV6:PYLDlen	1336
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IPV6:NXTHdr	17
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IPV6:HOPLimit	12
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IPV6:SRCIpadd	Automatically detected from the active Network Interface Card (NIC interface)
:PLAY:IP:PARAMeters:PRTOcol:CUSTomize:HEADers:IPV6:DSTIpadd	ff0e::1
IP Interface: Protocol Settings: Stream Replication Settings	

Table 23: Default Settings (cont.)

Header	Default settings
:PLAY:IP:PARAMeters:REPLiCation:COUNT	0
:PLAY:IP:PARAMeters:REPLiCation:INCRemet:ETHERnet:SRcMac	00:00:00:00:00:00
:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:DSTMac	00:00:00:00:00:00
:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:EPROtocol	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:ETHERnet:VLANid	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IP:TOS	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IP:TTL	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IP:SRCIpadd	0.0.0.0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IP:DSTIpadd	0.0.0.0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IP:IPROtocol	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:UDP:SRcPort	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:UDP:DSTPort	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:RTP:PAYLoad	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:RTP:SSRC	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IPV6:TRFCc1s	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IPV6:FLOW1b1	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IPV6:NXTHdr	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IPV6:HOPLimit	0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IPV6:SRCIpadd	0:0:0:0:0:0:0:0
:PLAY:IP:PARAMeters:REPLiCation:INCRement:IPV6:DSTIpadd	0:0:0:0:0:0:0:0
IP:Error Insertion	
:PLAY:IP:ERRIns:ENBLed	OFF (0)
:PLAY:IP:ERRIns:PARAMeters:PLENbled	OFF (0)
:PLAY:IP:ERRIns:PARAMeters:PLVAlue	1
:PLAY:IP:ERRIns:PARAMeters:PLRAnge	1000
:PLAY:IP:ERRIns:PARAMeters:SQEENbled	OFF (0)
:PLAY:IP:ERRIns:PARAMeters:SQEVAlue	1
:PLAY:IP:ERRIns:PARAMeters:SQERAnge	1000
:PLAY:IP:ERRIns:PARAMeters:SQEDistance	1
:PLAY:IP:ERRIns:PARAMeters:CSEENbled	OFF (0)
:PLAY:IP:ERRIns:PARAMeters:CSEType	IP
:PLAY:IP:ERRIns:PARAMeters:CSEVAlue	1
:PLAY:IP:ERRIns:PARAMeters:CSErAnge	1000
:PLAY:IP:ERRIns:PARAMeters:RANDOmizerr	ON (1)
IP:Error Generation	
:PLAY:IP:ERRGen:GPKT1os	No parameters
:PLAY:IP:ERRGen:GSQNerr	No parameters

Table 23: Default Settings (cont.)

Header	Default settings
:PLAY:IP:ERRGen:GCHIperr	No parameters
:PLAY:IP:ERRGen:GCHUdperr	No parameters
IP:Parametric Settings	
:PLAY:IP:OTHStngs:PROCpriority	ABOVE_NORMAL
:PLAY:IP:OTHStngs:THRPriority	REAL_TIME
:PLAY:IP:PRMetric:BSTEnabled	OFF (0)
:PLAY:IP:PRMetric:BSTType	BURST PERIOD
:PLAY:IP:PRMetric:BPERiod	2 ms
:PLAY:IP:PRMetric:BSIZE	10
:PLAY:IP:PRMetric:JITEnabled	OFF (0)
:PLAY:IP:PRMetric:LOWJitmd	OFF (0)
:PLAY:IP:PRMetric:JITType	FIXED
:PLAY:IP:PRMetric:JITPeriod	1.000000 μ s
IP:Timestamped TS Payout Settings	
:PLAY:IP:TTSSStngs:TTSEnabled	OFF (0)
:PLAY:IP:TTSSStngs:PRSRvts	OFF (0)
:PLAY:IP:TTSSStngs:TTSJitter:JTREnable	OFF (0)
:PLAY:IP:TTSSStngs:TTSJitter:PATtern	SINE
:PLAY:IP:TTSSStngs:TTSJitter:PERIod	0
:PLAY:IP:TTSSStngs:TTSJitter:AMPLitude	0
:PLAY:IP:TTSSStngs:TTSJitter:PLSwidth	0

Error Messages and Codes

This section lists the error messages and codes.

Error messages and codes can be obtained by using the query :SYSTem:ERRor[:NEXT]?. These are returned in the following format:

```
<error_code>,"<error_message>"
```

Command Errors

Command errors are returned when there is a syntax error in the command.

Table 24: Command errors

Error code	Error message
-100	command error
-101	invalid character
-102	syntax error
-103	invalid separator
-104	data type error
-105	GET not allowed
-108	parameter not allowed
-109	missing parameter
-110	command header error
-111	header separator error
-112	program mnemonic too long
-113	undefined header
-114	header suffix out of range
-120	numeric data error
-121	invalid character in numeric
-123	exponent too large
-124	too many digits
-128	numeric data not allowed
-130	suffix error
-131	invalid suffix
-134	suffix too long
-138	suffix not allowed
-140	character data error
-141	invalid character data
-144	character data too long

Table 24: Command errors (cont.)

Error code	Error message
-148	character data not allowed
-150	string data error
-151	invalid string data
-158	string data not allowed
-160	block data error
-161	invalid block data
-168	block data not allowed
-170	command expression error
-171	invalid expression
-178	expression data not allowed
-180	macro error
-181	invalid outside macro definition
-183	invalid inside macro definition
-184	macro parameter error

Execution Errors

These error codes are returned when an error is detected while a command is being executed.

Table 25: Execution errors

Error code	Error message
-200	execution error
-201	invalid while in local
-202	settings lost due to RTL
-210	trigger error
-211	trigger ignored
-212	arm ignored
-213	init ignored
-214	trigger deadlock
-215	arm deadlock
-220	parameter error
-221	settings conflict
-222	data out of range
-223	too much data
-224	illegal parameter value
-225	out of memory

Table 25: Execution errors (cont.)

Error code	Error message
-226	lists not same length
-230	data corrupt or stale
-231	data questionable
-240	hardware error
-241	hardware missing
-250	mass storage error
-251	missing mass storage
-252	missing media
-253	corrupt media
-254	media full
-255	directory full
-256	FileName not found
-257	FileName error
-258	media protected
-260	execution expression error
-261	math error in expression
-270	execution macro error
-271	macro syntax error
-272	macro execution error
-273	illegal macro label
-274	execution macro parameter error
-275	macro definition too long
-276	macro recursion error
-277	macro redefinition not allowed
-278	macro header not found
-280	program error
-281	cannot create program
-282	illegal program name
-283	illegal variable name
-284	program currently running
-285	program syntax error
-286	program runtime error

Device Specific Errors

These error codes are returned when an internal instrument error is detected. This type of error may indicate a hardware problem.

Table 26: Device specific errors

Error code	Error message
-300	device specific error
-310	system error
-311	memory error
-312	PUD memory lost
-313	calibration memory lost
-314	save/recall memory lost
-315	configuration memory lost
-330	self test failed
-350	queue overflow

Query Errors

These error codes are returned in response to an unanswered query.

Table 27: Query errors

Error code	Error message
-400	query error
-410	query interrupted
-420	query unterminated
-430	query deadlocked
-440	query unterminated after indefinite period

Network Interface Specifications

The MTX100B supports remote control using the Ethernet interface. This section describes the MTX100B network interface specifications.

The TCP/IP is used as the network protocol. The commands can be sent from the application program through the socket interface of the TCP/IP. Also, the query can be received through the interface.

Keep the following in mind while controlling the MTX100B remotely with the Ethernet interface.

- The LF (linefeed) or CR (carriage return) code is needed at the end of a message as a terminator. Use the Communication dialog box or the `:SYSTEM:COMMUNICATE:SOCKET:RXTERM` command to set which terminator is used. (See Figure 19.)
- The IEEE 488.1 standard (for instance Device Clear or Service Request) is not supported.
- The Message Exchange Control Protocol in the IEEE 488.2 is not supported. However, the common commands such as *ESE and the event handling features are supported.
- The Indefinite format (the block start at #0) in the <ARBITRARY BLOCK PROGRAM DATA> of the IEEE 488.2 is not supported.

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. The Run dialog box appears. (See Figure 29.)



Figure 29: Run dialog box

3. In the Open text box, type `telnet` and then click **OK**. The Telnet window appears. (See Figure 30.)

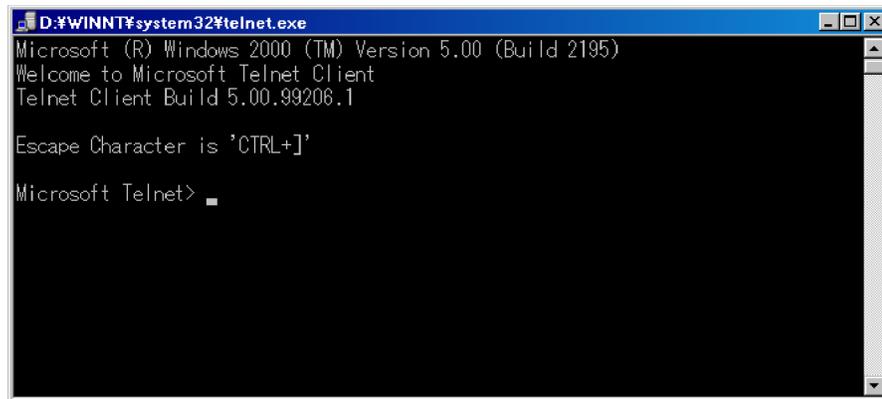


Figure 30: Telnet window

4. At the command line prompt, type `set local_echo` and press **Enter**. This sets the local echo mode to on.
5. At the command line prompt, type `open <host name> <port number>` and press **Enter**. Where `<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 **Enter**.
7. Verify that the following ID information of the MTX100B appears:
`TEKTRONIX, MTX100B, Vx.xx, Hxx, Cxx`

Using the IEEE1394 Interface (Option 05 Only)

The IEEE1394 interface of the MTX100B Option 05 allows you to send and receive a transport stream from an IEEE1394 device, and to capture a transport stream between two IEEE1394 devices using the following three modes:

- Point-to-point connection
- Data probing
- ASI/IEEE1394 input/output conversion

This section explains how to connect the MTX100B Option 05 and IEEE1394 device(s), and how to set up the MTX100B Option 05 when using these modes.

For using the IEEE1394 interface, you need a keyboard and mouse connected to the MTX100B Option 05.

Another section of this manual contains detailed information about menus and dialog boxes related to the IEEE1394 interface settings.

NOTE. *The MTX100B Option 05 does not support the copy protection feature by DTCP (Digital Transmission Control Protection). Therefore, you cannot record or play copy-guarded data using the IEEE1394 interface.*

Note for Connections

When you connect the MTX100B Option 05 to IEEE1394 device(s) such as a BS/CS tuner or a D-VHS recorder, note the following:



CAUTION. *To prevent the possible damage to the MTX100B Option 05, do not use a damaged IEEE1394 cable for connection.*

- Connect an IEEE1394 cable to the MTX100B Option 05 after power on. If you power on the instrument with the IEEE1394 cable connected, it takes about 10 to 30 seconds for the instrument to enable the menu operation.
- Power on the MTX100B Option 05 first, and then power on an IEEE1394 device(s).
- The MTX100B Option 05 does not function as a repeater with the instrument powered off. If you make the following connections when the MTX100B Option 05 is powered off, the connection between a BS/CS tuner and a D-VHS recorder is not established.



- If you disconnect the power cord from the IEEE1394 device with an IEEE1394 cable connected, the device information displayed on the MTX100B Option 05 may become incorrect.

Point-to-Point Connection

In the point-to-point connection, you can connect the MTX100B Option 05 to an IEEE1394 device such as a BS/CS tuner or a D-VHS recorder, and send and receive a transport stream from the device. (See Figure 31.)

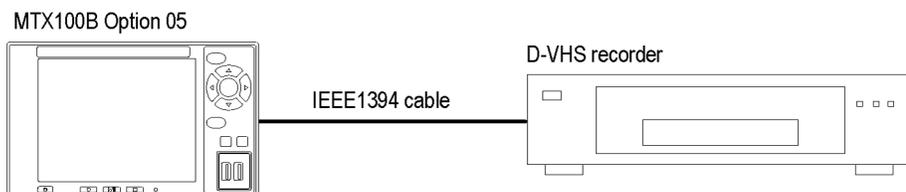


Figure 31: Connection example for point-to-point connection

This subsection describes the setting procedure to use the point-to-point connection of the MTX100B Option 05. In the following procedure, you will connect the MTX100B Option 05 to a D-VHS recorder.

Sending a Transport Stream to the D-VHS Recorder

1. Use an IEEE1394 cable to connect the IEEE1394 connector on the MTX100B Option 05 to the IEEE1394 connector on the D-VHS recorder.
2. In the device connection menu of the D-VHS recorder, select **MTX100B Option 05**. Refer to the instruction manual attached with the D-VHS recorder for the device connection menu.
3. Press the **Play/Pause** button on the MTX100B Option 05 to display the Play screen.
4. Select **ASI/1394 > 1394 Mode > PtoP Connect**, or click the **PtoP Connect** button on the toolbar. The IEEE1394 dialog box appears.
5. Select the **D-VHS** recorder from the **Instrument** list box, and click the **Connect** button. If necessary, select the **to Tuner** check box.

If the connected IEEE1394 device can operate the other device remotely, then select the **to Tuner** check box since the connection setting may be made by the IEEE1394 device (the MTX100B Option 05 cannot be operated remotely from the device).

6. Click **OK**.
7. Select **File > Open** to open the Select File dialog box.

NOTE. Some devices may require the SI information such as *SIT* or *NIT* when decoding the TS file.

8. In the dialog box, select the transport stream file you want to output.
9. Press the **Play/Pause** button on the MTX100B Option 05 to output the transport stream.
10. If you want to record the transport stream, press the **Record** button on the D-VHS recorder.

Receiving a Transport Stream from the D-VHS Recorder

1. Use an IEEE1394 cable to connect the IEEE1394 connector on the MTX100B Option 05 to the IEEE1394 connector on the D-VHS recorder.
2. In the device connection menu of the D-VHS recorder, select **MTX100B Option 05**. Refer to the instruction manual attached with the D-VHS recorder for the device connection menu.
3. Press the **Record** button on the MTX100B Option 05 to display the Record screen.
4. Select **Record > Source > ASI/1394**.
5. Select **ASI/1394 > Input Port > 1394**.
6. Select **ASI/1394 > 1394 Mode > PtoP Connect**, or click the **PtoP Connect** button on the toolbar. The IEEE1394 dialog box appears.
7. Select the **D-VHS** recorder from the **Instrument** list box, and click the **Connect** button.
8. Click the **OK** button.
9. Press the **Play** button on the D-VHS recorder to start playing a transport stream. The hierarchical view of the captured transport stream is displayed on the screen of the MTX100B Option 05.

Recording the Transport Stream.

10. If the transport stream being captured is in the partial transport stream format, select **ASI/1394 > Partial TS > On Partial TS**.

NOTE. Be sure to set the Partial TS command to On when you record a partial transport stream. If you fail to do this, the packet interval does not reproduce correctly while outputting the file. Refer to the About the Partial Transport Stream section for detailed information about the partial transport stream. (See page 128.)

11. Press the **Record** button on the MTX100B Option 05 to start recording the transport stream.

Data Probing

In data probing, when the connection between two IEEE1394 devices is established, you can capture the transport stream between them using the MTX100B Option 05. (See Figure 32.)

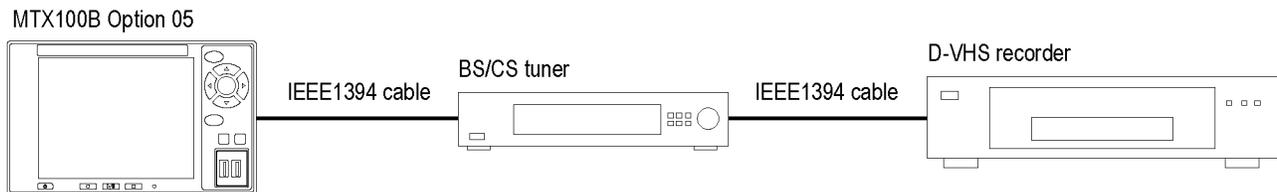


Figure 32: Connection example for data probing

This subsection describes the setting procedure to use the data probing of the MTX100B Option 05. In the following procedure, you will connect the MTX100B Option 05 to a BS/CS tuner and connect a BS/CS tuner to a D-VHS recorder.

1. Use an IEEE1394 cable to connect the IEEE1394 connector on the MTX100B Option 05 to the IEEE1394 connector on the BS/CS tuner.
2. Use an IEEE1394 cable to connect the IEEE1394 connector on the BS/CS tuner to the IEEE1394 connector on the D-VHS recorder.
3. In the device connection menu of the BS/CS tuner, select the **D-VHS** recorder. Refer to the instruction manual attached to the BS/CS tuner for the device connection menu.
4. Press the **Play** button on the D-VHS recorder, and check that a picture is played by the BS/CS tuner.
5. Press the **Record** button on the MTX100B Option 05 to display the Record screen.
6. Select **Record > Source > ASI/1394**.
7. Select **ASI/1394 > Input Port > 1394**.
8. Select **ASI/1394 > 1394 Mode > Probe**, or click the **Probe** button on the toolbar. The IEEE1394 dialog box appears.
9. Select the **D-VHS** recorder from the **Source** list.
10. Select the **BS/CS** tuner from the **Destination** list.
11. Click **OK**. The hierarchical view of the captured transport stream is displayed on the screen of the MTX100B Option 05.

ASI/IEEE1394 Conversion

In the ASI/IEEE1394 conversion, you can output a transport stream applied to the ASI IN connector from the IEEE1394 connector or output a transport stream applied to the IEEE1394 connector from the ASI connector.

ASI to IEEE1394 Conversion

Perform the following procedure to output a transport stream applied to the ASI Input connector from the IEEE1394 connector:

In the following procedure, you will apply a transport stream output from an MPEG generator to the MTX100B Option 05, and apply the transport stream output from the MTX100B Option 05 to a D-VHS recorder. (See Figure 33.)

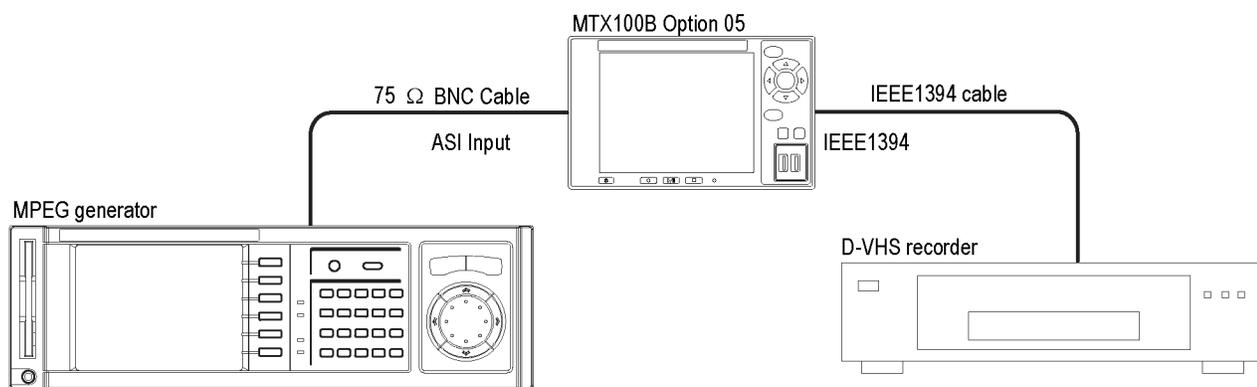


Figure 33: Connection example for ASI to IEEE1394 conversion

1. Use a 75 Ω BNC cable to connect ASI OUT connector on the MPEG generator to the ASI Input connector on the MTX100B Option 05.
2. Use an IEEE1394 cable to connect the IEEE1394 connector on the MTX100B Option 05 to the IEEE1394 connector on the D-VHS recorder.
3. In the device connection menu of the D-VHS recorder, select **MTX100B Option 05**. Refer to the instruction manual attached with the D-VHS recorder for the device connection menu.
4. Press the **Record** button on the MTX100B Option 05 to display the Record screen.
5. Select **ASI/1394 > Input Port > ASI**.
6. Select **ASI/1394 > 1394 Mode > PtoP Connect**, or click the **PtoP Connect** button on the toolbar. The IEEE1394 dialog box appears.
7. Select the **D-VHS** recorder from the **Instrument** list, and click the **Connect** button. If necessary, select the **to Tuner** check box.
8. Click the **OK** button.

IEEE1394 to ASI Conversion

Perform the following procedure to output a transport stream applied to the IEEE1394 connector from the ASI Output connector:

In the following procedure, you will apply a transport stream output from a BS/CS tuner to the MTX100B Option 05, and apply the transport stream output from the MTX100B Option 05 to an MPEG analyzer (See Figure 34.)

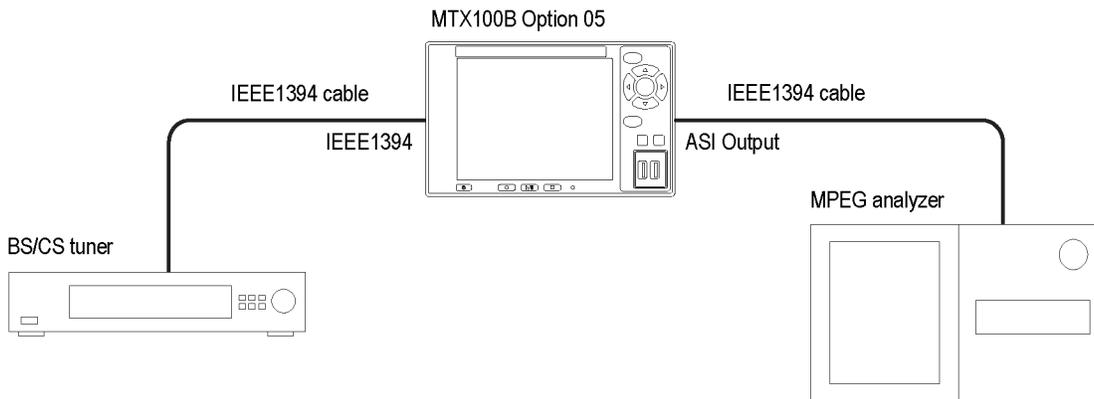


Figure 34: Connection example for IEEE1394 to ASI conversion

1. Use an IEEE1394 cable to connect the IEEE1394 connector on the BS/CS tuner to the IEEE1394 connector on the MTX100B Option 05.
2. Use a 75 Ω BNC cable to connect the ASI Output connector on the MTX100B Option 05 to the ASI IN connector on the MPEG analyzer.
3. In the device connection menu of the BS/CS tuner, select the MTX100B Option 05. Refer to the instruction manual attached to the BS/CS tuner for the device connection menu.
4. Press the **Record** button on the MTX100B Option 05 to display the Record screen.
5. Select **ASI/1394 > Input Port > ASI**.
6. Select **ASI/1394 > 1394 Mode > PtoP Connect**, or click the **PtoP Connect** button on the toolbar. The IEEE1394 dialog box appears.
7. Select the **BS/CS tuner** from the **Instrument** list, and click the **Connect** button.
8. Click the **OK** button.

About the Partial Transport Stream

The partial transport stream is a bit stream used for data transmission in the IEEE1394 interface. Unlike the MPEG-2 transport stream, the partial transport stream has a time code of 4-bytes after each transport stream packet of 188 bytes. (See Figure 35.) The time code provides the interval between the sync byte of a packet and the sync byte of the next packet in 27 MHz resolution.

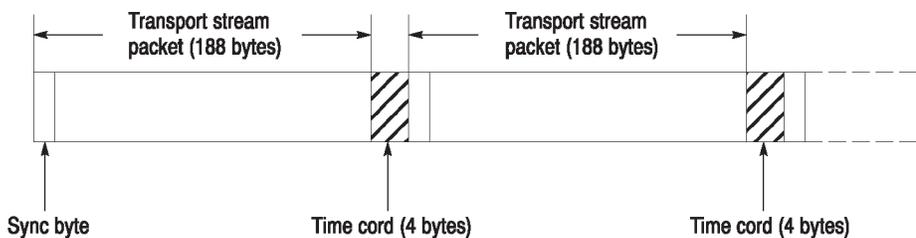


Figure 35: Partial transport stream

In the MTX100B Option 05, a captured transport stream can be recorded as a partial transport stream by setting the Partial TS command in the ASI/1394 menu to On.

The packet size of the recorded file in the partial transport stream format is fixed to 192 bytes. When you open the file, the Partial TS letters are displayed in the status bar.

The following are notes for recording or playing a partial transport stream:

- Be sure to record a partial transport stream using the partial transport stream format. If you fail to do this, the packet interval is not reproduced when the transport stream is played.
- A partial transport stream with any packet interval more than 600 ms cannot be recorded correctly as a partial transport stream.
- A transport stream cannot be output from the SPI In/Out connector while a partial transport stream is played.

Appendix A: Recommended Settings for MPEG Player in IP Mode

This appendix lists the recommended settings that are required to improve the performance of the MPEG player in IP mode.

NOTE. For optimum performance of the MPEG player, you can run the batch file *Optimum_Performance_Settings.bat*. To reset the NIC settings to default, you can run the batch file *Reset_NIC_Settings.bat*. The batch files are available at *C:\Program Files\Tektronix\MpegPlayer*.

Settings for Intel(R) Pro/1000 MT Drivers

Perform the following steps to set the options for Intel/Pro 1000 MT drivers in Category/Classic view:

1. Click **Control Panel > Network and Internet Connections > Network Connections** in Category view or click **Control Panel > Network Connections** in Classic view.
2. Select **Intel(R) Pro/1000 MT Network Connection** device and right-click to select the **Properties** option.

3. Click **Configure > Advanced** to set the following options in the dialog box:
- Adaptive Inter-Frame Spacing: Disabled
 - Flow Control: Off
 - Interrupt Moderation Rate: Off
 - Jumbo Frames: 16128
 - Link Speed and Duplex: Auto-negotiate 1000Mbps
 - Receive Descriptors: 2048

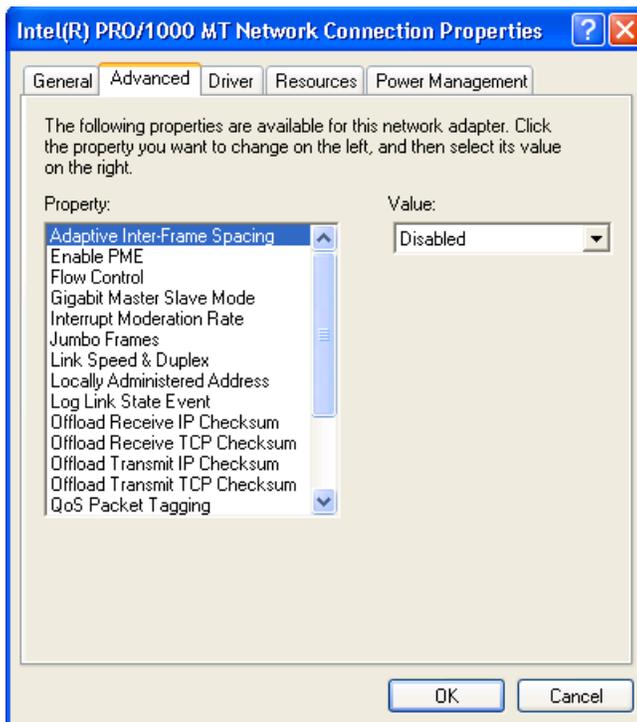


Figure 36: Intel(R) PRO/1000 MT Network Connection Properties

Settings for Playout Performance

Perform the following steps to set the options of Administrative tools for improved performance during the Playout:

1. Click **Control Panel > Administrative Tools > Services** in Classic view.
2. Select **Windows Firewall/Internet Connection Sharing (ICS)** to open the dialog box. Stop the service and select **Disabled** from the Startup Mode list to disable the startup.

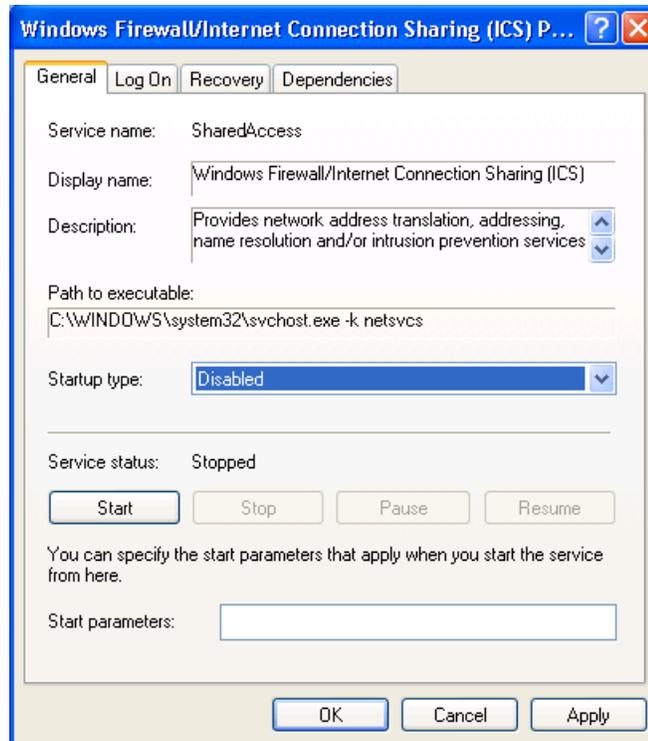


Figure 37: Windows Firewall/Internet Connection Sharing (ICS)

3. Select **Automatic Updates** to open the dialog box. Stop the service and select **Disabled** from the Startup Mode list to disable the startup.

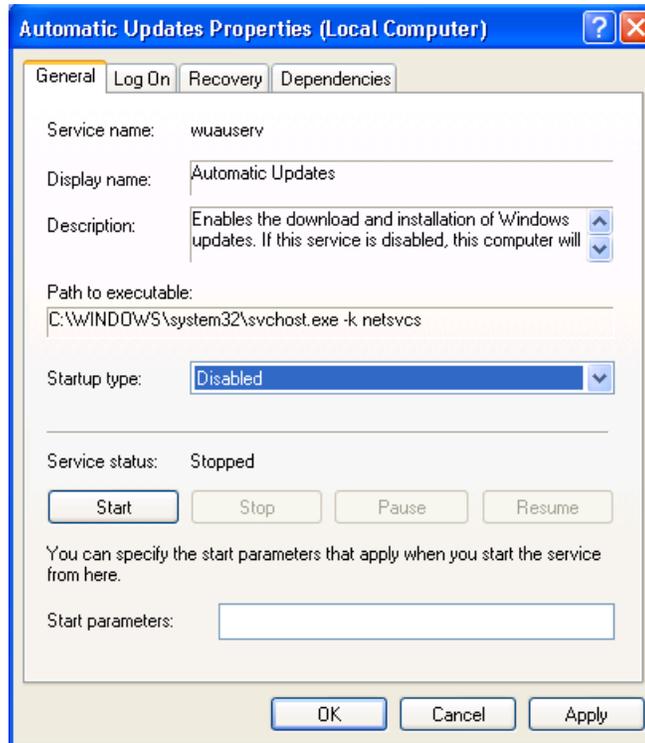


Figure 38: Automatic Updates Properties

4. Select **IIS admin** to open the dialog box. Stop the service and select **Disabled** from the Startup Mode list to disable the startup.

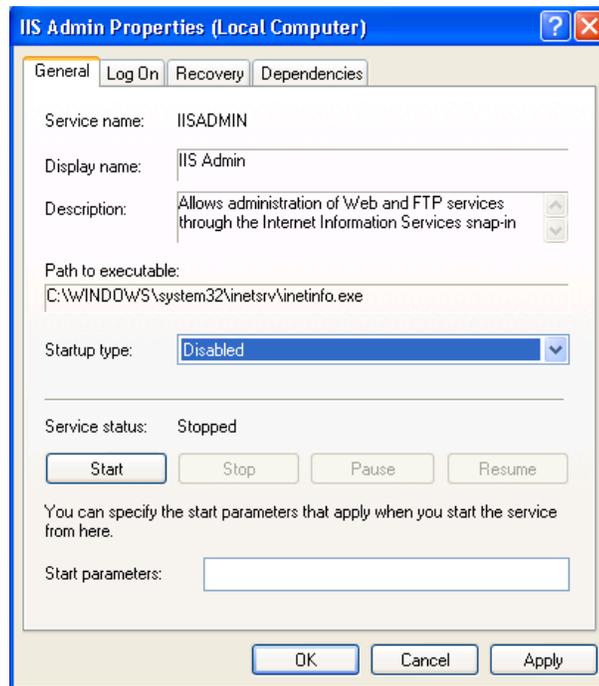


Figure 39: IIS Admin Properties

Settings for Java Update

Perform the following steps to disable the automatic Java updates:

1. Click **Control Panel > Java**.
2. Select the **Update** tab and clear the **Check for Updates Automatically** check box.

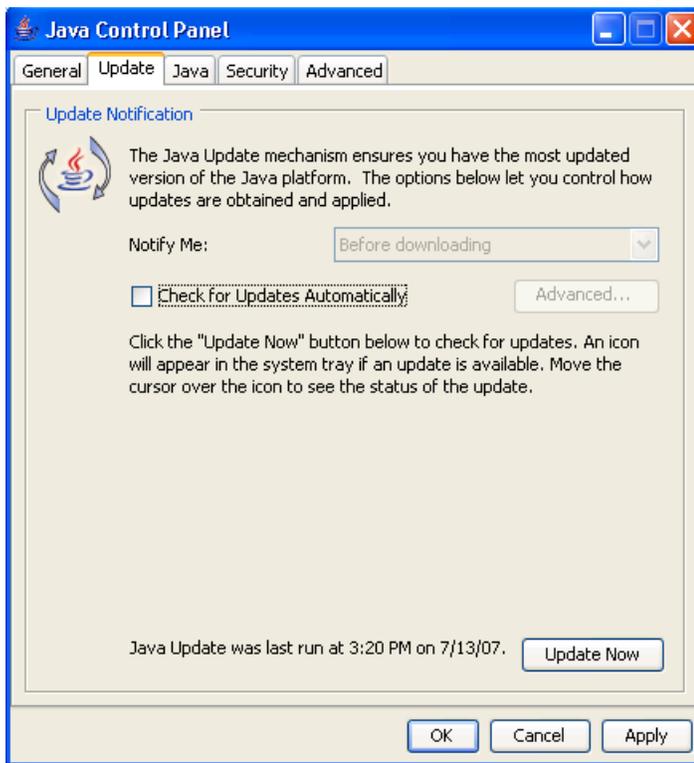


Figure 40: Java Control Panel

A warning message appears. Click **Never Check** to not check the updates.



Figure 41: Java Update-Warning

Settings for VLAN

Perform the following steps to set the options for VLAN:

1. Click **Start > Run** and type **regedit**. Press **OK** to display the Registry Editor Window.
2. Browse to **HKEY_LOCAL_MACHINE\SYSTEM\ControlSet\Control\Class\{4D36E972-E325-11CE-BFC1-08002BE10318}\00XX** where **XX** is the instance of the network adapter that you need to see tags on. You can check by opening and viewing the driver descriptor value (DriverDesc value should be Intel(R) PRO/1000 MT Network Connection).

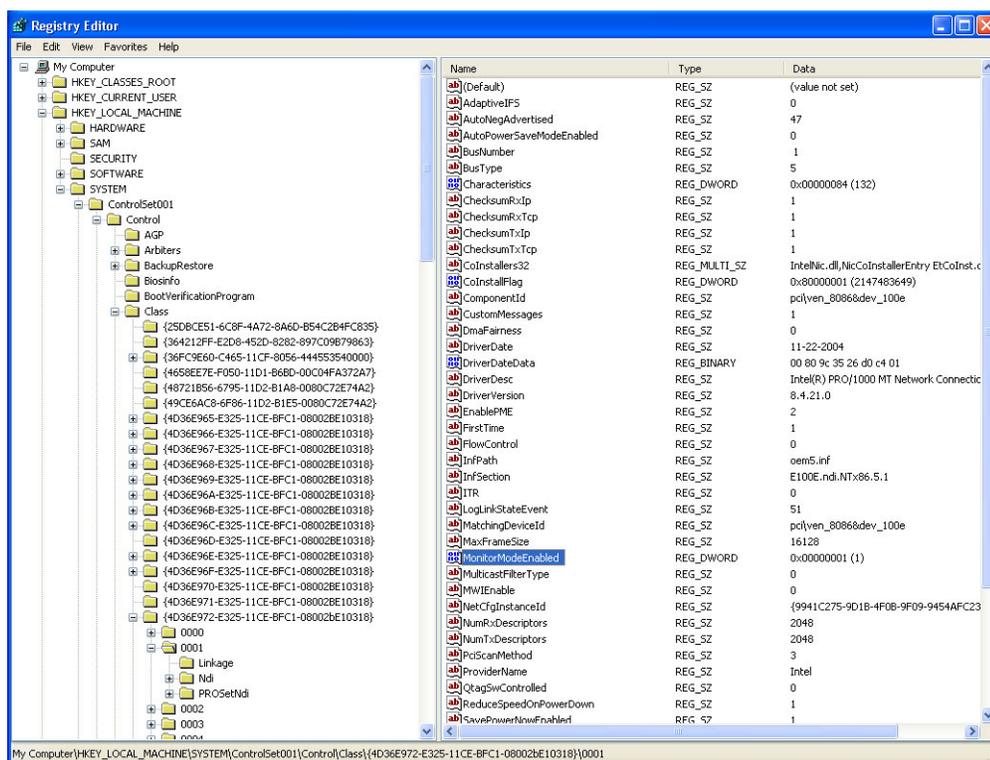


Figure 42: Registry Editor

3. Right-click to select **New > DWORD Value** or select **Edit > DWORD Value** option. Rename the option to **MonitorModeEnabled**.

4. Double-click the **DWORD Value** to open the Edit DWORD Value dialog box. Set the **Value data** to **1** and press **OK**.

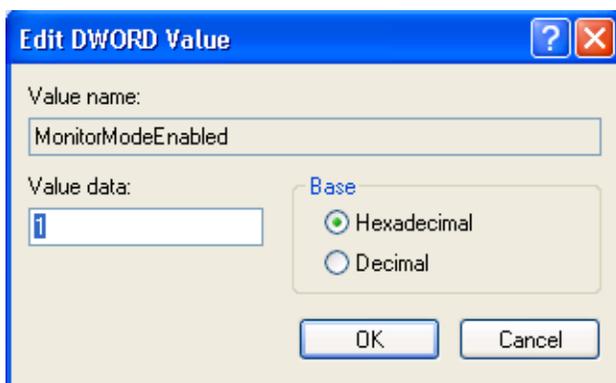


Figure 43: Edit DWORD Value

Appendix B: Using the ReMux Application

ReMux provides the capability to create a transport stream of super frame structure defined in the ISDB-S system from an MPEG-2 transport stream.

This appendix describes the functions of the ReMux application and shows how to create a transport stream of super frame structure.

NOTE. *The ReMux application cannot handle files larger than 2 GB.*

Starting and Exiting ReMux

The ReMux application is preinstalled on the MTX100B. To start the ReMux application, select **Start > Program > Tektronix > MPEG > ReMux** the Windows desktop.

If you create a shortcut icon for the Remux application on the Windows desktop, you can start the ReMux application by double-clicking the icon. Refer to the Windows help for information about how to create a shortcut icon.

To exit (quit) the ReMux application, select **File > Exit**.

Elements of the ReMux Window

The following figure and table describe the elements in the ReMux application window.

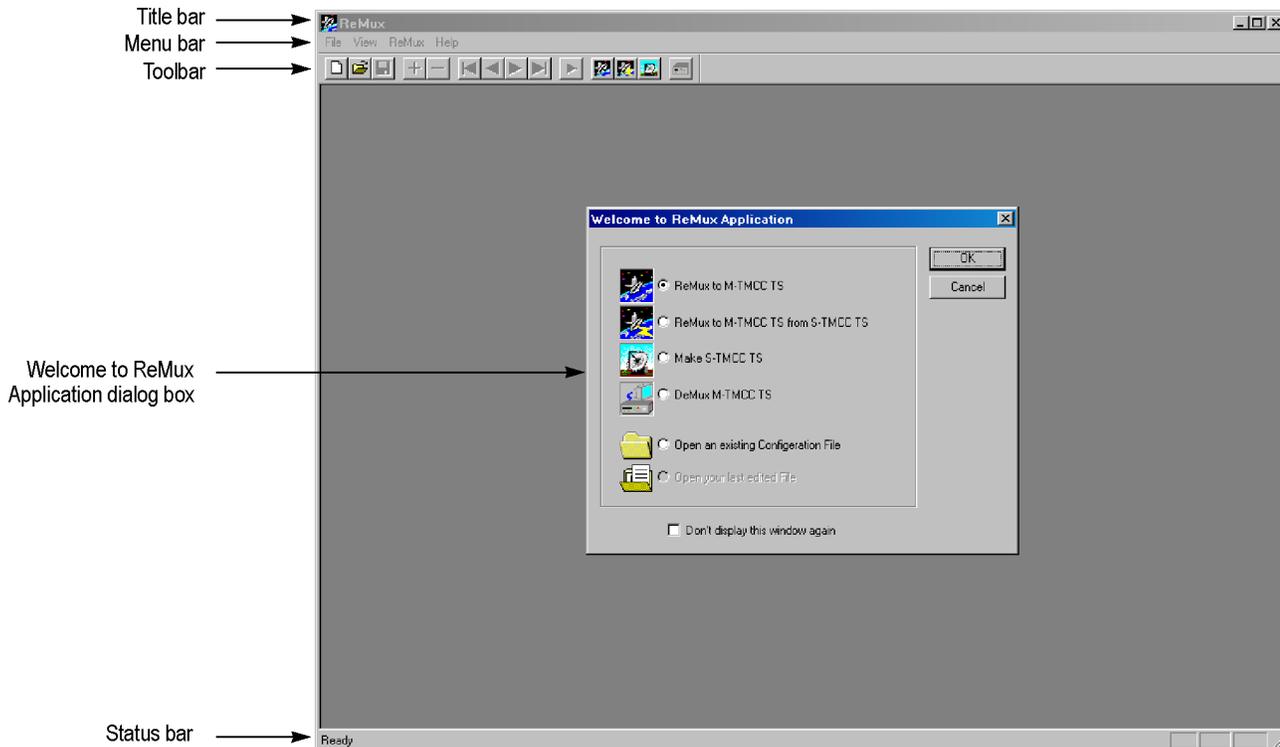


Figure 44: ReMux application window

Table 28: Elements of the ReMux window

Element	Description
Title bar	The Title bar displays the name of the application and contains the standard window-sizing boxes for Windows.
Menu bar	The Menu bar displays the names of the six drop-down menus. (See page 140, <i>Using the ReMux Menus.</i>)
Toolbar	The toolbar provides shortcut buttons for many of the most often used menu commands. (See Table 29.) 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 drop-down menu.

Table 28: Elements of the ReMux window (cont.)

Element	Description
Welcome to ReMux Application dialog box	<p>Use this dialog box to select the operation mode.</p> <ul style="list-style-type: none"> ■ ReMux to M-TMCC TS: Create a transport stream of M-TMCC structure from a transport stream. ■ ReMux to M-TMCC TS from S-TMCC TS: Create a transport stream of M-TMCC structure from a transport stream of S-TMCC structure. ■ Make S-TMCC TS: Creates a transport stream of S-TMCC structure from a transport stream. ■ DeMux M-TMCC TS: De-multiplexes (separates) the original transport stream from a transport stream of M-TMCC structure. ■ Open an existing Configuration File: Opens a stored configuration file (.cfg). ■ Open your last edited File: Opens the file used last (configuration file or transport stream file). <p>You can toggle the dialog box display on or off using the OPTION dialog box.</p>
Status bar	<p>The status bar displays a short explanation of the currently selected command and information related to the operation. You can toggle the status bar display on and off using the Status Bar command in the View drop-down menu.</p>

Table 29: Toolbar button descriptions

Icon	Name	Function
	New	Equivalent to the New command in the File menu.
	Open	Equivalent to the Open command in the File menu.
	Save	Equivalent to the Save command in the File menu.
	Add	Equivalent to the Add command in the Edit menu.
	Delete	Equivalent to the Delete command in the Edit menu.
	First	Equivalent to the First command in the Edit menu.
	Previous	Equivalent to the Previous command in the Edit menu.

Table 29: Toolbar button descriptions (cont.)

Icon	Name	Function
	Next	Equivalent to the Next command in the Edit menu.
	Last	Equivalent to the Last command in the Edit menu.
	Execute	Equivalent to the Execute command in the ReMux menu.
	ReMux to M-TMCC TS	Equivalent to the Mode: ReMux to M-TMCC TS command in the ReMux menu.
	ReMux to M-TMCC TS from S-TMCC TS	Equivalent to the Mode: ReMux to M-TMCC TS from S-TMCC TS command in the ReMux menu.
	Make S-TMCC TS	Equivalent to the Mode: Make S-TMCC TS command in the ReMux menu.
	DeMux to M-TMCC TS	Equivalent to the Mode: DeMux to M-TMCC TS command in the ReMux menu.

Using the ReMux Menus

The Menu bar has six drop-down menus: File, Edit, View, ReMux, Window, and Help. This section describes the function of each selection in these menus.

File Menu

The File menu contains commands for managing the file operations and for exiting the ReMux application. (See Table 30.)

Table 30: ReMux File menu commands

Command	Function
New	Opens the Select Remux Mode dialog box where you can select the mode to execute. (See page 141, <i>Select Remux Mode Dialog Box</i> .)
Open	Opens a saved configuration file or a transport stream file of M-TMCC structure. If you try to open other files, an error message appears.
Close	Closes the active window.
Save	Saves the active window settings to a configuration file.
Save as	Saves the active window settings to the specified configuration file.
Exit	Exits the ReMux application.

Select Remux Mode Dialog Box. The Select Remux Mode dialog box appears after you select the New command in the File menu. (See Figure 45.) Select one of the ReMux modes, and click the **OK** button.

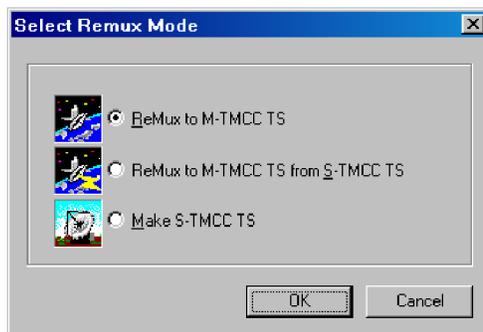


Figure 45: Select Remux Mode dialog box

- **ReMux to M-TMCC TS:** Creates a transport stream of M-TMCC structure from a transport stream.
- **ReMux to M-TMCC TS from S-TMCC TS:** Creates a transport stream of M-TMCC structure from a transport stream of S-TMCC structure.
- **Make S-TMCC TS:** Creates a transport stream of S-TMCC structure from a transport stream.

Edit Menu

The Edit menu contains commands that control TMCC information display and add/delete TMCC information and transport stream. (See Table 31.)

Table 31: ReMux File menu commands

Command	Function
Previous	Displays the previous TMCC information.
Next	Displays the next TMCC information.
First	Displays the first TMCC information.
Last	Displays the last TMCC information.
Add	Adds TMCC information or a transport stream.
Delete	Deletes TMCC information or a transport stream.

ReMux Menu The ReMux menu contains commands that execute the selected operation, select a ReMux mode, and select option settings. (See Table 32.)

Table 32: ReMux menu commands

Command	Function
Execute	Executes the ReMux or DeMux operation.
Mode	Selects a ReMux mode. This command has the same function as the New command in the File menu.
Option	Opens the OPTION dialog box where you can set the TS ID of the transport stream(s) inserted as a dummy and toggle the Welcome dialog box display on or off. (See page 142, <i>OPTION Dialog Box</i> .)

OPTION Dialog Box. The OPTION dialog box appears after you select the Option command in the ReMux menu. (See Figure 46.)



Figure 46: OPTION dialog box

In the dialog box, you can set the following parameters:

- **Dummy TSID:** When you select **ReMux to M-TMCC TS** or **ReMux to M-TMCC TS** from S-TMCC mode, and if the number of slots of the transport stream of M-TMCC structure is less than 48, then dummy transport streams are inserted automatically so that the number of slots is equal to 48. This parameter sets the transport stream ID for all of them.
- **Show “Welcome” Window:** Sets whether or not the Welcome to ReMux Application dialog box appears when you start the ReMux application.

Window Menu The Window menu contains commands that control the appearance of the editing windows and open the new window. (See Table 33.)

Table 33: ReMux Window menu commands

Command	Function
New Window	Opens the new window with the same settings as those of the active window.
Cascade	Arranges the editing windows so that they overlap each other.

Table 33: ReMux Window menu commands (cont.)

Command	Function
Tile	Arranges the editing windows so that they do not overlap each other.
Arrange Icons	When the editing windows are minimized, arranges their title bars.

View Menu The View menu contains commands that control the appearance of the ReMux application window. (See Table 34.)

Table 34: ReMux View menu commands

Command	Function
Toolbar	Toggles the display of the Toolbar on and off in the application window. A check mark precedes the command in the menu when the Toolbar is selected for display.
Status Bar	Toggles the display of the Status bar on and off in the application window. A check mark precedes the command in the menu when the Status bar is selected for display.

Help Menu The About ReMux command displays information including the ReMux software version number and copyright information.

ReMux Tutorials

This subsection describes the basics of operating the ReMux application.

Make S-TMCC TS Mode This mode allows you to create a transport stream of S-TMCC structure from a transport stream.

This subsection describes the procedure to create a transport stream of S-TMCC structure from a transport stream.

1. Select **File > New** or click the **New** button on the toolbar to open the **Select Remux Mode** dialog box. (See Figure 45.)
2. Select **Make S-TMCC TS** in the dialog box, and then click the **OK** button to open the editing window for the Make S-TMCC TS mode. (See Figure 47.)

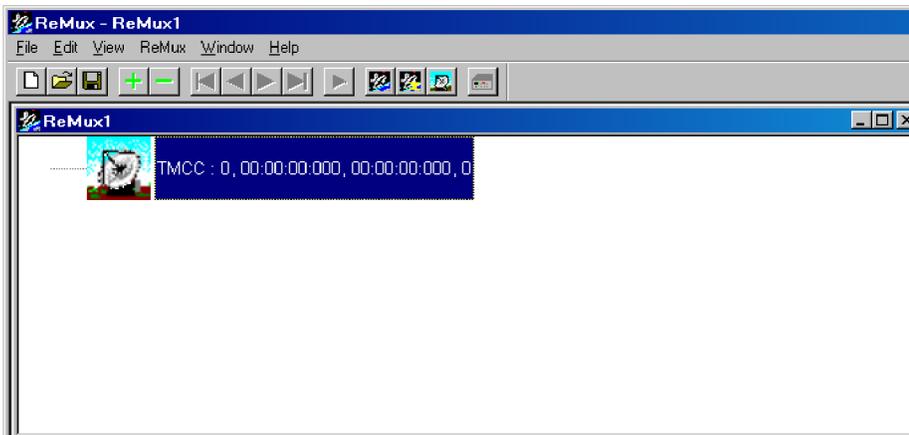
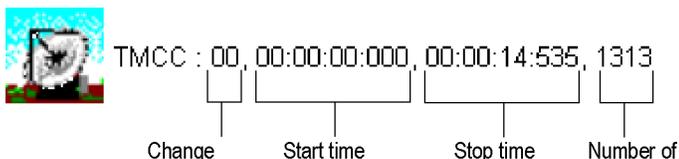


Figure 47: Editing window for the Make S-TMCC TS mode

The information displayed to the right of the TMCC icon has the following meaning:



Selecting a Transport Stream File.

3. Select **Edit > Add** or click the + (Add) button on the toolbar to open the Open dialog box.
4. In the dialog box, select a transport stream file, and click the **Open** button to open the Edit TS Information dialog box. (See Figure 48.)

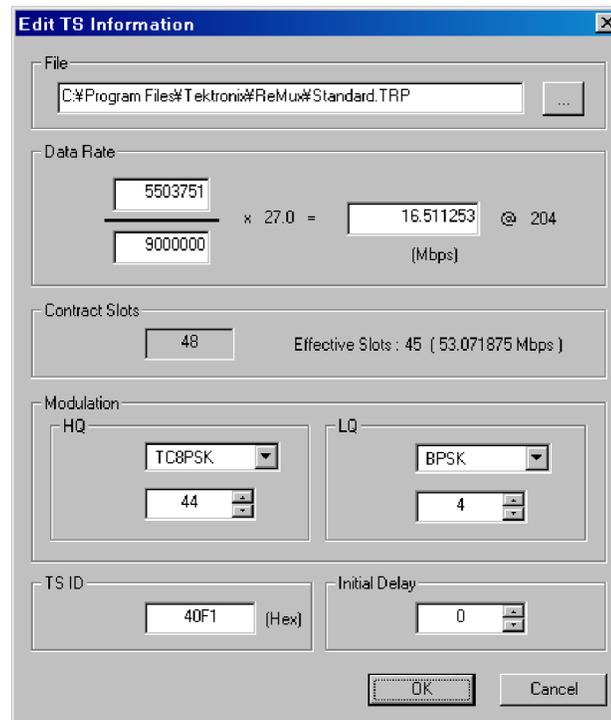


Figure 48: Edit TS Information dialog box

In this dialog box, you can set the following parameters:

- **File:** Specify the transport stream file that has to be converted to a transport stream file of S-TMCC structure.
- **Data Rate:** Specify the data rate of the transport stream. You cannot set the value exceeding the data rate of the effective slots. If this value is less than the data rate of the effective slot, the data rate is converted by inserting null packets.
- **Contract Slots:** Shows the number of contract slots. This value depends on the number of slots set in the Modulation item.
- **Modulation:** Specify the modulation system and the number of slots to be assigned to HQ and LQ when performing hierarchical data transfer.
 - **HQ:** Specify the modulation system and the number of slots to be assigned to HQ level.
 - **LQ:** Specify the modulation system and the number of slots to be assigned to LQ level. This field is enabled only when the hierarchical control descriptor exists in PMT.
- **TS ID:** Specify the transport stream ID. This value is used to change the ID value in TMCC, and the ID value in PAT is not changed.

- **Initial Delay:** Specify the number of delay packets (null packets) to be inserted at the start of re-multiplex. You can set the value in the range of 0 to 65535.
5. After you change the parameters, click the **OK** button to confirm the changes and close the dialog box.

This displays a transport stream icon under the TMCC icon. (See Figure 49.)

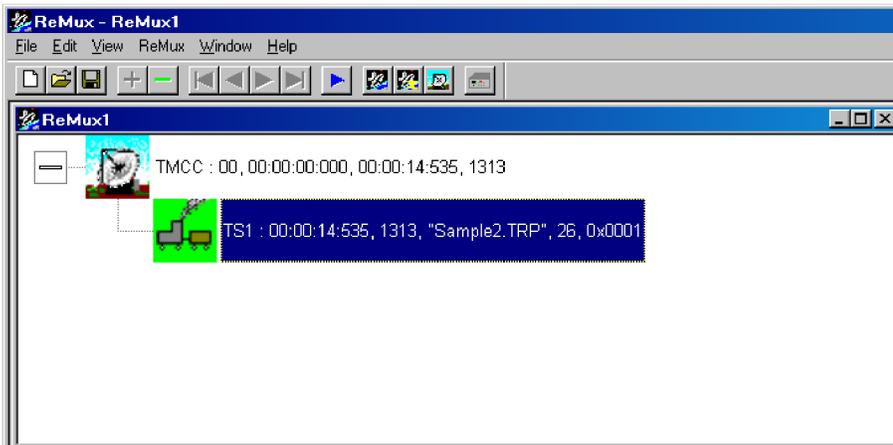
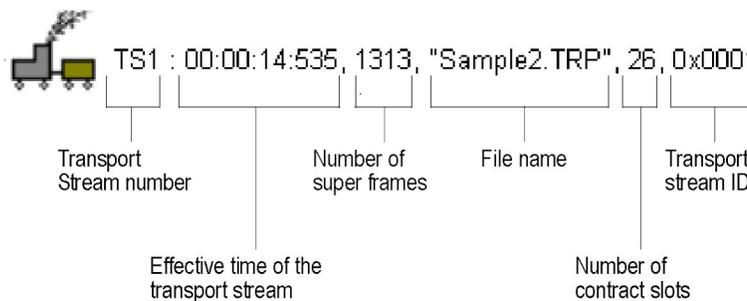


Figure 49: Windows displaying a transport stream icon

The information displayed to the right of the transport stream icon has the following meaning:



Editing the TMCC Information for the Transport Stream.

- Double-click the **TMCC** icon to open the Edit TMCC Information dialog box to edit the TMCC information for the transport stream. (See Figure 50.)

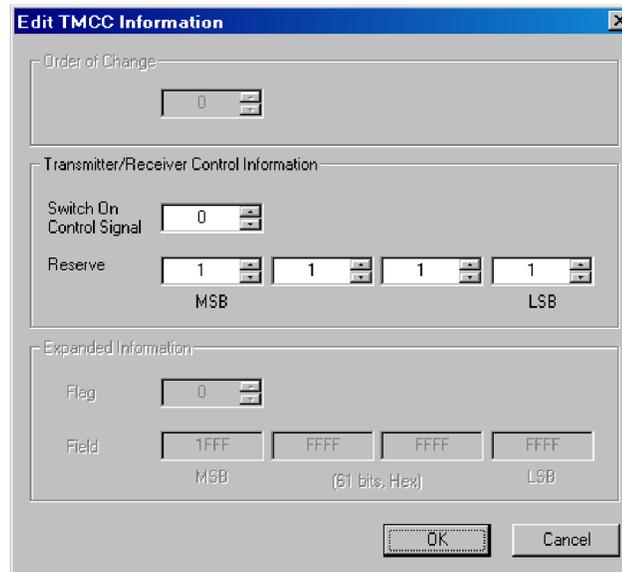


Figure 50: Edit TMCC Information dialog box (S-TMCC)

In this dialog box, you can set the following parameters:

- **Transmitter/Receiver Control Information:** Set the transmission/receiving control information.
 - **Switch On Control Signal:** Set the start control signal to on (1) or off (0).
 - **Reserve:** Set the reserve bit.
- After you change the parameters, click the **OK** button to confirm the changes and close the dialog box.

Creating a Transport Stream of S-TMCC Structure.

- Select **ReMux > Execute** or click the ► (Execute) button to open the **Save As** dialog box.
- In the dialog box, specify a file name and click the **Save** button.

ReMux to M-TMCC TS from S-TMCC TS Mode

This mode allows you to create a transport stream of M-TMCC structure from a transport stream of S-TMCC structure.

This subsection describes the procedure to create a transport stream of M-TMCC structure from a transport stream of S-TMCC structure.

1. Select **File > New** or click the **New** button on the toolbar to open the Select Remux Mode dialog box. (See Figure 45.)
2. Select **ReMux to M-TMCC TS from S-TMCC TS** in the dialog box, and click the **OK** button to open the editing window for the ReMux to M-TMCC TS from S-TMCC TS mode. (See Figure 51.)

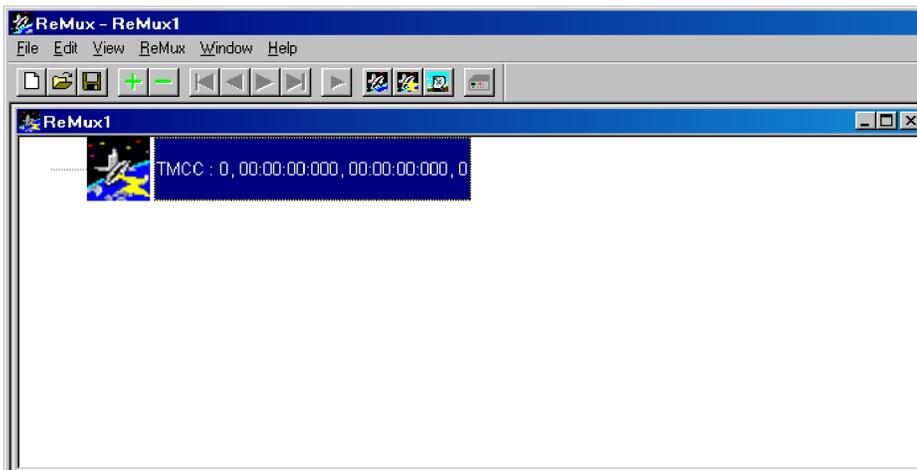


Figure 51: Editing window for the ReMux to M-TMCC TS from S-TMCC TS mode

Selecting a Transport Stream File.

3. Select **Edit > Add** or click the + (Add) button on the toolbar to open the Open dialog box.
4. In the dialog box, select a transport stream file of S-TMCC structure, and click the **Open** button to open the Edit TS Information dialog box. (See Figure 48.)

NOTE. *If you select a transport stream file that does not have S-TMCC structure, an error message appears.*

5. In the dialog box, set the parameters, and click the **OK** button. This displays a transport stream icon in the window.

Multiplexing Transport Streams. In the ReMux to M-TMCC TS from S-TMCC TS mode, you can multiplex transport streams of S-TMCC structure until the total number of slots reaches 48.

6. Select **Edit > Add** or click the + (Add) button on the toolbar to open the Open dialog box.
7. In the dialog box, select a transport stream file of S-TMCC structure, and click the **Open** button to open the Edit TS Information dialog box. (See Figure 48.)
8. In the dialog box, set the parameters, and click the **OK** button.

This multiplexes the newly selected transport stream and the transport stream icon is added in the window. (See Figure 52.)

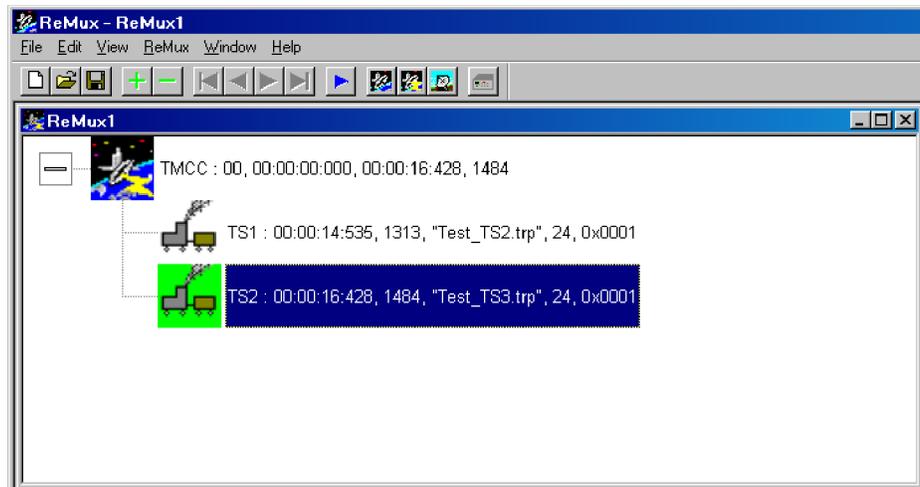


Figure 52: Transport stream is multiplexed

9. If you want to multiplex more transport streams, repeat steps 3 through 8.

Editing the TMCC Information for the Transport Stream.

10. Double-click the **TMCC** icon to open the Edit TMCC Information dialog box to edit the TMCC information for the transport stream. (See Figure 53.)

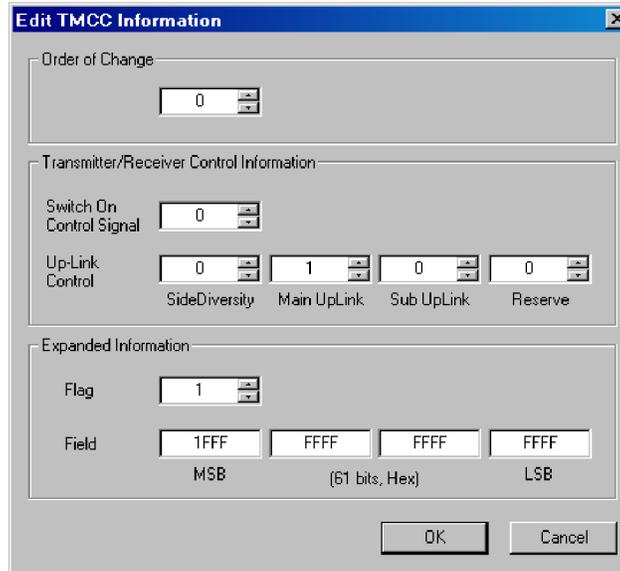


Figure 53: Edit TMCC Information dialog box (M-TMCC)

In this dialog box, you can set the following parameters:

- **Order of Change:** Set the TMCC change instruction. You can set the value in the range of 0 to 31.
 - **Transmitter/Receiver Control Information:** Set the transmission/receiving control information.
 - **Switch On Control Signal:** Set the control signal on (1) or off (0).
 - **Up-Link Control:** Enter the Up-Link Control value.
 - **Extended Information:** Set the extended information. When you set the Flag (extension flag) item to 1, the Field item becomes active.
11. After you change the parameters, click the **OK** button to confirm the changes and close the dialog box.

Creating a Transport Stream of M-TMCC Structure.

12. Select **ReMux > Execute** or click the ► (Execute) button to open the Save As dialog box.
13. In the dialog box, specify a file name, and click the Save button.

If the number of slots of M-TMCC structure transport stream is less than 48, one or more dummy streams are inserted so that the number of slots equal 48. The transport stream thus inserted has the ID value set in the OPTION dialog box and TS8PSK is used as the modulation system. (See Figure 46.)

Multiplexing Transport Streams of M-TMCC Structure with Different TMCC Information.

Information. In the ReMux to M-TMCC TS from S-TMCC TS mode, you can multiplex a transport stream of M-TMCC structure with a transport stream of M-TMCC structure having different TMCC information.

14. Click the **TMCC** icon of the M-TMCC stream created in step 13.
15. Select **Edit > Add** or click the + (Add) button on the toolbar to open the Add TMCC dialog box. (See Figure 54.)

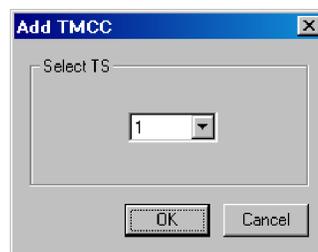
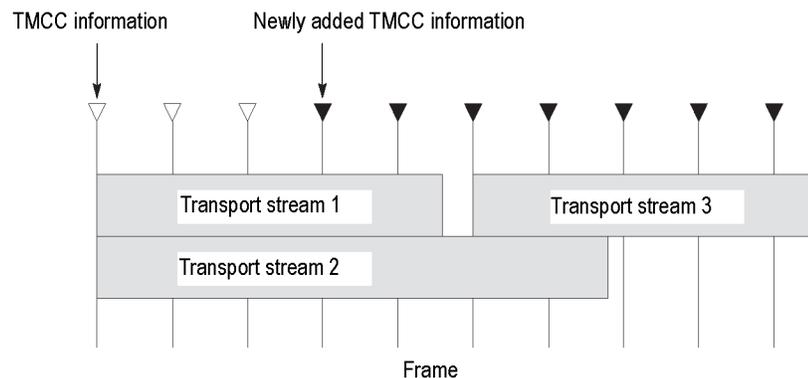


Figure 54: Add TMCC dialog box

In this dialog box, you can specify the transport stream to which the new TMCC information is inserted if more than one transport stream is multiplexed.



This illustration shows the placement of the new TMCC information and the transport stream 3 when they are multiplexed after the transport stream 1. The

new TMCC information is inserted two frames before the location in which the new transport stream is inserted.

16. In the Add TMCC dialog box, select a transport stream number, and click the **OK** button to open the Edit TMCC Information dialog box. Edit the TMCC information. (See Figure 53.)
17. After you change the parameters, click the **OK** button to confirm the changes and close the dialog box.

This opens a new editing window with a TMCC icon displayed. In this case, note the increase of the value indicating change instruction at the right side of the TMCC icon. In addition, the **First** and **Previous** buttons on the toolbar change to green indicating that a TMCC exists before this TMCC.

18. Repeat steps 3 through 5 to select a transport stream file.
19. Repeat steps 6 through 8 to multiplex the transport stream file.
20. If you want to further multiplex a transport stream(s) of M-TMCC structure having different TMCC information, repeat steps 14 through 19.

Creating a Transport Stream of M-TMCC Structure.

21. Select **ReMux > Execute** or click the ► (Execute) button to open the Save As dialog box.
22. In the dialog box, specify a file name, and then click the **Save** button.

If the number of slots of the M-TMCC structure transport stream is less than 48, one or more dummy streams are inserted so that the number of slots equal 48. The transport stream thus inserted has the ID value set in the OPTION dialog box. (See Figure 46 on page 142.)

ReMux to M-TMCC TS Mode

This mode allows you to create a transport stream of M-TMCC structure from a transport stream. In this mode, two Remux functions are simultaneously executed: the Make S-TMCC TS and the ReMux to M-TMCC TS from S-TMCC TS mode.

This subsection describes the procedure to create a transport stream of M-TMCC structure from a transport stream.

1. Select **File > New** or click the **New** button on the toolbar to open the Select Remux Mode dialog box. (See Figure 45.)
2. Select **ReMux to M-TMCC** in the dialog box, and then click the **OK** button to open the edit window for the ReMux to M-TMCC TS mode. (See Figure 55.)

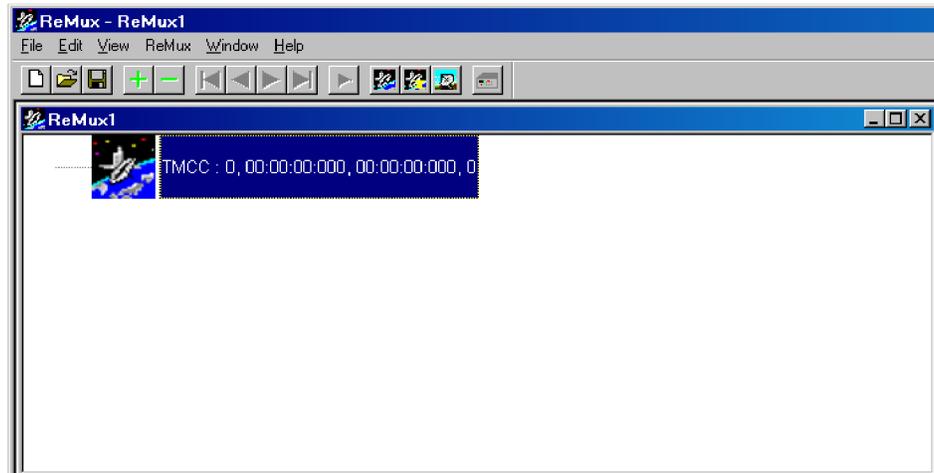


Figure 55: Editing window for the ReMux to M-TMCC TS mode

Selecting a Transport Stream File.

1. Select **Edit > Add** or click the + (Add) button on the toolbar to open the Open dialog box.
2. In the dialog box, select a transport stream file, and click the **Open** button to open the Edit TS Information dialog box. (See Figure 48 on page 145.)
3. In the dialog box, set the parameters, and click the **OK** button. This will display a transport stream icon in the window.

Multiplexing Transport Streams. Perform steps 6 through 9 of the previous procedure. (See page 149, *Multiplexing Transport Streams*.)

Editing the TMCC Information for M-TMCC. Perform steps 10 and 11 of the previous procedure. (See page 150, *Editing the TMCC Information for the Transport Stream*.)

Multiplexing Transport Streams of M-TMCC Structure with Different TMCC Information. Perform steps 14 through 20 of the previous procedure. (See page 151, *Multiplexing Transport Streams of M-TMCC Structure with Different TMCC Information*.)

Creating a Transport Stream of M-TMCC Structure. Perform steps 21 and 22 of the previous procedure. (See page 152, *Creating a Transport Stream of M-TMCC Structure.*)

DeMux M-TMCC TS Mode

This mode allows you to demultiplex (separate) the original transport stream from a transport stream of M-TMCC structure. The resulting demultiplexed transport stream is converted to a bit rate packet form of 204 bytes.

This subsection describes the procedure to demultiplex the original transport stream from a transport stream of M-TMCC structure.

1. Select **ReMux > DeMux** or click the **DeMux M-TMCC TS** button on the toolbar to open the Open dialog box.
2. In the dialog box, select a transport stream file of M-TMCC structure, and then click the Open button to open the editing window for the DeMux M-TMCC TS mode. (See Figure 56.)

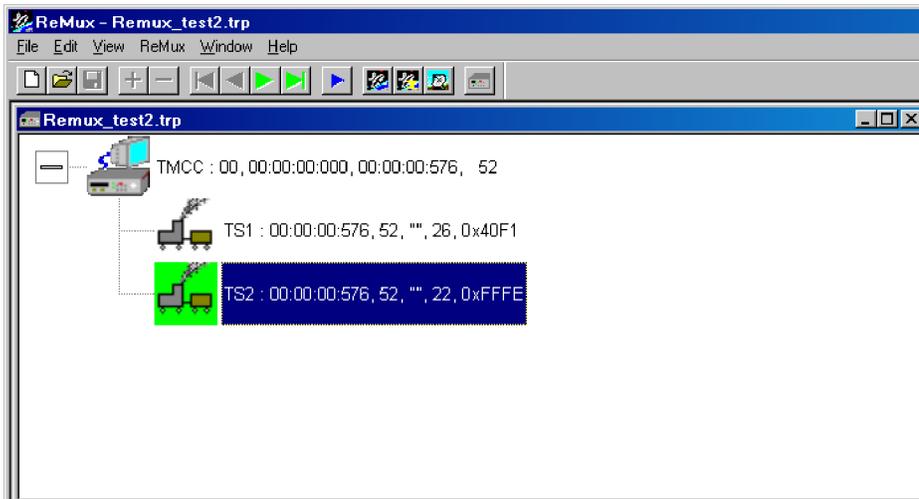


Figure 56: Editing window for the DeMux M-TMCC TS mode

NOTE. If you select a transport stream file that does not have M-TMCC structure, an error message appears.

3. Select **ReMux > Execute** or click the ► (Execute) button to open the DEMUX dialog box. (See Figure 57.)

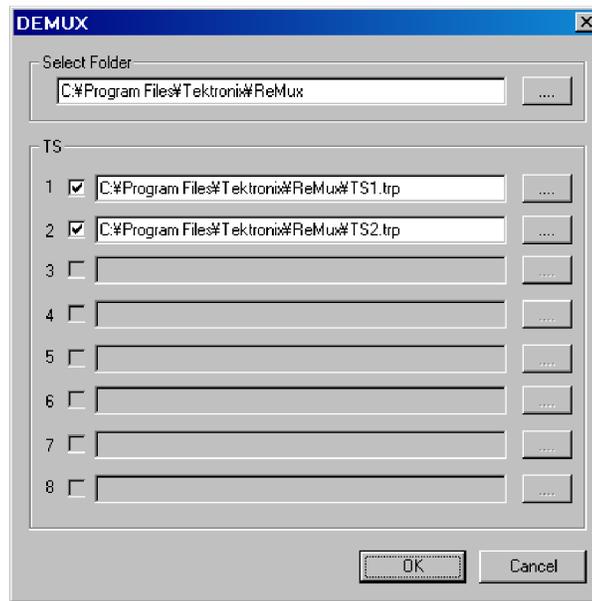


Figure 57: DEMUX dialog box

In this dialog box, you can set the following parameters:

- **Select Folder:** Specify the directory to which the demultiplexed transport stream is to be saved.
 - **TS:** Select the transport stream(s) to be demultiplexed. Click the check box at the front of the file name to select the file to be demultiplexed. When you click the ... button to the right of the file name, the Save As dialog box appears, where you can specify a file name and save the file.
4. After you select the directory and transport stream(s), click the **OK** button. The transport stream(s) will be demultiplexed and saved to the directory.

Appendix C: Using the Scheduler Application (Option SC Only)

The Scheduler is a software application that provides scheduling capability for the MTX100B. The application enables you to create a schedule list of streams for subsequent play or record.

This appendix describes the functions of the Scheduler application and how to create a schedule list, play, and record streams within the list.

Starting and Exiting Scheduler

To start the Scheduler application on the MTX100B, select **File > Scheduler** in the Play or Record screen.

- **In the Play screen:** Starts Scheduler in the schedule play mode. This mode allows you to create a schedule list and play streams.
- **In the Record screen:** Starts Scheduler in the schedule record mode. This mode allows you to create a schedule list and record streams.

To exit (quit) the Scheduler application, select **File > Exit** or click the **Close** button in the upper-right corner of the application window.

Elements of the Scheduler Application Window

The Scheduler application window contains a title bar, a menu bar, a toolbar, a status/control panel, a schedule list, and a status bar. (See Figure 58.)

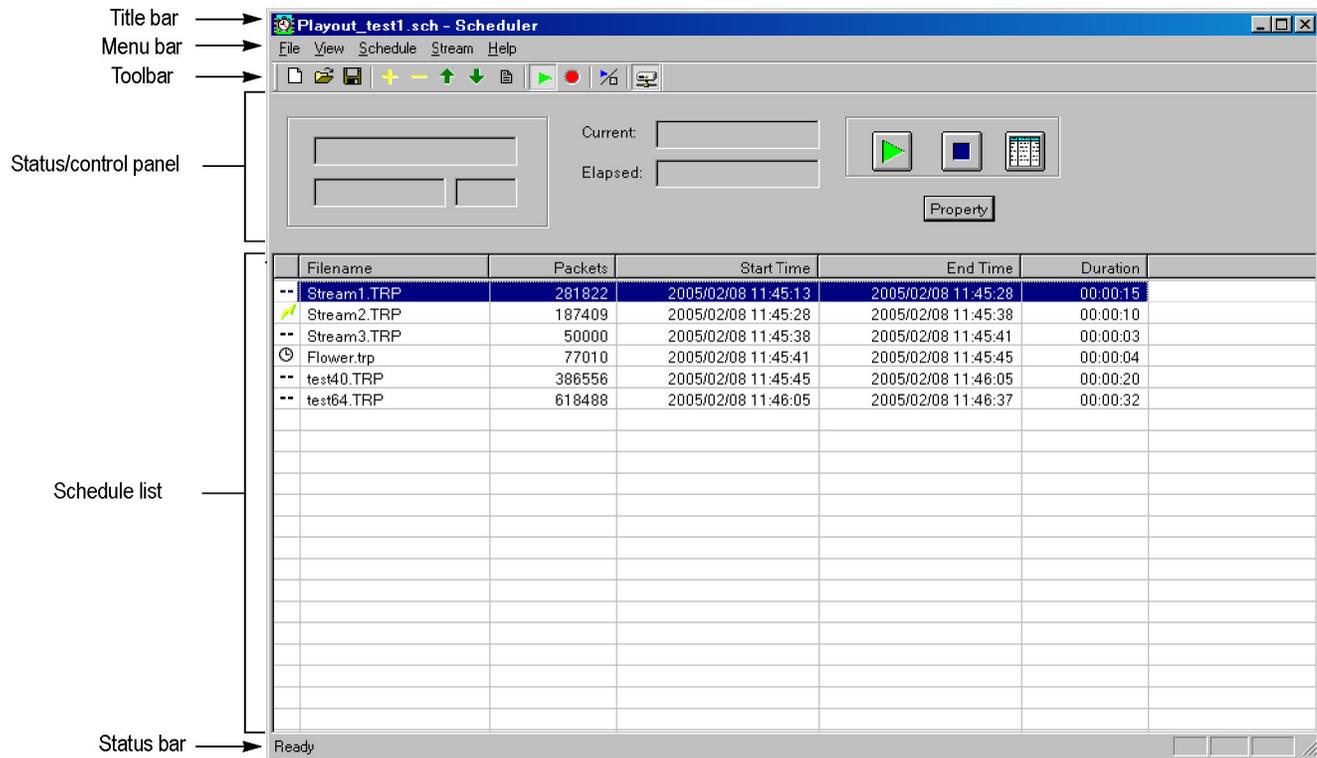


Figure 58: Scheduler application window (schedule play mode)

Title Bar The title bar displays the file name of the currently selected schedule list and the name of the application. It also contains the standard window-sizing boxes for Windows.

Menu Bar The menu bar displays the names of the drop-down menus. (See page 161, *Using the Scheduler Menus.*)

Toolbar The Toolbar provides shortcut buttons for many of the most 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 commands in the View drop-down menu. (See Table 35.)

Table 35: Toolbar button descriptions

Icon	Name	Function
	New	Equivalent to the New command in the File menu.
	Open	Equivalent to the Open command in the File menu.
	Save	Equivalent to the Save command in the File menu.
	Add	Equivalent to the Add command in the Stream menu.
	Delete	Equivalent to the Delete command in the Stream menu.
	Move up	Equivalent to the Move Up command in the Stream menu.
	Move down	Equivalent to the Move Down command in the Stream menu.
	Properties	Equivalent to the Properties command in the Stream menu.
	Play	Equivalent to the Play command in the Schedule menu.
	Record	Equivalent to the Record command in the Schedule menu.
	Execute	Equivalent to the Execute command in the Schedule menu.
	Connect	Equivalent to the Connect command in the Schedule menu.

Status/Control Panel

The status/control panel appears when you select the **Execute** command from the Schedule menu or click the **Execute** button on the toolbar. This panel allows you to set properties for the whole schedule list, and start/stop stream playout or record. (See page 171, *Status/Control Panel*.)

Schedule List Lists the streams currently included in the schedule. The schedule list is composed of the following items:

- **Schedule icon:** The following icons are displayed in front of the file name:

Icon	Description
	This icon shows that no start time or triggered start has been specified for the stream.
	This icon shows that the start time has been specified for the stream.
	This icon shows that a triggered start has been specified for the stream.

These icons change depending on the Start Time option setting in the Play Properties or the Record Properties dialog box. (See Figure 61 on page 166.) (See Figure 63 on page 170.)

- **Filename:** Shows the file name of the stream.
- **Packets:** Shows the number of packets contained in the stream (For a Non-TS stream, it shows the number of bytes). This item does not appear in the schedule record mode.
- **Start time:** Shows the start date/time for the stream.
- **End time:** Shows the end date/time for the stream.
- **Duration:** Shows the duration time of the stream.

To select a stream, click the stream name. Only one stream can be selected at a time.

When you start playing or recording streams, the background of the schedule list changes to gray, and the stream currently being played or recorded is highlighted.

Status Bar The status bar displays a short explanation of the currently selected command and information related to the operation. You can toggle the status bar display on and off using the Status Bar command in the View drop-down menu.

Using the Scheduler Menus

The Menu bar displays the names of the five pull-down menus. This section describes the function of each selection in these menus.

File Menu The File menu contains commands for managing file operations and for exiting the Scheduler application. (See Table 36.)

Table 36: File menu commands

Command	Function
New	Opens a new (blank) schedule.
Open	Opens the Open dialog box where you can select a schedule list file (*.sch).
Save	Saves the currently selected schedule list.
Save As	Opens the Save As dialog box where you can save the currently selected schedule list.
1 xxx.sch ... 4 xxx.sch	Lists up to four of the most recently opened schedule list files. When you select a file name, the schedule opens.
Exit	Exits the application.

View Menu The View menu contains commands that control the appearance of the application window. (See Table 37.)

Table 37: View menu commands

Command	Function
Show message	Opens the Show error message dialog box that lists all errors that have occurred in the MTX100B.
Toolbar	Toggles the display of the Toolbar on and off in the application window. A check mark precedes the command in the menu when the toolbar is selected for display.
Status Bar	Toggles the display of the Status bar on and off in the application window. A check mark precedes the command in the menu when the status bar is selected for display.

Schedule Menu The Schedule menu contains commands that control the remote connection to the MTX100B and changes between the play mode and record mode. (See Table 38.)

Table 38: Schedule menu commands

Command	Function
Connect	Opens the MTX/RTX Host Name dialog box. (See page 162, <i>MTX/RTX Host Name Dialog Box</i> .)
Disconnect	Closes the connection to the MTX100B.
Play	Sets the schedule play mode.
Record	Sets the schedule record mode.
Settings	Opens the Scheduler Settings dialog box. (See page 163, <i>Scheduler Settings Dialog Box</i> .)
Execute	Displays the status/control panel in the application window. (See page 171, <i>Status/Control Panel</i> .)

MTX/RTX Host Name Dialog Box. When you select the Connect command from the Schedule menu, the MTX/RTX Host Name dialog box appears. (See Figure 59.)

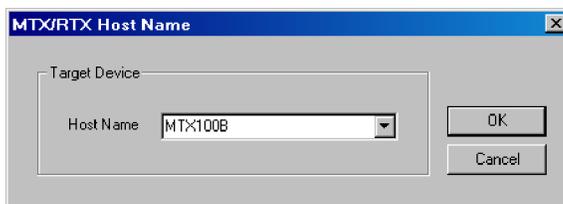


Figure 59: MTX/RTX Host Name dialog box

You can select the host name MTX100B to which the Scheduler is connected.

Scheduler Settings Dialog Box. When you select the Settings command from the Schedule menu, the Scheduler Settings dialog box appears. (See Figure 60.)

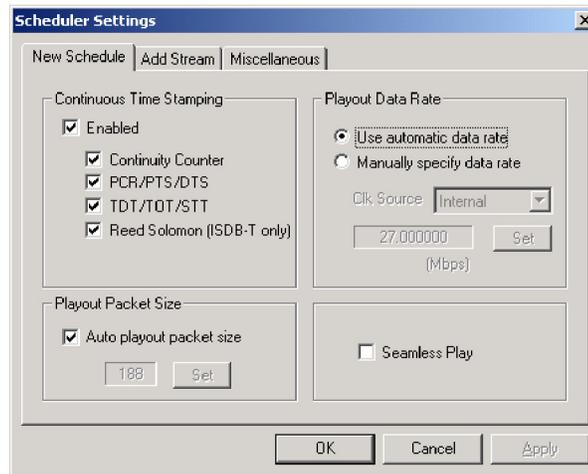


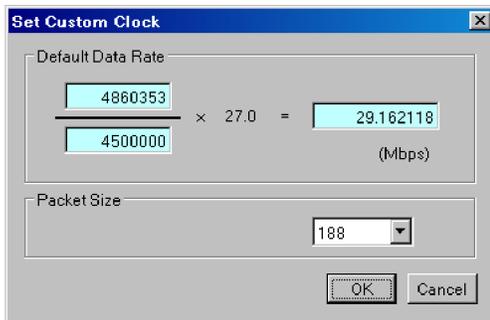
Figure 60: Scheduler Settings dialog box

The Scheduler Settings dialog box has three tabs: New Schedule, Add Stream, and Miscellaneous.

New Schedule tab

- **Continuous Time Stamping:** Specify the parameters in the transport stream that should be modified when looping a transport stream to simulate continuous playout. After selecting the Enabled check box, select the appropriate parameter(s) you intend to modify. The parameters are updated by the system hardware (27 MHz clock).
- **Playout Packet Size:** When you select the Auto playout packet size check box, the default packet size displayed is derived from the first stream added to the schedule list. However, if the first stream in the schedule list is a Non-TS stream, the packet size of subsequent streams is set to 188 bytes.

- If you clear the **Auto playlist packet size** check box, the **Set** button becomes available. When you click the **Set** button, the Set Custom Clock dialog box appears. In this dialog box, you can set the appropriate packet size.



- **Default Data Rate:** Set the default bit rate.
- **Packet Size:** Set the default packet size. You can select 188, 204, and 208.
- **Playlist Data Rate:** Set the playlist bit rate for the overall schedule.
 - **Use automatic playlist data rate:** Uses the bit rate derived from the first stream in the schedule list.
 - **Manually specify a playlist data rate:** Uses a clock source and bit rate that you specify. When you select this option, the Clk Source list box and the Set button become available. Use the Clk Source list box to select a clock source for the stream playlist. You can select Internal, ExtRef 10M, ExtRef 27 M, ExtRef IFFT, Ext P Clk, or Ext S Clk. When you click the Set button, the Set Custom Clock dialog box appears. In this dialog box, you can set the appropriate bit rate.
- **Seamless Play:** Set whether the streams in the schedule list are played continuously. Normally, stream output stops at every file, changing points if each stream has different bit rate. When this option is checked, all the streams are played using the same bit rate set by the Playlist Bitrate options.

NOTE. You cannot play a Non-TS or M-TMCC stream using the Seamless Play mode.

Before you play streams that have different packet sizes using the Seamless Play mode, clear the Enabled check box in the Continuous Time Stamping field.

If you play streams that have different bit rates using the Seamless Play mode, the Fixed ES Rate setting in the MTX100B does not work properly.

Add Stream tab

- **Playout Properties:** Set the default playout properties (bit rate and packet size) to be used when a stream is added to a schedule list.
 - **from Schedule:** Uses the settings in the dialog box.
 - **from Source:** Uses the default bit rate and packet size derived from the original stream.
 - **Custom:** Uses the custom bit rate and packet size set in the tab. When you select this option, the Set Custom Clock dialog box appears.

Miscellaneous tab

- **Loop Mode:** Set whether the schedule is run in the loop mode. When this option is checked, the current schedule is restarted when it reaches the end of the last stream.

NOTE. *You cannot use the loop mode if the stream has a time or triggered start specified in a schedule list.*

- **Local lock out:** Set whether the front-panel lockout function is enabled or not. When it is checked, all front-panel buttons are disabled.
- **Port:** Set the port number of the MTX100B to which Scheduler is connected. The default value is 49152.

Stream Menu

The Stream menu contains commands to add, delete, and move a stream in the schedule list. It also contains the command to view and set the stream properties of the currently selected stream. (See Table 39.)

Table 39: Stream menu commands

Command	Function
Move up	Moves the currently selected stream one position up in the schedule list. If the stream is currently at the top of the list, this command has no effect.
Move down	Moves the currently selected stream one position down in the schedule list. If the stream is currently at the bottom of the list, this command has no effect.
Add	<ul style="list-style-type: none"> ■ For the schedule play mode: Opens the Open dialog box where you can select a stream to be added to the schedule list. ■ For the schedule record mode: Opens the Save as dialog box where you can specify a path and file name for the stream file to be recorded. (See page 169, <i>Save as Dialog Box</i>.)

Table 39: Stream menu commands (cont.)

Command	Function
Delete	Deletes the currently selected stream from the schedule list.
Properties	<ul style="list-style-type: none"> ■ For the schedule play mode: Opens the Play Properties dialog box for the selected stream. (See page 166, <i>Play Properties Dialog Box</i>.) ■ For the schedule record mode: Opens the Record Properties dialog box for the selected stream. (See page 170, <i>Record Properties Dialog Box</i>.)

Play Properties Dialog Box. If Scheduler is set to the schedule play mode, when you select the Properties command from the Stream menu, the Play Properties dialog box appears. (See Figure 61.) This dialog box allows you to display the properties for the selected stream, and set the start/stop position and the start time of the stream. This dialog box can be displayed by selecting Properties from the right-click menu or by double-clicking the stream name.

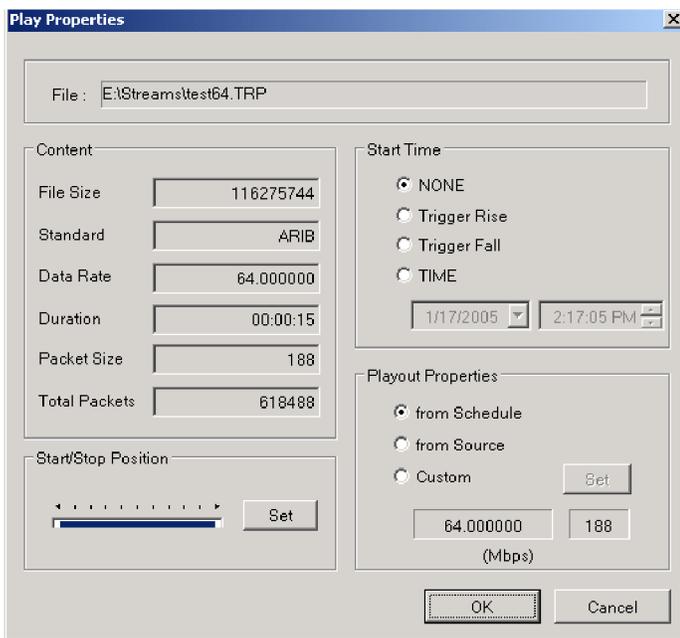
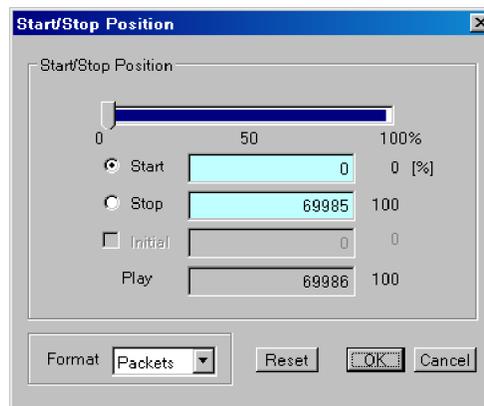


Figure 61: Play Properties dialog box

- **File:** Shows the name and location of the stream.
- **Content:** Shows the content of the stream.
 - **File Size:** Shows the file size of the stream in bytes.
 - **Standard:** Shows the standard of the stream (MPEG-2, ARIB, DVB, ATSC, S-TMCC, M-TMCC, ISDB-T, or NON-TS).

- **Data Rate:** Shows the bit rate derived from the PCRs in the stream.
- **Duration:** Shows the duration of the stream.
- **Packet Size:** Shows the packet size of the stream. For a Non-TS file, a dash is displayed.
- **Total Packets:** Shows the total number of the packets in the stream. For a Non-TS file, a dash is displayed.
- **Start/Stop Position:** Set the start and stop positions of the stream. When you click the Set button, the Start/Stop Position dialog box allows you to set the start/stop position.



- **Start:** Set the start position of the stream by the number of packets (the number of super frames for an M-TMCC file, or the number of bytes for a Non-TS file).
- **Stop:** Set the stop position of the stream by the number of packets (the number of super frames for an M-TMCC file, or the number of bytes for a Non-TS file).
- **Play:** Shows the actual number of packets (the number of super frames for an M-TMCC file, or the number of bytes for a Non-TS file) that is calculated using the Start and Stop values.
- **Format:** Shows the unit of the start and stop positions of the stream. It shows Packets for a transport stream file, SF (super frame) for an M-TMCC file, and Bytes for a Non-TS file.

For an ISDB-T file, the start packet is defined as the first-appearing packet including an OFDM frame start flag after the specified start position. The stop packet is defined as the packet before the last-appearing packet including an OFDM frame start flag before the specified stop position. At this time, if the number of OFDM frames between the start packet and stop packet is not an even number, the packet in the last OFDM frame becomes the stop packet.

First, specify the format for the setting in the Format list box at the bottom of the dialog box. Click the Start or Stop option button, and set the number of packets or time using the slider. You can directly enter the desired values in the text boxes.

- **Start Time:** Specify the time at which the stream will start to play within a schedule. If the Seamless Play option is selected in the Schedule Settings dialog box, this field is disabled.

NONE: The stream is integrated into the schedule and obeys the overall timing of the schedule. It will follow on from the previous stream without a break in the playout bit stream.

Trigger Rise: The stream playout starts on the rising edge (low to high transition) of the trigger signal applied to the Trig In/Out connector. When you select this option, the spin boxes used to set date and time are available.

Trigger Fall: The stream playout starts on the falling edge (high to low transition) of the trigger signal applied to the Trig In/Out connector. When you select this option, the spin boxes used to set date and time are available.

NOTE. *If the trigger does not occur within a specified time, the subsequent stream will be played out.*

TIME: The stream playout starts at an absolute time. When you select this option, spin boxes to set date and time become available.

- **Playout Properties:** Set the playout bit rate and packet size of the stream. If the Seamless Play option is selected in the Schedule Settings dialog box, this field is disabled.

from Schedule: Uses the values from the Schedule Settings dialog box. (See Figure 60.)

from Source: Uses the original bit rate and packet size of the stream.

Custom: Uses the bit rate and packet size specified in the Play Properties dialog box. When you select this option, the Set button becomes available. Click the Set button, and then set the appropriate bit rate and packet size in the resulting Set Custom Clock dialog box.

Save as Dialog Box. If the Scheduler is set to the schedule record mode, when you select the Add command from the Stream menu, the Save as dialog box appears. (See Figure 62.)

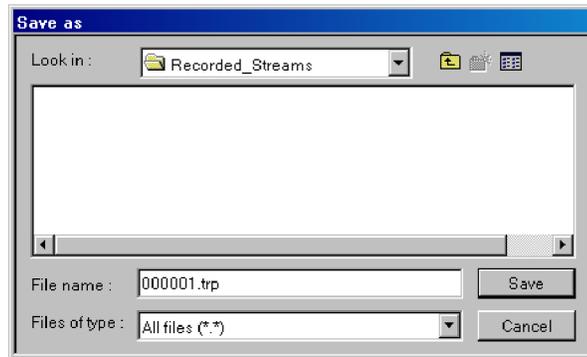


Figure 62: Save as dialog box

Use this dialog box to do the following:

1. Select the appropriate drive and directory for the stream file you are going to record.
2. Specify a file name for the stream. You can use the default file name that is automatically displayed in the File name text box. Do not use the following characters in a file name: \ / : , ; * ? " < > |.
3. Click the **Save** button to add the stream file to a schedule list.

When you click the Save button, the Record Properties dialog box appears. (See page 170, *Record Properties Dialog Box*.)

Record Properties Dialog Box. If Scheduler is set to the schedule record mode, when you select the Add command from the Stream menu and click the Save button on the Save as dialog box, the Record Properties dialog box appears. (See Figure 63.) This dialog box allows you to set the start time, record time, and stop time for the stream to be recorded. This dialog box can be displayed by selecting Properties from the right-click menu, the Stream menu, or by double-clicking the stream name.

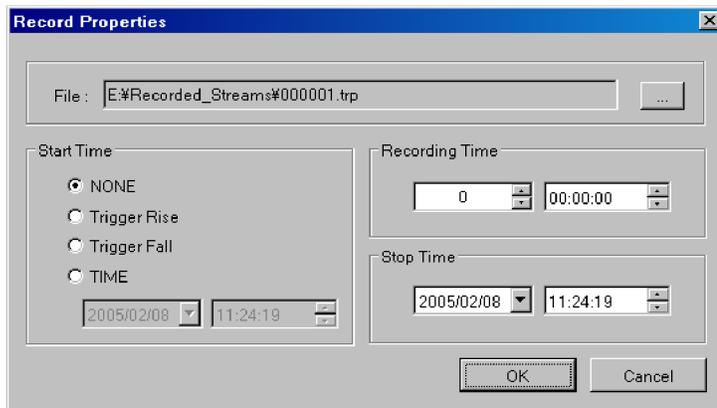


Figure 63: Record Properties dialog box

- **File:** Shows the directory path and file name for the stream to be recorded.
- **Start Time:** Specifies the time at which a stream will start to record. The choices are:
 - **NONE:** The stream is integrated into the schedule and obeys the overall timing of the schedule. It will follow on from the previous stream without a break.
 - **Trigger Rise:** The stream record starts on the rising edge (low to high transition) of the trigger signal applied to the Trig In/Out connector. When you select this option, spin boxes to set date and time become available.
 - **Trigger Fall:** The stream record starts on the falling edge (high to low transition) of the trigger signal applied to the Trig In/Out connector. When you select this option, spin boxes to set date and time become available.

NOTE. *If the trigger does not occur within a specified time, the subsequent stream will be recorded.*

- **TIME:** The stream record starts at an absolute time. When you select this option, spin boxes to set date and time become available.

- **Recording Time:** Specifies the recording time for the stream.
- **Stop Time:** Specifies the time at which a stream will stop recording. When you click the down arrow (▼) to the right side of the date spin box, a calendar allows you to set a date.

Help Menu

The About Scheduler command displays information including the Scheduler software version number and the copyright information.

Status/Control Panel

The status/control panel appears when you select the Execute command from the Schedule menu or click the Execute button on the toolbar. (See Figure 64.) This panel allows you to set properties for the whole schedule list. You can start and stop the stream playing and recording.

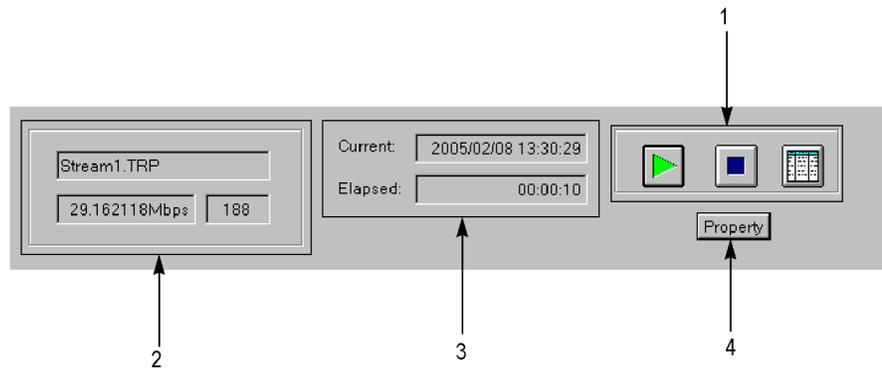


Figure 64: Status/control panel (schedule play mode)

1. **Control buttons.** Controls the schedule play, schedule record, and application window display.

Button	Description
	Play button: Starts the schedule playing. This button is displayed in the schedule play mode.
	Record button: Starts the schedule recording. This button is displayed in the schedule record mode.
	Stop button: Stops the schedule playing or recording.
	Schedule list button: Closes the status control panel.

2. **Stream information:** Shows the file name, bit rate, and packet size of the stream currently being played or recorded.

3. Payout or record status: Shows the following time information:

Current: Shows the current date and time.

Elapsed: Shows the elapsed time from the start of the stream being played or recorded.

4. Property button. Displays the Schedule Property dialog box. (See Figure 65.)

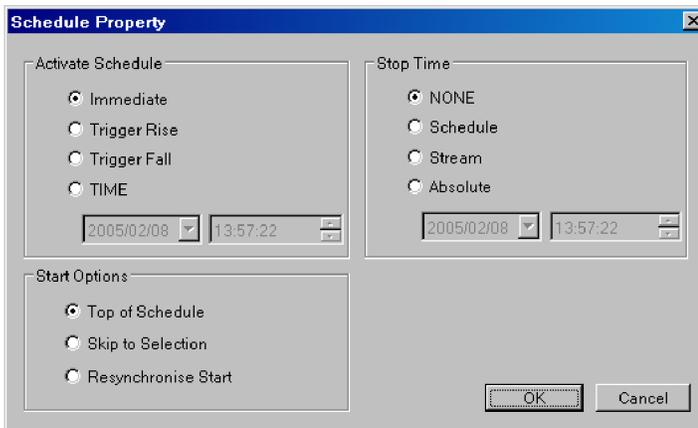


Figure 65: Schedule Property dialog box

- **Activate Schedule:** Sets the way in which the schedule is activated. The setting in this field affects the Start Time setting of a stream at the top of the schedule list.
 - **Immediate:** In the schedule play mode, the schedule playing starts as soon as you click the Play button in the status/control panel. In the schedule record mode, the schedule recording starts as soon as you click the Record button in the status/control panel.
 - **Trigger Rise:** The schedule playing or recording starts on the rising edge (low to high transition) of the trigger signal applied to the Trig In/Out connector. When you select this option, spin boxes to set date and time become available.
 - **Trigger Fall:** The schedule playing or recording starts on the falling edge (high to low transition) of the trigger signal applied to the Trig In/Out connector. When you select this option, spin boxes to set date and time become available.

NOTE. *If the trigger does not occur within a specified time, the subsequent stream will be played out or recorded.*

- **TIME:** The schedule playing or recording starts by an absolute starting time. When you select this option, spin boxes to set date and time become available.

- **Start Options:** Set the actual time when the schedule starts.
 - **Top of Schedule:** The schedule playing or recording starts with the first stream in the schedule list.
 - **Skip to Selection:** The schedule playing or recording starts at the currently highlighted stream. If no stream is highlighted, the schedule will start at the top of the schedule list. This option is available only when you select Immediate in the Active Schedule field.
 - **Resynchronize Start:** The start time of the first stream is adjusted to equal to the current time (the first stream must have an absolute Start Time specified). This option is available only when you select Immediate in the Active Schedule field.
- **Stop Time:** Set the way in which the schedule stops playing or recording.
 - **NONE:** The schedule plays or records according to the start and stop times of each stream.
 - **Schedule:** The schedule playing or recording stops at the specified date and time but not until the current (schedule) pass is completed. When you select this option, the spin boxes used to set date and time are available.
 - **Stream:** The schedule playing or recording stops at the specified date and time but not until the current stream is completed. When you select this option, the spin boxes used to set date and time are available.
 - **Absolute:** The schedule playing or recording stops immediately at the specified date and time. When you select this option, the spin boxes used to set date and time are available.

Scheduler Tutorials

This section describes the basics of operating the Scheduler application. The application has the following two operating modes:

- Schedule play mode
- Schedule record mode

Schedule Play Mode

The schedule play mode allows you to create a schedule list of streams (defined playout properties) and playout up to 256 streams continuously. You can set the start and stop positions, absolute start time, bit rate, and packet size as playout properties for each stream.

In the schedule play mode, you can play five kinds of stream files:

- Transport stream (188/204/208) file
- S-TMCC file
- M-TMCC file
- ISDB-T file
- Non TS file

Perform the following procedure to create a schedule list and play streams:

Creating a Schedule List.

1. Select **Schedule > Play** or click the **Play** button on the toolbar to set Scheduler to the schedule play mode.
2. Select **Schedule > Settings** to open the Scheduler Settings dialog box. (See Figure 60.)
3. In the **New Schedule** tab, set parameters to be updated, playout packet size, and playout bit rate. You can also set whether or not the streams in the schedule list are played continuously.
4. Click the **Add Stream** tab.
5. In the **Add Stream** tab, set the playout properties used when a stream is added to the schedule.
6. Click the **Miscellaneous** tab.
7. In the **Miscellaneous** tab, set the loop mode, the local lock out status, and the port number. The port number needs to be the same port number as the MTX100B.
8. Click the **OK** button to confirm the changes and close the dialog box.
9. Select **Stream > Add** or click the **Add** button on the toolbar to open the Open dialog box.
10. In the **Open** dialog box, select a file to be added to the schedule list and click the **Open** button.
11. Repeat steps 9 and 10 until all the stream files you want to play are added to the schedule list. You can add up to 256 files in a single schedule.
12. Select **Schedule > Execute** or click the **Execute** button on the toolbar to open the status/control panel.
13. Click the **Property** button on the panel to open the Schedule Property dialog box. (See Figure 65.)
14. In the **Schedule Property** dialog box, set conditions to activate, start, and stop the schedule.

15. If you want to set properties for an individual stream, use the following methods to open the Play Properties dialog box. (See Figure 61.)
 - Highlight the stream name you want to set (by clicking the name on the schedule list), and then select Properties from the Stream menu.
 - Double-click the stream name you want to set.
 - Right-click the stream name you want to set, and select Properties from the pop-up menu.
16. In the Play Properties dialog box, set the start/stop positions, start time, and playout properties for the stream.

Schedule Playout Timing

Schedule playout timing is determined by the Active Schedule setting in the Schedule Property dialog box and the Start Time setting in the Play Properties dialog box.

- When you add a stream to a new schedule list with no Active Schedule date/time set, the Start Time is set to the current date/time. The start times of streams subsequently added to the schedule list are cumulative.

Filename	Packets	Start Time	End Time	Duration
-- Stream1.TRP	281822	2005/02/09 9:23:48	2005/02/09 9:24:03	00:00:15
-- Stream2.TRP	187409	2005/02/09 9:24:03	2005/02/09 9:24:13	00:00:10
-- Stream3.TRP	50000	2005/02/09 9:24:13	2005/02/09 9:24:16	00:00:03
-- test40.TRP	386556	2005/02/09 9:24:16	2005/02/09 9:24:36	00:00:20
-- test64.TRP	618488	2005/02/09 9:24:36	2005/02/09 9:25:08	00:00:32

- If you set an Active Schedule date/time (for example, 2005/2/12 12:00:00) in the Schedule Property dialog box, this is applied to all streams.

Filename	Packets	Start Time	End Time	Duration
-- Stream1.TRP	281822	2005/02/12 12:00:00	2005/02/12 12:00:15	00:00:15
-- Stream2.TRP	187409	2005/02/12 12:00:15	2005/02/12 12:00:25	00:00:10
-- Stream3.TRP	50000	2005/02/12 12:00:25	2005/02/12 12:00:28	00:00:03
-- test40.TRP	386556	2005/02/12 12:00:28	2005/02/12 12:00:48	00:00:20
-- test64.TRP	618488	2005/02/12 12:00:48	2005/02/12 12:01:20	00:00:32

- If you set a Start Time (for example, 2005/2/10 15:00:00) in the Play Properties dialog box for an individual stream, the start date/time of all subsequent streams are changed. This does not affect the preceding streams.

	Filename	Packets	Start Time	End Time	Duration
--	Stream1.TRP	281822	2005/02/09 9:34:38	2005/02/09 9:34:53	00:00:15
--	Stream2.TRP	187409	2005/02/09 9:34:53	2005/02/09 9:35:03	00:00:10
Ⓞ	Stream3.TRP	50000	2005/02/10 15:00:00	2005/02/10 15:00:03	00:00:03
--	test40.TRP	386556	2005/02/10 15:00:03	2005/02/10 15:00:23	00:00:20
--	test64.TRP	618488	2005/02/10 15:00:23	2005/02/10 15:00:55	00:00:32

NOTE. *If there is an inconsistent time setting between the Schedule Property and Play Properties dialog boxes or between two streams, an error message appears.*

Saving a Schedule List.

17. Perform either of the following methods to save the schedule list:

- Select **Save > File** menu to save a new schedule list or save an existing schedule list.
- Select **Save As > File** menu to save a schedule list under a different name.

Playing Streams.

18. Click the **Play** button (▶) on the status/control panel to start the schedule.

Schedule Record Mode

The schedule record mode allows you to create a schedule list for stream files to be recorded and to record an input stream continuously on the hard disk drive of the MTX100B. You can set record properties for each stream, and record up to 256 stream files.

Creating a Schedule List. Perform the following procedure to create a schedule list and record streams.

1. Select **Schedule > Record** or click the **Record** button on the toolbar to set the schedule record mode.
2. Select **Stream > Add** or click the **Add** button on the toolbar to open the Save as dialog box. (See Figure 62 on page 169.)
3. In the **Save as** dialog box, specify the appropriate drive, directory, and file name for the stream file to be recorded. You can use the default file name that is automatically displayed in the file name text box.
4. Click the **Save** button to open the Record Properties dialog box. (See Figure 63 on page 170.)
5. In the **Record Properties** dialog box, set the start time and stop time (or recording time) for the stream.
6. Repeat steps 1 through 5 for all the files that you want to record.
7. Select **Schedule > Execute** or click the **Execute** button on the toolbar to open the status/control panel.
8. Click the **Property** button on the panel to open the Schedule Property dialog box. (See Figure 65 on page 172.)
9. In the **Schedule Property** dialog box, set conditions to activate, start, and stop the schedule.

Schedule Record Timing. Schedule record timing is determined by the Active Schedule setting in the Schedule Property dialog box and the Start Time setting in the Record Properties dialog box. Set the timing using the same method as described in Schedule Playout Timing. (See page 175.)

Recording Streams.

10. Click the **Record** button (●) on the status/control panel to start the schedule.

NOTE. *You cannot change a property in the schedule while a schedule is running.*

If you try to run a schedule with past time assigned, an error message appears. If this happens, change the Start Time setting of the corresponding stream(s).

If you continuously output streams that have different bit rates, the instrument requires the start and end times to accumulate a certain amount of data in FIFO and output the last data from FIFO to output each stream in a specific bit rate. Therefore, the actual start and end times of streams are slightly different from the displayed Start and End times in a schedule list.

Any discontinuity may be caused by streams that have different playout properties.

If you output streams from the SMPTE 310 interface (Option 07), set the bit rate to 19.392658 Mbps and set the packet size to 188 bytes.

In the schedule record mode, the Without Limit feature of the MTX100B is automatically set to On.

Appendix D: Using the MTS400 MPEG Test System Applications (MTS400 Software Options only)

This appendix provides a brief overview of each of the MTS400 MPEG Test System applications and a summary of starting and setting up the Transport Stream Compliance Analyzer application. (See Table 40.)

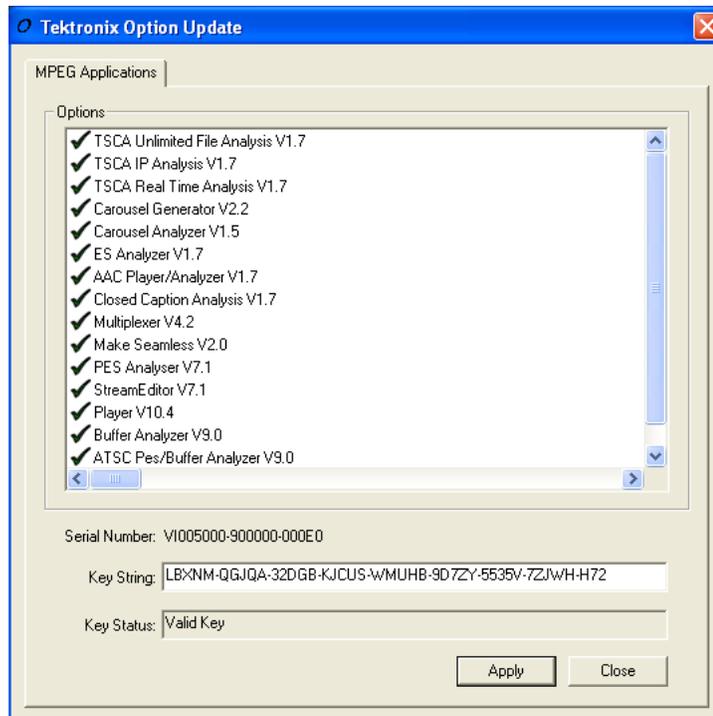
For detailed information on how to use the applications, refer to the *MTS400 Series MPEG Test Systems User Manual* (Tektronix part number 077-0204-XX) and *MTS400 Series MPEG Test Systems Getting Started Manual* (Tektronix part number 071-2607-XX).

NOTE. *The front-panel controls do not work with the MTS400 applications. Use the keyboard and mouse supplied with the instrument.*

Option wizard

Option key. Software options on the MTX100B MPEG player and recorder 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 is generated for a specific MTX100B monitor using the serial number and MAC address of that monitor.

An option key that is generated for one monitor will not work when applied to another monitor. The MAC address identifies the Transport Stream Processor board that is installed in the monitor. If there is a hardware failure and the Transport Stream Processor board is replaced, a new option key will need to be issued because the monitor will then have a different MAC address. The MAC address is printed on the label on the top cover of the monitor and above the network port on the rear panel.



The MTX100B MPEG player and recorder is 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 and on the top cover label of the instrument.

Attaching the Software Key

The MTS400 applications are pre-installed on the MTX100B. The software options can be enabled by installing the software key (dongle) to the Printer port.

Perform the following steps to attach the software key:

1. If there is a cable attached to the Printer port, disconnect the cable.
2. Attach the software key to the Printer port, and then tighten the retention screws. (See Figure 66.)

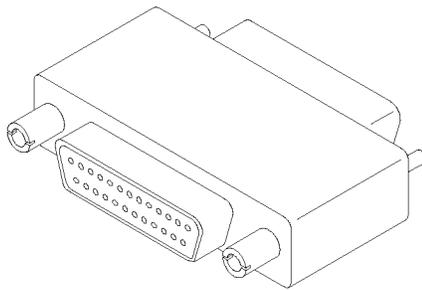


Figure 66: Security dongle

3. If you removed a cable in step 1, reconnect it directly to the software key.

NOTE. To run the MTS400 applications, the software key must be installed on the Printer port of the instrument. Do not remove or misplace the software key.

If you have the key for the MTXS01 software, you can connect both software keys in any order.

Software Applications

This section provides a brief overview of the software applications. Note that not all options may be enabled. Detailed descriptions of all applications can be found in the *MTS400 Series MPEG Test Systems User Manual* (Tektronix part number 077-0204-XX).

NOTE. The SMPTE310M/ASI/SPI interface (Option 07) is required to run the MTS400 real-time applications on the MTX100B.

Table 40: Overview of the applications

Application	Desktop icon
Analyzer	
Transport Stream Compliance Analyzer (TSCA) - Real-time transport stream analysis with user-selectable MPEG-2, DVB, ATSC and ISDB conformance tests. Shows transport structure, header contents, hexadecimal packet contents, PCR timing/transport rate graphs, and error message logs.	 TSCA Compliance Analyser
Transport Stream Compliance Analyzer (TSCA) - Deferred transport stream analysis with user-selectable MPEG-2, DVB, ATSC and ISDB conformance tests. Shows transport structure, header contents, hexadecimal packet contents, PCR timing/transport rate graphs, and error message logs.	 TSCA Compliance Analyser
Packetized Elementary Stream (PES) Analyzer - PES analysis with selectable test options. Shows PES program structure, header contents, packet contents, PTS/DTS timing graphs, and analysis reports.	 PES Analyser
Transport Stream - System Target Decoder (T-STD) - Buffer Analyzer analyzes program streams modeling their behavior in, and their conformance to, the MPEG-2 T STD Buffer Model.	 Buffer Analyser
Elementary Stream Analyzer - Elementary Stream analysis at video picture and audio level. This includes vector graphs and macroblock picture quality.	 ES Analyser
Carousel Analyzer - Data analysis showing structure, bit rate, repetition rate, syntax and semantics of data items.	 Carousel Analyser
Generators	
Carousel Generator - Provides in-depth off-line generation of MPEG-2, DVB transport streams containing a range of data broadcast protocols.	 Carousel Generator
Multiplexer - Multiplexes table information and packetized elementary streams together to synthesize new transport streams. A fine level of control is provided to allow nonconformances and test cases to be specified for new transport streams.	 Multiplexer
TS Editor - Viewing and editing transport stream packets, using a hexadecimal view of the packet contents and semantic interpretation of the header. Provides facilities to remap PIDs, recalculate PCR values and introduce PCR inaccuracies.	 TS Editor

Table 40: Overview of the applications (cont.)

Application	Desktop icon
Utilities	
Tracer - Views the message log produced by T-STD Buffer Analyzer.	 Tracer
Make Seamless Wizard - Guides the user through the process of creating an MPEG-2 file for use by Stream Player in continuously looped operation.	 Make Seamless Wizard
Stream Cutter - Extracts sections of MPEG-2 files to new files.	 Stream Cutter
Script Pad - Enables users to create and modify System Information (SI) scripts.	 ScriptPad

Starting an Application

NOTE. Before starting the MTS400 applications, exit the MTX100B application.

All applications are started from the **Start > All Programs > Tektronix MTS400** menus or from desktop icons. (See Table 40.)

The *MTS400 Series MPEG Test Systems User Manual* (Tektronix part number 071-10204-xx) provides full descriptions of all applications. The following table shows the hierarchy of applications in the Start menu.

Table 41: MTS400 series system start menu

Start menu name	Application category	Application name
Tektronix MTS400 Series system	Analyzer	Buffer Analyzer
		Carousel Analyzer
		ES Analyzer
		PES Analyzer
		TS Compliance Analyzer
	Generators	Carousel Generator
		Multiplexer
		TS Editor
	Utilities	Make Seamless Wizard
		ScriptPad
		Stream Cutter
		Tracer

NOTE. *Even though all applications are shown in the Start menu, you can open only those options that have been purchased and licensed.*

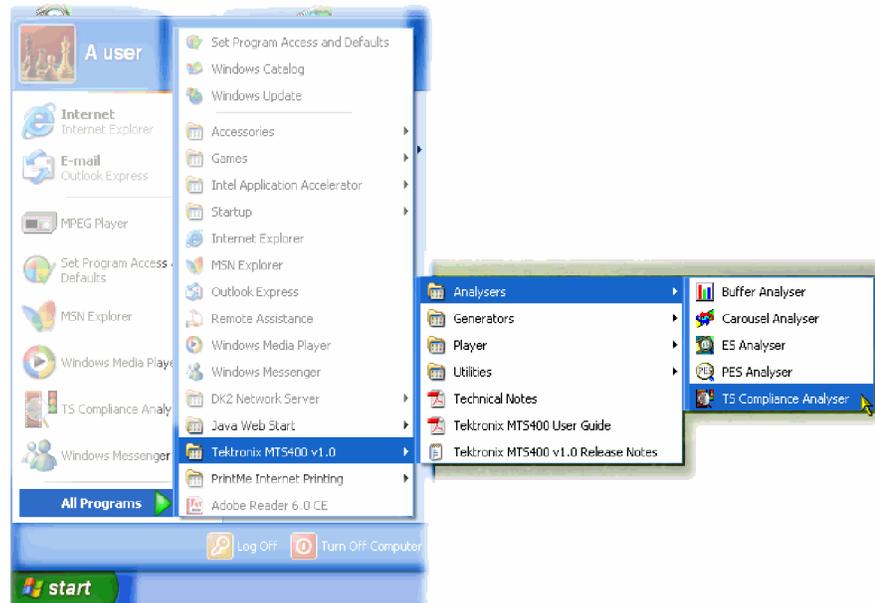
This section briefly describes how to set up and analyze off-line and real-time streams using the Transport Stream Compliance Analyzer (TCSA). You can find information on how to interpret the analysis results in the relevant chapter of the user manual.

You must perform the following actions to analyze a stream.

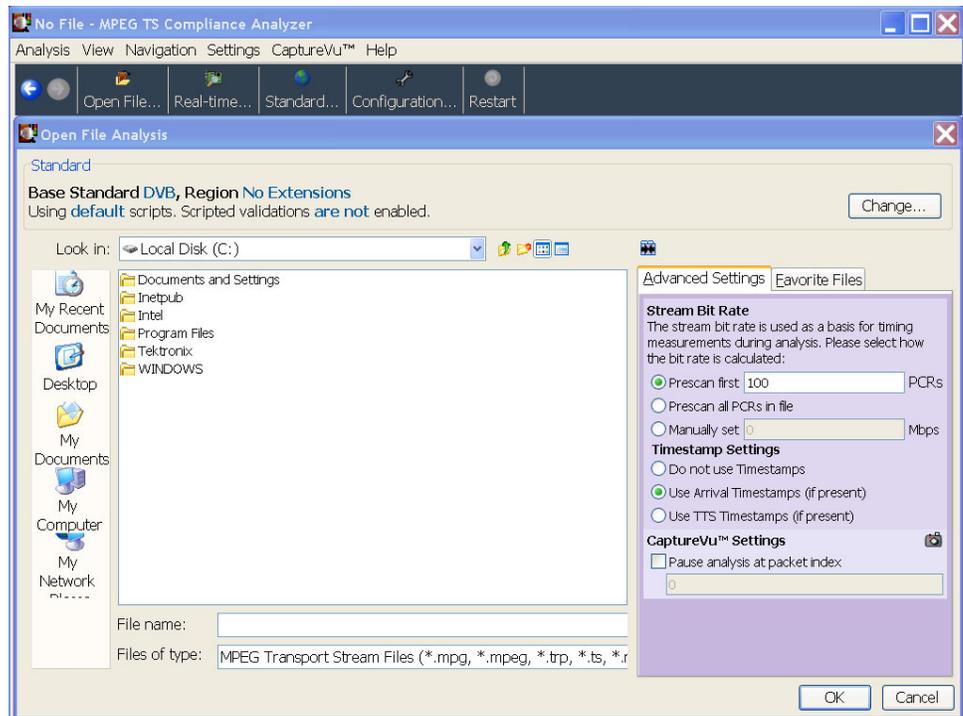
- Start the TSCA.
- Verify and, if necessary, select the stream interpretation standard.
- Set the stream transport rate calculation method (off-line only).
- Identify and select the stream to be analyzed (off-line or real-time).

Starting the TSCA

From the **Start** menu, select **Start > All Programs > Tektronix MTS400 > Analyzers > TS Compliance Analyzer**.

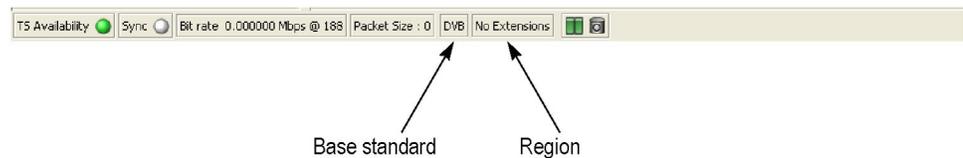


The TSCA opens and is immediately overlaid by the Open Transport Stream dialog box.

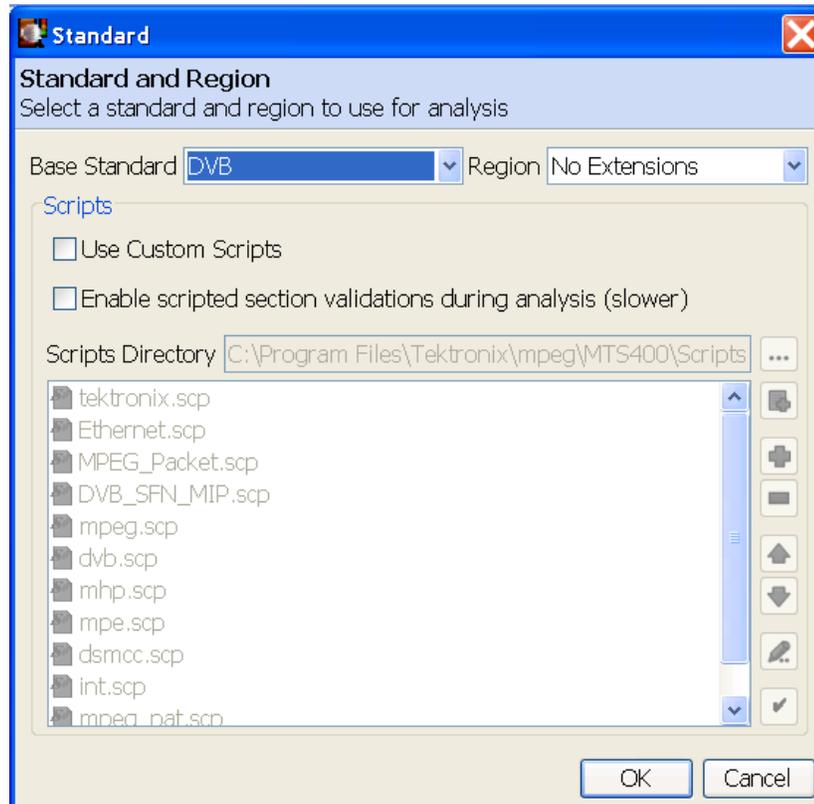


Setting the Interpretation Standard

For a stream to be analyzed correctly, the interpretation standard in the TSCA must be set to be the same as that used to create the stream. You can see the Base Standard and Region currently set for the TSCA by looking at the stream interpretation fields in the status bar of the Main window.



1. If you need to change the interpretation standard, click **Change...** in the Open Transport Stream dialog box. The Standard dialog box is appears.

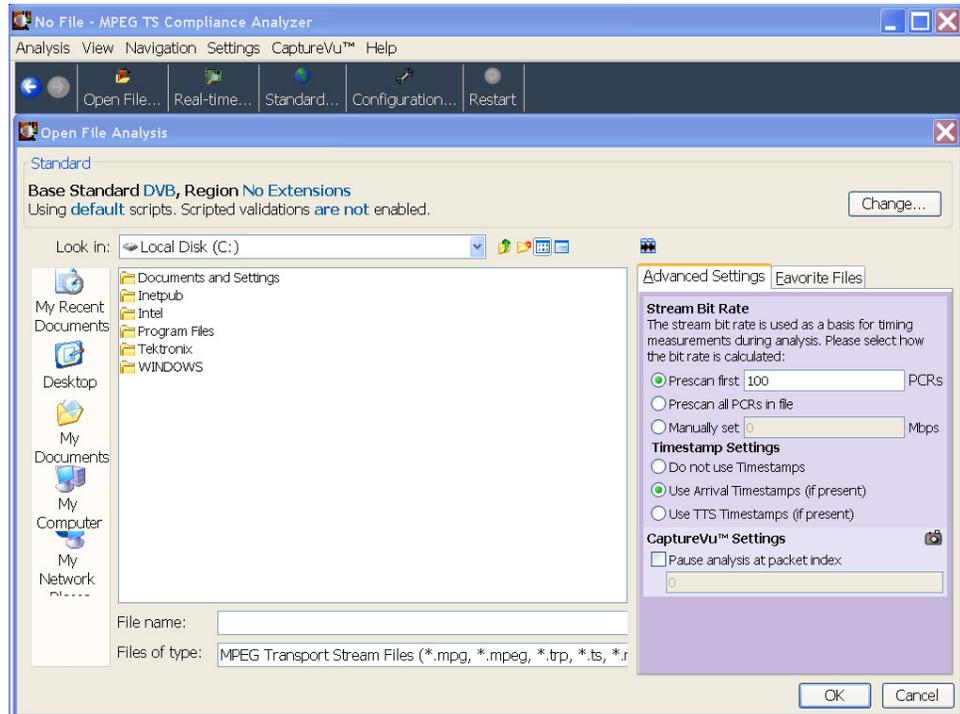


2. In the Stream Interpretation dialog box, select the **Base Standard** and **Region** as required. Note that the scripts used in the current selection are listed in the Script Files pane.

Off-Line Analysis

Set up off-line analysis as follows:

1. Select File Analysis.



2. Identify and select a file.

For the file to be analyzed correctly, the bit rate must be known. You can let the TSCA do this automatically or you can set it manually.

3. Calculate the stream bit rate.

If PCRs (Program Clock Reference) are present in the file, the TSCA is able to calculate the bit rate automatically either by prescanning the first 100 PCRs or by scanning the entire file. Scanning the entire file is a more accurate method of calculating the bit rate but analysis of the file will take longer.

If time-stamping is present in the file to be analyzed, it can be used to provide a more accurate calculation of the bit rate. If time-stamps are not found, the bit rate will be calculated using PCRs.

You can set the stream bit rate manually.

4. Set the CaptureVu packet index.

The packet index field allows you to specify how many packets in the stream are to be analyzed. The value entered will be the last packet analyzed; that is, from packet zero to the value entered. Note that if too small a sample of the stream is analyzed, insufficient service information may be available for meaningful analysis.

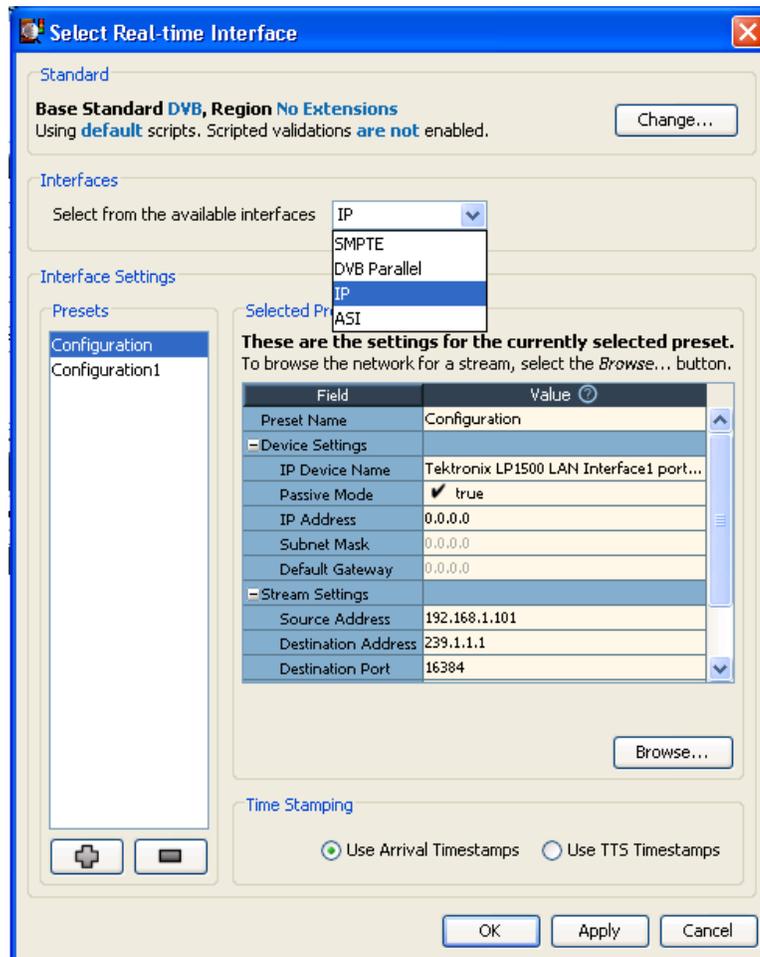
Clear the **Stop Analysis at Packet Index** check box to ensure full stream analysis.

5. Select **OK** to proceed with the off-line file analysis. During analysis of a stream, a progress bar is displayed in the toolbar.

Real-Time Analysis

Set up real-time analysis as follows:

1. Select **Real-time..**
2. Select the interface. This is the input on which your real-time stream is being received.



3. If present in the **Interface Settings** pane, select the **Use Timestamps** check box. For the IP interface, select the port number.
4. Select **OK** to proceed with the real-time file analysis.

Appendix E: Control Signal for Option 02

For the MTX100B Option 02, the control signals for the hierarchical multiplexing parameters are output from the Universal In/Out connector when outputting an ISDB-T transport stream.

This appendix describes the pin assignments of the Universal In/Out connector when the control signals are output and shows the timing relationship of these signals. (See Table 42.)

Table 42: Pin assignment of the Universal In/Out connector

Characteristics		Description			
Universal In/Out connector	Connect type	D-sub, 25 pin			
	Pin assignments	<i>Pin</i>	<i>Signal</i>	<i>Pin</i>	<i>Signal</i>
		1	Clock ¹	14	/Clock
		2	GND	15	GND
		3	CD3	16	/CD3
		4	CD2	17	/CD2
		5	CD1	18	/CD1
		6	CD0	19	/CD0
		7	HFLAG3	20	/HFLAG3
		8	HFLAG2	21	/HFLAG2
		9	HFLAG1	22	/HFLAG1
		10	HFLAG0	23	/HFLAG0
		11	NC	24	NC
		12	Frame	25	/Frame
		13	GND		

¹ The clock frequency can be selected from 4 MHz, 8 MHz, 16 MHz, or 32 MHz using the PI Clock command in the Univ I/F menu.

The following figure shows the timing relationship of the signals on the Universal In/Out connector.

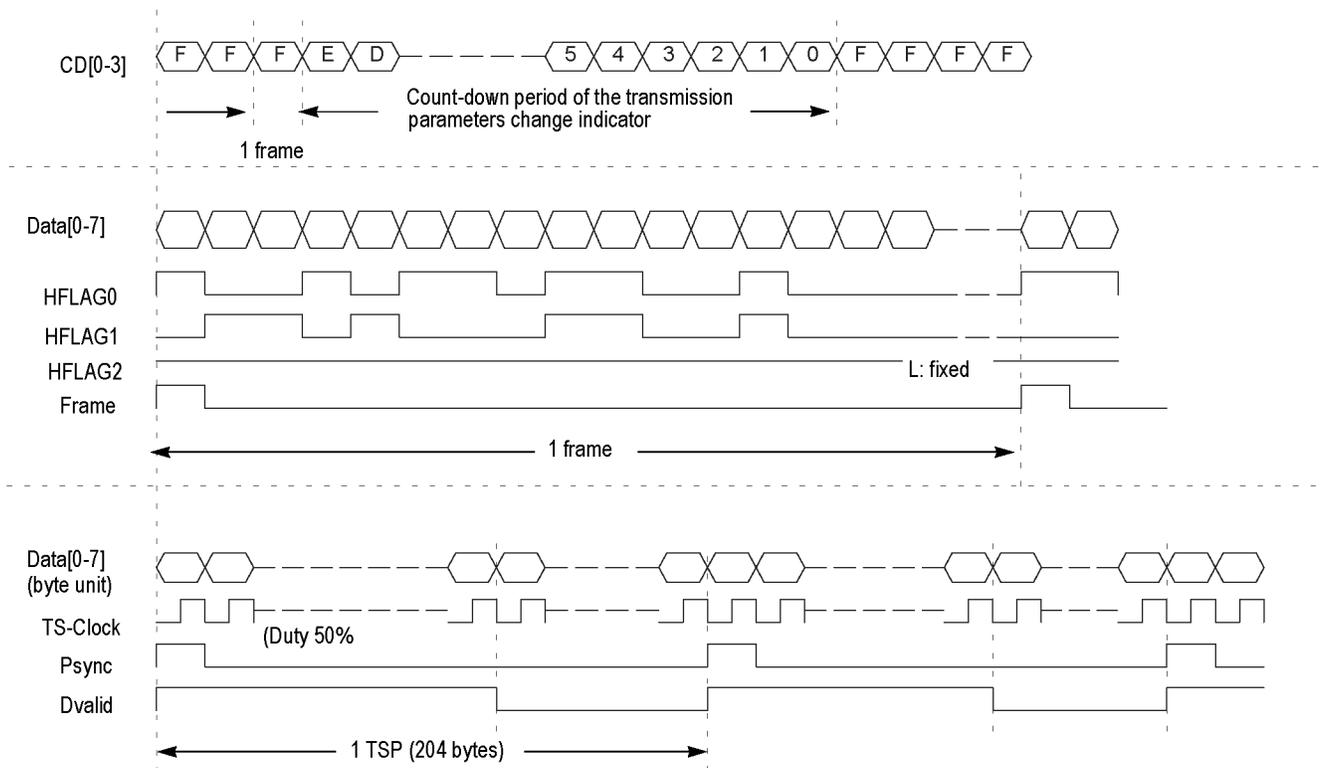


Figure 67: Timing relationship of the signals on the Universal In/Out connector

Appendix F: Defragment the Hard Disk Drive

The MTX100B displays the following messages when fragmentation occurs and data output or data record rate is slower than the specified characteristics.

- FIFO is underflow (when data is being output)
- FIFO is overflow (when data is being acquired)

If this condition happens, you need to optimize the hard disk drive by performing the Disk Defragmenter of Windows XP. This appendix provides instructions on how to defragment the hard disk drive.

Procedure

Perform the following procedure to defragment the hard disk drive:

1. Connect the keyboard and mouse provided with the instrument to the USB port on the front panel.
2. Select **File > Exit** in the Play or Record screen to exit the MTX100B application.
3. Select **Programs > Accessories > System Tools > Disk Defragmenter** from the **Start** menu. The Disk Defragmenter window appears. (See Figure 68.)

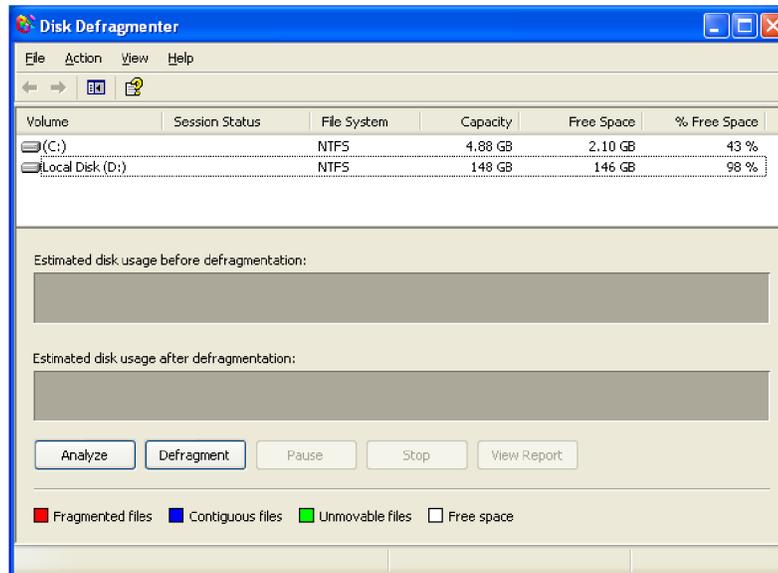


Figure 68: Disk Defragmenter window

4. Click **Local Disk (D:)**.

5. Click the **Defragment** button to start the defragmentation. When the defragmentation is completed, the Defragmentation Complete dialog box appears. (See Figure 69.)



Figure 69: Defragmentation Complete dialog box

6. Click the **Close** button.
7. Click the **Close** button at the upper right of the screen to close the Disk Defragmenter window.

Appendix G: System Software Recovery

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.*

The recovery can be performed in two ways:

- **Recover Boot Partition:** This permanently overwrites the contents of your boot partition. This mode of recovery is preferred if you want to keep your old data files on the D drive.
- **Recover Entire Disk:** This permanently overwrites the contents of your entire hard disk drive and resets the system to the factory defaults.

Recovery Procedure

Perform the following procedure to recover the Windows XP and 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. On selecting 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.*

Glossary

ACTS (Advanced Communications Technologies and Services)

A set of telecommunication research projects financed by the European Union.

ARIB

Association of Radio Industries and Businesses.

ATSC

Advanced Television Systems Committee.

BAT (Bouquet Association Table)

One of the tables defined by DVB-SI. The BAT provides information regarding bouquets (collections of services marketed as a single entity). DVB only.

CAT (Conditional Access Table)

One of the PSI tables described by the MPEG-2 standard. The CAT provides the association between one or more CA systems, their EMM (Entitlement Management Message) streams, and any special parameters associated with them.

CRC (Cyclic Redundancy Check)

One of the fields described in the MPEG-2 standard. CRC is used to verify the correctness of data in PSI and SI tables.

Defragmentation

The process of rewriting parts of a file to contiguous sectors on a hard disk to increase the speed of access and retrieval. When files are updated, the computer tends to save these updates on the largest continuous space on the hard disk, which is often on a different sector than the other parts of the file. When files are thus “fragmented,” the computer must search the hard disk each time the file is accessed to find all of the file’s parts, which slows down response time.

DVB (Digital Video Broadcast)

A project group of the European Broadcasting Union (EBU).

DVB-MG

Digital Video Broadcasting - Measurement Guidelines.

DVB-SI (Digital Video Broadcast Service Information)

The DVB-SI adds the information that enables DVB IRDs to automatically tune to particular services and allows services to be grouped into categories with relevant schedule information. It has several tables, including: NIT, SDT, BAT, and EIT. (NIT is also required for MPEG-2.)

DTS (Decoding Time-Stamp)

One of the fields described in the MPEG-2 standard. The DTS may be present in a PES packet header that indicates the time that an access unit is decoded in the T-STD.

ECM (Entitlement Control Message)

Private conditional access information that specifies control words and possibly other, typically stream-specific, scrambling and/or control parameters.

EISA (Extended Industry Standard Architecture)

The PC bus used to communicate with the CARB and PIA boards.

EIT (Event Information Table)

One of the tables defined by DVB-SI. The EIT contains data concerning events (a grouping of elementary broadcast data streams with a defined start and end time belonging to a common service) and programs (a concatenation of one or more events under the control of a broadcaster, such as event name, start time, and duration).

EMM (Entitlement Management Message)

Private conditional access information that identifies the authorization levels or the services of specific decoders.

ETS (European Telecommunication Standard)

One of the types of documents released by ETSI.

ETSI

European Telecommunications Standards Institute.

ETR (ETSI Technical Report)

One of the types of documents released by ETSI.

IP

Internet Protocol.

IRD (Integrated Receiver/Decoder)

A receiving decoder that can automatically configure itself using the MPEG-2 Program Specific Information (PSI).

ISDB-T (Integrated Services Digital Broadcasting-Terrestrial)

The Japanese broadcasting standard developed by ARIB. In ISDB-T, the television, radio, and data services are covered by one standard.

ISO (International Standard Organization)

Organization responsible for establishing standards at the world-wide level.

MPEG-2

A standard developed by MPEG (Moving Picture Experts Group) for the compression of digital video.

NIT (Network Information Table)

One of the PSI tables described by the MPEG-2 standard and also one of the tables defined by DVB-SI. The NIT conveys information relating to the physical organization of the multiplex; that is, transport streams carried through a given network and the characteristics of the network itself. Transport streams are identified by the combination of an original network ID and a transport stream ID in the NIT.

PAT (Program Association Table)

One of the PSI tables described in the MPEG-2 standard. The PAT provides information about the structure of a transport stream.

PCR (Program Clock Reference)

One of the fields defined in the MPEG-2 standard. A time stamp in the transport stream from which decoder timing is derived.

PES (Packetized Elementary Stream)

A structure defined in the MPEG-2 standard used to carry elementary stream data.

PID (Packet Identifier)

One of the fields described in the MPEG-2 standard. A unique integer value used to identify elementary streams of a program in a single or multiprogram TS.

PMT (Program Map Table)

One of the PSI tables described by the MPEG-2 standard. The PMT identifies and indicates the locations of the streams that make up each service and the

location of the Program Clock Reference (PCR) fields for a service. This table is transmitted in sections.

PSI (Program Specific Information)

A set of tables described by the MPEG-2 standard. The PSI contains all of the tables that define the MPEG-2 transport stream. It consists of the PAT, PMT, CAT, and NIT tables. (NIT is also used for DVB-SI.)

PSIP

Program and System Information Protocol.

PTS (Presentation Time Stamp)

One of the fields described in the MPEG-2 standard. The PTS may be present in a PES packet header that indicates the time that a presentation unit is presented in the T-STD.

RST (Running Status Table)

One of the tables defined by DVB-SI. The RST gives a quick updating mechanism for the status information carried in the EIT.

SDT (Service Description Table)

One of the tables defined by DVB-SI. The SDT contains data describing the services in the system. Examples include names of services and the service provider.

SI (Service Information)

Set of tables defined by DVB-SI. The SI provides information on services and events carried by different Multiplexes, and even other networks. SI is structured as six tables (PAT, NIT, CAT, SDT, EIT, and BAT). The applications are only concerned with NIT, BAT, SDT, and EIT.

ST (Stuffing Table)

One of the tables defined by DVB-SI. The ST provides stuffing sections.

TDT (Time & Date Table)

One of the tables defined by DVB-SI. The TDT carries the current time and date information.

TOT (Time Offset Table)

One of the tables defined by DVB-SI. The TOT gives information about a local time offset in a given area.

TS (Transport Stream)

A bit stream that contains 0 or more elementary streams combined in a manner that conforms to the MPEG-2 standard.

T-STD (Transport Stream System Target Decoder)

Described by the MPEG-2 standard, the T-STD is a hypothetical reference model of a decoding process used to define the semantics of a TS.

VLAN

Virtual Local Area Network.

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