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RTX130B
QAM and VSB RF Signal Generator

User Manual

www.tektronix.com
071-1933-03

Tektronix

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

To Avoid Fire or Personal Injury

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

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

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.

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.

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(Earth) Terminal

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Preface

The user manual for the RTX130B QAM & VSB RF Signal Generator contains the following sections:

Getting Started briefly describes the RTX130B QAM & VSB RF Signal Generator and provides installation instructions, option and accessory lists, repacking instructions, and power on and off instructions.

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

Reference provides detailed information about the functions and use of the RTX130B QAM & VSB Signal Generator's main menus, and 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 provides product specifications, instructions for operating the ReMux and Scheduler applications, defragging the hard disk, recovering the system, and inspecting and cleaning the RTX130B QAM & VSB Signal Generator.

Terms

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 having super frame structure. It is defined in the ISDB-S system.
- **Broadcast transport stream:** Transport stream defined in ARIB STD-B31.

Related Manual

The following related documentation for the instrument is available:

- The *RTX130B QAM & VSB RF Signal Generator Service Manual* (Tektronix part number 071-1935-XX) describes how to maintain and service the RTX130B and provides a complete module-level description of the operation of the instrument. This manual is an optional accessory.

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Getting Started

The RTX130B QAM & VSB RF Signal Generator generates QAM and 8VSB modulated signals that are compliant with the DVB-C/ITU-T J.83 Annex A/B/C and ATSC standards. In addition to the RF signal output feature, the RTX130B records and plays MPEG-2 transport streams that are compliant with ATSC, DVB, and ARIB standards.

- 16/64/256QAM and 8VSB modulation formats
- Modulation frequency range: 50 MHz to 860 MHz
- 44 MHz or 36 MHz IF output
- Support the following standards:
  - DVB-C/ITU-T J.83 Annex A (Option M1)
  - ITU-T J.83 Annex B (Option M2)
  - ITU-T J.83 Annex C (Option M3)
  - ATSC (Option M4)
- Data rate: 200 Mbps maximum (RAM mode); 256 Kbps minimum
- Hierarchy display of stored or captured transport streams
- 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)
- Playout on one interface at a time, either IP or QAM/VSB interfaces
- Two IP versions namely IPv4 and IPv6 are supported
- Stream replication (IP) with some attributes of the stream incremented by a certain value

The RTX130B includes the ReMux application software that provides the capability to create a transport stream of super frame structure defined in the ISDB-S systems from an MPEG-2 transport stream. (See page C-1, *Using the ReMux Application*.)

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

Standard Accessories

The following accessories are shipped with the RTX130B:

Document, CD-ROMs, and Other Parts

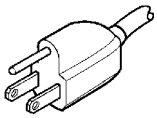
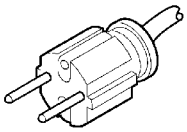
The following items are standard accessories:

- RTX130B QAM & VSB RF Signal Generator User Manual
  - English (Option L0): Tektronix part number 071-1933-XX
  - Japanese (Option L5): Tektronix part number 071-1934-XX
- Interface cable (D-sub 25-pin, twisted pair), Tektronix part number 012-A220-00
- Two RF attenuators, Tektronix part number 011-0185-00
- USB keyboard, Tektronix part number 119-B146-00
- USB mouse, Tektronix part number 119-6936-00
- Front cover, Tektronix part number 200-4716-00
- Software option key

Power Cords

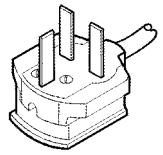
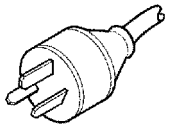
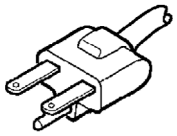
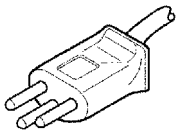
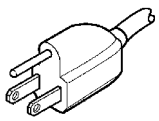
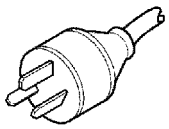
All RTX130B QAM & VSB RF Signal Generators are shipped with one of the following power cord options. Power cords for use in North America are UL listed and CSA certified. Cords for use in areas other than North America are approved by at least one authority acceptable in the country to which the product is shipped.

Table 1-1: Power cord identification

Plug configuration	Normal usage	Option number
	North America 115 V	Standard (A0)
	Universal Euro 220 V	A1

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Table 1-1: Power cord identification (cont.)

Plug configuration	Normal usage	Option number
	United Kingdom 240 V	A2
	Australia 240 V	A3
	North America 250 V	A4
	Switzerland 240 V	A5
	Japan 100 V	A6
	China 240 V	A10
	No power cord supplied.	A99

Optional Accessories

The following items are optional accessories:

- *RTX130B ISDB-T RF Signal Generator Service Manual*, Tektronix part number 071-1932-XX.
- WFM7F05 Option NN rackmount kit
- 1700F06 blank panel

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Options

The RTX130B can be ordered with the following options.

Instrument Option

The following instrument option is available for the RTX130B:

- **Option M1:** DVB-C/ITU-T J.83 Annex A modulation mode
- **Option M2:** ITU-T J.83 Annex B modulation mode
- **Option M3:** ITU-T J.83 Annex C modulation mode
- **Option M4:** ATSC modulation mode
- **Option SC:** Adds the Scheduler software

Service Options

The following service options are available for the RTX130B:

- **Option C3:** Provides calibration services for 3 years
- **Option C5:** Provides calibration services for 5 years
- **Option D1:** Provides calibration data
- **Option D3:** Provides calibration data for 3 years
- **Option D5:** Provides calibration data for 5 years
- **Option R3:** Extends the instrument warranty to 3 years
- **Option R5:** Extends the instrument warranty to 5 years

Power Cord Options

(See Table 1-1 on page 1-2.)

Initial Product Inspection

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

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1. Inspect the shipping carton for external damage, which indicates possible damage to the instrument.
2. Remove the RTX130B from the shipping carton.
3. Check that the instrument has not been damaged in transit. The exterior should not have any scratches or impact marks. Before shipment the instrument is thoroughly inspected for mechanical defects.

NOTE. *Save the shipping carton and packaging materials for instrument repackaging in case shipment becomes necessary.*

4. Verify that the shipping carton contains the instrument, the standard accessories, and any optional accessories that you ordered.
5. Perform the functional check procedure after installing the instrument. (See page 1-9, *Functional Check Procedure*.)

Contact your local Tektronix Field Office or representative if there is a problem with your instrument or if your shipment is incomplete.

Installation

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

Environment Operating Requirements

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



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

Table 1-2: Environmental operating requirement

Characteristics	Specifications
RTX130B ambient temperatures	from +5 ˚C to +40 ˚C
RTX130B relative humidity	from 20% to 80%
Clearance on top	5.0 cm (2 in)
Clearance on left side	5.0 cm (2 in)

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Table 1-2: Environmental operating requirement (cont.)

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

NOTE. *If you are installing the instrument in a dedicated rack, refer to the instruction sheet that comes with the rackmounting kit for proper installation procedures. When the RTX130B is mounted in a 19-inch rack, verify that there is at least one unit of clearance above the RTX130B.*

AC Line Voltage Requirement

Check that your location provides the proper electrical power requirements. (See Table 1-3.)

Table 1-3: AC line power requirement

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



CAUTION. *The instrument does not have a power switch, but does have an on/standby switch. When you connect the power cable to the AC line connector, power is applied to the power supply standby circuit of the instrument. Read the power application instructions before plugging the power cable into a power source. (See page 1-6, Applying Power to the Instrument.)*

Power Cord Requirement

Verify that you are using the proper power cord for your location. (See page 1-6, *Applying Power to the Instrument*.) Connect the power cord from the rear-panel power connector to the power system.



CAUTION. *The instrument is shipped with a power cord appropriate for use with your power systems (normal 115 V power system or 230 V power system). If the instrument is to be used with a power system other than that specified in the order, the power cord must be replaced with one appropriate for the power source used. (See Table 1-1 on page 1-2.)*

Applying Power to the Instrument

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

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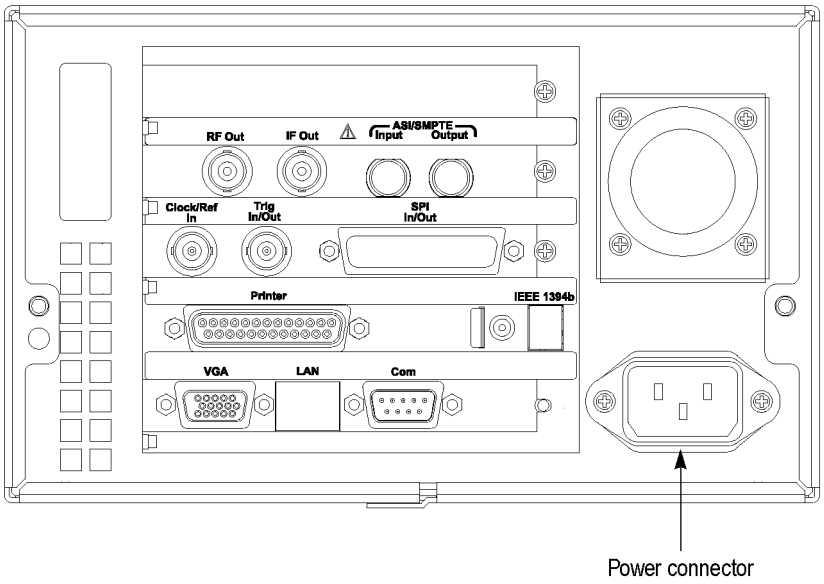


Figure 1-1: Rear-panel power connector

Power On. Press the On/Standby switch to power on the instrument. (See Figure 1-2.) After you power on the instrument, verify that the fan on the rear panel is operating. To verify that the fan is operating, place your hand behind the right side of the instrument. You should be able to feel the fan's air flow.

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

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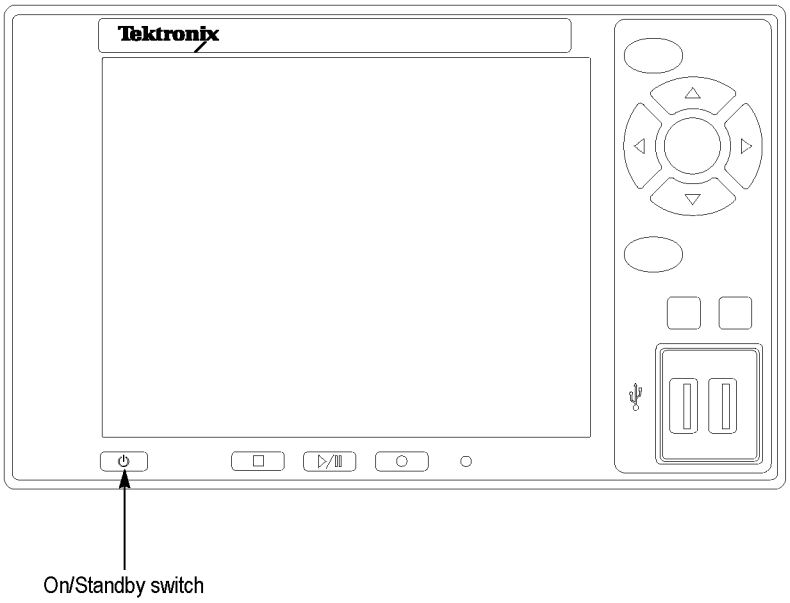


Figure 1-2: Front-panel On/Standby switch

Repacking for Shipment

When you ship this instrument, use the original packaging material if possible. If the original packaging is unfit for use or is not available, repackage the instrument using the following procedure:

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1. Obtain a corrugated cardboard shipping carton having inside dimensions at least six inches greater than the instrument dimensions and having a carton test strength of at least 125 kg (275 pounds).
2. If the instrument is being shipped to a Tektronix Service Center for repair or calibration, attach a tag to the instrument showing the following information:
   - The owner of the instrument (with address).
   - The name of a person at your firm who may be contacted if additional information is needed.
   - The complete instrument type and serial number.
   - A description of the service required.
3. Wrap the instrument with polyethylene sheeting or equivalent to protect the outside finish and prevent entry of packing materials into the instrument.
4. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and the instrument, allowing for three inches (7.62 cm) of padding on each side (including top and bottom).
5. Seal the carton with shipping tape or with an industrial stapler.
6. Mark the address of the Tektronix Service Center and your return address on the carton in one or more prominent locations.

Functional Check Procedure

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

NOTE. *Before you perform this procedure, install the RTX130B using the instructions listed in Installation.* *(See page 1-5, Installation.)*

1. Connect the RTX130B to a power source, and then turn on the instrument using the **On/Standby** switch.
2. Press the front-panel **Menu** button to display the File menu command list.
3. Press the up (▲) or down (▼) arrow button to select **Open** from the list, and then press the **Enter** button to open the Select File dialog box. (See Figure 1-3.)

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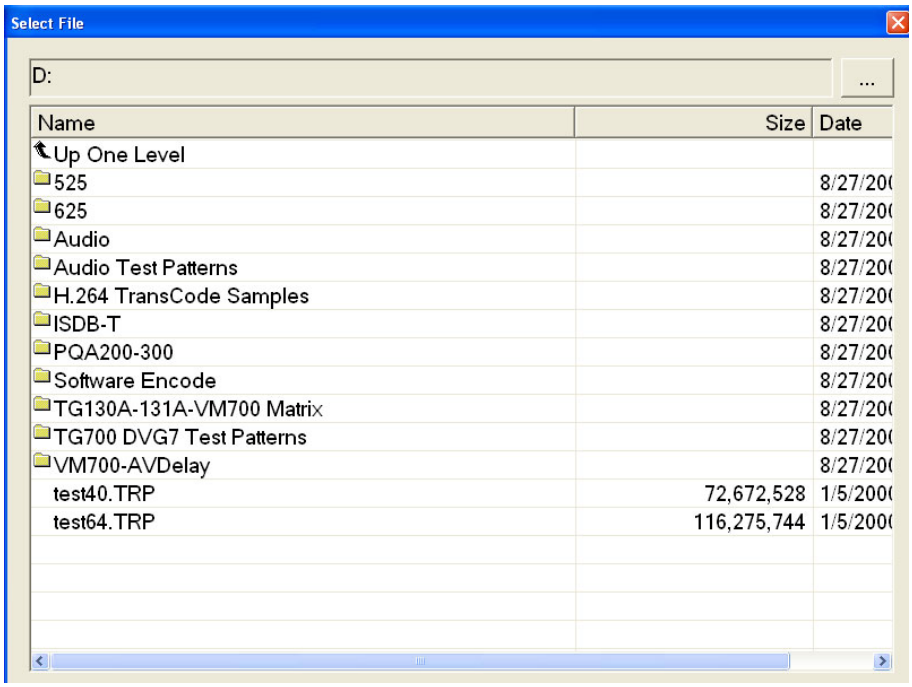


Figure 1-3: Select File dialog box

4. Press the up (▲) or down (▼) arrow button to select the **test64.TRP** file, and then press the **Enter** button. The hierarchy view of the transport stream file will be displayed on the screen.

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

---

5. Connect the interface cable provided with the instrument between the **SPI In/Out** connector on the RTX130B rear panel and the **SPI In** connector on an MPEG decoder. (See Figure 1-4.)
6. Connect the decoder to a picture monitor.
7. Press the RTX130B **Play/Pause** button to start the transport stream output. When transport stream output is started, the Play Status indicator appears on the screen.
8. Check that the picture from the transport stream is displayed correctly on the picture monitor.

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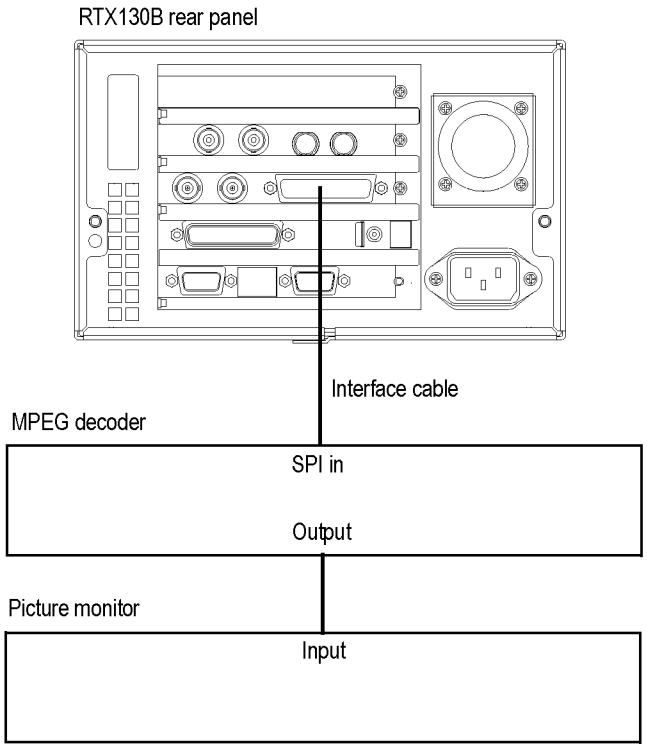


Figure 1-4: Equipment connection for the functional check

Windows Operations

All of the functions of the RTX130B are performed as an application (RTX130B) on the Windows XP operating system. Therefore, if you connect the keyboard and mouse provided with the instrument to the front-panel USB connectors, you can operate the RTX130B system with the same environment as a Windows PC.

Operation on the Play/Record Screen

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

Displaying the Windows Screen (Desktop)

To display the Windows screen (Desktop), select Minimize or Exit from the File menu in the Play screen or Record screen. When you click Minimize, the RTX130B application window minimizes and the Windows XP desktop appears. When you click Exit, the RTX130B application exits and the Windows XP desktop appears.

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File Operation

There are no menu commands to manage file operations in the RTX130B 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 RTX130B application is placed in the C:\ProgramFiles\Tektronix\Mpeg Player 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.

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Operating Basics

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Operating Basics

This section explains the basics of operating the RTX130B. It gives a functional overview and takes you through the basic menu operations.

Functional Overview

This subsection contains descriptions of the front-panel controls and the rear-panel connectors.

Front Panel Controls

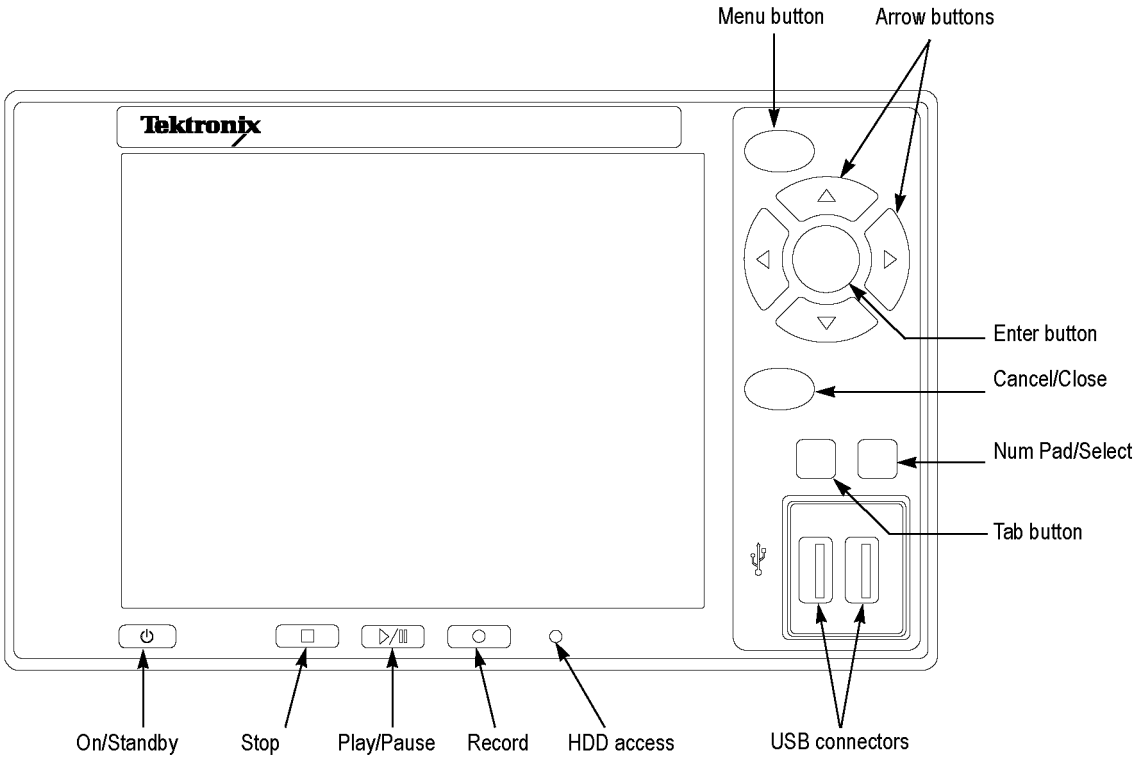


Figure 2-1: RTX130B front panel

On/Standby Switch. Powers on or off the instrument.

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

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Stop Button. This button performs the following functions:

- If this button is pressed while a stream data is being output, the data output stops.
- If this button is pressed while the pretrigger portion is filled and the instrument waits for a trigger event or the posttrigger portion is being recorded, the recorded data is stored in a file.

Play/Pause Button. This button performs the following functions:

- If this button is pressed, the data output starts.
- If this button is pressed while the Record screen is displayed, it switches to the Play screen.
- If this button is pressed while a stream data is being output, the data output pauses. Press the button again to start the stream output.

When an M-TMCC transport stream is selected, RTX130B outputs the stream from the start packet in the super frame to the maximum number of packets that can be looped as an integral multiple of the number of super frames. When an ISDB-T transport stream is selected, RTX130B outputs the stream from the start packet in the OFDM (Orthogonal Frequency Division Multiplexing) frame to the maximum number of packets that can be looped as 2 X N of the number of OFDM frames. If any of the transport streams within the ISDB-T transport stream have different modulation parameters, select Non TS from the Packet Size command in the Play menu. (See page 3-4, *Play Menu*.)

The status indicator light in the button illuminates when stream data is being output. The light blinks when the stream output pauses.

Record Button. This button performs the following functions:

- Press this button to record the stream data that is being applied.
- If this button is pressed while the Play screen is displayed, it switches to the Record screen.
- Press this button to start the RF output of the modulated signal when a broadcast transport stream is applied to the ASI In connector.

The status indicator light in the button blinks when a sync word is being detected, or when the pretrigger portion of the stream data has been recorded.

HDD Access Indicator. This indicator illuminates when the hard disk drive is in operation.

Menu Button. Use this button to toggle the display of the menu command list on or off.

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Arrow Buttons. Use the arrow buttons to maneuver on the LCD display. For example, you can use these buttons to move the Icon cursor or to move among the menu selections.

Enter Button. Use this button to execute the selected menu command or enable all setting changes in a dialog box.

Cancel/Close Button. Use this button to cancel the selected operation. When any menu command list is displayed, it closes the command list temporarily.

Tab Button. Use this button to move through a dialog box.

Num Pad/Select Button. Use this button to enable or disable any setting changes in a dialog box. It is also used to open the keypad, where you can enter numeric values for a text box.

USB Connectors. Use the USB2.0 connectors to connect the keyboard and mouse provided with the instrument for Windows operations. You can also connect other USB devices.

Rear Panel Connectors

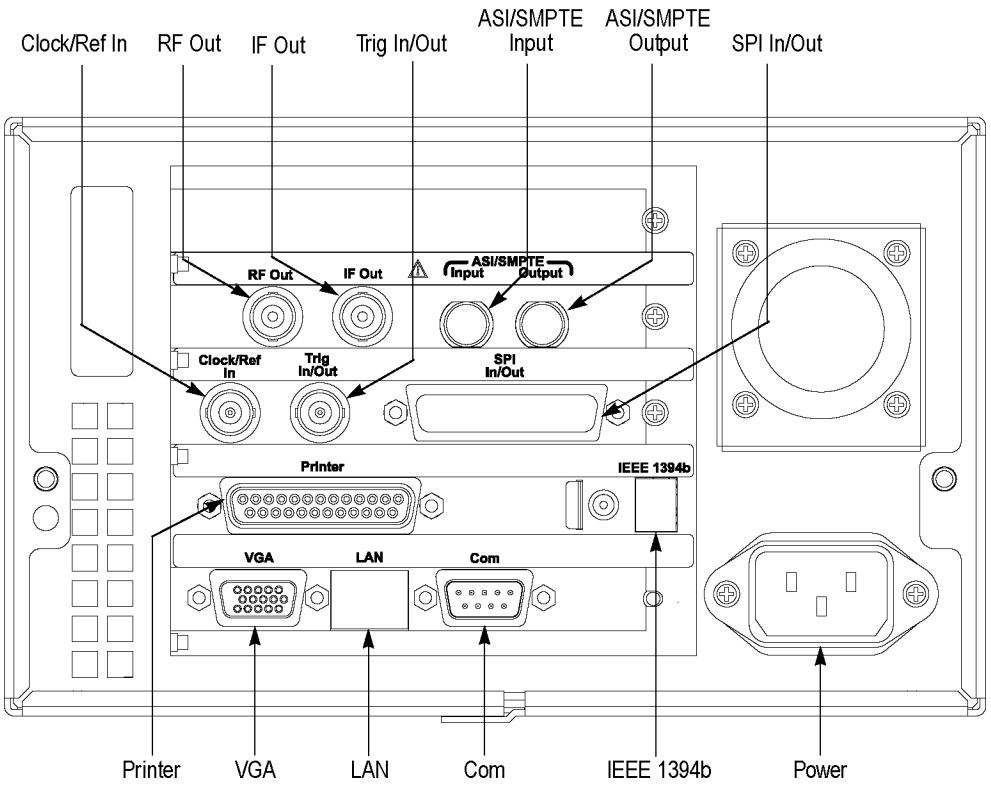


Figure 2-2: RTX130B rear panel

RF Out. Use this BNC connector to output an RF signal.

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NOTE. *The RF signal output is only available when a broadcast transport stream is being output or applied.*

ASI In. Use this BNC connector to input an ASI (Asynchronous Serial Interface) signal. When you want to output an RF signal using an external broadcast transport stream, apply the transport stream to the connector.

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

Clock/Ref In. Use this BNC connector to input an external reference signal or clock signal to the RTX130B. Refer to the specifications for detailed information about the signal specification. (See page A-1, *Specifications*.)

NOTE. *Use a continuous signal for an external reference or clock signal.*

Trig In/Out. Use this BNC connector to input an external trigger event for stream recording or output a 27 MHz reference clock signal or an ISDB-T frame pulse signal. You can change the configuration from the Play menu. (See page 3-4, *Play Menu*.) Refer to the specifications for detailed information about the signal specification. (See page A-1, *Specifications*.)

SPI In/Out. Use this 25-pin D-sub connector to input and output an SPI (Synchronous Parallel Interface) signal.

Printer. Use this 25-pin D-sub connector to connect a printer. This interface supports the IEEE 1284 parallel port standard.

IEEE1394b. Use this connector to connect an IEEE 1394b device such as an external hard disk drive.

VGA. Use this 9-pin D-sub connector to display the instrument screen to an external monitor.

The VGA output is automatically enabled only when you power on the instrument with an external monitor connected. If you want to enable the VGA output after powering on the instrument, perform the following steps:

1. Minimize the Play screen to display the Windows XP desktop.
2. Click the **Intel(R) Extreme Graphics 2M** icon (see below) at the right side of the taskbar.



3. Select **Graphic Options > Output To > Intel(R) Dual Display Clone > Monitor+Notebook** from the displayed menu.

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LAN(10/100/1000 Base-T). Use this connector to connect the RTX130B to your local Ethernet network.

Com. This 9-pin D-sub connector provides a serial interface for instrument control.

Power Connector. Use this connector to apply power to the instrument using the supplied power cord.

Display Elements

There are two types of display screens to operate the RTX130B: the Play screen and the Record screen.

- Play screen is used to output the selected stream. When you power on the instrument, this screen will display the last screen that was showing before powering down.
- Record screen is used to record the input stream. When you press the REC button or select the Record command from the File menu while the Play screen is displayed, the screen switches to the Record screen.

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

The following figure shows the location of display elements of the Play screen. The display elements of the Record screen are the same as that of the Play screen.

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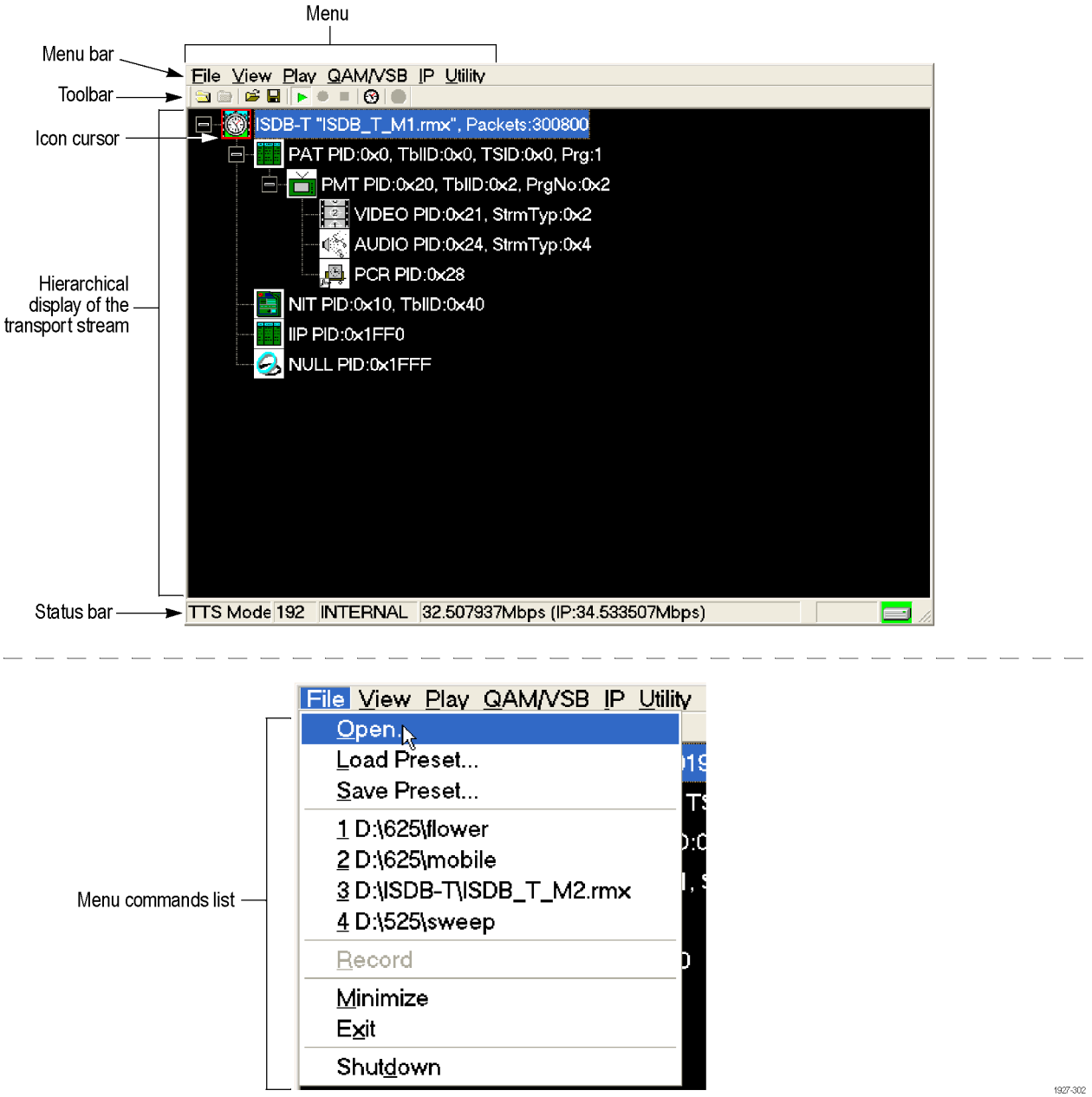


Figure 2-3: Elements of the Play screen

Menu Bar. The Menu bar displays the names of the menus that can be used in the Play or Record screen. Press the Menu button to enable or disable the menus. (See page 3-2, *Using the 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.

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You can toggle the toolbar display on and off using Toolbar command in the View menu. (See page 3-44, *Toolbar Buttons*.)

Hierarchy Display. Each icon in the hierarchy display represents an element of the stream. The hierarchy text contains a description of the associated icon. (See page 3-45, *Hierarchy Display*.)

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

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

Play/Record Status Indicator. The play status indicator is displayed while the selected stream is being output. (See Figure 2-4.) It shows the output status of the selected stream: the progress of the stream output, the output source, the operational status, and the elapsed time.

The record status indicator is displayed while the input stream is being recorded. It shows the record status of the input stream: the progress of the stream record, the record target, and the elapsed time.

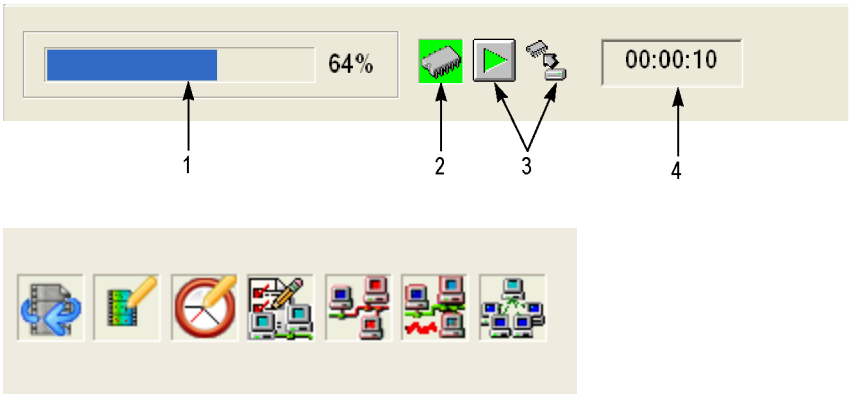


Figure 2-4: Play status indicator

The play/record status indicator shows the following information:

1. **Position Indicator.** In the Play screen, this indicator shows the progress of the stream output using the duration gauge. In the Record screen, this indicator shows the progress of the stream record using the duration gauge.

   The duration gauge is updated every 1 second. If you output a stream with a repetition rate of around 3 seconds, the gauge might not be displayed correctly.

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

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One of the following icons is displayed according to the selected output source or record target:



This icon shows that the hard disk is the output source or record target.



This icon shows that the RAM is the output source or record target.

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

In the Play screen, the following icons are used:



This icon shows that the selected stream is being output.



This icon shows that the stream output is stopped.



This icon shows that the selected stream is being read from the hard disk to the RAM.



This icon shows that the stream is continuously output using the loop method.



This icon indicates that the stream parameters are updated.



This icon shows that the PCR accuracy is enabled.



This icon (only in IP mode) shows that the Advanced Protocol Settings is enabled and applied to the stream.



This icon (only in IP mode) shows that the Stream Replication Settings is enabled and applied to the stream.



This icon (only in IP mode) shows that the errors are inserted in the stream.



This icon (only in IP mode) shows that the parametric settings are enabled and applied to the stream.

In the Record screen, the following icons are used:



This icon shows that the captured stream is being recorded.



This icon shows that the stream record is stopped.

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This icon shows that the RTX130B is waiting for a trigger event.



This icon shows that a trigger event is occuring.



This icon shows that the captured stream is being processed on the hard disk.



This icon shows that the captured stream is being saved from the RAM to the hard disk.

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

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

Status Bar. The status bar contains several indicators that display general information about the transport stream output or record status. (See Figure 2-5.)

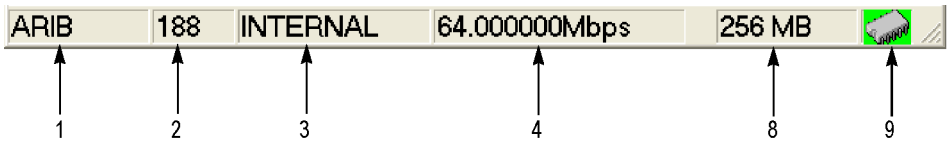


Figure 2-5: Status bar

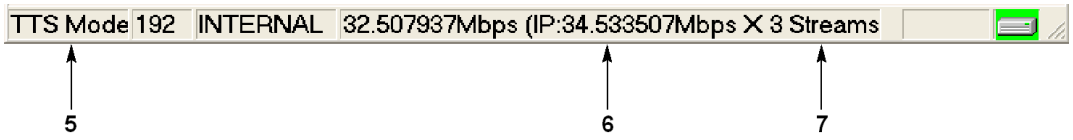


Figure 2-6: Status bar in IP mode

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The Status bar shows the following information:

1. **Standard.** In the Play screen, this indicator shows the standard used to display the selected stream (MPEG-2, ARIB, DVB, ATSC, S-TMCC, M-TMCC, or Non TS). In the Record screen, this indicator shows the standard used to display the input stream.
2. **Packet Size.** In the Play screen, this indicator displays the packet size in bytes (188, 204, 208, Non TS, or Partial TS (Option 05 only)) of the stream output. In the Record screen, this indicator displays the packet size in bytes of the input stream.
3. **Clock Source.** This indicator displays the source of the reference clock (internal or external) used for the stream output.
4. **Bit Rate.** In the Play screen, this indicator displays the bit-rate (in Mbps) of the stream output. In the Record screen, this indicator displays the bit-rate (in Mbps) of the input stream.
5. **TTS Mode.** In the Play screen when IP interface option is selected with the TTS mode enabled, this indicator displays that the TTS mode is enabled for the playout. The Record screen is disabled for the IP interface option.
6. **IP Bit Rate.** In the Play screen when the IP interface option is selected, this indicator displays the bit rate (Mbps) of the IP stream output. The Record screen is disabled for the IP interface option.
7. **Free RAM space.** In the Play screen, this indicator shows the free RAM space that can be used to output the selected stream. In the Record screen, this indicator shows the free RAM space that can be used to record the input stream.
8. **Output Source/Record Target.** In the Play screen, this indicator shows the source used to output the selected stream. In the Record screen, this indicator shows the target used to record the input stream.

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

RF Status Display. Displays a parameter and an icon related to the RF output.

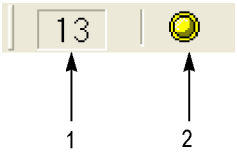


Figure 2-7: RF Status Display

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1. This indicator display the center frequency (UHF channel number) for the RF output. This value can be set using the RF Parameter command in the ISDB-T/ASI menu.
2. This icon appears while outputting an RF signal.

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

There are two display states:



This shows that the TCP/IP connection for remote control is established.



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

To reset the lock status, send the `:SYSTem:KLOCk:STATe OFF` command or press the Cancel/Close button on the front panel (if a keyboard is connected, press the Esc key).

When the TCP/IP connection is closed, the remote status icons disappear.

Basic Menu Operation

This section describes the basics of using the RTX130B menu and the methods for entering numeric input in the various dialog boxes.

The menus are displayed in the menu bar at the top of the Play or Record screen. You can operate these menus using the front-panel Menu, Enter, Cancel/Close, Tab, Num Pad/Select, and the arrow buttons. (See Figure 2-8.)

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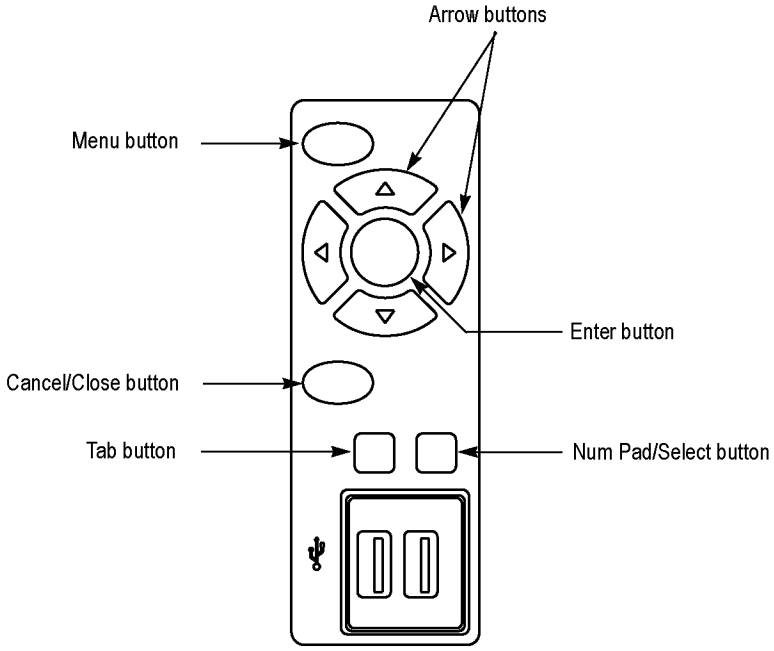


Figure 2-8: Front panel showing the menu controls

Accessing Menu Commands. To access any menu command, press the Menu button. When you press the Menu button, the File menu command list opens.

Use the up (▲) or down (▼) arrow button to move through the command list. Press the Enter button to execute the selected command.

Use the left (◄) or right (►) arrow button to select the desired menu. Press the Cancel/Close button to close the command list temporarily.

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

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

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Display States of the Menu Commands. The menu commands can have the following three display states. (See Figure 2-9.)

- A command followed by "►" indicates that a corresponding submenu will be displayed after you press the Enter button or the right (►) arrow button.
- A command followed by an ellipsis (...) indicates that a corresponding dialog box will open after you press the Enter button.
- A command name by itself will be executed after you press the Enter button.

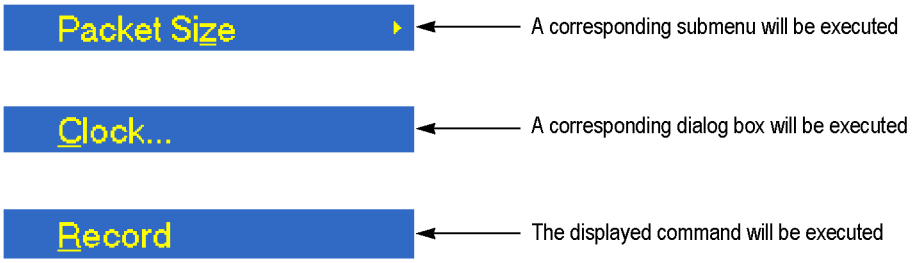


Figure 2-9: Display status of the menu commands

Numeric Input

You can enter numeric values in the displayed dialog box by using the keypad or by using the arrow buttons.

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Numeric Input Using the Keypad. Perform the following procedure to input numeric values using the keypad. (See Figure 2-10.)

1. Open a dialog box in which you want to change a parameter.
2. Press the **Tab** button repeatedly to select (highlight) the numeric parameter that you want to change in the open dialog box.
3. Press the **Num Pad/Select** button to open the keypad. (See Figure 2-10.)

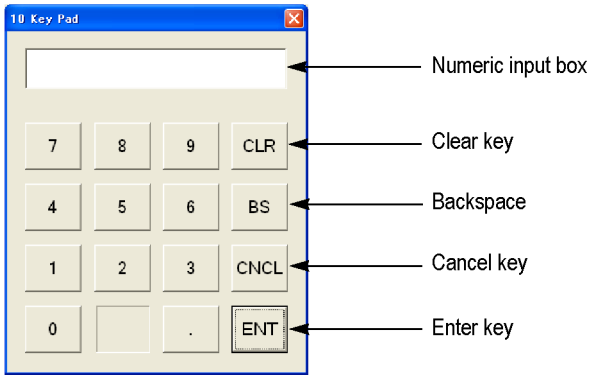


Figure 2-10: Keypad

4. Press the **Tab** button or the arrow buttons to move to the number you want to input (when the keypad first opens, the dotted line box is located on the ENT key).
5. Press the **Num Pad/Select** button. This displays the selected number in the numeric input box.
6. Repeat steps 4 and 5 to input the desired parameter value.
7. Press the **Enter** button (or select the **ENT** key and then press the **Num Pad/Select** button). This saves the new value in the numeric input box and closes the keypad.

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Numeric Input Using the Arrow buttons. Perform the following procedure to change a value by using the arrow buttons:

1. Open the dialog box in which you want to change a parameter.
2. Press the **Tab** button repeatedly to select the numeric parameter that you want to change in the open dialog box.
3. Press the left (◄) arrow button to begin editing the parameter. This highlights the last digit.
4. Press the left (◄) or right (►) arrow button to move the highlighted cursor to the value you want to change.
5. Press the up (▲) or down (▼) arrow button to increase or decrease the value.
6. Repeat steps 4 and 5 to enter all of the desired values. To add a digit, press the left (◄) arrow button.
7. Press the **Enter** button to save the changed numeric values.

About the Data Output Source

When you output the selected stream data, you can select either the hard disk or the RAM as the output source. This subsection describes the operation of the RTX130B when each output source is selected.

RAM

When you select the RAM as the output source, the RTX130B performs the following:

- When the data output rate is less than or equal to 120 Mbps, the RTX130B outputs the first stream data while transferring the data from the hard disk to the RAM and then continuously outputs the data from the RAM using looping methods.
- When the data output rate is more than 120 Mbps, the RTX130B continuously outputs a stream data from the RAM using looping methods after the data is completely transferred from the hard disk to the RAM.

If you select the RAM as the output source, you cannot output the data over the RAM free space (maximum 256 MB). This RAM free space is displayed on the status bar. (See page 2-9, *Status Bar*.)

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Hard Disk

If you select the hard disk (Disk) as the output source, the RTX130B always outputs the selected stream data from the hard disk regardless of the data output rate. When the reading speed of the hard disk cannot overtake the data output rate, the message “Error: Output Buffer Empty” appears.

Use the Source command in the Play menu to select the output source. (See page 3-4, *Play Menu*.)

You can see the currently selected output source in the status bar. (See page 2-9, *Status Bar*.)

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Tutorials

This section provides the following tutorials to familiarize you with the basic functions of the RTX130B:

- Outputting a transport stream
- Recording a transport stream
- Outputting an RF modulated broadcast transport stream

NOTE. *These tutorials do not cover all the features and functions of the RTX130B. The tutorials are intended to introduce you to the operations required to execute the basic instrument functions.*

Refer to the Reference section for detailed descriptions of the menus and functions used in these procedures.

Before you perform these tutorials, make sure that the RTX130B is properly installed. (See page 1-5, Installation.)

Required Equipment

The following table lists the equipment required to perform the tutorials. Accuracy of alternate equipment should equal or exceed that of the example instruments and accessories.

Table 2-1: Tutorial recommended test equipment and accessories

Item	Qty.	Requirement	Example
MPEG test system	1	Real-time transport stream analyzer	Tektronix MTS400 Series MPEG Test Systems or equivalent
ISDB-T receiver	1		Panasonic VP-8480A ISDB-T Analyzer
75 Ω BNC cable	1	Length: 42 inches	Tektronix part number 012-0074-00

Outputting a Transport Stream

The hard disk drive of the RTX130B is shipped with files containing factory-supplied samples of transport streams. This tutorial opens one of these sample files and outputs the transport stream.

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

1. Press the front-panel **Play/Pause** button to display the Play screen.
2. Press the **Menu** button to open the **File** menu.

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3. Press the up (▲) or down (▼) arrow button to select **Open** from the menu, and then press the **Enter** button to open the Select File dialog box. (See Figure 2-11.)

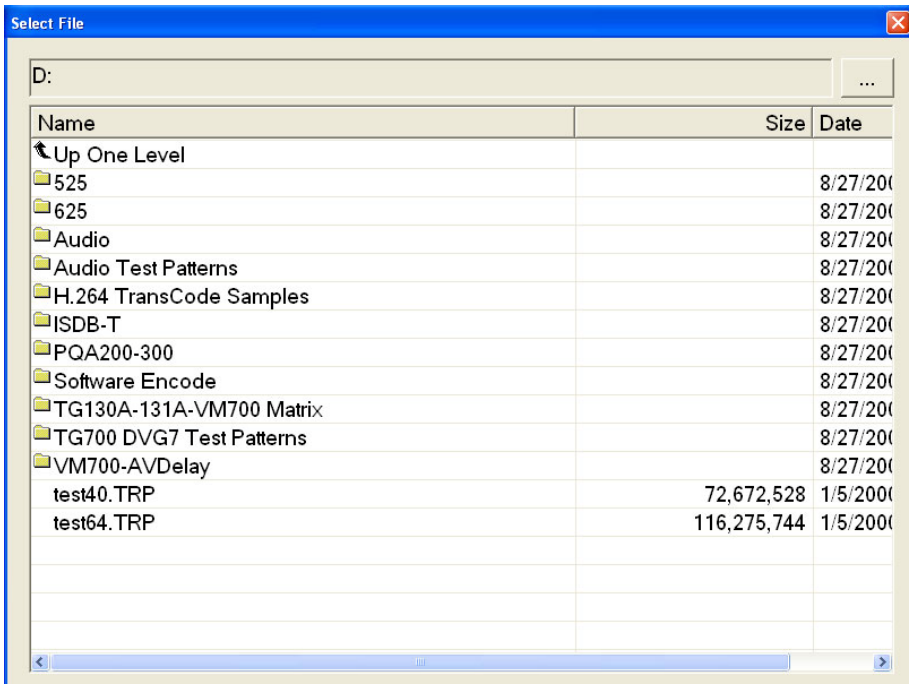


Figure 2-11: Select File dialog box

4. Press the up (▲) or down (▼) arrow button to select the **test64.TRP** file, and then press the **Enter** button. This displays the hierarchy view of the transport stream file. (See Figure 2-12.)

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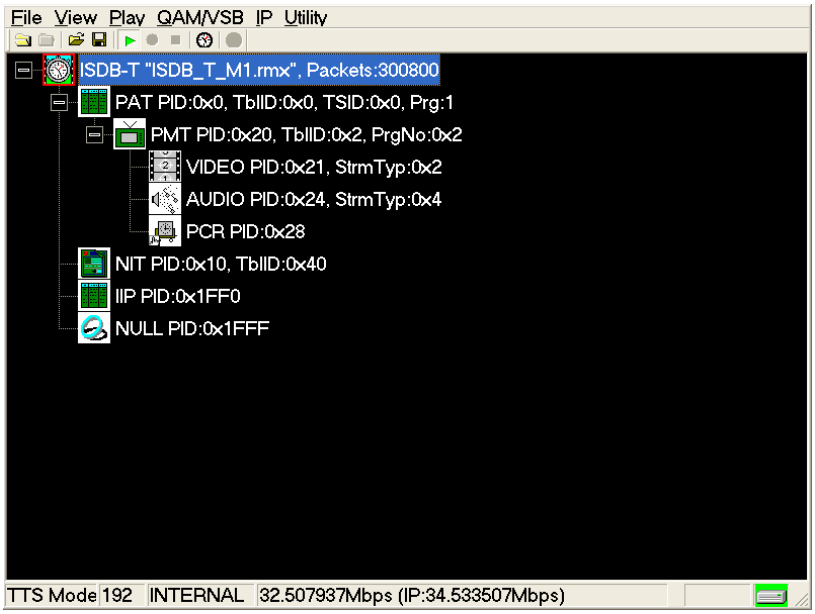


Figure 2-12: Hierarchy view of the transport stream file

5. Connect the 75 Ω BNC cable between the **ASI Out** connector on the RTX130B rear panel to the **ASI In** connector of the MPEG test system.

6. Press the RTX130B **Play/Pause** button to start the transport stream output.

   When transport stream output is started, the play status indicator appears and the indicator button illuminates. (See Figure 2-13.)

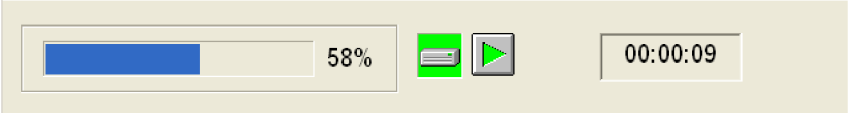


Figure 2-13: Play status indicator

7. Set up the MPEG test system to monitor the transport stream output from the RTX130B. (See Figure 2-14.)

8. Press the **Stop** button on the RTX130B to stop the transport stream output. Observe that the Play Status indicator disappears.

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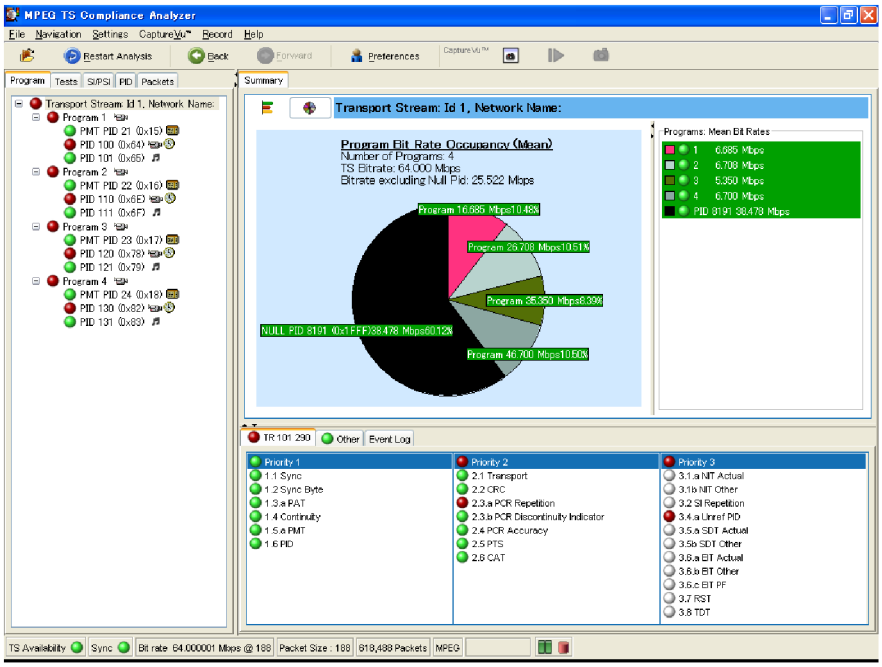


Figure 2-14: Transport stream display from an MPEG test system

Recording a Transport Stream

This tutorial captures a transport stream being applied into the ASI In connector and records it on the hard disk as a file.

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

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

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

   Since no signal is being applied at this time, the No Signal message appears at the top of the screen. (See Figure 2-15.)



Figure 2-15: No Signal message

2. Connect the 75 Ω BNC cable between the **ASI/SMPTE Input** connector on the RTX130B rear panel and the **ASI OUT** connector of the MPEG test system.

3. Output a transport stream from the MPEG test system.

   When transport stream output is started, the hierarchy view of the transport stream is displayed on the Record screen of the RTX130B.

4. Press the RTX130B **Record** button.

   When you press the button, the record status indicator appears and the indicator button illuminates. (See Figure 2-16.)



Figure 2-16: Record status indicator

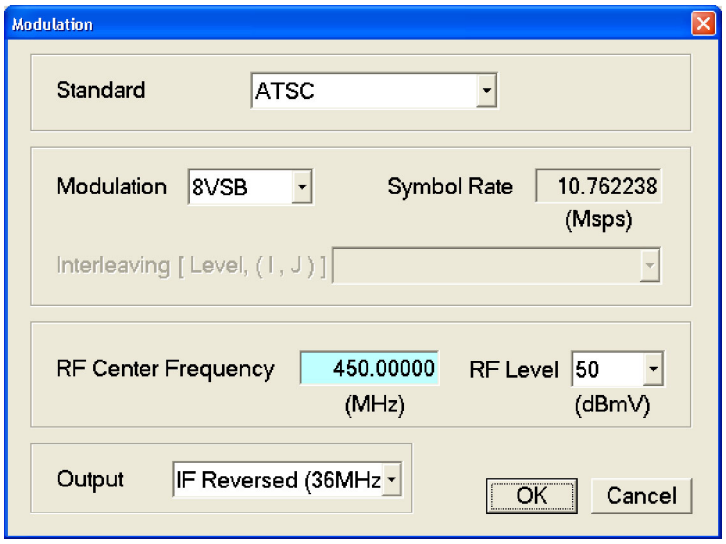
After the transport stream record is completed, the record status indicator disappears, and the transport stream is saved automatically with a file name that shows the current date (yy:mm:dd).

Outputting an RF modulated broadcast transport stream

The hard disk drive of the RTX130B is shipped with files containing factory-supplied samples of broadcast transport streams. This tutorial converts a broadcast transport stream into an RF signal and outputs it from the RF Out connector.

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1. Press the front-panel **Play/Pause** button to display the Play screen.
2. Select the **Open** command from the **File** menu to open the Select File dialog box.
3. Press the up (▲) or down (▼) arrow button to select the **525** folder, and press the **Enter** button. This displays the content of the 525 folder.
4. Press the up (▲) or down (▼) arrow button to select **Flower.rmx**, and press the **Enter** button. This displays the hierarchy view of the selected transport stream file.
5. Select **QAM/VSB > RF Output > On** to enable the RF output.
6. Select **QAM/VSB > Modulation** to open the Modulation dialog box.



Set the RF modulation parameters in the dialog box to meet your modulation standard.

7. Connect the 75 Ω BNC cable between the **RF Out** connector on the RTX130B rear panel and the **RF INPUT** connector on the RF receiver.
8. Press the RTX130B **Play/Pause** button to start the transport stream output.
9. Use the RF receiver to check that the RF modulated transport stream is output from the RF Out connector.

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Reference

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Reference

The Reference section gives you information on how to use the menus, add jitters to PCRS, connect to a network, and hierarchy display. The command syntax, remote commands, default settings, error messages, and network interface specifications are all listed in this section.

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Using the Menus

This section describes the function of each selection 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 Play 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 *Basic Menu Operation* for information about how to operate the menus. (See page 2-11.)

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 RTX130B application and to shutdown the instrument. (See Table 3-1.)

Table 3-1: File menu commands (Play screen)

Command	Description
Open	Opens a stream file. When a file is selected, the RTX130B checks the packet size of the file. For a transport stream file, the data is output 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. (See page 3-3, *Select File Dialog Box*.)
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. (See page 3-67, *Preset File*.)
Save Preset	Saves the current instrument settings as a preset file. (See page 3-67, *Preset File*.)
RECORD	Switches to the Record screen.
Scheduler	Starts the Scheduler application when the Option SC is installed.
Minimize	Minimizes the RTX130B application window.

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Table 3-1: File menu commands (Play screen) (cont.)

Command	Description
Exit	Quits the RTX130B application. The RTX130B application settings are saved.
Shutdown	Quits the RTX130B application and shuts down the RTX130B.

Select File Dialog Box. When you select the Open command from the File menu, the Select File dialog box appears. (See Figure 3-1.)

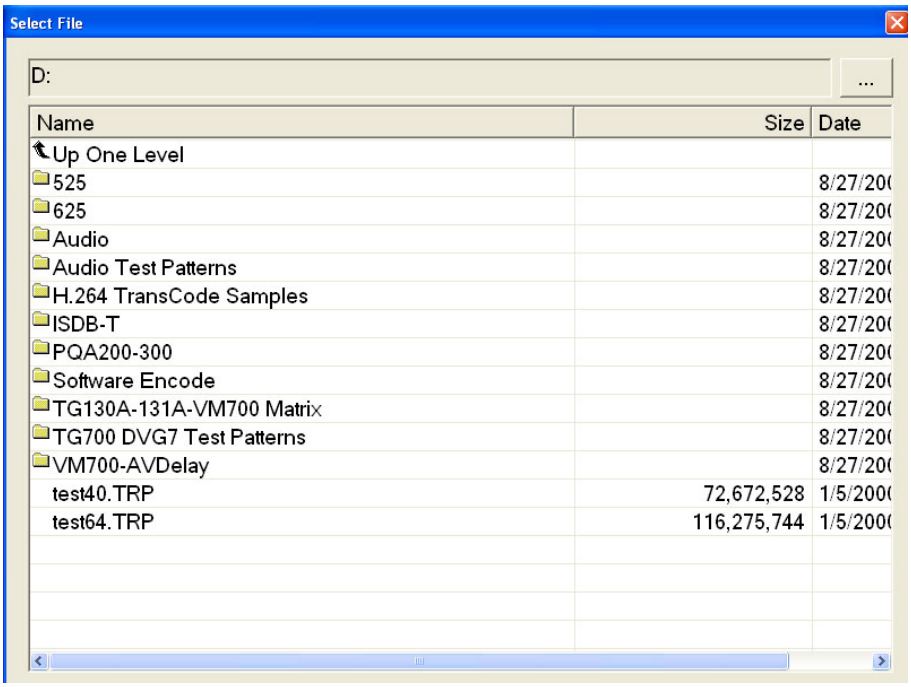


Figure 3-1: Select File dialog box

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 the directory one level higher.
- Click the "..." button at the upper right of the dialog box to select a file that is not listed.

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View Menu

The View menu contains commands that control the display of the Toolbar and Status bar. (See Table 3-2.)

Table 3-2: 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 3-3.)

Table 3-3: Play menu commands

Command	Description
Interface	Sets the interface to transmit and receive Ethernet packets. You can select either IP or QAM/VSB.
Packet Size	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. These packet sizes can only be set for an MPEG-2 transport stream. For an S-TMCC or M-TMCC transport stream, the packet size is fixed to 204. For a Non TS stream, the packet size is fixed to Non TS. The packet size is fixed to 188 when you set RF Output to On in the QAM/VSB menu. When you select Non TS, the RTX130B 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.
Clock	Opens the Clock dialog box where you can set the clock rate of the stream output. (See page 3-5, *Clock Dialog Box*.)
Update	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. You can select which parameters in the stream are updated using the Others dialog box. (See page 3-13, *Others Dialog Box*.)
Sync	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. You cannot select Non TS when you set RF Output to On in the QAM/VSB menu. (See page 3-9, *Set Non-TS Sync Dialog Box*.)

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Table 3-3: Play menu commands (cont.)

Command	Description
PCR Initial Value	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 page 3-10, *PCR Initial Value Dialog Box*.)
Source	Selects the source for stream output. You can select RAM or Disk. (See page 2-15, *About the Data Output Source*.)
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 initial start position of the stream for loop output. (See page 3-10, *Start/Stop Position Dialog Box*.)
Auto Play	Sets whether or not the transport stream is automatically output using the last power-off settings when you turn on the RTX130B. 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 page 3-12, *Timer Play/Record Dialog Box*.)
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 page 3-13, *Others Dialog Box*.)

Clock Dialog Box. When you select the Clock command from the Play menu, the Clock dialog box appears. (See Figure 3-2.)

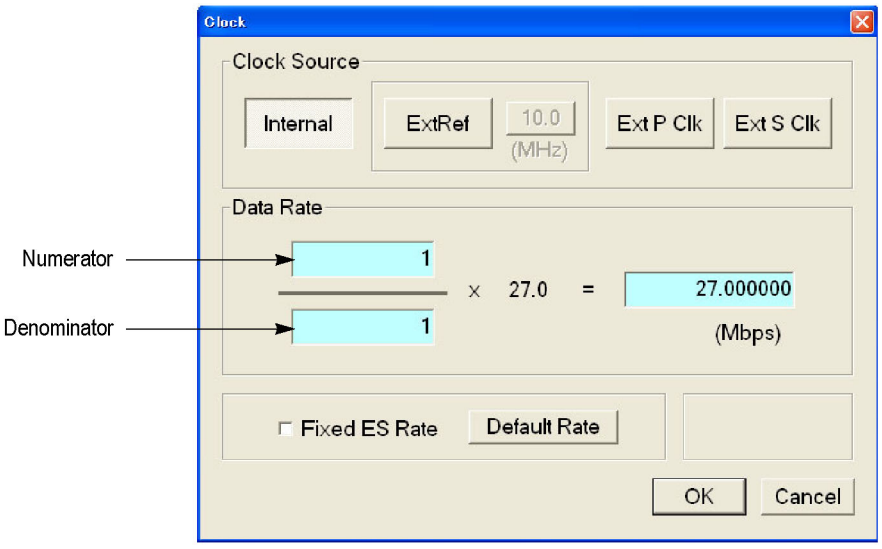


Figure 3-2: Clock dialog box for Option Interface

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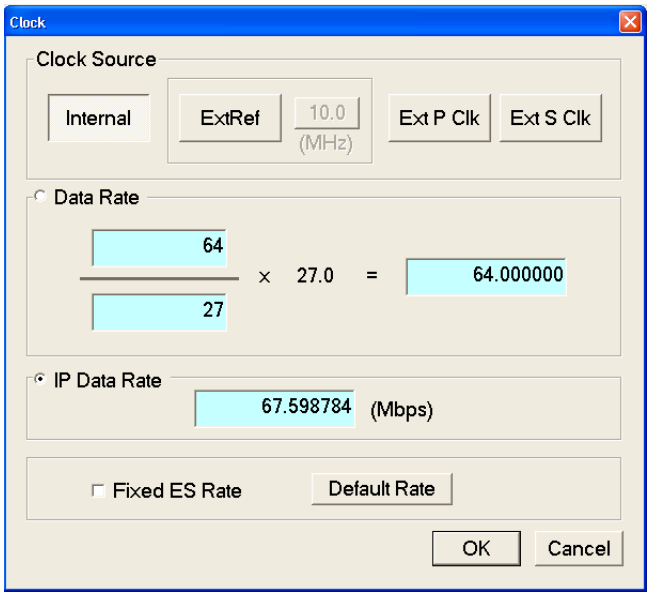
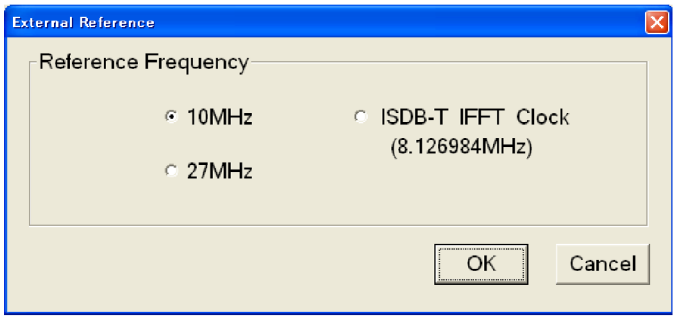


Figure 3-3: Clock dialog box for IP Interface

- **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 RTX130B 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.

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- **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. (See Figure 3-2.) TheRTX130B 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 RTX130B will calculate the numerator and denominator values based on the clock rate.

  Enter a value into the clock rate text box. The RTX130B will then calculate the numerator and denominator text boxes 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 × 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.

When you set the RF Output command in the QAM/VSB menu to On, this value is fixed to the bit rate that is calculated from the symbol rate setting.

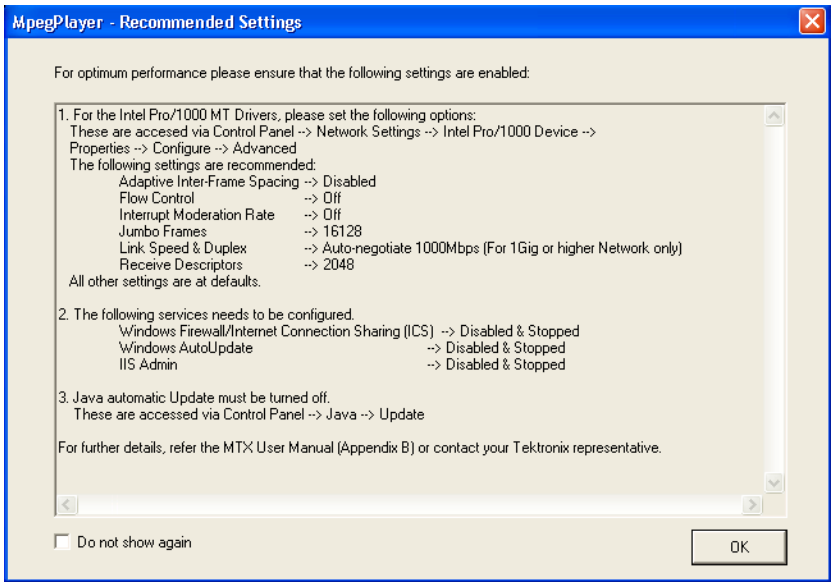
- **IP Data Rate:** Sets the clock rate for the IP packet. (See Figure 3-3.) In the IP mode, a change in the IP data rate will impact the TS data rate and a change in the TS data rate will impact the IP data rate. The packet length changes according to the selected protocol.

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 × Payload Size) / IP Packet Size

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

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- **Fixed ES Rate:** Sets whether the elementary stream rate is fixed or not. 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 more 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. (See page 3-2, *Using the Menus*.)

  If you enable the Fixed ES Rate check box when the RF Output command in the QAM/VSB menu is set to On, you can output the various RF signals without changing the elementary stream rate.

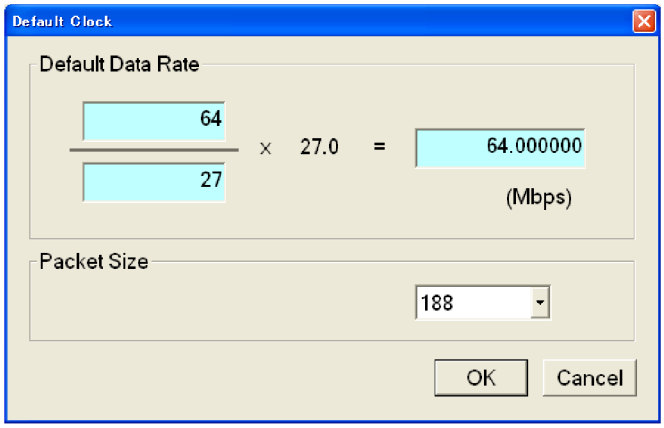
  The following table shows the relationship between the Fixed ES Rate setting and PCR jitter occurrence when outputting a signal.

Table 3-4: Relationship between Fixed ES Rate Setting and PCR Jitter

	Fixed ES Rate: checked	Fixed ES Rate: not checked
Update: Hardware	PCR jitter meets the standard	PCR jitter meets the standard
Update: Software		PCR jitter meets the standard, provided that the original file does not contain any PCR jitter
Update: Off	PCR Jitter occurs	PCR, PTS/DTS discontinuity occurs on loop points

- **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.

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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 3-4.)

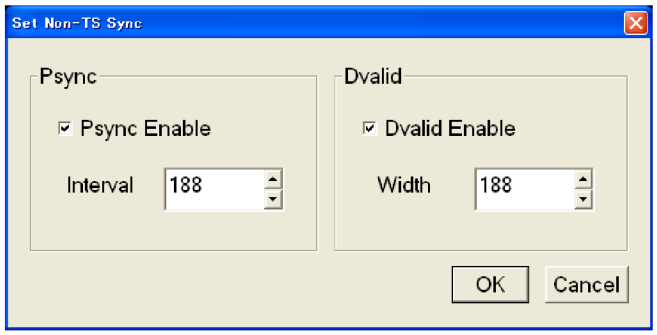


Figure 3-4: Set Non-TS Sync dialog box

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- **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 3-5.)

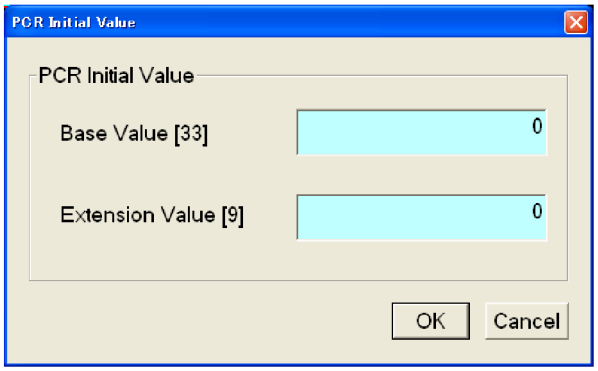


Figure 3-5: PCR Initial Value dialog box

- **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 3-6.)

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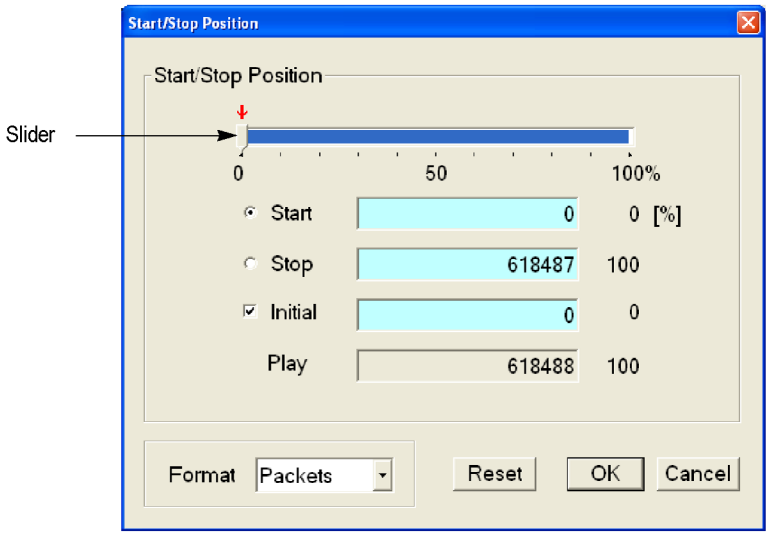


Figure 3-6: Start/Stop Position dialog box

- **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 list box, 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 list box, 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 list box, 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 a Non TS file) that is calculated by the values of the Start and Stop text boxes.
- **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.

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To set the start, stop, and initial positions, either use the slider or enter the values directly in the text boxes. (See Figure 3-6.)

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 1 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 3-7.)

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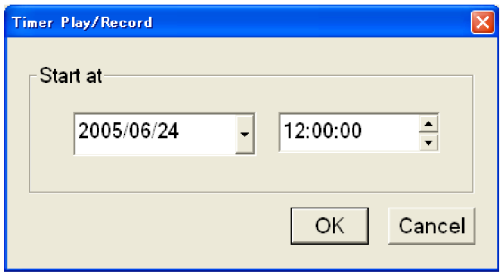


Figure 3-7: Timer Play/Record dialog box

- **Start at:** Sets the date and time when the stream output or record starts. Press the Tab button to select year, month, date, hour, minute, or second, and then press the up (▲) or down (▼) arrow button to set the value.

  If a mouse is connected to the RTX130B, 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 3-8.)

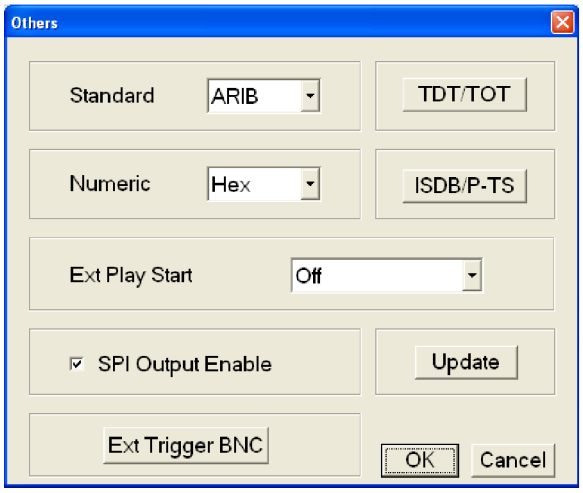


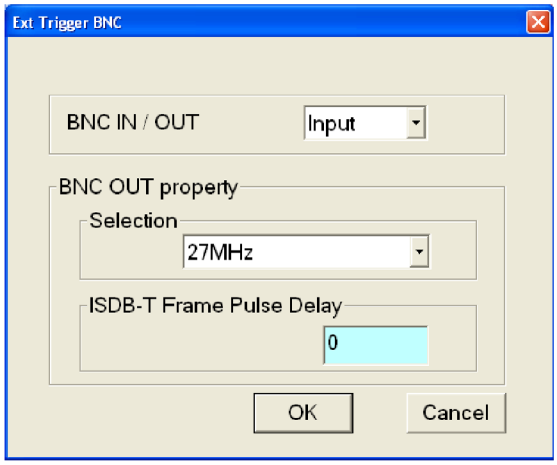
Figure 3-8: Others dialog box

- **Standard:** Sets the standard used on the hierarchy-display screen. You can select ARIB, ATSC, DVB, or MPEG-2. For a transport stream (ARIB, ATSC,

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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. 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 select the check box.
- **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 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.

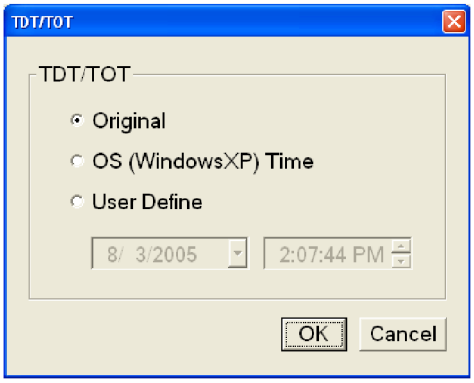
BNC OUT property: Selects the output signal from the Trig In/Out connector when BNC IN/OUT is set to Output. You can select 27 MHz or ISDB-T Frame Pulse. If you select 27 MHz, a 27 MHz reference clock signal is output from the Trig In/Out connector. Use this option to check the clock frequency accuracy. If you select ISDB-T Frame Pulse, an ISDB-T frame pulse signal is output from the Trig In/Out connector.

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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.



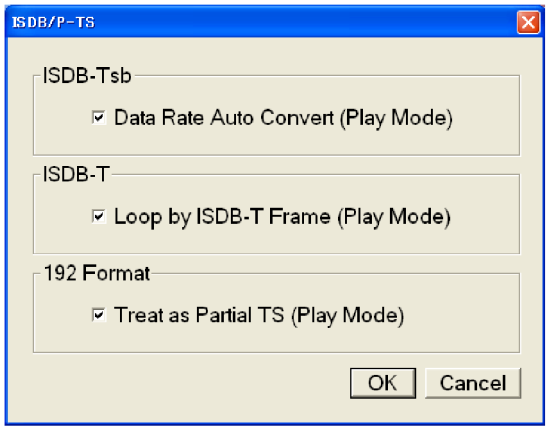
Original: Uses the original (default) value that is already defined in the selected stream.

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 following ISDB/P-TS dialog box appears.

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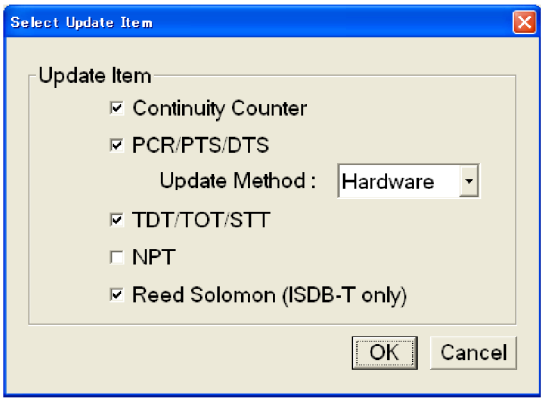


Data Rate Auto Convert (Play Mode): Sets whether the clock rate is set automatically when the ISDB-TSB file is loaded. When selected, the clock rate is automatically set to (2048/1701) x 27 MHz and the elementary stream rate becomes constant regardless of the Fixed ES Rate setting.

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 following 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 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).

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Update Method: Specify the method to update PCR/PTS/DTS. The optional interface supports both Software or Hardware update methods but 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 if 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 updating 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 Descripter 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 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.

QAM/VSB Menu

The QAM/VSB menu contains commands for setting the parameter for the RF modulated output of a transport stream and an ASI output format. (See Table 3-5.)

Table 3-5: QAM/VSB menu commands (Play screen)

Command	Description
BNC Port	Sets the signal format output from the ASI/SMPTE Output connector. You can select ASI or 310M 8VSB (SMPTE310M signal with data rate of 8 VSB).
Through Out	Sets whether the signal supplied to the ASI/SMPTE Input connector is output from the ASI/SMPTE Output connector when a stream is not output. 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.
RF Output	Sets whether to output an RF signal from the RF Output connector. You can select On or Off. When you select On, the outputs from the ASI/SMPTE Output and SPI In/Out connectors stop. Also, the clock rate is fixed to the rate that is calculated from the symbol rate and RF parameters.

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Table 3-5: QAM/VSB menu commands (Play screen) (cont.)

Command	Description
Modulation	Sets the parameter for the RF modulated output of the transport stream. When you select this command, the Modulation dialog box appears. (See page 3-18, *Modulation Dialog Box*.)
Calibration	This command is not for users for the RTX130B. This command is used only by factory personnel to calibrate the instrument.

Modulation Dialog Box. When you select the Modulation command from the QAM/VSB menu, the Modulation dialog box appears as shown in Figure (See Figure 3-9 on page 3-18.) If RF Output in the QAM/VSB menu is set to Off, you cannot set the parameters in the dialog box.

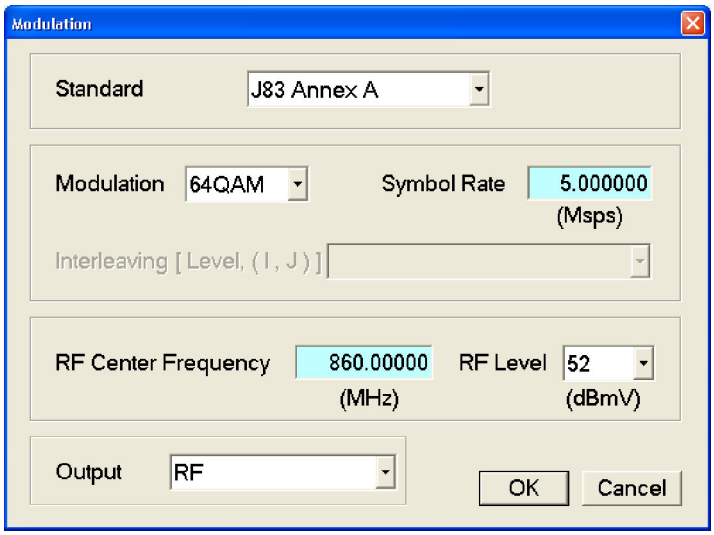


Figure 3-9: Modulation dialog box

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- **Standard:** Sets the RF modulation standard. The available selections depend on installed modulation options.

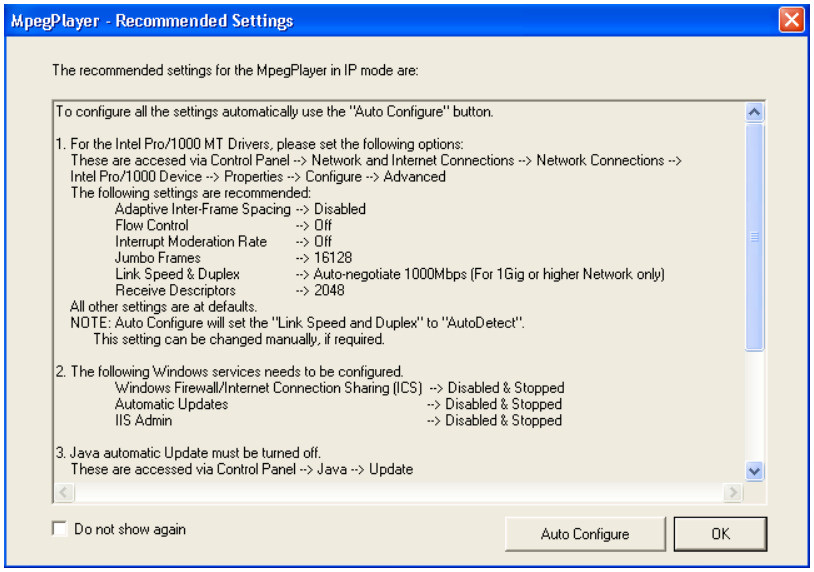
  If the ITU-T J.83 Annex C modulation option is installed in the instrument, you can select J83 Annex C and J83 Annex C-JCTEA. J83 Annex C-JCTEA is a modulation scheme that is defined by JCTEA STD-002.

- **Modulation:** Sets the modulation mode. The available selections depend on the standard selected in the Standard list box.
  - For J83 Annex A: 16 QAM, 64 QAM, or 256 QAM
  - For J83 Annex B: 64 QAM and 256 QAM
  - For J83 Annex C and J83 Annex C-JCTEA: 64 QAM
  - For ATSC: 8VSB
- **Symbol Rate:** Sets the symbol rate. The available values are depend on the standard selected in the Standard list box.
  - For J83 Annex A: 1.0 Msps to 6.956522 Msps (IF output), 5.0 Msps to 6.956522 Msps (RF output)
  - For J83 Annex B: 5.056941 Msps (64QAM), 5.360537 Msps (256QAM)
  - For J83 Annex C: 1.0 Msps to 5.3097 Msps (IF output), 5.0 Msps to 5.3097 Msps (RF output)
  - For J83 Annex C-JCTEA: 5.274 Msps
  - For ATSC: 10.762237 Msps
- **Interleaving [Level, (I,J)]:** Sets the operating mode of interleaving (Level 1 or Level 2) and interleaving parameters I and J when Standard is set to J83 Annex B.
- **RF Center Frequency:** Sets the center frequency of the RF signal. You can set the value from 50 MHz to 860 MHz in 12.5 kHz steps.
- **RF Level:** Sets the output level of the RF signal. You can set the value from 45 dBmV to 58 dBmV in 1 dBmV steps.
- **Output:** Selects the signal output from the RF Out and IF Out connectors.
  - **RF:** An RF signal is output from the RF Out connector.
  - **IF (44 MHz):** A 44 MHz IF signal is output from the IF Out connector.
  - **IF Reversed (44 MHz):** A 44 MHz IF signal with reversed spectrum is output from the IF Out connector.
  - **IF (36 MHz):** A 36 MHz IF signal is output from the IF Out connector.
  - **IF Reversed (36 MHz):** A 36 MHz IF signal with reversed spectrum is output from the IF Out connector.

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IP Menu

The IP Playout is capable of transmitting TS streams on both IPv4 and IPv6 network. The IP menu is displayed when the option is selected 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 page B-1, *Recommended Settings for MPEG Player in IP Mode*.) (See Table 3-6.)



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 3-6: 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 player process priority, transmitter thread priority, 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	Generates errors like packet loss, checksum, and sequence in the transmitted stream manually.

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Table 3-6: IP menu commands (cont.)

Commands	Description
Statistics	Displays details about parameter names, current stream values, and the history of the previous transmission.
TTS Settings	Enables to play out a TS file as a TTS file by prefixing a 4-byte time stamp to each TS packet.

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

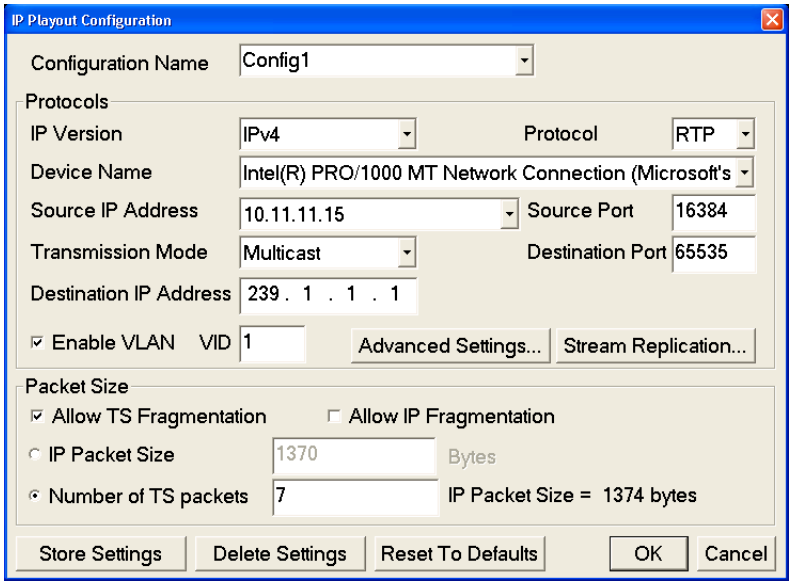


Figure 3-10: IP Configuration for IPv4

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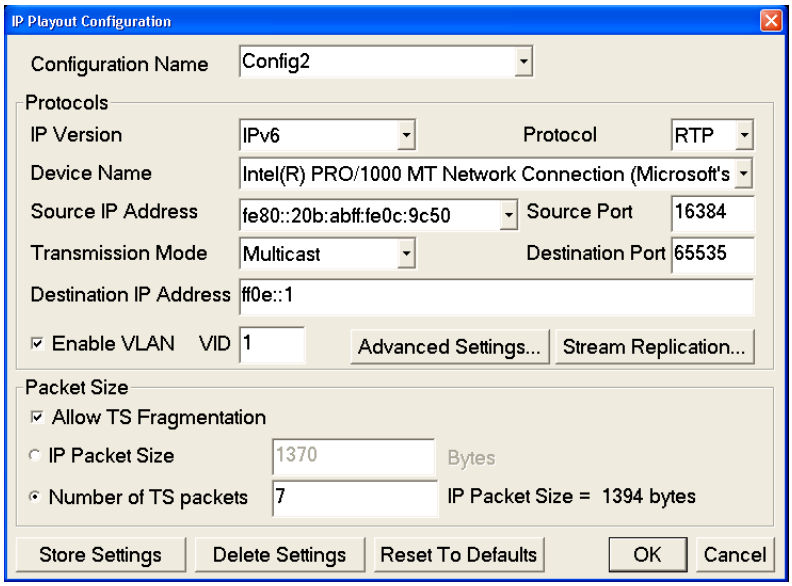


Figure 3-11: IP Configuration for IPv6

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 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 playout. IPv4 is set as the default value.
- **Protocol:** Allows you to set the protocol (UDP, RTP) for the IP playout. RTP is set as the default value.
- **Device Name:** Allows you to set the device for the IP playout. The Device Name lists all the active Network Interface Cards (NIC) in the system based on the selected IP version. Always, the first interface card that has a valid IP address assigned to it is automatically selected as the default value for both IPv4 and IPv6 versions.
- **Source IP Address:** Sets the source IP address for the IP playout. 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 playout. The port value ranges from 0 to 65535. The default value for UDP and for RTP protocol is 16384.

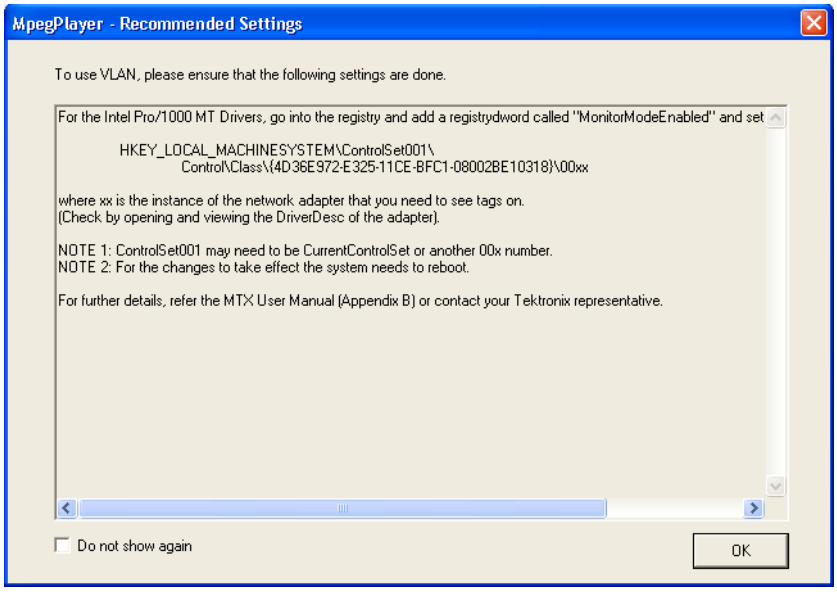
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- **Transmission Mode:** Allows you to set the transmission mode of the protocol. Unicast and Multicast transmission modes are supported by both IP versions. Broadcast transmission mode is supported only by the IPv4 version. Multicast is set as the default value for both the versions.
- **Destination IP Address:** Sets the destination IP address for the IP playout. 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:

  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 239.255.255.255.255 for IPv4 and FFxx:y:y:y:y:y:y:y (where x is 0 to F and Y is 0000 to FFFF) for IPv6.

  Broadcast Range: Network or node portion of an IP address will be set to "1"s or "0"s for IPv4 version.
- **Destination Port:** Allows you to set the destination port for the IP playout. 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 Playout 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

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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 B-7, *Settings for VLAN*.) The protocol headers of Advanced Protocol Settings can be customized but are not validated

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

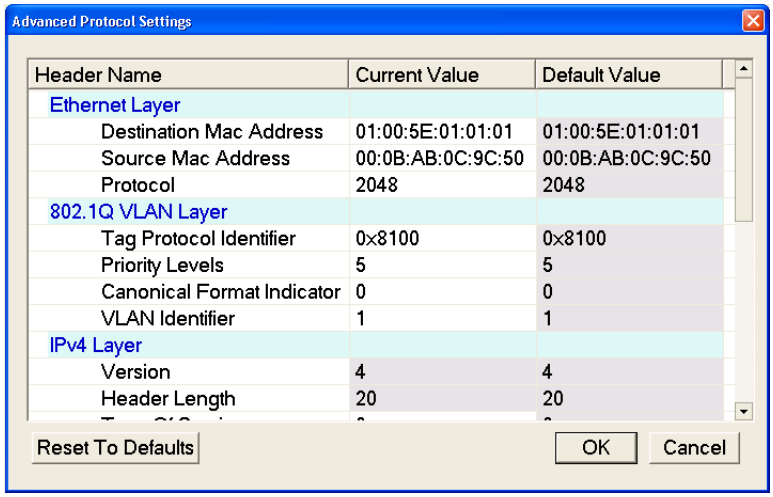


Figure 3-12: Advanced Protocol Settings for IPv4

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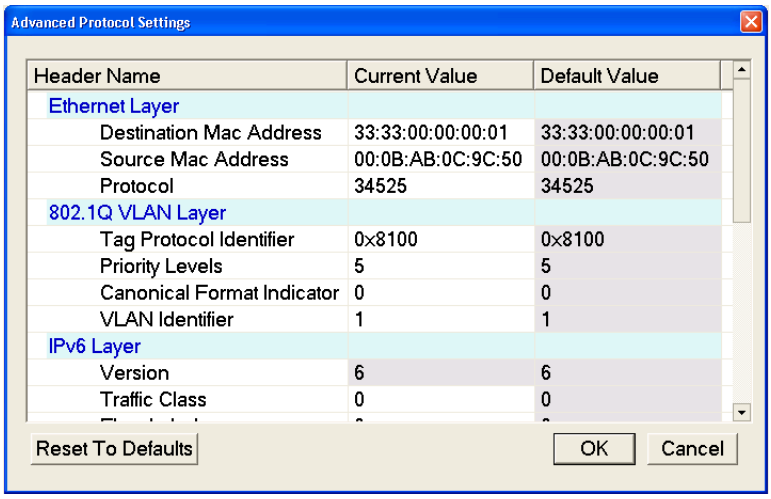


Figure 3-13: Advanced Protocol Settings for IPv6

The Header Name and Default Value are read only options. The protocol headers displayed are limited to headers common to all packets. 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 playout. (See page 2-7, *Play/Record Status Indicator*.)

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.

  You can specify the increment value for the following attributes:

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- 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

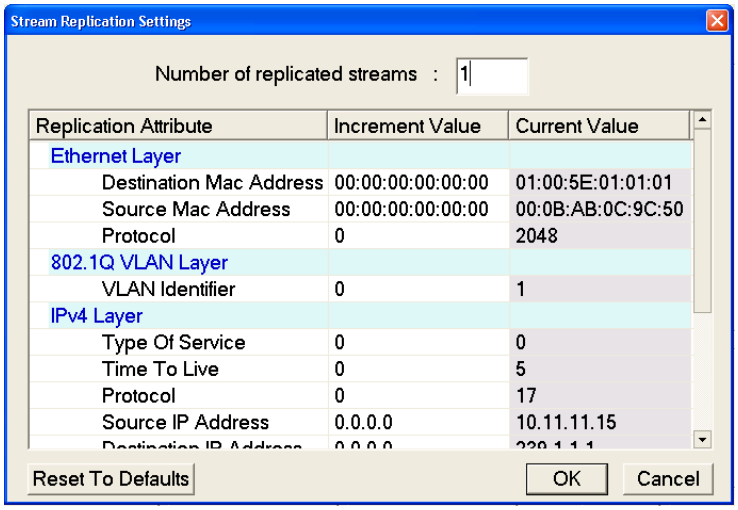


Figure 3-14: Stream Replication Settings for IPv4

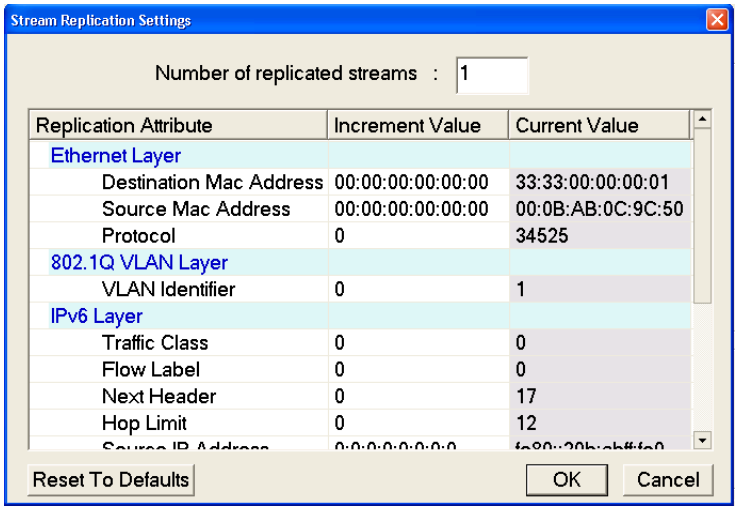


Figure 3-15: Stream Replication Settings for IPv6

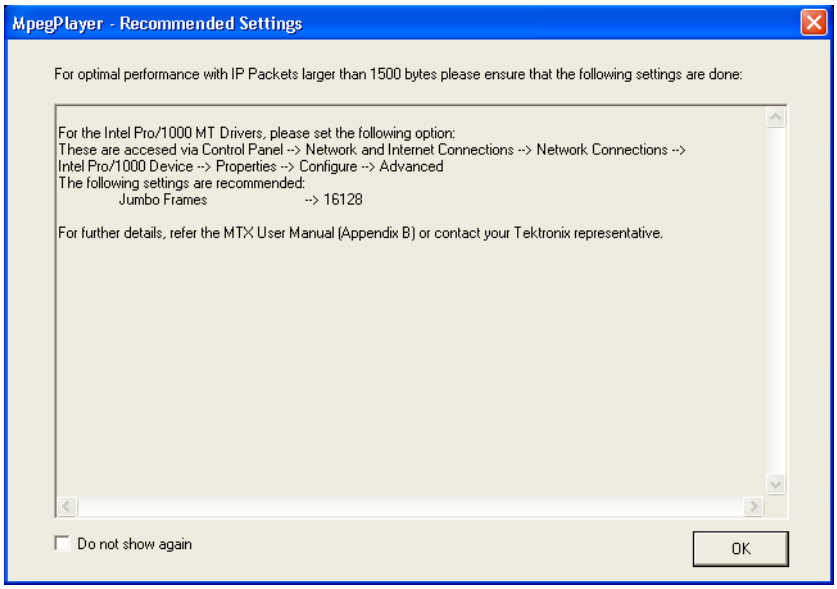
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Stream Replication Settings is used to replicate the streams n times with certain attributes of the stream incremented by a value within the n replicated streams. You can enter the number of replications in the Number of replicated streams text box.

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 the 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. This 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. 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

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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 Size = 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 IP packet size allowed 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 Size = Payload Size + Header Size

  where payload size is calculated as follows:

  Payload Size = Number of TS Packets × 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. (See Figure 3-16.)

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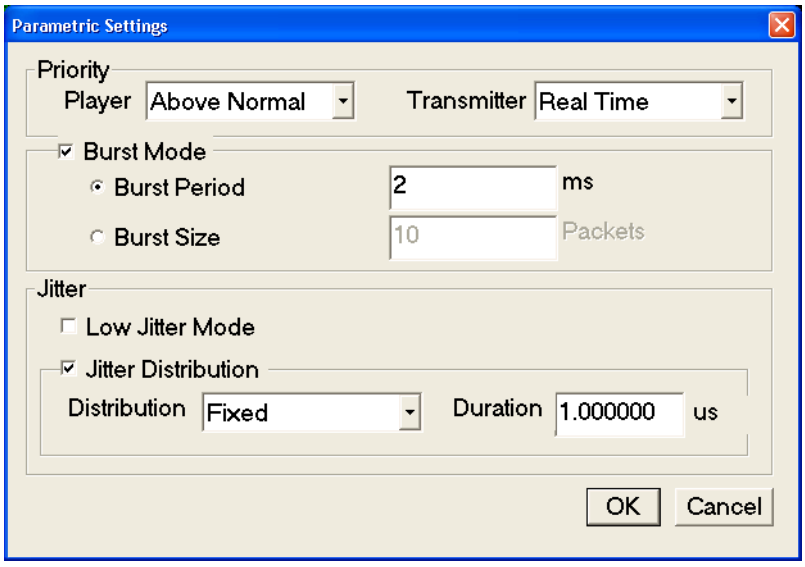
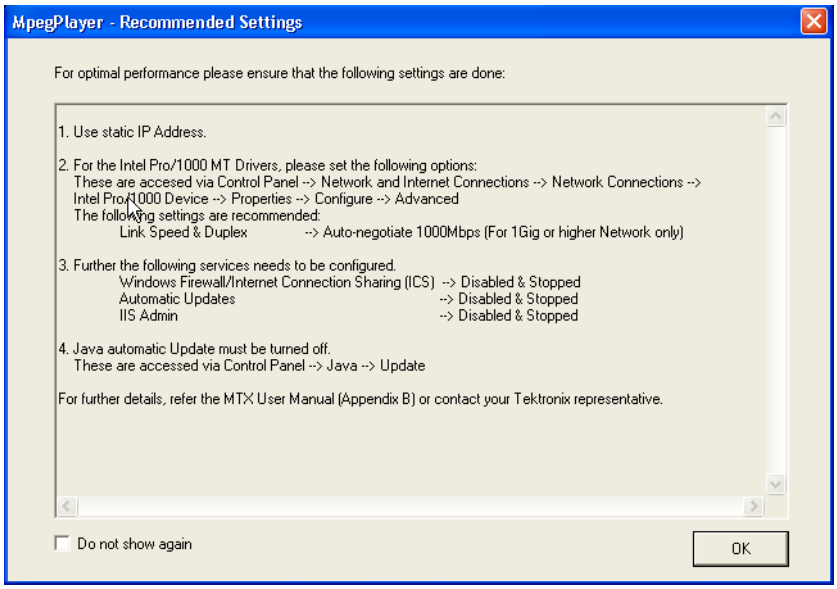


Figure 3-16: Parametric Settings

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.



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

- **Priority:** Allows you to set the priority of the player process and transmitter thread. As a result you can increase or decrease the accuracy of the interpacket gaps during playout.

  Player: You can set the process priority for the player. The priorities are Real Time, Normal, Above Normal, and Highest. Above Normal is set as the default.

  Transmitter: You can set the priority for the transmitter thread. The priorities are Idle, Below Normal, Normal, Above Normal, Highest, and Real Time. Real Time is set as the default.

- **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 playout.

  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 3-17: Low Jitter Mode Status Indicator

Jitter Distribution: Inserts jitter during IP playout. 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 3-18.)

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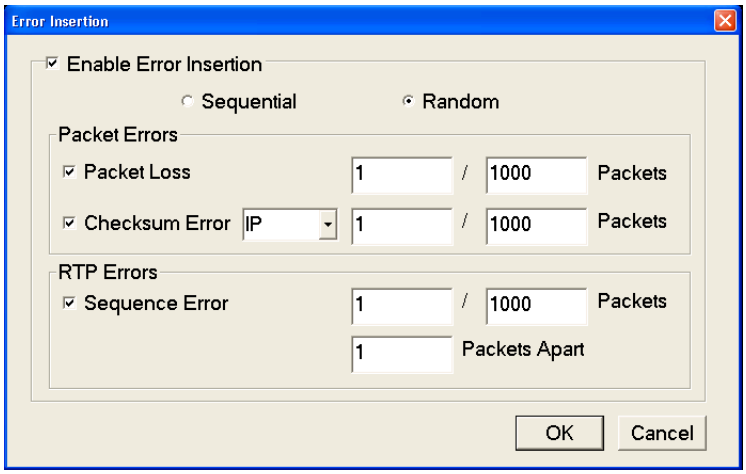


Figure 3-18: Error Insertion

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 3-19.)

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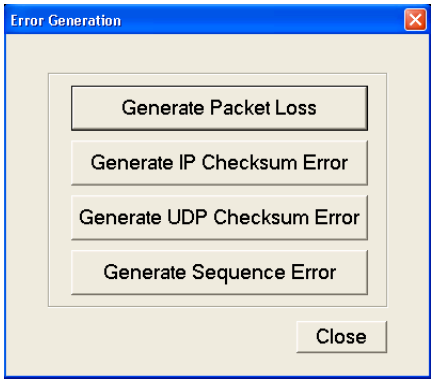


Figure 3-19: Error Generation

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.

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

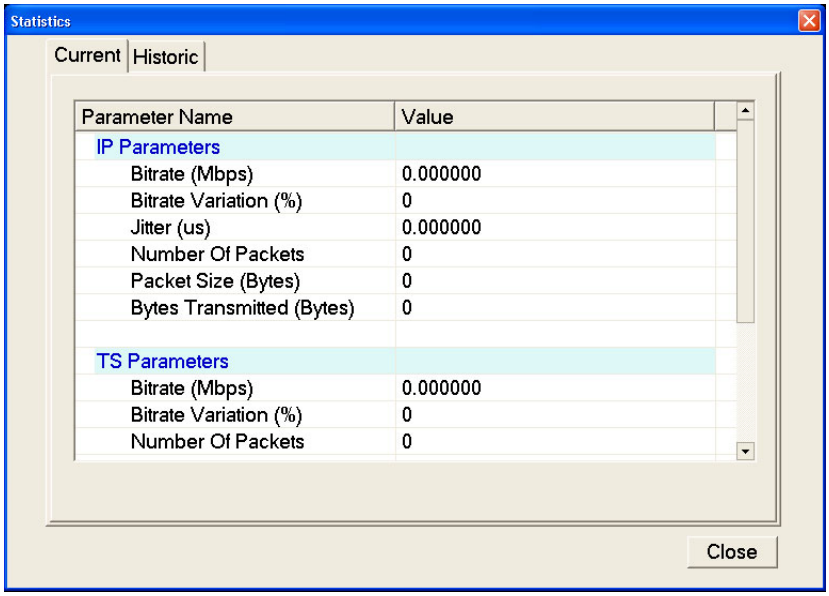


Figure 3-20: Statistics

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The player displays the current and historic statistics of IP parameters, TS parameters, and errors. These statistics are cleared at the start of next play, when a new file is opened, or when the player is restarted.

- **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 the playout are all 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 four timestamped bytes. 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 3-20.) 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 3-20.) 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.

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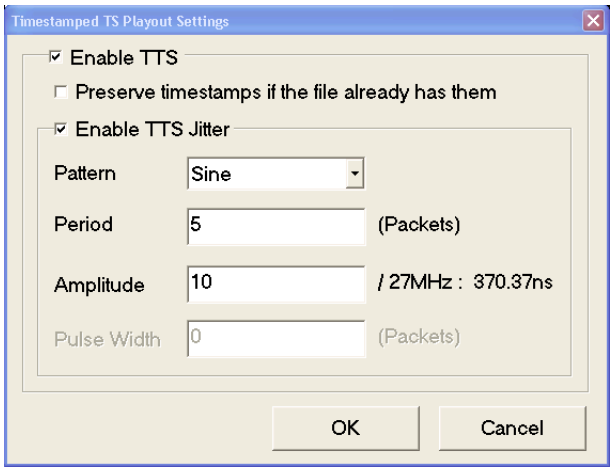


Figure 3-21: Timestamped TS Playout Settings

When TTS is enabled, each packet (188 bytes) of TS stream 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 has them or add four 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. (See Figure 2-6 on page 2-9.)

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The IP bit rate displayed will change because there will be 4 extra bytes that are 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 3-7.)

Table 3-7: Utility menu commands

Command	Description
Communication	Opens the Communication dialog box where you can set the port number needed to remotely control the RTX130B over an Ethernet network and the terminator used to communicate with a controller. (See Figure 3-22 on page 3-36.)
Status	Opens the Status dialog box where you can check general system information including the software and hardware versions. (See page 3-37, *Status Dialog Box*.)

Communication Dialog Box. When you select the Communication command from the Utility menu, the Communication dialog box appears. (See Figure 3-22.)

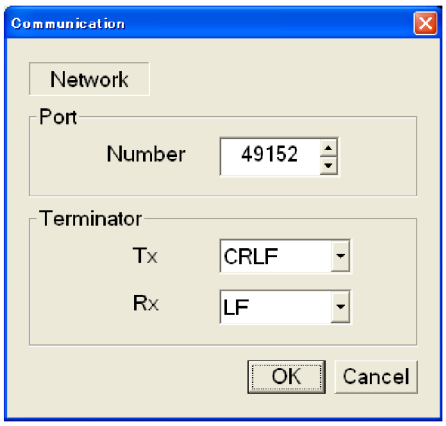


Figure 3-22: Communication dialog box

- **Port Number:** Sets the port number needed to remotely control the RTX130B over an Ethernet network. You can set the value from 1024 to 65535.
- **Terminator Tx:** Sets the terminator used when the RTX130B 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 RTX130B receives commands from a controller. You can select LF (linefeed) or CR (carriage return).

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Status Dialog Box. When you select the Status command from the Utility menu, the Status dialog box appears. (See Figure 3-23.)

This dialog box shows the version of the RTX130B application and hardware version of the main and installed interface modules.

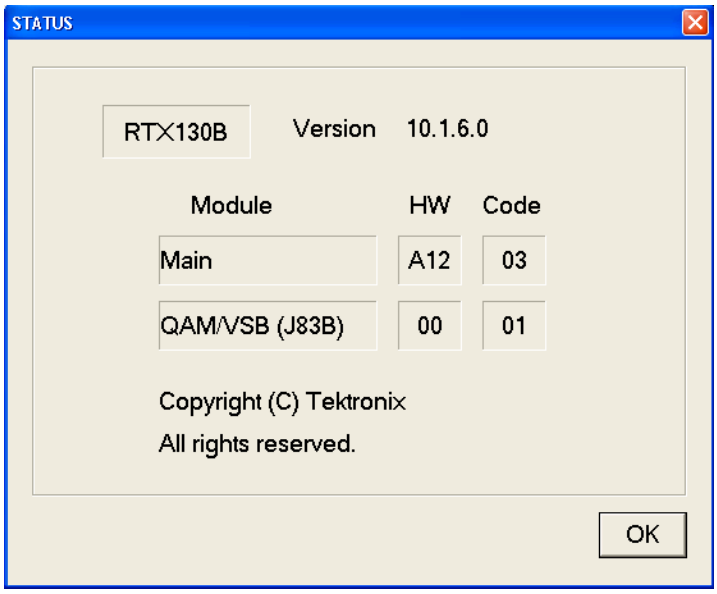


Figure 3-23: Status dialog box

Menus in the Record Screen

This subsection describes the menus in the Record screen.

NOTE. *The IP interface mode does not support the Record functionality, 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 RTX130B application and for shutting down the instrument. (See Table 3-8.)

Table 3-8: 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.

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Table 3-8: 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. (See page 3-67, *Preset File*.)
Save Preset	Saves the current instrument settings as a preset file. (See page 3-67, *Preset File*.)
PLAY	Switches to the Play screen.
Scheduler	Starts the Scheduler application when Option SC is installed.
Minimize	Minimizes the RTX130B application window.
Exit	Quits the RTX130B application. The RTX130B application settings are saved.
Shutdown	Quits the RTX130B application and shuts down the RTX130B.

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 Table 3-2 on page 3-4.)

Record Menu

The Record menu contains commands for setting the input interface, record size, trigger position, and target source. (See Table 3-9.)

Table 3-9: 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. (See page 3-39, *Target Dialog Box*.)
Timer Record	Opens the Timer Play/Record dialog box where you can set the time used to record the input stream automatically. (See page 3-12, *Timer Play/Record Dialog Box*.)
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. (See page 3-40, *Others Dialog Box*.)

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Target Dialog Box. When you select the Target command from the Record menu, the Target dialog box appears. (See Figure 3-24.)

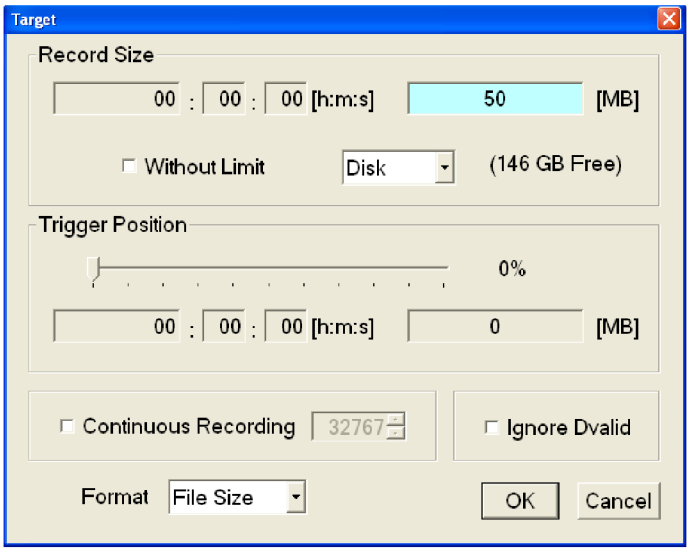


Figure 3-24: Target dialog box

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- **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 checked, the available recording time and data size are automatically set. In addition, the Continuous Recording check box is disabled.

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

  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.

- **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).

- **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 Continuos 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. (See page 3-62, *Continuous Recording Feature*.)

- **Ignore Dvalid:** Sets whether the RTX130B ignores the DVALID signal from the selected interface or not when a stream data is acquired. When it is checked, the RTX130B 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.

- **Format:** Specifies how to set the record size and trigger position. You can select Time or File Size.

Others Dialog Box. When you select the Other command from the Record menu, the Others dialog box appears. (See Figure 3-25.)

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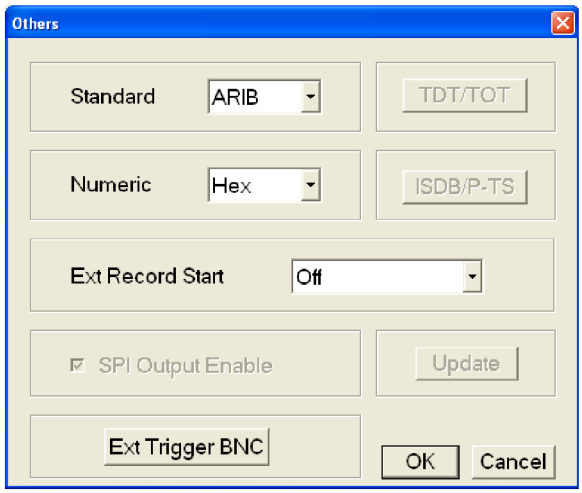


Figure 3-25: Others dialog box

- **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 RTX130B acquires pretrigger data when a valid trigger signal occurs and waits for a trigger. When a valid trigger signal occurs again, the RTX130B acquires posttrigger data and creates a stream file.
- **Ext Trigger BNC:** This item is common to the Play screen. (See page 3-13, *Others Dialog Box*.)

QAM/VSB Menu

The QAM/VSB menu contains commands for setting the parameters for the RF modulated output of an input transport stream and selecting the reference clock for the RF modulated output. This menu is available only when ASI is selected from the Source command in the Record menu. (See Table 3-10.)

Table 3-10: QAM/VSB menu command (Record screen)

Command	Description
BNC Port	Sets the signal format applied to the ASI/SMPTE Output connector. You can select ASI or 310M 8VSB (SMPTE310M signal with data rate of 8 VSB).

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Table 3-10: QAM/VSB menu command (Record screen) (cont.)

Command	Description
Through Out	Sets whether the signal supplied to the ASI/SMPTE Input connector is output from the ASI/SMPTE Output connector when a stream is not output. You can select On or Off.
RF Output	Sets whether to modulate and output a signal that is applied to the ASI/SMPTE Input connector. You can select On or Off.
Modulation	Sets the parameter for the RF modulated output of the transport stream. When you select this command, the Modulation dialog box appears. The dialog box is same as the Modulation dialog box displayed in the Play screen. (See page 3-18, *Modulation Dialog Box*.)
RF Clock Source	Opens the RF Clock Source dialog box where you can set the reference clock for the RF modulated output of the transport stream applied to the ASI/SMPTE Input connector. (See page 3-42, *RF Clock Source Dialog Box*.)

RF Clock Source Dialog Box. When you select the RF Clock Source command from the QAM/VSB menu, the RF Clock Source dialog box appears. (See Figure 3-26 on page 3-42.)

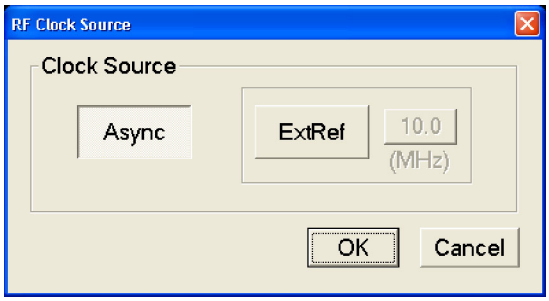


Figure 3-26: RF Clock Source dialog box

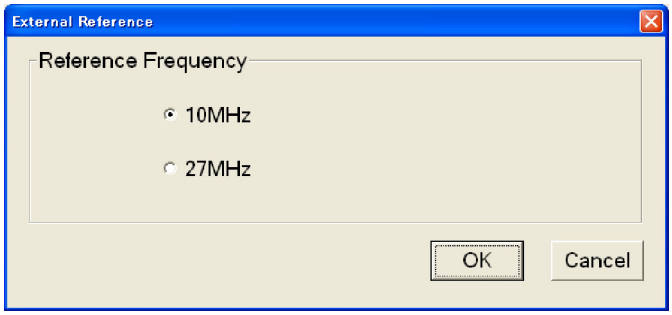
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- **Async:** Uses the internal clock, which is not synchronized with the clock that is created by an ASI or SMPTE310M signal, for real-time modulation.

  In this mode, the input transport stream clock is not synchronized with the symbol rate. The transport stream rate that is calculated by the symbol rate and modulation parameters are synchronized with the actual transport stream signal by inserting null packets. In this case, PCR jitter of maximum 1 packet is generated.

NOTE. *If the bit rate of the input transport stream is higher than the calculated bit rate, a non-modulated signal is output.*

- **Ext Ref:** Uses a signal applied to the Clock/Ref In connector as the reference signal. When you select the button to the right of the ExtRef button, the following External Reference dialog box appears. This button is available only when J.83 Annex C-JCTEA or ATSC is selected as a modulation standard.



- **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.

  Press the **TAB** button repeatedly to select an option button, and then press the arrow buttons to select one of the options.

NOTE. *If the input transport stream and external reference signal are not synchronized, a non-modulated signal is output.*

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 that of the Play screen. (See Table 3-7 on page 3-36.)

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Toolbar Buttons

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

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

Table 3-11: Toolbar button descriptions

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

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Hierarchy Display

The RTX130B 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 RTX130B uses icons displayed in a hierarchical structure to show the interrelationship of transport stream components. (See Figure 3-27.) Additional information about each stream component such as PID and Table ID numbers is displayed next to each icon.

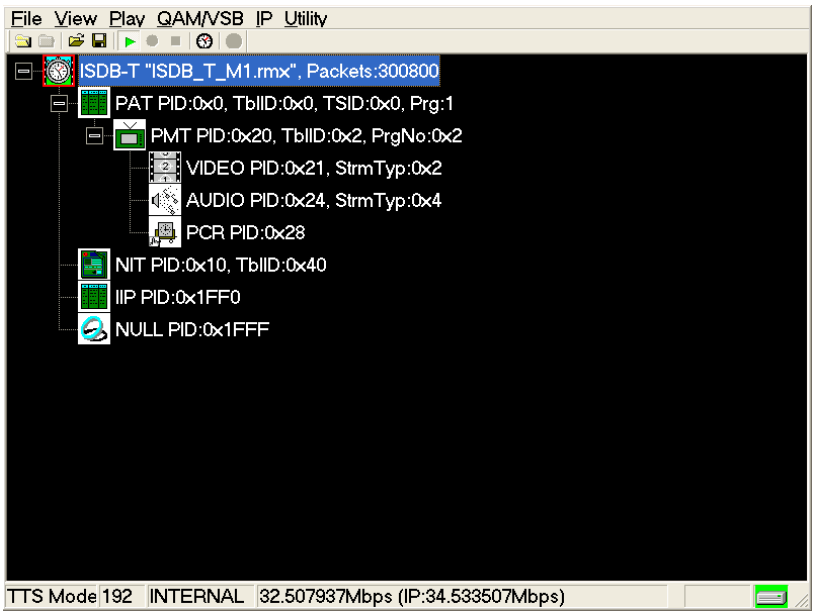


Figure 3-27: Example of Hierarchy display

The "–" symbol displayed to the left of some icons indicates that the lower-level transport stream components are displayed. The symbol changes to "+" when the lower level components are not 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 will display on the screen at a time, a scroll bar appears at the right of the screen.

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

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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. (See Figure 3-27.) Use the arrow buttons to move the Icon cursor through the hierarchy. The hierarchy 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 3-52, *Icon Text and Dialog Box*.)

Table 3-12: 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 to which TMCC information is inserted into 8 bytes in its Reed-Solomon area (16 bytes).
	M-TMCC Transport stream to 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 (TSDT) 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.

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Table 3-12: Icons used for MPEG-2, ARIB, DVB, and ATSC formats (cont.)

Icon	Element type
	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.
 	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.

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Table 3-12: Icons used for MPEG-2, ARIB, DVB, and ATSC formats (cont.)

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

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Table 3-13: Icons specific to DVB format

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

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Table 3-14: Icons specific to ARIB format

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

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Table 3-14: 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.

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Table 3-15: Icons specific to ATSC format

Icon	Element type
	Master Guide Table (MGT) One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC7.
	Terrestrial Virtual Channel Table (TVCT) One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC8.
	Cable Virtual Channel Table (CVCT) One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC9.
	Rating Region Table (RRT) One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xCA.
	Event Information Table (EIT) 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.
	Channel Extended Text Table (CETT) One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC8.
	Event Extended Text Table (EETT) One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xC9.
	Program Identifier Table (PIT) 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.
	System Time Table (STT) One or more transport packets with a PID value of 0x1FFB and a table_id value of 0xCD.

Icon Text and Dialog Box

To the right of each icon, the RTX130B 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.

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S-TMCC Icon

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

- "xxx.trp": Shows the file name.
- TC8PSK/xx, BPSK/xx, or QPSK/xx: Shows the modulation system and the number of contract slots (xx).

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.

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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 3-28.) This dialog box allows you to add jitter to the program_clock_reference_base value and the program_clock_reference_extension value. (See page 3-59, *Adding Jitter to PCRs*.)

The PCR Inaccuracy dialog box contains four parameters that you can use to specify the jitter. (See Table 3-16.)

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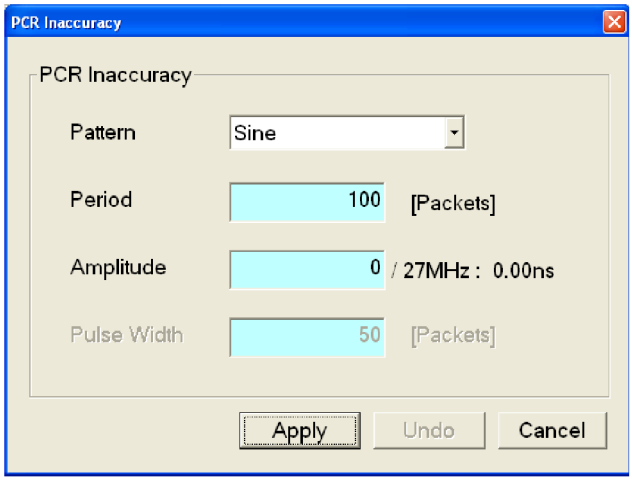


Figure 3-28: PCR Inaccuracy dialog box

Table 3-16: 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).

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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 ADIO_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.

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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

The following text information is displayed for the 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.

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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.

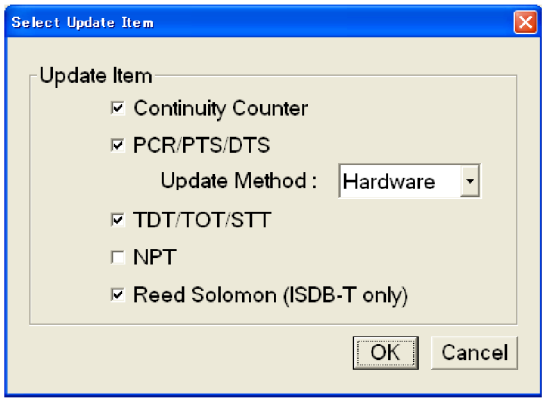
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Adding Jitter to PCRs

The RTX130B provides the capability to add jitter to PCRs (Program Clock References). Adding jitter to PCRs allows you to simulate transmission delay variations and to test the robustness of decoders under various conditions.

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

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



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Adding Jitter

Perform the following procedure to add jitter to PCRs:

1. Use the Icon cursor to select the PCR item in the hierarchy display. If the Icon cursor is not available, press the **Menu** button to enable the Icon cursor.
2. Press the **Num Pad/Select** button. This opens the PCR Inaccuracy dialog box. (See Figure 3-29.)

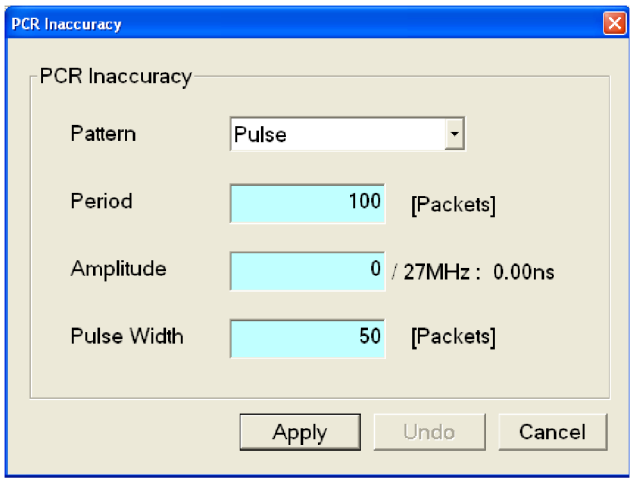


Figure 3-29: PCR Inaccuracy dialog box

3. The PCR Inaccuracy dialog box lets you set the parameters for how jitter will be added to the PCR.
   - **Pattern:** Selects the type of waveform used to add jitter. You can select Sine, Square, Triangle, Pulse, Sawtooth, Random, or Offset.
   - **Period:** Sets the period of the waveform used to add jitter. You can set the value from 5 to 3000 packets in 1 packet steps.
   - **Amplitude:** Sets the amplitude of the waveform used to add jitter. You can set the value from 0/27 MHz to 135000000/27 MHz (0 to 5 s).
   - **Pulse Width:** Sets the pulse width of the waveform used to add jitter. You can set the value from 1 to (period–1) packet(s) in 1 packet steps. This Pulse Width parameter is available only when the Pattern parameter is set to Pulse.
4. After you have set the parameters, press the **Enter** button to enable the jitter function.

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

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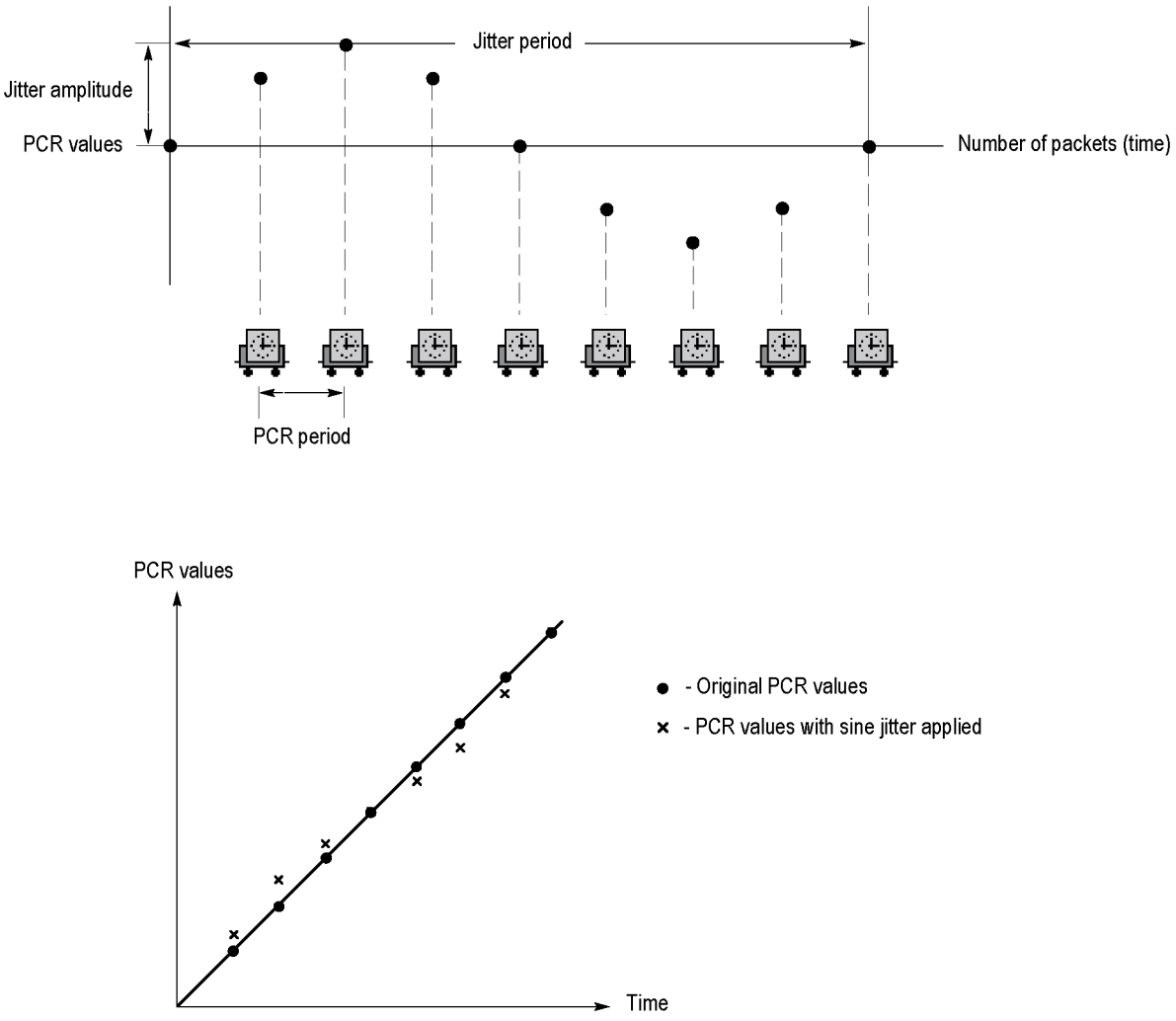


Figure 3-30: Jitter function with a sine jitter pattern applied

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Continuous Recording Feature

The Continuous Recording feature allows you to record multiple stream files continuously on the hard disk or RAM.

This section describes the features and basic actions of continuous recording, and tells how to use it to record stream files.

Overview

Continuous Recording has the following features:

- Records multiple stream files continuously on the hard disk
- Operates with variable file sizes
- Records the timestamp information of the first trigger event in a file as the updated date property of the file
- Records file in Disk or RAM recording mode

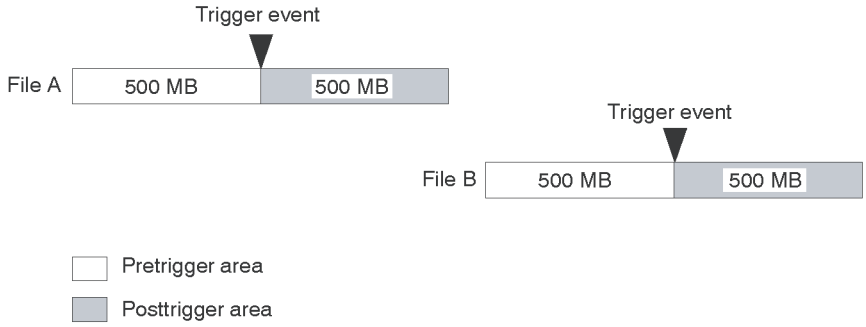
Basic Action of Continuous Recording

This section describes how files are recorded by locating trigger events in Continuous Recording.

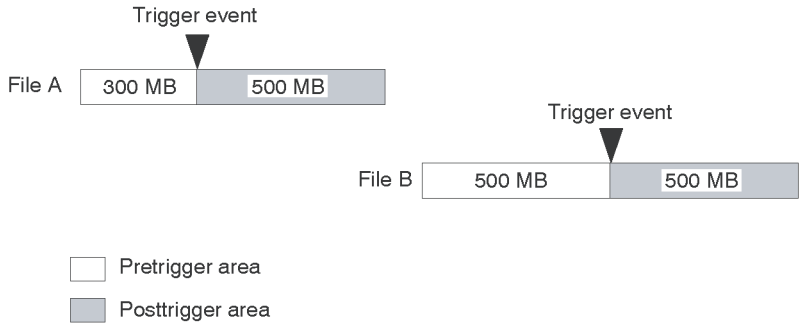
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In the following explanation, both pretrigger and posttrigger sizes must be set to 500 MB.

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

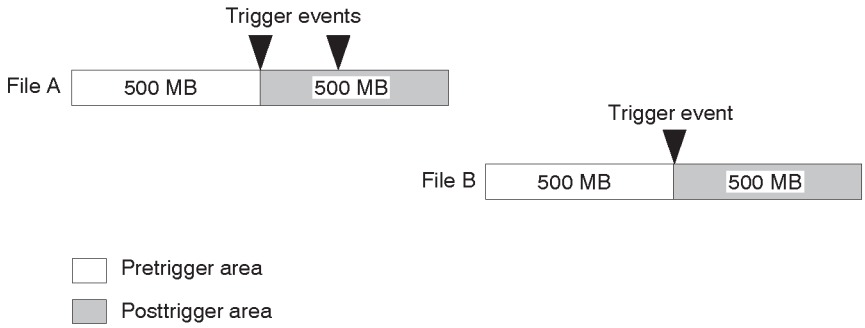


- If a trigger event occurs while the pretrigger area is filled with data, the pretrigger area becomes smaller than the specified size. However, the posttrigger area stays the specified size. In this case, File A is smaller than the specified size.



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

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

Performing Continuous Recording

Use the following procedure to perform Continuous Recording:

1. Press the front-panel **Record** button to display the Record screen.
2. Select **File > Save** to open the Save as dialog box.
3. In the dialog box, select the folder where stream files are to be saved.
4. Select **Record > Target** to open the Target dialog box.
5. In the dialog box, enable the **Continuous Recording** check box. (See Figure 3-31.)

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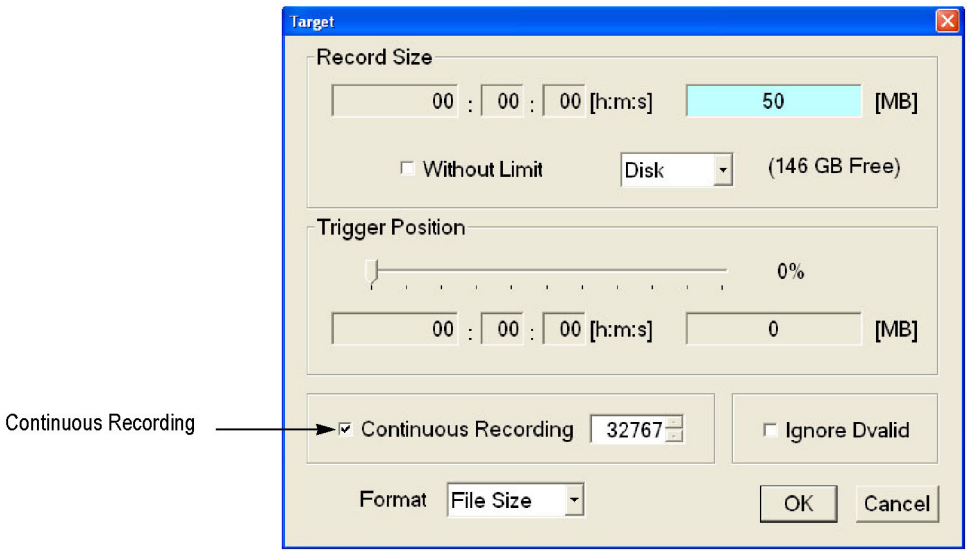


Figure 3-31: Continuous Recording check box

6. In the Continuos Recording box to the right of the check box, set the number of files to stop Continuous Recording. After the specified number of files are created, stream capture stops automatically.
7. In the **Record Size** field, set the file size to be recorded.
8. In the **Trigger Position** field, set the trigger position.
9. If you want to start recording using a trigger signal on the Trig In/Out connector:
   a. Select **Record > Other** to open the Others dialog box.
   b. Select **Rise** or **Fall** in the **Ext Record Start** field.
10. Press the front-panel **Record** button to start continuous recording.

    While Continuous Recording is running, the total number of captured files are displayed in the file counter on the record status indicator. (See Figure 3-32.)

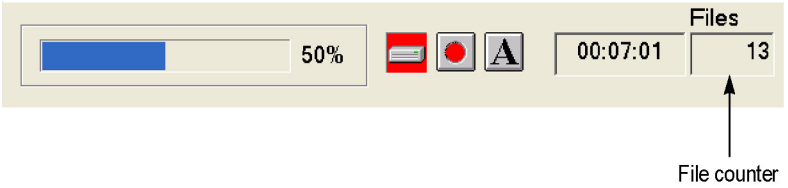


Figure 3-32: File counter

When the specified number of files are created or you press the front-panel Stop button, stream capture stops.

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After the stream capture stops, recording of the captured streams starts. The file counter value decreases every time the recording of each file is complete. The recording starts from the last captured file. If you press the Stop button while the captured streams are recording, the recording terminates at the file currently being recorded.

NOTE. *The error message Drive Full appears when there is no space to record a captured file with the specified file size on the hard disk.*

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Preset File

The RTX130B provides the capability to save the user-defined instrument settings as a preset file and load the instrument settings saved as a preset file. This section describes the contents of the instrument settings saved as a preset file and tells how to save and load a preset file.

Contents of the Preset File

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

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

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Saving a Preset File

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

1. Set the instrument settings that you want to save.
2. Select **File > Save Preset**, and then press the **Enter** button. The Save As dialog box appears. (See Figure 3-33.)

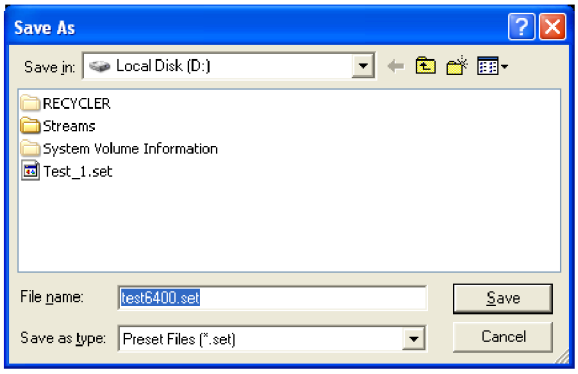


Figure 3-33: Save As dialog box

In the File name text box, the following default file name is displayed automatically:

- In the Play Screen, a two-digit serial number is added to the selected file name (for example, if the selected file name is Test_TS, the default file name becomes Test_TS00).
- In the Record Screen, Preset## (## represents a two-digit serial number) is used as a file name.

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

3. Press the **Enter** button. This saves the instrument settings as a preset file.

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Loading a Preset File

Use this procedure to load instrument settings saved as a preset file:

1. Select **File > Load Preset**, and then press the **Enter** button. The Open dialog box appears. (See Figure 3-34.)

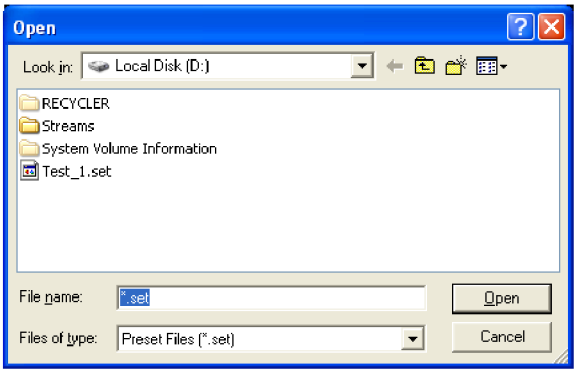


Figure 3-34: Open dialog box

2. Press the **Tab** button repeatedly to select the file displayed at the top of the file list. When the file is selected, broken lines are shown around the file name.
3. Press the up (▲) or down (▼) arrow button to select the preset file that you want to load. The selected file name is displayed in the File Name text box.
4. Press the **Enter** button. This loads the preset file onto the instrument.

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Connecting to a Network

The RTX130B has a LAN (10/100/1000 Base-T) port on the rear panel for Ethernet communications.

This section provides instructions for connecting the RTX130B to a single PC or a network and setting the network parameters for the LAN port.

Connecting the RTX130B to your PC(s)

The RTX130B uses the rear-panel LAN port to communicate with a PC. (See Figure 2-2.) Use one of the following two methods to connect the RTX130B to your PC(s):

- If you are connecting the RTX130B directly to a single PC, use a crossover Ethernet cable to connect between the LAN port on the RTX130B and the Ethernet port on the PC. If you need to construct your own crossover cable, the following figure shows the pin connections to change on a straight cable to produce a crossover cable.

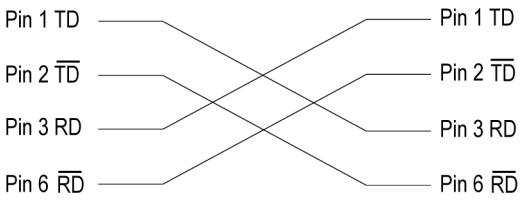


Figure 3-35: Pin connections for a crossover Ethernet cable

- If you are connecting the RTX130B to your local Ethernet network, use a straight Ethernet cable to connect between the LAN port on the RTX130B and the Ethernet hub port of your local network. By connecting to an Ethernet network, you can access the RTX130B using any PC on the network.

Setting Ethernet Network Parameters

You can set the network parameters for the RTX130B using the Control Panel of Windows XP.

NOTE. *The following procedure requires that you are familiar with the basics of using the Windows XP operating system. If necessary, review the Windows XP documentation.*

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Perform the following procedure to set the network parameters for the RTX130B:

1. Connect the keyboard and mouse provided with the instrument to the USB connectors on the front panel. You can connect them to either of the connectors.
2. Select **File > Minimize** or **File > Exit** to close the Play (or Record) screen. The Windows XP desktop appears.
3. Select **Settings > Control Panel** from the **Start** menu. The Control Panel window appears.
4. Double-click the **Network Connections** icon in the window. The Network Connections window appears. (See Figure 3-36.)

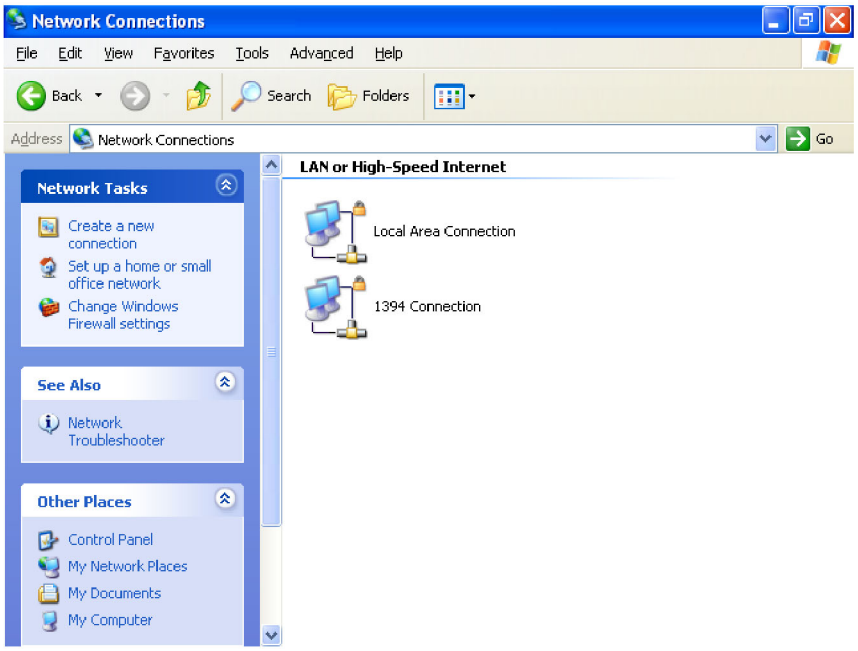


Figure 3-36: Network Connections window

5. Double-click the **Local Area Connection** icon. The Local Area Connection Status dialog box appears. (See Figure 3-37.)

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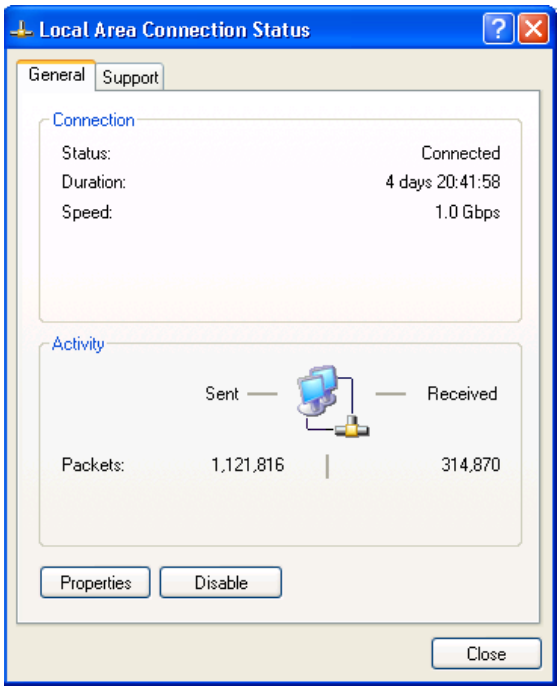


Figure 3-37: Local Area Connection Status dialog box

6. Click the **Properties** button. The Local Area Connection Properties dialog box appears. (See Figure 3-38.)

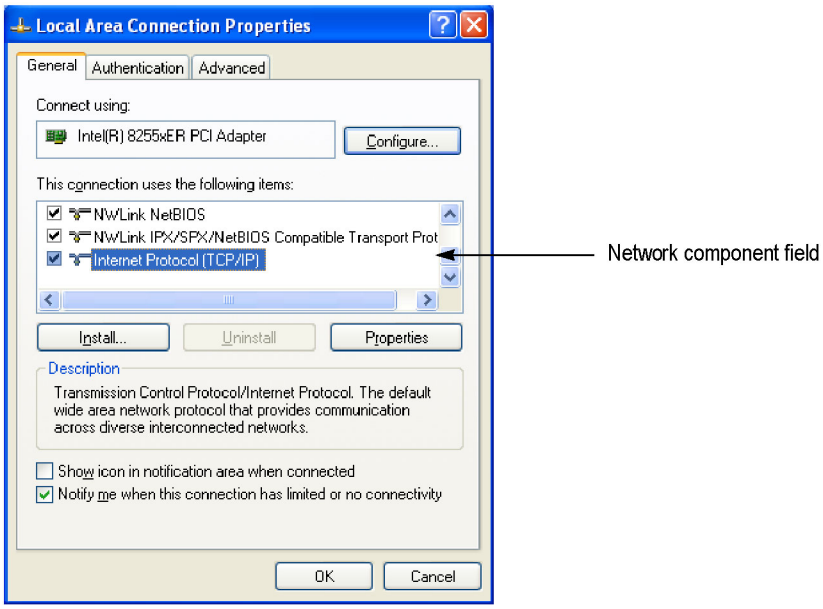


Figure 3-38: Local Area Connection Properties dialog box

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

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8. Click the **Properties** button. The Internet Protocol (TCP/IP) Properties dialog box appears. (See Figure 3-39.)

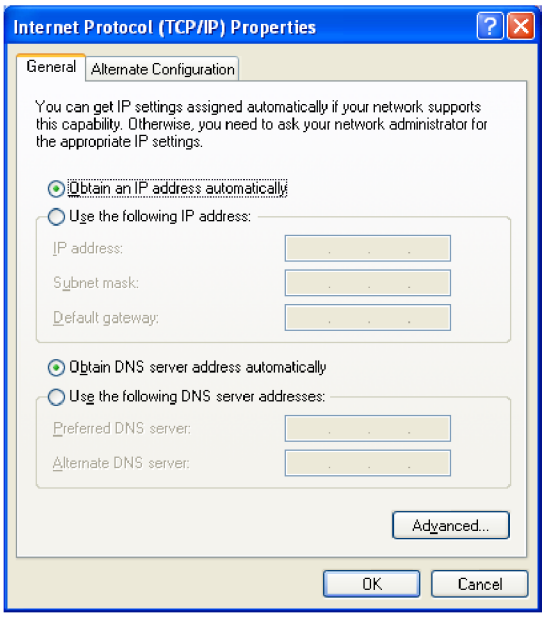


Figure 3-39: Internet Protocol (TCP/IP) Properties dialog box

The settings in the dialog box depend on whether a DHCP (Dynamic Host Configuration Protocol) server is in the network connected to the RTX130B.

When the DHCP Server is in the Network. If the DHCP server is in the network, perform steps 13 and 10, otherwise skip to step 11.

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

10. Click the **OK** button.

The RTX130B accesses the DHCP server and obtains the addresses automatically when connected to the network.

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

NOTE. *Under some network environments, the RTX130B may not be able to obtain the IP address automatically from a DHCP server. In this case, you need to enter the appropriate address value in each submenu item.*

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

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11. If you connect the RTX130B directory to a single PC:

- **a.** In the dialog box, select **Use the following IP address**.
- **b.** Set the **IP address** parameter to be the same IP address as the PC's address except for the last number. The last number must be different from the last number in the PC's IP address.
- **c.** Set the **Subnet mask** parameter to be the same net mask (subnet mask) used by the PC. Do not enter a number if the PC does not have a net mask.
- **d.** You do not need to enter a **Default gateway** if you are directly connected to a single PC.

12. If you connect the RTX130B to your local Ethernet network:

- **a.** In the dialog box, select **Use the following IP address**.
- **b.** Ask your local network administrator and set the appropriate addresses.



CAUTION. *To prevent communication conflicts on your Ethernet network, ask your local network administrator for the correct numbers to enter in the dialog box if you connect the RTX130B to your local Ethernet network.*

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

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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 RTX130B.

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 RTX130B 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 3-40.)

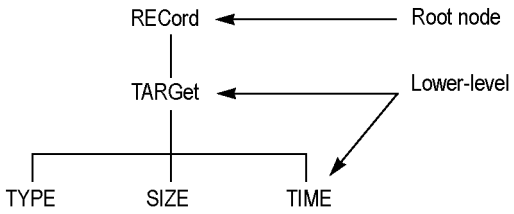


Figure 3-40: Example of SCPI subsystem hierarchy tree

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.

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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 3-40.)

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 RTX130B command set and some are defined by ANSI/IEEE 488.2-1987. (See Table 3-17.)

Table 3-17: Parameter types used in syntax descriptions

Parameter type	Description	Example
binary	Binary numbers	#B0110
arbitrary block [1]	A specified length of arbitrary data	#512234xxxxx . . . where 5 indicates that the following 5 digits (12234) specify the length of the data in bytes; xxxxx ... 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 3-41.) The accepted short form and the long form are equivalent and request the same action of the instrument.

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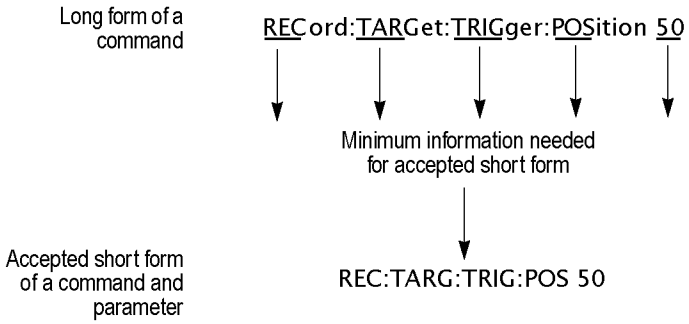


Figure 3-41: Example of abbreviating a command

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.

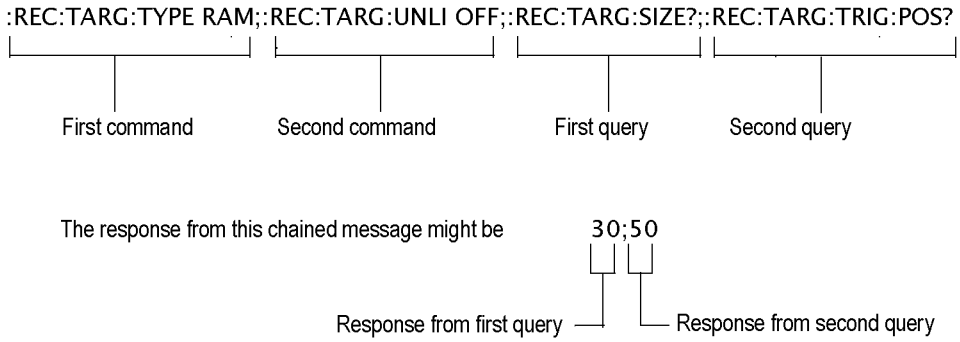


Figure 3-42: Example of chaining commands and queries

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 3-43.)

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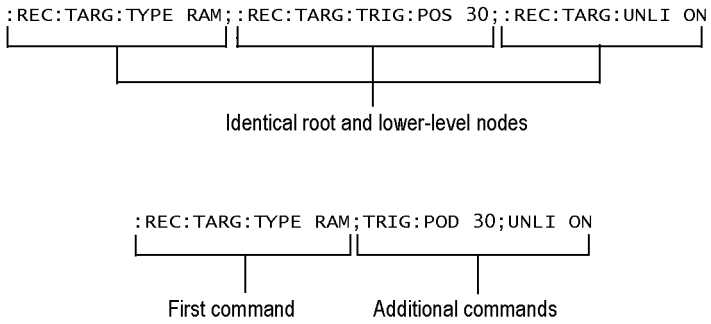


Figure 3-43: Example of omitting root and lower-level nodes in a chained message

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 RTX130B complies with this standard.

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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 3-18.)

Table 3-18: 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

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Remote Commands

This section describes the remote command set that is used in the RTX130B. The commands for the RTX130B 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 RTX130B for remote operation through the LAN port on the rear panel. (See page 3-70, *Connecting to a Network*.)

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
```


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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).

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*SRE?

Returns the contents of SRER.

*STB?

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

*TRG

Generates a trigger event.

*TST?

Performs the self test and returns its result. The RTX130B always returns 1.

*WAI

Wait-to-continue command. This command is not necessary because the RTX130B 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 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.

:DISPlay:VIEW:FORMat?

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

MASS MEMORY Commands

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

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Command Tree

```
:MMEMory
   :CATalog?                    [<directory_path>]
   :CDIRectory
      [:DATA]                   <directory_path>
      :STATe                    <directory_path>
   :LOAD
      :STATe                    <preset_name>
   :MDIRectory                  <directory_path>
   :STORe
      :STATe                    <preset_name>
```

Command Description

`:MMEMory:CATalog? [<directory_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] [<directory_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.

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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              ON|OFF
      :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>[,<numeric_value>]]]
   :QAMVsb
```


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```
    :INTerleave          M16Qam|M64Qam|M256Qam|M8Vsb
                         <numeric_value>
    :MODulation
    :OUTPut
        :MODE            RF|IF|IFReversed|IF36M|IFR36M
        :STATe           ON|OFF
    :PORT
        :THROughout      ON|OFF
        :TYPE            ASI|S310M
    :RF
        :FREQuency       <numeric_value>
        :LEVEl           <numeric_value>
    :STANdard            J83A|J83B|J83C|J83CJ|ATSC
        :CATalog?
    :SYMBol
        :RATE            <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>,<numeric_value>
    :MODE                ORIGinal|OS|USER
```


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```
: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 RTX130B 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?`

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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) x 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.

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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:EXTernal 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:EXTernal?`

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 clock 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.

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`: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|RIangle|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

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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:INACcurracy?`

Returns the current PCR jitter insertion settings.

`:PLAY:QAMVsb:INTerleave <numeric_value>`

Sets the operating mode and modulation parameters (I and J) of interleaving. You can set the value from 0 to 13. This command is only available when the :PLAY:QAMVsb:STANdard command is set to J83B and :PLAY:QAMVsb:MODulation command is set to M64Qam or M256Qam. The default value is 1.

Setting value	Operating mode and modulation parameters
0	Level 1: I=128, J=1
1	Level 2: I=128, J=1
2	Level 2: I=64, J=2
3	Level 2: I=32, J=4
4	Level 2: I=16, J=8
5	Level 2: I=8, J=16
6	Level 2: I=128, J=1
7	Level 2: I=128, J=2
8	Level 2: I=128, J=3
9	Level 2: I=128, J=4
10	Level 2: I=128, J=5
11	Level 2: I=128, J=6
12	Level 2: I=1,28 J=7
13	Level 2: I=128, J=8

`:PLAY:QAMVsb:INTerleave:LEVEl?`

Returns the current operating mode and modulation parameters of interleaving.

`:PLAY:QAMVsb:MODulation M16Qam|M64Qam|M256Qam|M8Vsb`

Sets the modulation mode. The choices are M16Qam (16QAM), M64Qam (64QAM), M256Qam (256QAM), and M8Vsb (8VSB). The available selections depend on the standard that is selected by the

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:PLAY:QAMVsb:STANdard command. The default value is M8Vsb for the ATSC standard and M64Qam for the other standards.

`:PLAY:QAMVsb:MODulation?`

Returns the current modulation mode setting.

`:PLAY:QAMVsb:OUTPut:MODE RF|IF44M|IFR44M|IF36M|IFR36M`

Sets the signal output from the RF Out and IF Out connectors. The choices are RF (RF output), IF44M (44 MHz IF output), IFR44M (44 MHz IF output that the spectrum is reversed), IF36M (36 MHz IF output), and IFR36M (36 MHz IF output that the spectrum is reversed). The default value is RF.

`:PLAY:QAMVsb:OUTPut:MODE?`

Returns the current output status of the RF Out and IF Out Connectors.

`:PLAY:QAMVsb:PORT:THROughout ON|OFF`

Sets the throughout mode; whether the signal applied to the ASI/SMPTE Input connector is output from the ASI/SMPTE Output connector when a stream is not output. You can use 1 or 0 instead of ON or OFF. This setting changes the :RECord:QAMVsb:PORT:THROughout command setting. The default value is ON.

`:PLAY:QAMVsb:PORT:THROughout?`

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

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

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

`:PLAY:QAMVsb:PORT:TYPE?`

Returns the current output signal selection.

`:PLAY:QAMVsb:RF:FREQency <numeric_value>`

Sets the center frequency of the RF output signal. You can set the value from 50.0 MHz to 860.0 MHz. The default value is 50.0 MHz.

`:PLAY:QAMVsb:RF:FREQency?`

Returns the current center frequency of the RF output signal.

`:PLAY:QAMVsb:RF:LEVEl <numeric_value>`

Sets the RF signal output level. You can set the value from 45 dBmV to 58 dBmV. The default value is 45 dBmV.

`:PLAY:QAMVsb:RF:LEVEl?`

Returns the current RF signal output level.

`:PLAY:QAMVsb:STANdard J83A|J83B|J83C|J83CJ|ATSC`

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Sets the RF modulation standard. The choices are J83A (DVB-C/ITU-T J.83 Annex A), J83B (ITU-T J.83 Annex B), J83C (ITU-T J.83 Annex C), J83CJ (ITU-T J.83 Annex C-JCTEC), and ATSC. The available selections depend on the installed options.

`:PLAY:QAMVsb:STANdard?`

Returns the current RF modulation standard.

`:PLAY:QAMVsb:STANdard:CATalog?`

Lists the RF modulation standards that are installed in the instrument.

`:PLAY:QAMVsb:SYMBol:RATE <numeric_value>`

Sets the symbol rate when the :PLAY:QAMVsb:ATANdard command is set to J83A or J83C. You can set the value from 1.0 to 6.956532 Msps for J83A and from 1.0 to 5.274 for J83C. The default value is 1.0 Msps.

`:PLAY:QAMVsb:SYMBol:RATE?`

Returns the current symbol rate setting.

`: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:SPIOutput 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:SPIOutput?`

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 that has to be looped. You can use 1 or 0 instead of ON or OFF. The default value is OFF.

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`: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 are both 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?`

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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 204 x 48 x 8 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>`

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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?`

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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.

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Command Tree

```
:RECord
    :ACQuire
        :STARt
        :STOP
    :PROGress
    :CLOCk
        :RATE?
    :EXTernal            RISE|FALL|OFF
    :PACKet?
    :QAMVsb
        :CLOCk
            :SOURce      ASYNc|EXT10M|EXT27M
        :PORT
            :TYPE        ASI|S310M
            :THROughout  ON|OFF
    :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

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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:QAMVsb:CLOCk:SOURce ASYNc|EXT10M|EXT27M`

Sets the reference signal used for the RF modulated output of the transport stream applied to the ASI/SMPTE Input connector. The choices are ASYNc (the internal clock, which is not synchronized with an ASI signal or SMPTE310M signal), EXT10M (an external 10 MHz signal), and EXT27M (an external 27 MHz signal). This setting changes the :PLAY:CLOCk:SOURce command setting. The default value is ASYNc.

`:RECord:QAMVsb:CLOCk:SOURce?`

Returns the current reference signal used for the RF modulated output of the transport stream applied to the ASI/SMPTE Input connector.

`:RECord:QAMVsb:PORT:THROughout ON|OFF`

Sets the throughout mode; whether the signal applied to the ASI/SMPTE Input connector is output from the ASI/SMPTE Output connector. You can use 1 or 0 instead of ON or OFF. This setting changes the

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:PLAY:QAMVsb:PORT:THROughout command setting. The default value is ON.

`:RECord:QAMVsb:PORT:THROughout?`

Returns the current throughout mode status.

`:RECord:QAMVsb:PORT:TYPE ASI|S310M`

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

`:RECord:QAMVsb:PORT:TYPE?`

Returns the current input signal selection.

`: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

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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:TRIGger: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:TRIGger: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>`

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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?
```


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```
: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 RTX130B 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 RTX130B receives commands from a controller.

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

Sets the terminator used when the RTX130B 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 RTX130B 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 3-129, *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 lock function.

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`: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 data
2: the instrument is acquiring data
3: the instrument is recording 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 RTX130B.

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.

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`:PLAY:IPENable?`

Returrns whether the IP interface is enabled.

`:PLAY:OPCArdenbl ON|OFF`

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

`:PLAY:OPCArdenbl?`

Returns whether the optional card is enabled.

`:PLAY:IP:PARAmeters:DEFAult`

Resets the configuration settings to the default values.

IP Configuration Settings

`:PLAY:IP:PARAmeters:IPLAyrver`

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

`:PLAY:IP:PARAmeters:IPLAyrver?`

Returns the IP player version of the playout.

`:PLAY:IP:PARAmeters:DVCName?`

Returns the current device name for the IP playout.

`: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 playout. The choices are IPPKSZMD and TSPKCTMD. The default value is TSPKCTMD.

`:PLAY:IP:PARAmeters:PACKetszmode?`

Returns the current packet size mode.

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`: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 playout.

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

Sets the IP bit rate value for the playout. 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 playout. The choices are UDP and RTP. The default mode is RTP.

`:PLAY:IP:PARAmeters:PRTOcol:SETTings:MODE?`

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Returns the current protocol mode for IP playout.

```
:PLAY:IP:PARAmeters:PRTOcol:SETTings:SRCIpadd <IP address
of the instrument>
```

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

```
:PLAY:IP:PARAmeters:PRTOcol:SETTings:SRCIpadd?
```

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

```
:PLAY:IP:PARAmeters:PRTOcol:SETTings:DSTIpadd <IP address of
the destination>
```

Sets the destination IP address for the IPv4 version of the playout. 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 playout.

```
: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>
```


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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.

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`: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.

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`: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.

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`: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:PRTOcol: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:PRTOcol:CUSTomize:HEADers:RTP:SQNCnumber?`

Returns the first value of the sequence number field.

`:PLAY:IP:PARAmeters:PRTOcol: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:PRTOcol:CUSTomize:HEADers:RTP:SSRC?`

Returns the SSRC value for the RTP layer.

`:PLAY:IP:PARAmeters:PRTOcol: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:PRTOcol:CUSTomize:HEADers:RTP:PYLOadtype?`

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

`:PLAY:IP:PARAmeters:PRTOcol:CUSTomize:HEADers:IPV6:VERSion?`

Returns the version number of the IPv6 protocol.

`:PLAY:IP:PARAmeters:PRTOcol: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:PRTOcol:CUSTomize:HEADers:IPV6:TRFCcls?`

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

`:PLAY:IP:PARAmeters:PRTOcol: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:PRTOcol:CUSTomize:HEADers:IPV6:FLOWlbl?`

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

`:PLAY:IP:PARAmeters:PRTOcol: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.

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`: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.

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`: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>`

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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.

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`: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:SQEEndbled ON|OFF`

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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:CSEEnbled 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:CSEEnbled?`

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.

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`: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 playout.

`:PLAY:IP:ERRGen:GSQNerr`

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

`:PLAY:IP:ERRGen:GCHIperr`

Generates checksum error in the IP layer.

`:PLAY:IP:ERRGen:GCHUperr`

Generates checksum error in the UDP layer.

Statistics

`:PLAY:IP:STATistics:IP:BIRAte?`

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:BIRAte:MIN?`

Returns the minimum IP bit rate value for the play.

`:PLAY:IP:STATistics:IP:BIRAte:MINVariation?`

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

`:PLAY:IP:STATistics:IP:BIRAte:MAX?`

Returns the maximum IP bit rate value for the play.

`:PLAY:IP:STATistics:IP:BIRAte:MAXVariation?`

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

`:PLAY:IP:STATistics:IP:BIRAte:AVG?`

Returns the average bit rate value for the play.

`:PLAY:IP:STATistics:IP:BIRAte:AVGVariation?`

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

`:PLAY:IP:STATistics:IP:JITTer?`

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:BIRAte?`

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.

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`: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:BIRAte?`

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:BIRAte?`

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?`

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

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

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

Parametric Settings

`:PLAY:IP:PRMEtric: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:PRMEtric: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:PRMEtric:THRPriority?`

Returns the current thread priority value of the play.

`:PLAY:IP:PRMEtric:BSTEnbled 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:BSTEnbled?`

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?`

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Returns the current value of the burst size.

`:PLAY:IP:PRMEtric:JITEnbled 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:JITEnbled?`

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 playout. The options are LAPLACE, GAUSSIAN, SINE, and FIXED. FIXED is taken as the default value.

`:PLAY:IP:PRMEtric:JITType?`

Returns the current jitter type for IP playout.

`:PLAY:IP:PRMEtric:JITPeriod <numeric_value>`

Sets the jitter period value for IP playout. 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 playout.

Timestamped TS Playout Settings

`:PLAY:IP:TTSSttngs:TTSEnbled ON|OFF`

Enables the timestamped TS (TTS) settings for the playout when set to ON. You can use 1 or 0 instead of ON or OFF. The default is set to OFF.

`:PLAY:IP:TTSSttngs:TTSEnbled?`

Returns whether the TTS settings has been enabled for the playout.

`:PLAY:IP:TTSSttngs:PRSRvts ON|OFF`

Enables to preserve the TTS settings of the file that already has them. You can use 1 or 0 instead of ON or OFF. The default is set to OFF.

`:PLAY:IP:TTSSttngs:PRSRvts?`

Returns whether the preserve TTS settings option is enabled for the player.

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`:PLAY:IP:TTSSttngs:TTSJitter:JTREnable ON|OFF`

Enables the TTS jitter settings for the playout. You can use 1 or 0 instead of ON or OFF. The default is set to OFF.

`:PLAY:IP:TTSSttngs:TTSJitter:JTREnable?`

Returns whether the timestamped jitter settings is enabled for the playout.

`:PLAY:IP:TTSSttngs:TTSJitter:PATTern SINE|SQUARE|TRIANGLE|PULSE|SAW|RANDOM|OFFSET`

Sets the TTS jitter pattern for the playout. The various options are SINE, SQUARE, TRIANGLE, PULSE, SAW, RANDOM, and OFFSET. The default option is SINE.

`:PLAY:IP:TTSSttngs:TTSJitter:PATTern?`

Returns the TTS jitter pattern of the playout.

`:PLAY:IP:TTSSttngs:TTSJitter:PERIod <numeric_value>`

Sets the TTS jitter period for the playout. You cannot set the period for random and offset jitter patterns. The default value is 0.

`:PLAY:IP:TTSSttngs:TTSJitter:PERIod?`

Returns the TTS jitter period of the playout.

`:PLAY:IP:TTSSttngs:TTSJitter:AMPLitude <numeric_value>`

Sets the TTS jitter amplitude for the playout. You can set the amplitude for all the jitter patterns. The default value is 0.

`:PLAY:IP:TTSSttngs:TTSJitter:AMPLitude?`

Returns the TTS jitter amplitude of the playout.

`:PLAY:IP:TTSSttngs:TTSJitter:PLSWidth <numeric_value>`

Sets the TTS jitter pulse width for the playout. You can set the width of only pulse pattern. The default value is 0.

`:PLAY:IP:TTSSttngs:TTSJitter:PLSWidth?`

Returns the TTS jitter pulse width of the playout.

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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 3-19: Default Settings

Header	Default settings
DISPLAY commands	
:DISPlay:VIEW:FORMat	HEXadecimal
PLAY commands	
:PLAY:AUTOplay	OFF (0)
:PLAY:CLOCk:DEFault:RATE	5.6610E+001
:PLAY:CLOCkDEFault: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	INTernal
:PLAY:EXTTrigger:BNC	INPUt
:PLAY:EXTTrigger:OUTPut:DELAy	0
:PLAY:EXTTrigger:OUTPut:SELEct	C27M
:PLAY:ISDBT:FREQuency:CHANnel	13
:PLAY:LOOP	ON (1)
:PLAY:LOOP:ISDBT:FRAMe	ON (1)
:PLAY:PACKet	188
:PLAY:PCR:INACCuracy	NONE
:PLAY:PCR:INITial	0, 0
:PLAY:QAMVsb:INTerleave	1
:PLAY:QAMVsb:MODulation	M64Qam (M8Vsb for ATSC)
:PLAY:QAMVsb:OUTPut:MODE	RF
:PLAY:QAMVsb:PORT:THROughout	ON (1)
:PLAY:QAMVsb:PORT:TYPE	ASI
:PLAY:QAMVsb:RF:FREQuency	50.0 MHz
:PLAY:QAMVsb:RF:LEVEl	45 dBm
:PLAY:QAMVsb:SYMBol:RATE	1.0
:PLAY:SOURce	DISK
:PLAY:SPIOutput	ON (1)
:PLAY:SSPOsition:INITial:ENABle	ON (1)

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Table 3-19: Default Settings (cont.)

Header	Default settings
:PLAY:SSPOsition:INITial[:POSition]	0
:PLAY:SSPOsition:INITial: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:INTerval	NONE
:PLAY:TIMEpacket:DEFine	Current data and time
:PLAY:TIMEpacket:MODE	ORIGinal
: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:EXTernal	OFF (0)
:RECord:ISDBT:CLOCk:SOURce	ASI
:RECord:ISDBT:FREQuency:CHANnel	13
: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

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Table 3-19: Default Settings (cont.)

Header	Default settings
Optional Commands	
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:PACKetszmode	TSPKTZMODE
:PLAY:IP:PARAmeters:IPPKtsize	1370
:PLAY:IP:PARAmeters:TSPKtcount	7
:PLAY:IP:PARAmeters:TSFRagment	OFF (0)
:PLAY:IP:PARAmeters:IPFRagment	OFF (0)
:PLAY:IP:PARAmeters:BITRate	28.107902 Mbps
IP Interface: Protocol Settings	
:PLAY:IP:PARAmeters:PRTOcol:SETTings:MODE	RTP
:PLAY:IP:PARAmeters:PRTOcol:SETTings:SRCIpadd	Autodetected from the active Network nterface Card (NIC interface)
:PLAY:IP:PARAmeters:PRTOcol:SETTings: DSTIpadd	239.1.1.1
:PLAY:IP:PARAmeters:PRTOcol:SETTings: SRCPort	16384
: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	Autodetected 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)

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Table 3-19: Default Settings (cont.)

Header	Default settings
: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	Autodetected 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	

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Table 3-19: 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:TRFCcls	0
:PLAY:IP:PARAmeters:REPLication:INCRement:IPV6:FLOWlbl	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)

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Table 3-19: Default Settings (cont.)

Header	Default settings
: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:GPKTlos	No parameters
:PLAY:IP:ERRGen:GSQNerr	No parameters
:PLAY:IP:ERRGen:GCHIperr	No parameters
:PLAY:IP:ERRGen:GCHUdperr	No parameters
IP:Parametric Settings	
:PLAY:IP:PRMEtric:PROCpriority	ABOVE_NORMAL
:PLAY:IP:PRMEtric:THRPriority	REAL_TIME
:PLAY:IP:PRMEtric:BSTEnbled	OFF (0)
:PLAY:IP:PRMEtric:BSTType	BURST PERIOD
:PLAY:IP:PRMEtric:BPERiod	2 ms
:PLAY:IP:PRMEtric:BSIZe	10
:PLAY:IP:PRMEtric:JITEnbled	OFF (0)
:PLAY:IP:PRMEtric:LOWJitmd	OFF (0)
:PLAY:IP:PRMEtric:JITType	FIXED
:PLAY:IP:PRMEtric:JITPeriod	1.000000 µs
IP:Timestamped TS Playout Settings	
:PLAY:IP:TTSSttngs:TTSEnbled	OFF (0)
:PLAY:IP:TTSSttngs:PRSRvts	OFF (0)
:PLAY:IP:TTSSttngs:TTSJitter:JTREnable	OFF (0)
:PLAY:IP:TTSSttngs:TTSJitter:PATTern	SINE
:PLAY:IP:TTSSttngs:TTSJitter:PERIod	0
:PLAY:IP:TTSSttngs:TTSJitter:AMPLitude	0
:PLAY:IP:TTSSttngs:TTSJitter:PLSWidth	0

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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 3-20: 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

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Table 3-20: 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 3-21: 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

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Table 3-21: 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.

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Table 3-22: 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 3-23: Query errors

Error code	Error message
–400	query error
–410	query interrupted
–420	query unterminated
–430	query deadlocked
–440	query unterminated after indefinite period

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Network Interface Specifications

The RTX130B supports remote control using the Ethernet interface. This section describes the RTX130B 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 RTX130B 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 3-22.)
- 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 remote command operation of the RTX130B, perform the following steps:

1. Connect the RTX130B to your PC using an Ethernet cable. (See page 3-70, *Connecting to a Network*.)
2. Click the Windows **Start** button and select **Run** from the start menu. The Run dialog box appears as shown. (See Figure 3-44.)

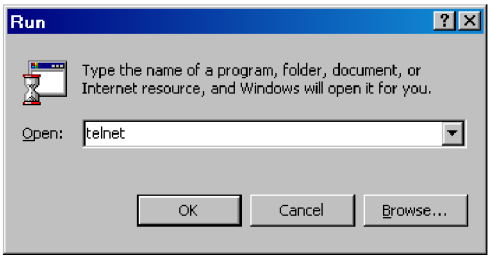


Figure 3-44: Run dialog box

3. In the Open text box, type `telnet` and then click **OK**. The Telnet window appears as shown. (See Figure 3-45.)

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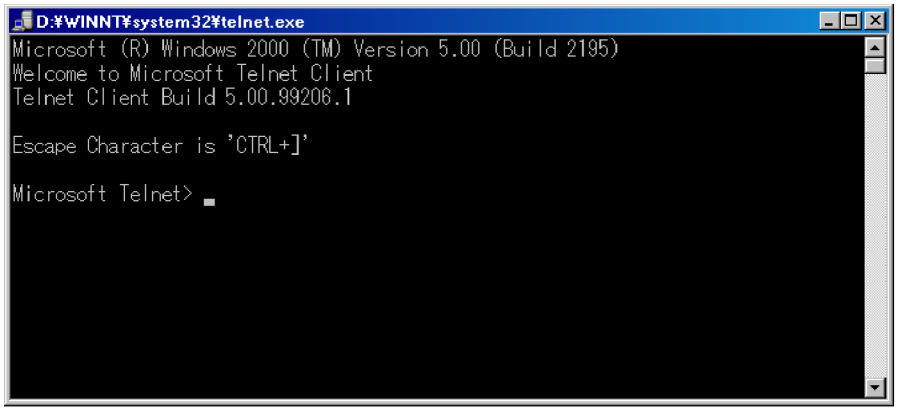


Figure 3-45: Telnet window

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

5. At the command line prompt, type `open <host name> <port number>` and press the **Enter** key.

   Where <host name> is a computer name of the RTX130B to be connected and <port number> is the port number set in the Communication dialog box (default value: 49152).

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

7. Check that the following ID information of the RTX130B appears:

   `TEKTRONIX, RTX130B, Vx.xx, Hxx, Cxx`

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Appendices

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Appendix A: Specifications

The following tables list the functional, electrical, mechanical, and environmental characteristics of RTX130B. The RTX130B also complies with national and international standards. (See page A-11, *Certifications and Compliances*.)

All listed specifications are guaranteed unless labeled “typical”. Typical specifications are provided for your convenience but are not guaranteed.

Performance Conditions

The electrical characteristics listed on the following pages are valid under the following conditions:

- The RTX130B must be in an environment where the temperature, altitude, humidity, and vibration conditions are within the operating limits. (See Table A-4 on page A-10.)
- The RTX130B must have a warm-up period of at least 20 minutes.
- The RTX130B must be operating at an ambient temperature between +5 °C and +40 °C, unless otherwise noted.

Functional Specifications

Table A-1: Functional specifications

Characteristics		Description
System configuration	System OS	Windows XP Professional
	CPU	1.3 GHz
	System memory	512 MB
	Display	6.3 inch, SVGA (800 x 600)
	Hard disk drive	250 GB

Electrical Specifications

Table A-2: Mainframe

Characteristics		Description
Maximum output rate	Hard disk	≥ 120 Mbps
	RAM	≥ 200 Mbps
Maximum record rate	Hard disk	≥ 120 Mbps (File size: < 4 GB, just after disk format operation) ≥ 90 Mbps (File size: 33 GB, just after disk format operation)
	RAM	≥ 200 Mbps

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Table A-2: Mainframe (cont.)

Characteristics		Description	
Internal reference clock		For Output_clock, PCR/PTS/DTS, packet operation timing, and TDT/STT time.	
	Frequency	27 MHz ± 1 ppm	
External reference/ clock input	Connector type	BNC	
	Input impedance, typical	50 Ω	
	Reference input	*Frequency*	*Input level, typical*
		8.129698 MHz, 10 MHz, 27 MHz	Sine wave: 0 ± 6 dBm Vp-p Square wave: 0.5 Vp-p to 3.0 Vp-p
	Clock input	*Frequency*	*Input level, typical*
		160 kHz to 26.75 MHz (parallel clock) 1.28 MHz to 32 MHz (serial clock)	0.5 V to 3.0 V
External trigger input/MISC output	Connector type	BNC	
	Input impedance, typical	1 kΩ	
	Threshold level	Rising and falling edges are programmable	
		High level	*Low level*
		> 3.5 V (maximum input voltage: 7 V)	< 0.8 V
	Output level	*High level*	*Low level*
		> 2.2 V (with 50 Ω termination)	< 0.8 V (with 50 Ω termination)
	Output impedance	50 Ω	
PLL	Frequency	50 MHz to 100 MHz, locked to reference clock	
	Output clock	50 MHz maximum (serial clock) 26.75 MHz maximum (parallel clock)	
	Output rate	214 Mbps maximum 64 Kbps minimum	
	TS clock with internal and external reference, 27 MHz and 10 MHz	TS clock = (X / (2 × Y × Z)) × 27 MHz 15362 < X < 31248 1686 < Y < 3376 2 ≤ Z ≤ 65536	
	TS clock with external parallel clock	TS clock = (X / (2 × Y × Z)) × external parallel clock, 214 MHz maximum 15632 < X < 31248 1 < Y < 16383 2 ≤ Z ≤ 65536	
	TS clock with external serial clock	TS clock = (X / (2 × Y × Z)) × external serial clock / 8, 32 MHz maximum 15632 < X < 31248 1 < Y < 16383 2 ≤ Z ≤ 65536	
	P/N and Jitter (serial clock)	< -104 dBc/Hz at 21.455707 MHz + 20 kHz (RBW=300 Hz)	

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Table A-2: Mainframe (cont.)

Characteristics		Description			
SPI interface	Connector type	D-sub, 25 pin			
	Data rate	256 Kbps to 214 Mbps			
	Pin assignments	*Pin*	*Signal*	*Pin*	*Signal*
		1	DCLK	14	/DCLK
		2	GND	15	GND
		3 to 10	DATA 7 to DATA 0	16 to 23	/DATA 7 to /DATA 0
		11	DVALID	24	/DVALID
		12	PSYNC	25	/PSYNC
		13	Shield		
	Output				
	Output level, typical	330 mV to 550 mV (termination: internal 100 Ω, external 100 Ω), bus LVDS with 50 Ω termination			
	Offset	1.1 V to 1.5 V			
	Output resistance, typical	100 Ω, between differential outputs (output off)			
	Data delay, typical	± 5 ns from the falling edge of DCLK (See Figure A-1 on page A-9.)			
	Input				
	Input level, typical	> +100 mV, < -100 mV, (RI+)-(RI-) with 100 Ω termination			
	Input resistance, typical	100 Ω (between differential inputs)			
	Clock pulse width, typical	T/2 ± T/10, T=1/f (f=byte clock frequency) (See Figure A-1 on page A-9.)			
	Data hold time, typical	T/2 ± T/10, T=1/f (f=byte clock frequency, data are latched on DCLK rising edge) (See Figure A-1 on page A-9.)			

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Table A-2: Mainframe (cont.)

Characteristics		Description	
RF/IIF output	Connector type	BNC	
	Connector type	75 Ω	
	Digital modulation		
	Standard: DVB-C/ITU-T J.83 Annex A (Option M1)	The following parameters conform to the standard:	
		Symbol rate:	1 Msps to 6.9565 Msps (IF output) 5 Msps to 6.9565 Msps (RF output)
		Modulation:	16/64/256QAM
		Outer coding:	RS (204, 188)
		Roll off:	0.15
	Standard: ITU-T J.83 Annex B (Option M2)	The following parameters conform to the standard:	
		Symbol rate:	5.056941/5.360537 Msps
		Modulation:	64/256QAM
		Outer coding:	RS (128, 122)
		Roll off:	0.18/0.12
		Interleaving:	Level 1 (64 QAM only) I=128, J=1 Level 2 I=128, J=1 (Control Word: 0001) I=64, J=2 (0011) I=32, J=4 (0101) I=16, J=8 (0111) I=8, J=16 (1001) I=128, J=1 (0000) I=128, J=2 (0010) I=128, J=3 (0100) I=128, J=4 (0110) I=128, J=5 (1000) I=128, J=6 (1010) I=128, J=7 (1100) I=128, J=8 (1110)
	Standard: ITU-T J.83 Annex C (Option M3)	The following parameters conform to the standard:	
		Symbol rate:	1 Msps to 5.3097 Msps (IF output) 5 Msps to 5.3097 Msps (RF output)
		Modulation:	64QAM
		Outer coding:	RS (204, 188)
		Roll off:	0.13

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Table A-2: Mainframe (cont.)

Characteristics		Description	
	Standard: ITU-T J.83 Annex C-JCTEA	The following parameters conform to the standard:	
		Symbol rate:	5.274 Msps
		Modulation:	64QAM
		Outer coding:	RS (204, 188)
		Roll off:	0.13
	Standard: ATSC (Option M4)	The following parameters conform to the standard:	
		Symbol rate:	10.762237 Msps
		Modulation:	8VSB
		Outer coding:	RS (187, 207)
		Roll off:	0.1152
	RF output		
	Frequency	50 MHz to 860 MHz (setting resolution: 12.5 kHz steps)	
	Output amplitude	45 dBmV to 58 dBmV (setting resolution: 1 dB steps)	
	EVM (ITU-T J.83 Annex A)	256QAM < 2.5% (RMS), 50 MHz to 750 MHz @ 45 dBmV to 52 dBmV < 3.1% (RMS), 50 MHz to 860 MHz @ > 52 dBmV 64QAM < 2.7% (RMS), 50 MHz to 750 MHz @ 45 dBmV to 52 dBmV < 3.3% (RMS), 50 MHz to 860 MHz @ > 52 dBmV 16QAM < 3.0% (RMS), 50 MHz to 750 MHz @ 45 dBmV to 52 dBmV < 3.8% (RMS), 50 MHz to 860 MHz @ > 52 dBmV	
	EVM (ITU-T J.83 Annex B)	256QAM < 2.5% (RMS), 50 MHz to 750 MHz @ 45 dBmV to 52 dBmV < 3.1% (RMS), 50 MHz to 860 MHz @ > 52 dBmV 64QAM < 2.7% (RMS), 50 MHz to 750 MHz @ 45 dBmV to 52 dBmV < 3.3% (RMS), 50 MHz to 860 MHz @ > 52 dBmV	
	EVM (ITU-T J.83 Annex C and Annex C for JCTEA)	64QAM < 2.7% (RMS), 50 MHz to 750 MHz @ 45 dBmV to 52 dBmV < 3.3% (RMS), 50 MHz to 860 MHz @ > 52 dBmV	
	SN (8VSB)	> 27.0 dB, 190 MHz to 860 MHz @ 45 dBmV to 52 dBmV > 25.0 dB, 190 MHz to 860 MHz @ > 52 dBmV > 25.0 dB, < 190 MHz @ 45 dBmV to 58 dBmV	
	Return loss	< -12 dB @ 50 MHz to 860 MHz	

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Table A-2: Mainframe (cont.)

Characteristics		Description
	IF output	
	Frequency	36 MHz, 44 MHz
	Output amplitude	35 dBmV
	EVM (ITU-T J.83 Annex A)	256QAM: < 0.8% (RMS), 64QAM: < 0.9% (RMS), 16QAM: < 1.0% (RMS) (symbol rate: ≥ 1 Msps, IF frequency: 36 MHz)
	EVM (ITU-T J.83 Annex B)	256QAM: < 0.8% (RMS), 64QAM: < 0.9% (RMS) (IF frequency: 36 MHz)
	EVM (ITU-T J.83 Annex C and Annex C for JCTEA)	64QAM: < 0.9% (RMS) (symbol rate: ≥ 1 Msps, IF frequency: 36 MHz)
	SN (8VSB)	> 34 dB (IF frequency: 36 MHz)
	Return loss	< -20 dB @ 5 MHz to 44 MHz
ASI/ SMPTE310M interface	Connector type	BNC
	Impedance	75 Ω
	Data rate	256 Kbps to 214 Mbps (ASI), 19.3 Mbps (SMPTE310M)
	Output	
	Output voltage	800 mV ± 10%
	Jitter (ASI)	≤ 0.2 UI p-p
	Jitter (SMPTE310M)	Past 1st edge < 1.4 ns Past 2nd edge < 2 ns Prev 1st edge < 1.4 ns
	Rise/fall time	≤ 1.2 ns, 20% to 80% (ASI) 0.4 ns ≤ X ≤ 5 ns, 20% to 80% (SMPTE310M)
	Return loss	< -17 dB (5 MHz to 270 MHz) into 75 Ω load (ASI) < -30 dB (5 MHz to 38.7 MHz) into 75 Ω load (SMPTE310M)
	Input	
	Input voltage	200 mV to 880 mV
	Return loss	< -17 dB (5 MHz to 270 MHz) into 75 Ω load (ASI) < -17 dB (5 MHz to 38.785316 MHz) into 75 Ω load (SMPTE310M)
	Data format	Accepts both byte and packet modes.

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Table A-2: Mainframe (cont.)

Characteristics		Description			
VGA output	Connector type	D-sub, 15 pin			
	Pin assignments	*Pin*	*Signal*	*Pin*	*Signal*
		1	RED	9	NC
		2	GREEN	10	GND
		3	BLUE	11	NC
		4	NC	12	NC
		5	GND	13	HSYNC
		6	GND	14	YSYNC
		7	GND	15	NC
		8	GND		
Printer port		Supports SPP (Standard Parallel Port), EPP (Enhanced Parallel Port), and ECP (Extended Capabilities Port) modes.			
	Connector type	D-sub, 25 pin			
	Pin assignments	*Pin*	*Signal*	*Pin*	*Signal*
		1	STROBE	14	AUTOLF
		2	D0	15	ERR
		3	D1	16	INIT
		4	D2	17	SELECT
		5	D3	18	GND
		6	D4	19	GND
		7	D5	20	GND
		8	D6	21	GND
		9	D7	22	GND
		10	ACK	23	GND
		11	BUSY	24	GND
		12	PaperEmpty	25	GND
		13	SELECT		
USB 2.0 interfaces	Number of connectors	2			
	Pin assignments	*Pin*	*Signal*	*Pin*	*Signal*
		1	VCC	3	+DATA
		2	–DATA	4	GND

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Table A-2: Mainframe (cont.)

Characteristics		Description			
LAN interface		10/100/1000 Base-T Ethernet interface			
	Connector type	RJ-45			
	Pin assignments	*Pin*	*Signal*	*Pin*	*Signal*
		1	MDI_0+	5	MDI_2-
		2	MDI_0-	6	MDI_1-
		3	MDI_1+	7	MDI_3+
		4	MDI_2+	8	MDI_3-
Serial interface (Com)		RS-232C			
	Connector type	D-sub, 9 pin			
	Pin assignments	*Pin*	*Signal*	*Pin*	*Signal*
		1	DCD	6	DSR
		2	RX	7	RTS
		3	TX	8	CTS
		4	DTR	9	RI
		5	GND		
IEEE1394b interface	Compliant	IEEE1394b-2002			
	Pin assignments	*Pin*	*Signal*	*Pin*	*Signal*
		1	TPB-	6	VG
		2	TPB+	7	NC
		3	TPA-	8	VP
		4	TPA+	9	TPB (R)
		5	TPA (R)		
AC line power	Rating voltage	100 VAC to 240 VAC, CATII			
	Voltage range	90 VAC to 250 VAC			
	Frequency range	50 Hz to 60 Hz			
	Maximum power	180 VA			
	Maximum current	1.3 A			
	Main fuse data	5A Time-delayed, 250 V (not operator replaceable) 2A Time-delayed, 250 V (not operator replaceable)			

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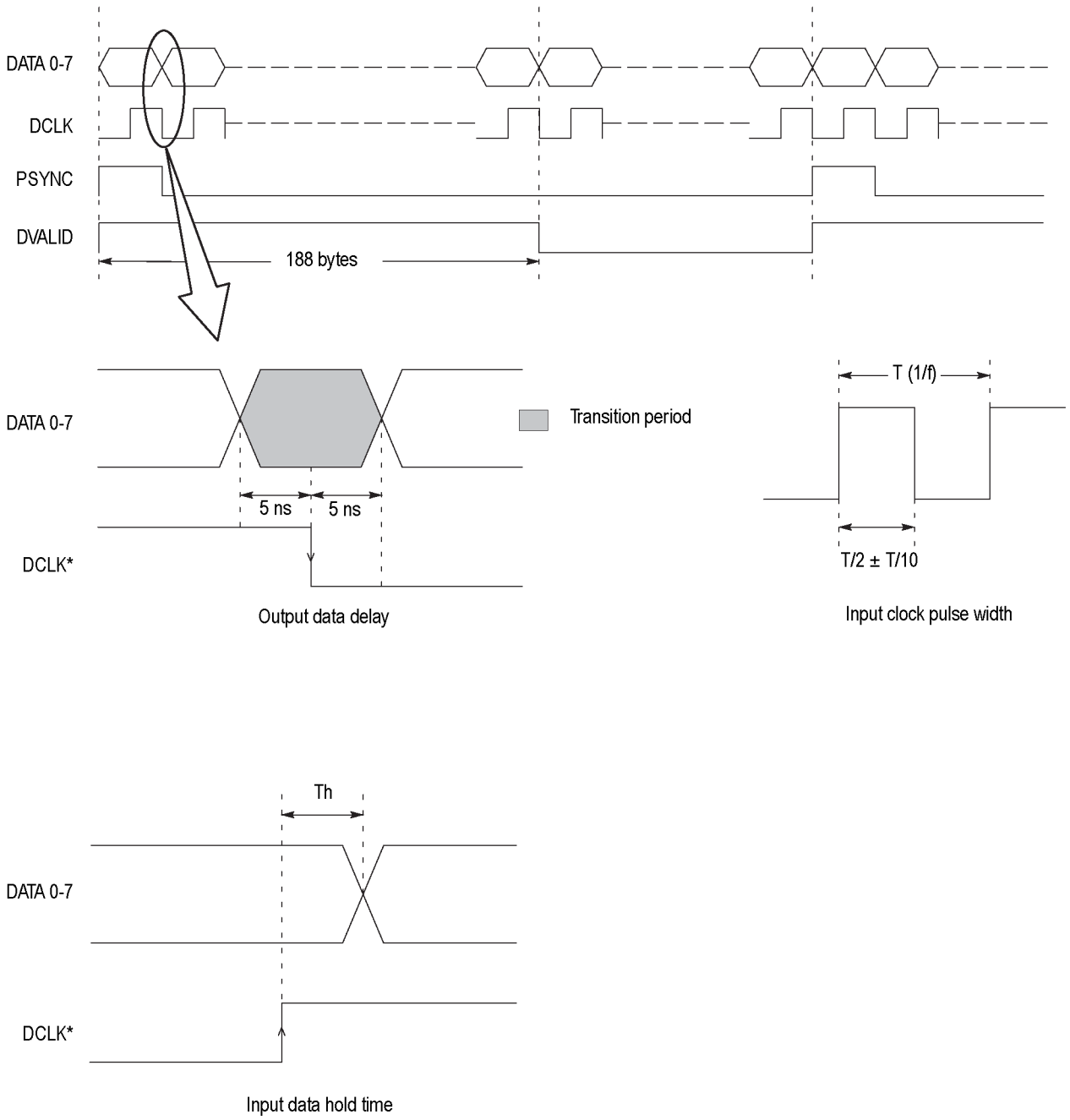


Figure A-1: Timing diagram of the SPI interface

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Mechanical (Physical) Characteristics

Table A-3: Mechanical characteristics

Characteristics		Description
Net weight	Standard	Approximately 6 kg (13.2 lb)
Dimensions	Height	132 mm (5.1 in), without feet
	Width	214 mm (8.4 in)
	Length	435 mm (17.1 in)

Environmental Characteristics

Table A-4: Environmental characteristics

Characteristics		Description
Temperature	Operating	+5 °C to +40 °C
	Nonoperating	-20 °C to +60 °C
Relative humidity	Operating	20% to 80% (no condensation) Maximum wet-bulb temperature 29.0 °C
	Nonoperating	5% to 90% (no condensation) Maximum wet-bulb temperature 29.0 °C
Altitude	Operating	Up to 3.0 km (10,000 feet) Maximum operating temperature decreases 1 °C each 300 m above 1.5 km
	Nonoperating	Up to 12 km (40,000 feet)
Dynamics	Vibration	
	Operating	2.65 m/s^2 rms (0.27 Grms), 5 Hz to 500 Hz, 10 min, three axes
	Nonoperating	22.3 m/s^2 rms (2.28 Grms), 5 Hz to 500 Hz, 10 min, three axes
	Shock	
	Nonoperating	294 m/s^2 (30 G), half-sine, 11 ms duration
Installation requirements	Power dissipation	100 W maximum. Maximum line current is 1.3 Arms at 50 Hz
	Surge current	≤ 12 A peak for less than 5 line cycles at 25 °C after product has been off for at least 30 seconds
	Cooling clearance	
	Top	5 cm (2 in)
	Side	5 cm (2 in)
	Rear	5 cm (2 in) from the fan guard

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Certifications and Compliances

EC Declaration of Conformity - EMC

Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 61326. EMC requirements for Class A electrical equipment for measurement, control, and laboratory use. [1]

- IEC 61000-4-2. Electrostatic discharge immunity (Performance criterion B)
- IEC 61000-4-3. RF electromagnetic field immunity (Performance criterion A)
- IEC 61000-4-4. Electrical fast transient/burst immunity (Performance criterion B)
- IEC 61000-4-5. Power line surge immunity (Performance criterion B)
- IEC 61000-4-6. Conducted RF immunity (Performance criterion A)
- IEC 61000-4-11. Voltage dips and interruptions immunity (Performance criterion B)

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

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

Australia / New Zealand Declaration of Conformity - EMC

Complies with EMC provision of Radiocommunications Act per these standards:

- AS/NZS 2064.1/2. Industrial, Scientific, and Medical Equipment: 1992

EMC Compliance

Meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility when it is used with the product(s) stated in the specifications table. Refer to the EMC specification published for the stated products. May not meet the intent of the directive if used with other products.

FCC Compliance

Emissions comply with FCC 47 CFR, Part 15, Subpart B for Class A equipment.

Russian Federation

This product was certified by the GOST ministry of Russia to be in compliance with all applicable EMC regulations.

EC Declaration of Conformity - Low Voltage

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

Low Voltage Directive 73/23/EEC, amended by 93/68/EEC.

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- Essential Requirements: This product complies with the essential requirements as outlined in the LVD.
- EN 61010-1: 2001. Safety requirements for electrical equipment for measurement control and laboratory use.

U.S. Nationally Recognized Testing Laboratory Listing

- UL 61010B-1: 2003. Standard for electrical measuring and test equipment.

Canadian Certification

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

Equipment Type

Test and measuring equipment.

Safety Class

Class 1 – grounded product.

Pollution Degree Description

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

- Pollution Degree 1. No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.
- Pollution Degree 2. Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
- Pollution Degree 3. Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.
- Pollution Degree 4. Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.

Pollution Degree

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

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Installation (Overvoltage) Category Descriptions

Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:

- Measurement Category IV. For measurements performed at the source of low-voltage installation.
- Measurement Category III. For measurements performed in the building installation.
- Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation.
- Measurement Category I. For measurements performed on circuits not directly connected to MAINS.

Overvoltage Category

Overvoltage Category II (as defined in IEC 61010-1)

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Appendix B: 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

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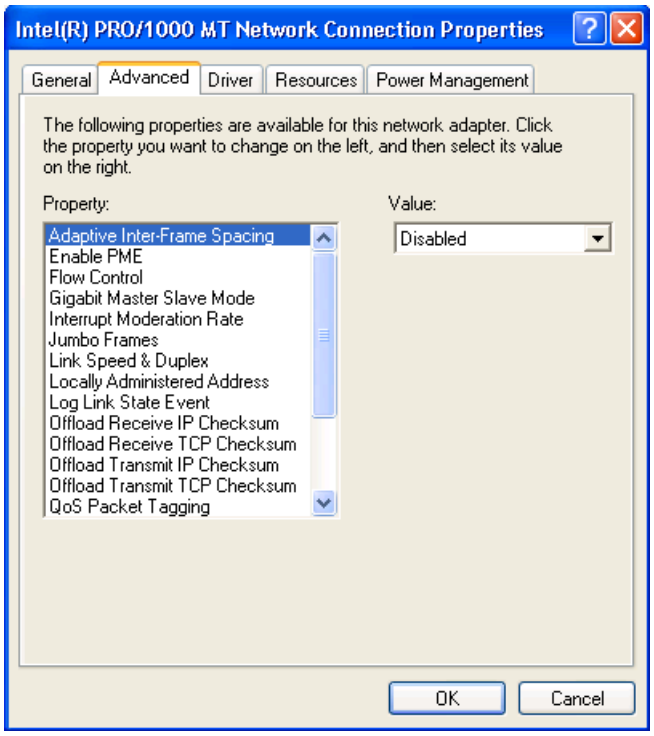


Figure B-1: Intel(R) PRO/1000 MT Network Connection Properties

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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.

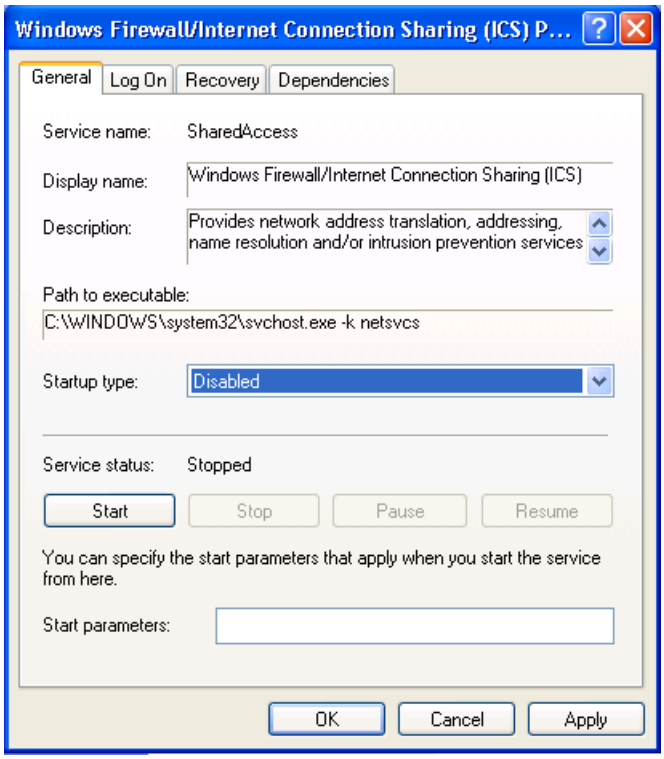


Figure B-2: Windows Firewall/Internet Connection Sharing (ICS)

3. Select Automatic Updates to open the dialog box. Stop the service and select **Disabled** from the Startup Mode list to disable the startup.

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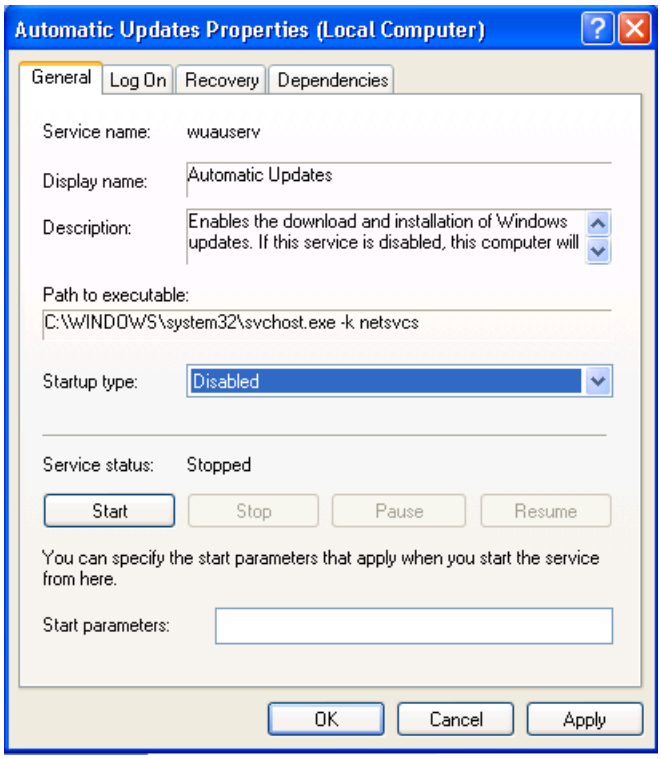


Figure B-3: Automatic Updates Properties

4. Select IIS admin to open the dialog box. Stop the service and select **Disabled** from the Startup Mode list to disable the startup.

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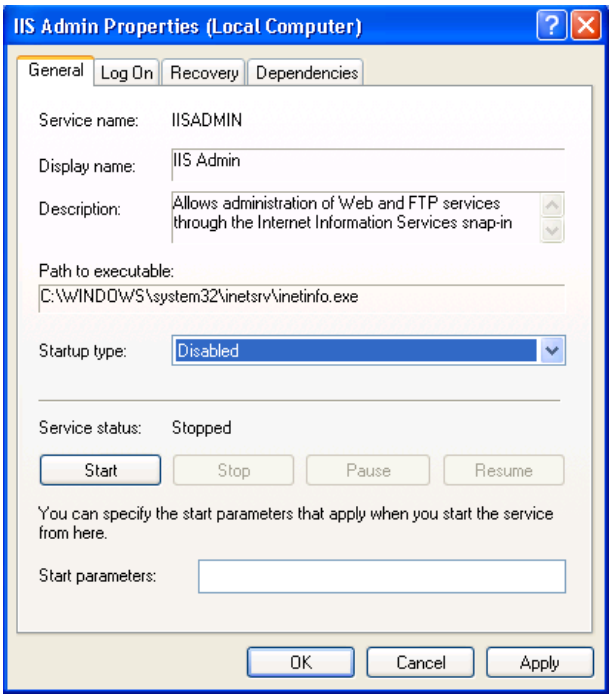


Figure B-4: IIS Admin Properties

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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.

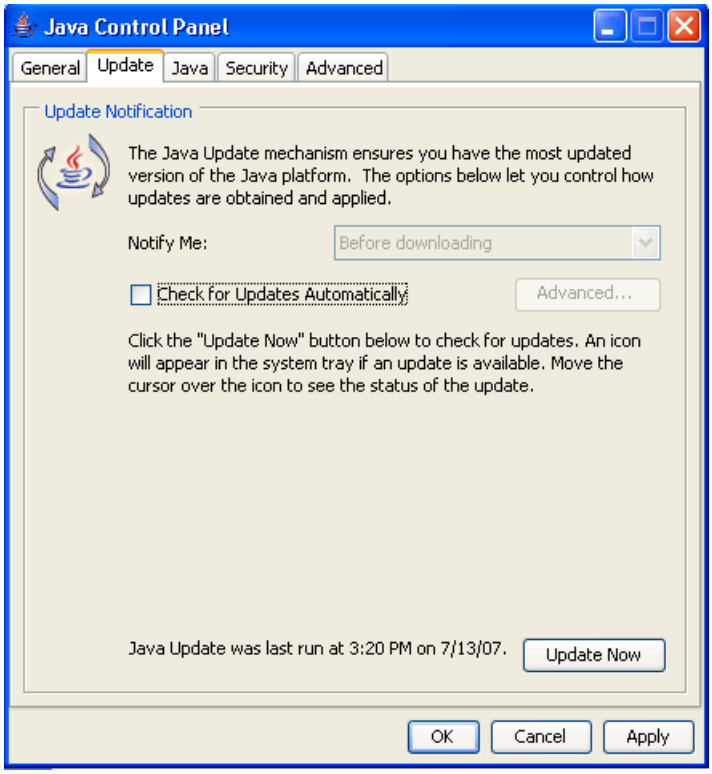


Figure B-5: Java Control Panel

A Java warning message is displayed. Click Never Check to not check the updates.

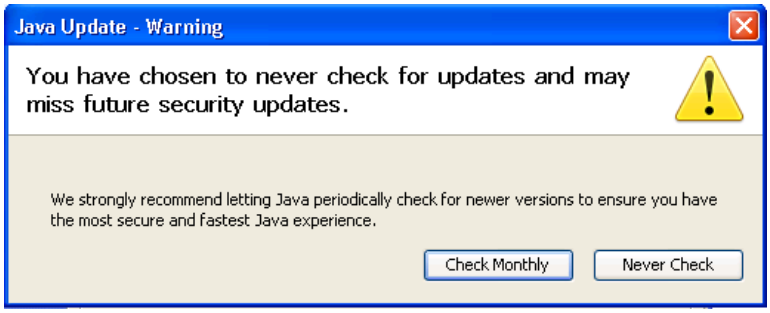


Figure B-6: Java Update-Warning

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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\ControlSet001\ 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 (Intel(R) PRO/1000 MT Network Connection).

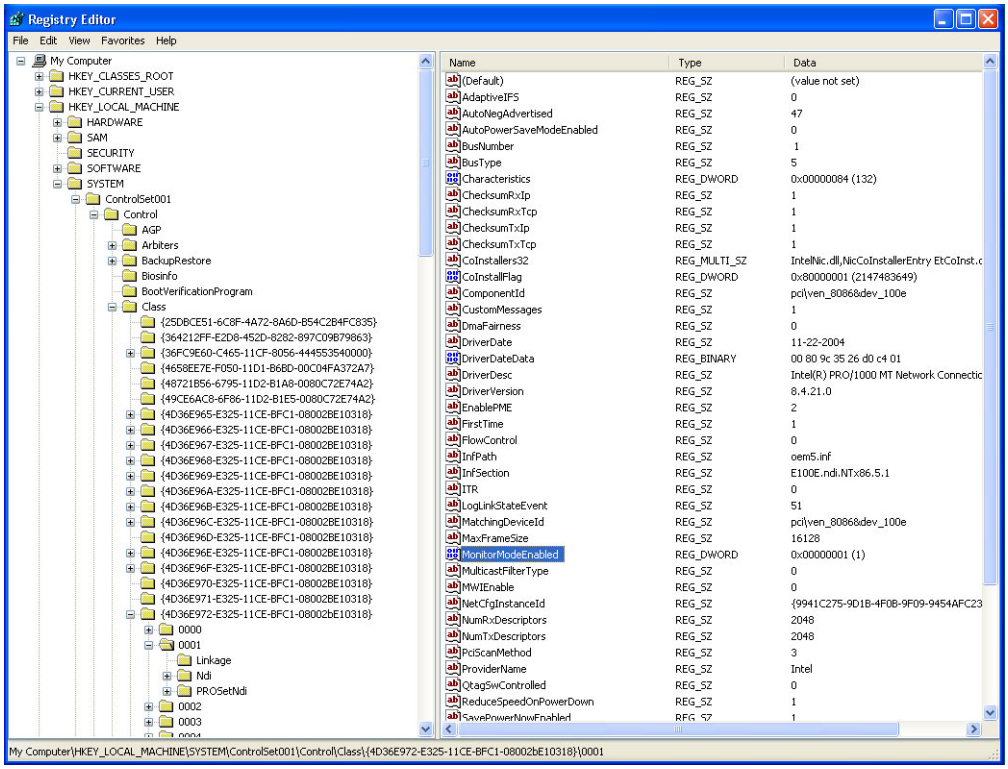


Figure B-7: Registry Editor

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.

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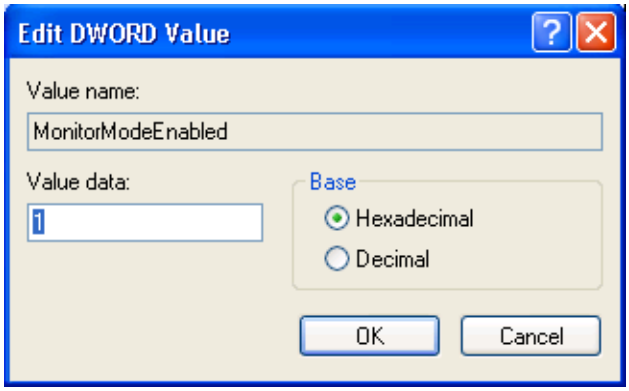


Figure B-8: Edit DWORD Value

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Appendix C: 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 RTX130B. To start the ReMux application, select **Tektronix > MPEG > ReMux** from the Start - Programs menu on 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.

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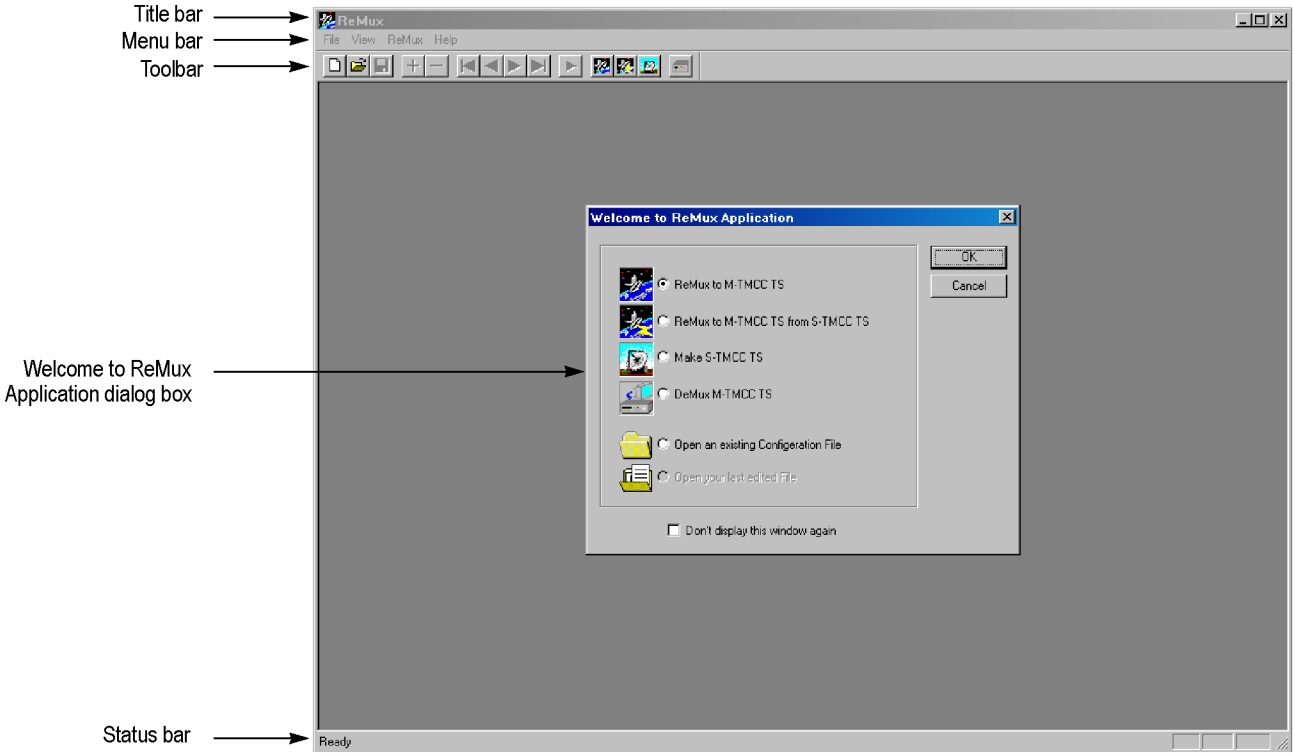


Figure C-1: ReMux application window

Table C-1: Element 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 C-4, *Using the ReMux Menus*.)
Toolbar	The toolbar provides shortcut buttons for many of the most often used menu commands. (See Table C-2.) 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.

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Table C-1: Element of the ReMux window (cont.)

Element	Description
Welcome to ReMux Application dialog box	Use this dialog box to select the operation mode. ■ 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). You can toggle the dialog box display on or off using the OPTION dialog box.
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.

Table C-2: 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.

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Table C-2: 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 file operations and for exiting the ReMux application. (See Table C-3.)

Table C-3: ReMux File menu commands

Command	Function
New	Opens the Select Remux Mode dialog box where you can select the mode to execute. (See page C-4, *Select Remux Mode Dialog Box*.)
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 C-2.) Select one of the ReMux modes, then click the **OK** button.

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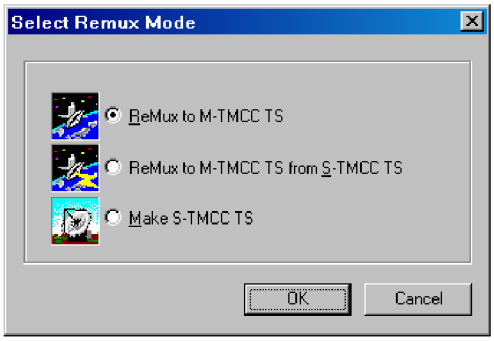


Figure C-2: Select Remux Mode dialog box

- **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 C-4.)

Table C-4: 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 C-5.)

Table C-5: ReMux menu commands

Command	Function
Execute	Executes the ReMux or DeMux operation.

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Table C-5: ReMux menu commands (cont.)

Command	Function
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 C-6, *OPTION Dialog Box*.)

OPTION Dialog Box. The OPTION dialog box appears after you select the Option command in the ReMux menu. (See Figure C-3.)

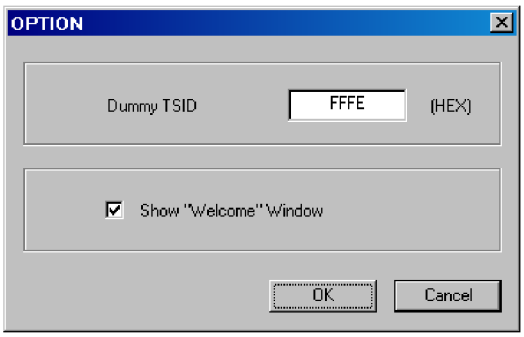


Figure C-3: OPTION dialog box

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, if the number of slots of the transport stream of M-TMCC structure is less than 48, 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 C-6.)

Table C-6: 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.

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Table C-6: 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 C-7.)

Table C-7: 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 Help menu 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.

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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 C-2.)
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 C-4.)

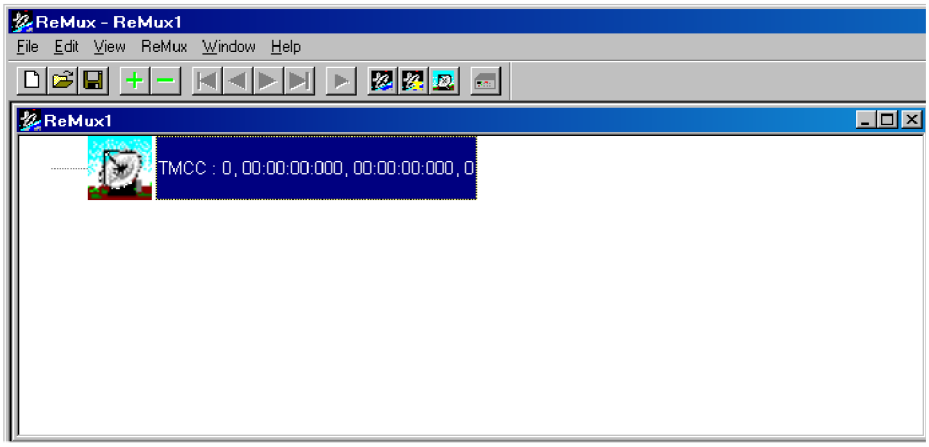
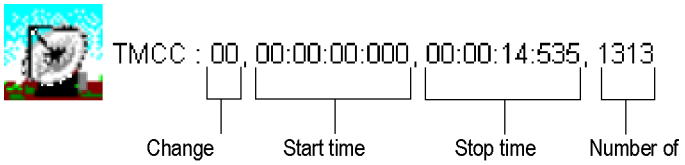


Figure C-4: Editing window for the Make S-TMCC TS mode

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 then click the **Open** button to open the Edit TS Information dialog box. (See Figure C-5.)

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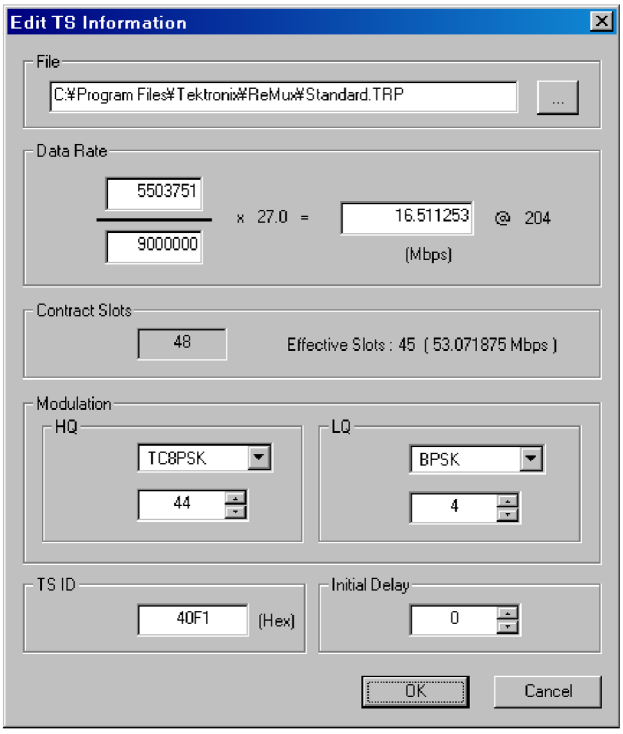


Figure C-5: Edit TS Information dialog box

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.

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- **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 C-6.)

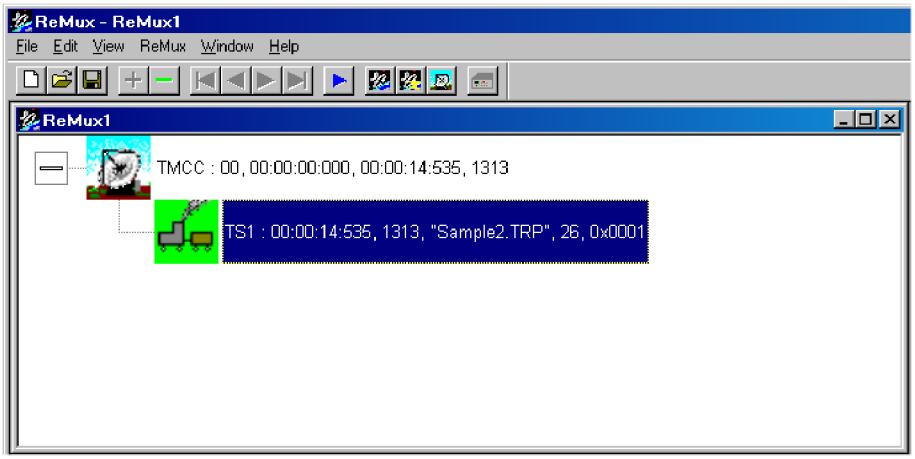
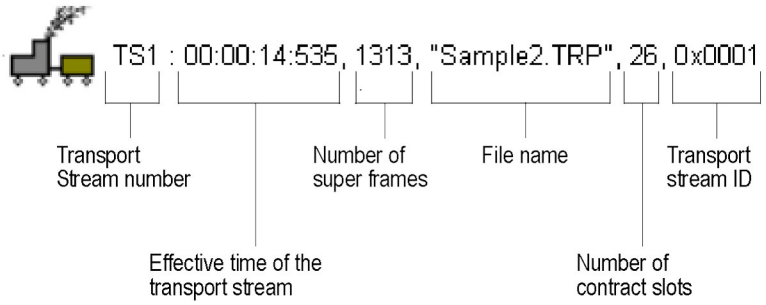


Figure C-6: Windows displaying a transport stream icon

The information displayed to the right of the transport stream icon has the following meaning:



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Editing the TMCC Information for the Transport Stream.

6. Double-click the TMCC icon to open the Edit TMCC Information dialog box to edit the TMCC information for the transport stream. (See Figure C-7.)

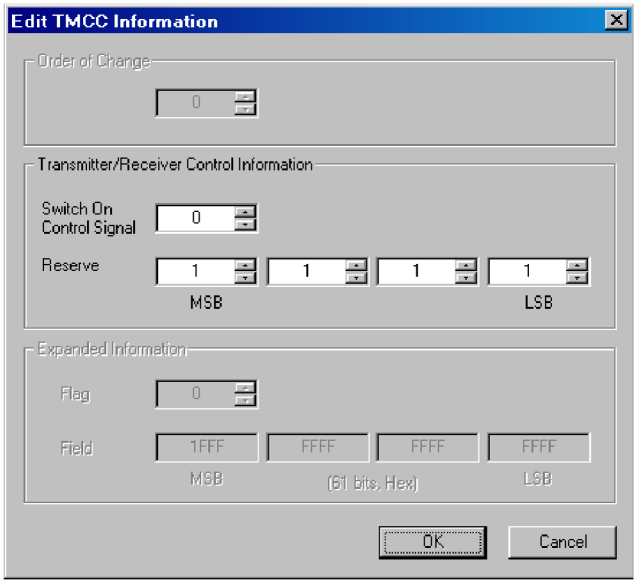


Figure C-7: Edit TMCC Information dialog box (S-TMCC)

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.

7. 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.

8. Select **ReMux** > **Execute** or click the ► (Execute) button to open the **Save As** dialog box.
9. In the dialog box, specify a file name and click the **Save** button.

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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 C-2.)
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 C-8.)

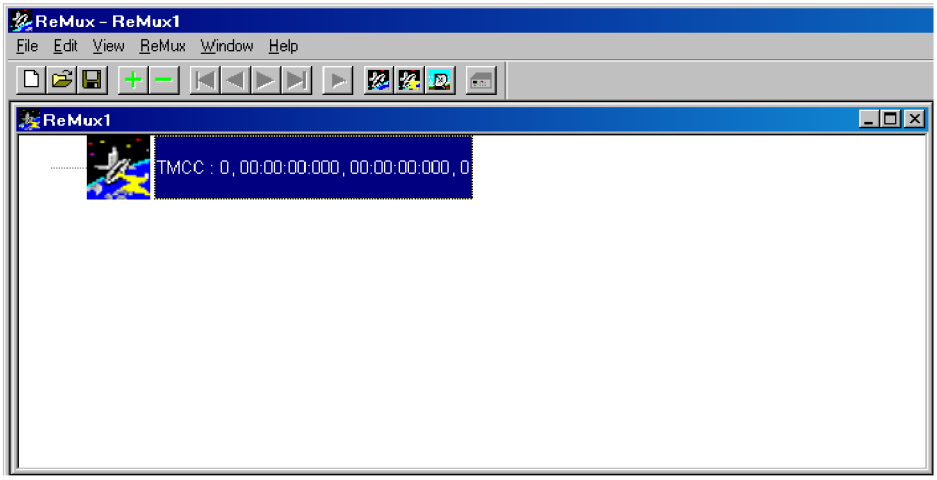


Figure C-8: Editing window for the ReMux to M-TMCC TS from S-TMCC TS mode

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 then click the **Open** button to open the Edit TS Information dialog box. (See Figure C-5.)

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.

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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 C-5.)

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 C-9.)

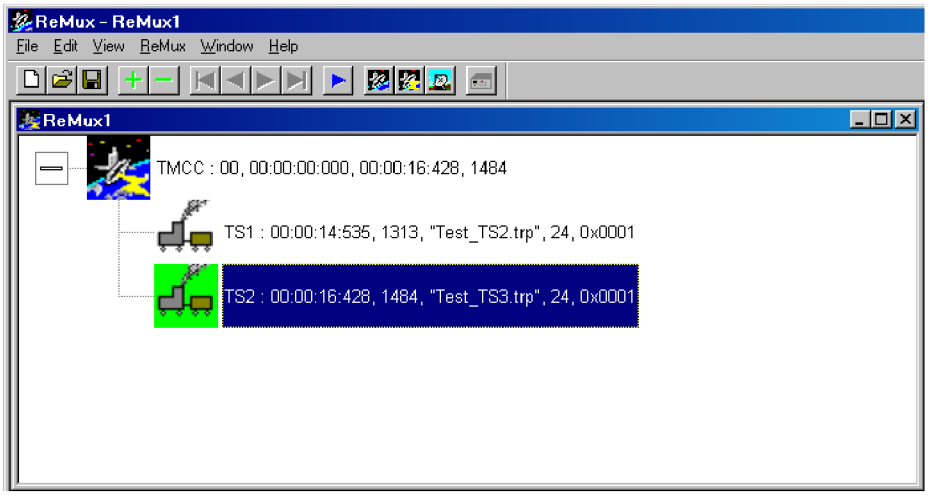


Figure C-9: Transport stream is multiplexed

9. If you want to multiplex more transport streams, repeat steps 3 through 8.

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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 C-10.)

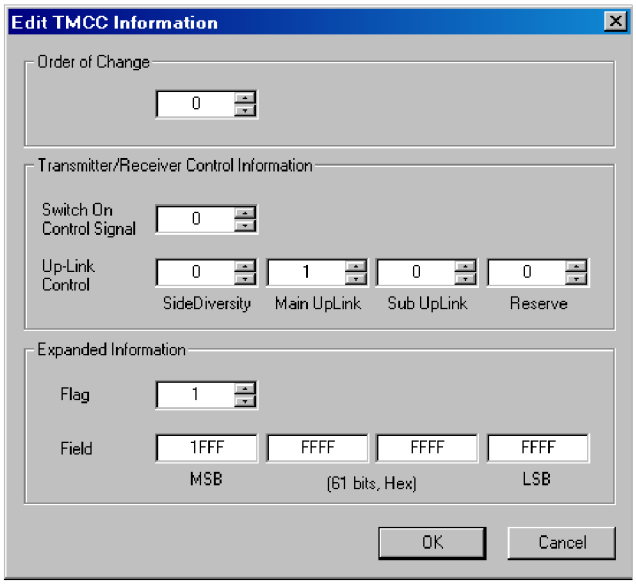


Figure C-10: Edit TMCC Information dialog box (M-TMCC)

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.

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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 the M-TMCC structure transport stream is less than 48, one or more dummy transport 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 C-3.)

Multiplexing Transport Streams of M-TMCC Structure with Different TMCC 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 C-11.)

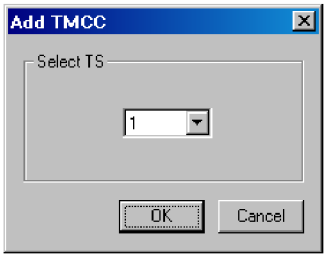
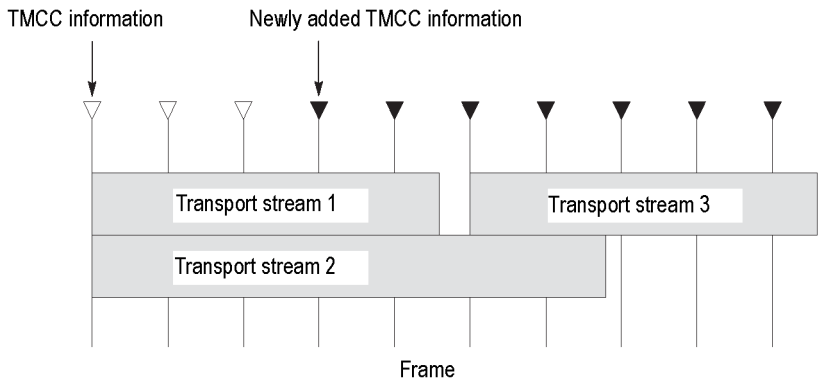


Figure C-11: Add TMCC dialog box

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.



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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 to edit the TMCC information. (See Figure C-10.)

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 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 equals 48. The transport stream thus inserted has the ID value set in the OPTION dialog box. (See Figure C-3 on page C-6.)

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.

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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 C-2.)
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 C-12.)

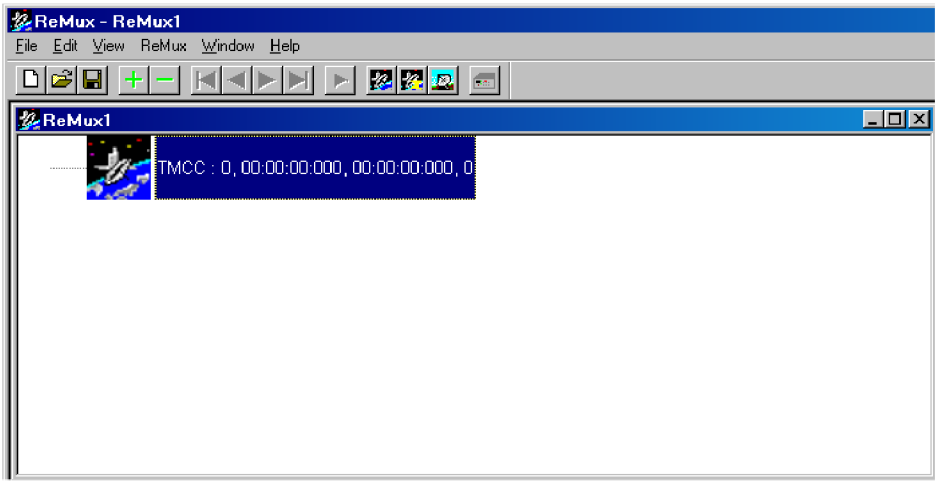


Figure C-12: Editing window for the ReMux to M-TMCC TS mode

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 shown. (See Figure C-5 on page C-9.)
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 C-12, *Multiplexing Transport Streams*.)

Editing the TMCC Information for M-TMCC. Perform steps 10 and 11 of the previous procedure. (See page C-14, *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 C-15, *Multiplexing Transport Streams of M-TMCC Structure with Different TMCC Information*.)

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Creating a Transport Stream of M-TMCC Structure. Perform steps 21 and 22 of the previous procedure. (See page C-16, *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 C-13.)

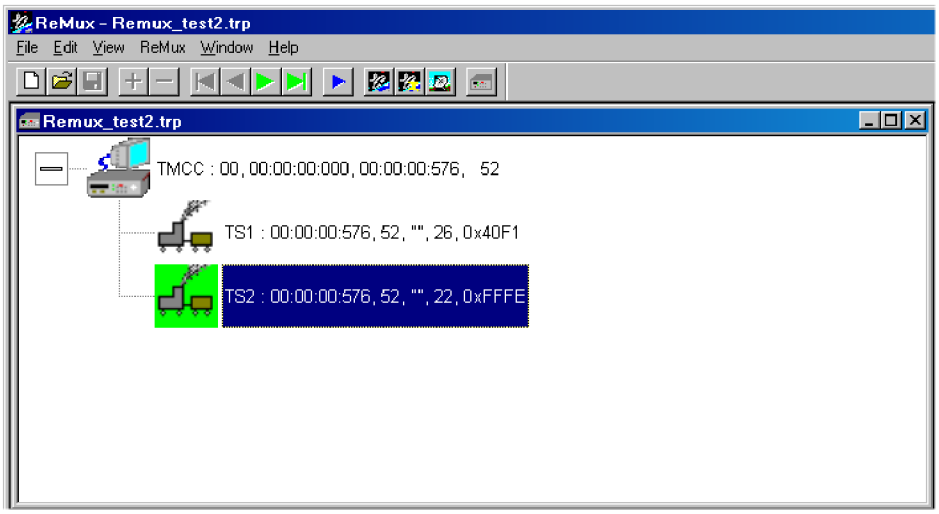


Figure C-13: Editing window for the DeMux M-TMCC TS mode

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 C-14.)

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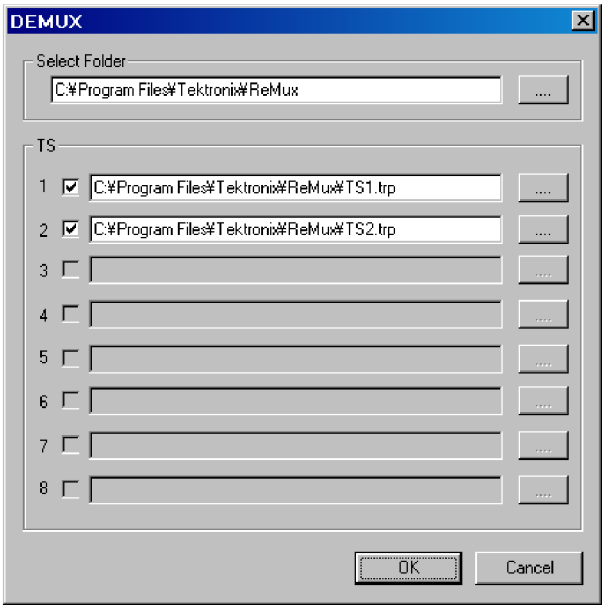


Figure C-14: DEMUX dialog box

In this dialog box, you can set the following parameters:

- **Save to:** 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.

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Appendix D: Using the Scheduler Application (Option SC Only)

Scheduler is a software application that provides scheduling capability for the RTX130B. 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.

NOTE. *When the RF Output of the RTX130B is set to On, be sure to select Custom in the Playout Properties field in the Play Properties dialog box and set the bit rate to be the same bit rate that is calculated from the RF parameters (this value is displayed in the status bar).*

Starting and Exiting Scheduler

To start the Scheduler application on the RTX130B, 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 D-1.)

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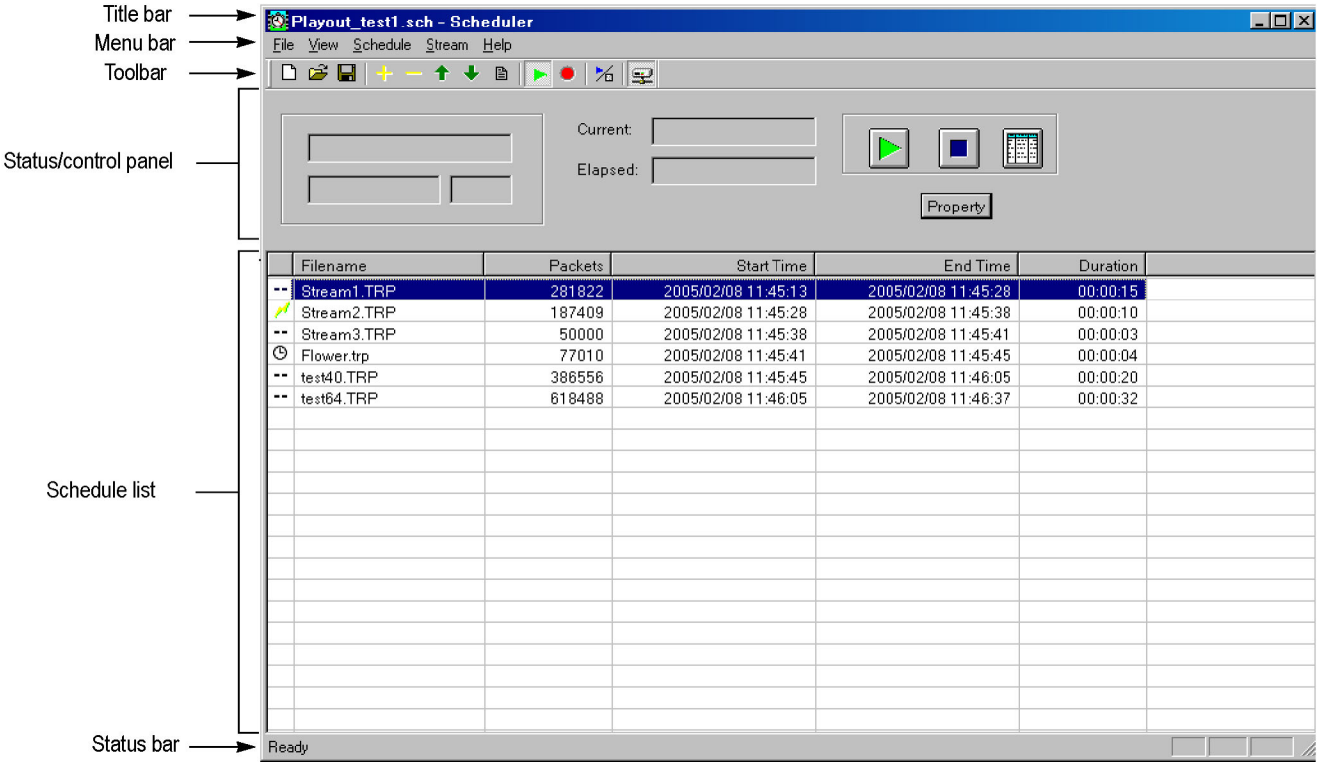


Figure D-1: Scheduler application window (schedule play mode)

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 D-4, *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 D-1.)

Table D-1: 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.

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Table D-1: Toolbar button descriptions (cont.)

Icon	Name	Function
	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 D-14, *Status/Control Panel*.)

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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 Record Properties dialog box. (See Figure D-4 on page D-9.)(See Figure D-6 on page D-13.)

- **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.

Streams can be selected by clicking 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 drop-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 D-2.)

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Table D-2: 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 D-3.)

Table D-3: View menu commands

Command	Function
Show message	Opens the Show error message dialog box that lists all errors that have occurred in the RTX130B.
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 RTX130B and changes between the play mode and record mode. (See Table D-4.)

Table D-4: Schedule menu commands

Command	Function
Connect	Opens the MTX/RTX Host Name dialog box. (See page D-6, *MTX/RTX Host Name Dialog Box*.)
Disconnect	Closes the connection to the RTX130B.
Play	Sets the schedule play mode.
Record	Sets the schedule record mode.

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Table D-4: Schedule menu commands (cont.)

Command	Function
Settings	Opens the Scheduler Settings dialog box. (See page D-6, *Scheduler Settings Dialog Box*.)
Execute	Displays the status/control panel in the application window. (See page D-14, *Status/Control Panel*.)

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 D-2.)

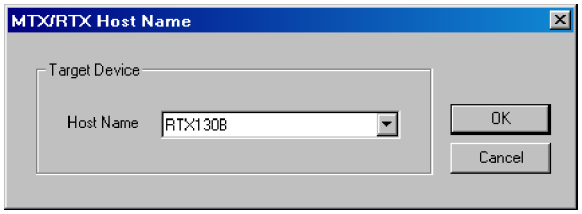


Figure D-2: MTX/RTX Host Name dialog box

You can select the host name RTX130B 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 D-3.)

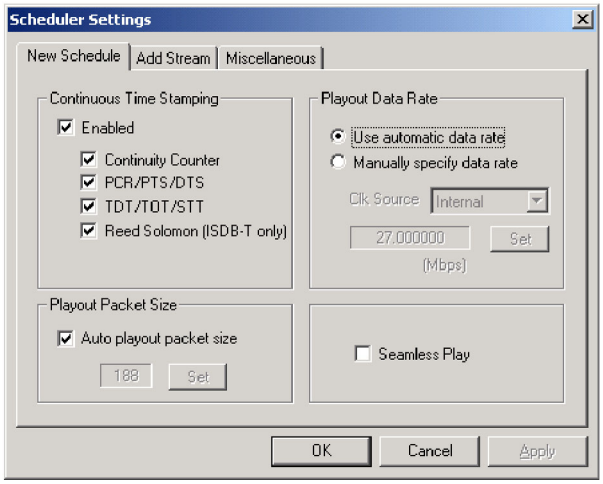


Figure D-3: Scheduler Settings dialog box

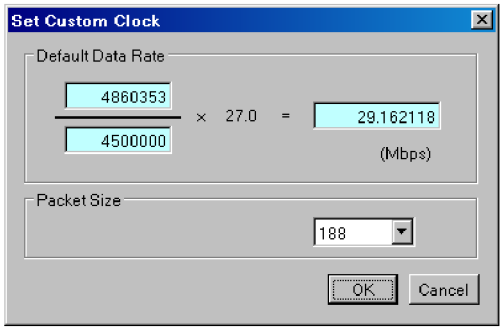
The Schedule Settings dialog box has three tabs: New Schedule, Add Stream, and Miscellaneous.

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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 playout 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.
- **Playout Data Rate:** Set the playout bit rate for the overall schedule.
  - **Use automatic playout data rate:** Uses the bit rate derived from the first stream in the schedule list.
  - **Manually specify a playout 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 playout. You can select Internal, ExtRef 10M, ExtRef 27 M, ExtRef IFFT, Ext P Clk, or Ext S Clk. (See page 3-5, *Clock Dialog Box*.) 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 Playout Bitrate options.

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NOTE. *You cannot play a Non TS or M-TMCC stream(s) 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 RTX130B 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 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 there is a stream having 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 RTX130B 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 D-5.)

Table D-5: 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.

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Table D-5: Stream menu commands (cont.)

Command	Function
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	■ 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 D-12, *Save as Dialog Box*.)
Delete	Deletes the currently selected stream from the schedule list.
Properties	■ For the schedule play mode: Opens the Play Properties dialog box for the selected stream. (See page D-9, *Play Properties Dialog Box*.) ■ For the schedule record mode: Opens the Record Properties dialog box for the selected stream. (See page D-12, *Record Properties Dialog Box*.)

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 D-4.) 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.

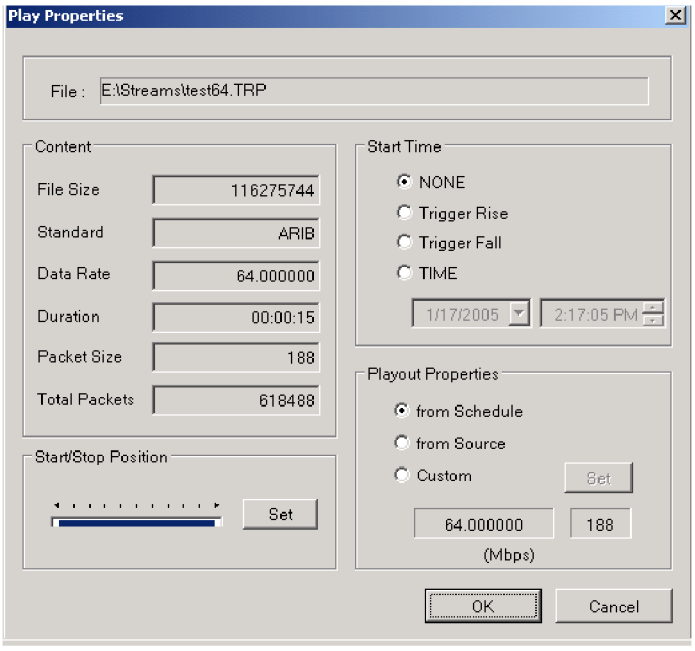
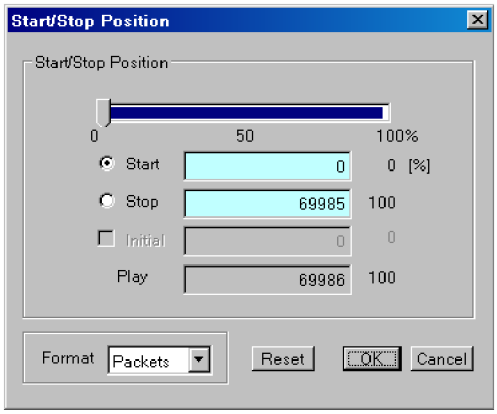


Figure D-4: Play Properties dialog box

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- **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 a 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 a 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 a 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 setting unit of the start and stop positions of the stream. It shows Packets for a transport stream file, SF (super frame) for a M-TMCC file, and Bytes for a Non TS file.

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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.

Specify the format setting in the Format list box. Click Start or Stop, 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, boxes to set date and time become 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, 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.*

TIME: The stream playout starts at an absolute time. When you select this option, 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 D-3.)

  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.

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NOTE. *When RF Output of the RTX130B is set to On, be sure to select Custom and set the bit rate to be the same bit rate that is calculated from the RF parameters (this value is displayed on the status bar).*

Save as Dialog Box. If 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 D-5.)

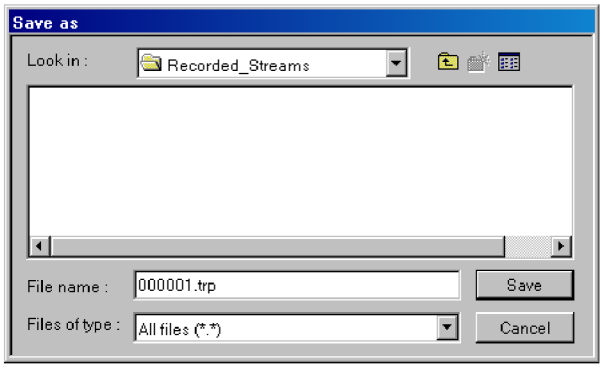


Figure D-5: Save as dialog box

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. The following characters must not be used 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 D-12, *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 D-6.) This dialog box allows you to set the start time, recording time, and stop time for the stream to be recorded. This dialog box can be displayed by selecting Properties from either the right-click menu, the Stream menu, or by double-clicking the stream name.

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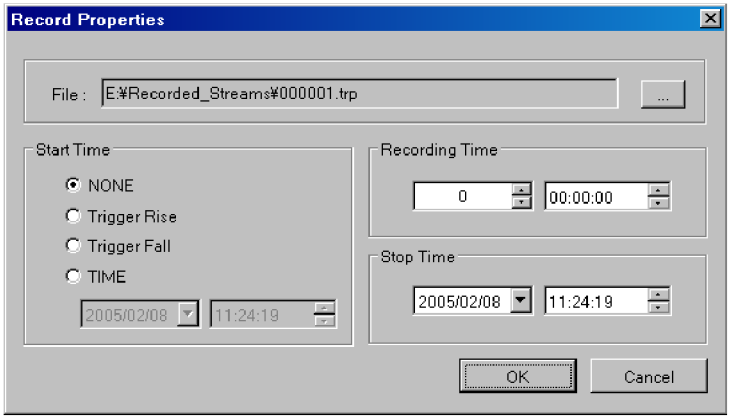


Figure D-6: Record Properties dialog box

- **File:** Shows the directory path and file name for the stream to be recorded.
- **Start Time:** Specify 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, the boxes used to set date and time are 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, the 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 recorded.*

  - **TIME:** The stream record starts at an absolute time. When you select this option, 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 (▼) at the right of the date box, a calendar allows you to set a date.

Help Menu

The Help menu About Scheduler command displays information including the Scheduler software version number and copyright information.

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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 D-7.) This panel allows you to set properties for the whole schedule list. You can start and stop the stream playing and recording.

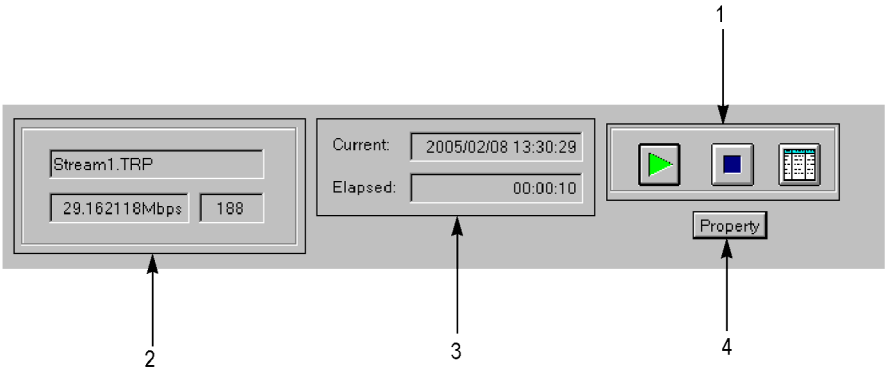


Figure D-7: Status/control panel (schedule play mode)

1. **Control buttons.** Controls the schedule play, record, and the 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. **Playout 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 D-8.)

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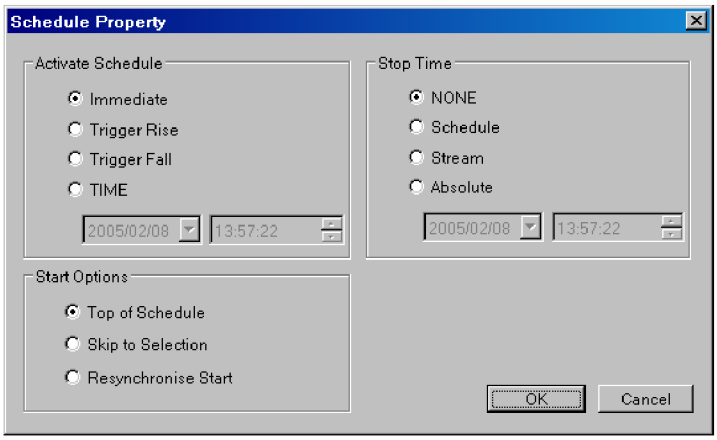


Figure D-8: Schedule Property dialog box

- **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 on the status/control panel. In the schedule record mode, the schedule recording starts as soon as you click the Record button on 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, 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, 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, boxes to set date and time become available.

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- **Start Options:** Sets 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.
  - **Resyncronize 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:** Sets 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 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 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 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.

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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 D-3.)
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 without discontinuities.
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 RTX130B.
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 D-8.)
14. In the **Schedule Property** dialog box, set conditions to activate, start, and stop the schedule.

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15. If you want to set properties for an individual stream, use the following methods to open the Play Properties dialog box. (See Figure D-4.)
    - 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.

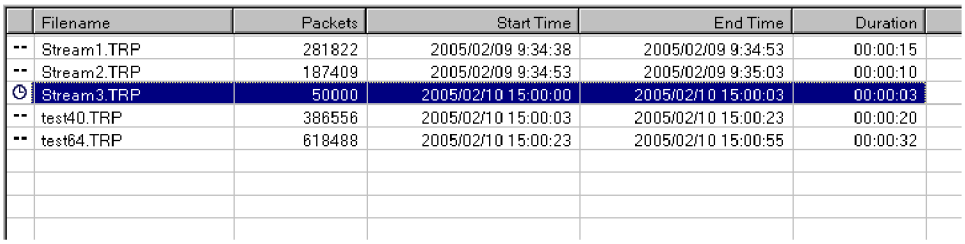
	Filename	Packets	Start Time	End Time	Duration
--	Stream1.TRP	281822	2005/02/09 9:23:48	2005/02/09 9:24:03	00:00:15
--	Stream2.TRP	187409	2005/02/09 9:24:03	2005/02/09 9:24:13	00:00:10
--	Stream3.TRP	50000	2005/02/09 9:24:13	2005/02/09 9:24:16	00:00:03
--	test40.TRP	386556	2005/02/09 9:24:16	2005/02/09 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.

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	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** from the **File** menu to save a new schedule list or an existing schedule list.
- Select **Save As** from the **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 RTX130B. You can set record properties for each stream, and record up to 256 stream files.

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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 D-5 on page D-12.)
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 D-6 on page D-13.)
5. In the **Record Properties** dialog box, set the start time and stop time (or recording time) for the stream.
6. Repeat steps 2 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 D-8 on page D-15.)
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 D-18.)

Recording Streams.

10. Click the **Record** button (●) on the status/control panel to start the schedule.

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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 RTX130B is automatically set to On.

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Appendix E: Defragment the Hard Disk Drive

The RTX130B 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 RTX130B application.
3. Select **Programs** > **Accessories** > **System Tools** > **Disk Defragmenter** from the Start menu. The Disk Defragmenter window appears. (See Figure E-1.)

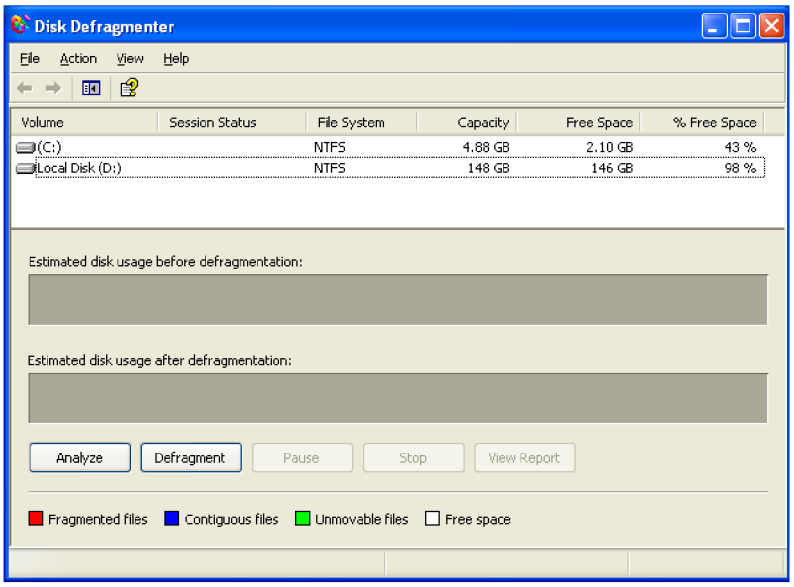


Figure E-1: Disk Defragmenter window

4. Click **Local Disk (D:)**.

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5. Click the **Defragment** button to start the defragmentation. When the defragmentation is completed, the Defragmentation Complete dialog box appears. (See Figure E-2.)



Figure E-2: 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.

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Appendix F: System Software Recovery

If the RTX130B 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 Drive: This permanently overwrites the contents of your entire hard disk drive and resets the system to the factory defaults.

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Recovery Procedure

Perform the following procedure to recover the Windows XP and RTX130B application software:

1. Restart your system and press the **F4** key as soon as the BIOS tests are complete. This opens the Phoenix Always screen with the following options:
   - Restore System
   - System Information
2. Click **Restore System** > **Phoenix Recover Pro 6**.
3. Click **Advanced** > **Factory Restore** to replace the Windows XP and RTX130B application software from the backup created when the system was manufactured. A confirmation dialog box is displayed.
4. Click **OK** to restart your system and display the Phoenix Recover Pro 6 screen. This screen allows you to perform one of the following operations:
   - Click **Recover Boot Partition** or **Recover Entire Drive** to overwrite the data according to your requirements. A confirmation dialog box is displayed. Click **Yes** to continue.

     A screen showing the progress of the recovery appears with the details of the time elapsed, time remaining, amount of data recovered, and total data to recover.



CAUTION. *Do not Cancel the recovery process once initiated. Cancelling the process will leave your hard disk drive in a partially recovered, unstable state.*

Immediately after the data is recovered, the system restarts and the Windows XP setup wizard is displayed.

   - Click **Cancel and Exit** to cancel the recovery process and exit from the Phoenix Recovery Pro 6 application.
5. Click the **Next** button of the wizard until Windows XP is installed. The system restarts after the installation of Windows XP to display the RTX130B application screen.

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Appendix G: Inspection and Cleaning

Inspect and clean the instrument as often as your operating conditions require. The collection of dirt can cause instrument overheating and operational failure. Dirt acts as an insulating blanket, preventing efficient heat dissipation. Dirt also provides an electrical conduction path that can cause an instrument failure, especially under high-humidity conditions.

CAUTION. *Avoid the use of chemical cleaning agents that might damage the plastics used in this instrument. Use only deionized water when cleaning the front-panel controls. Use a 75% ethyl alcohol solution as a cleaner and rinse with deionized water.*

Avoid the use of high-pressure compressed air when cleaning dust from the interior of this instrument. High-pressure air can cause Electro Static Discharge (ESD). Instead, use low-pressure compressed air (about 9 psi).

Exterior Inspection

Inspect the outside of the instrument for damage, wear, and missing parts. You should thoroughly check instruments that appear to have been dropped or otherwise abused to verify correct operation and performance. Have a qualified service technician immediately repair defects that could cause personal injury or lead to further damage to the instrument.

Exterior Cleaning

Perform the following steps when you clean the exterior of the instrument:

WARNING. *To avoid injury or death, unplug the power cord from the line voltage before cleaning the instrument. Avoid getting moisture inside the instrument during external cleaning. Use only enough liquid to dampen the cleaning cloth.*

1. Remove loose dust on the outside of the instrument with a lint-free cloth.
2. Remove remaining dirt with a lint-free cloth dampened with a general purpose detergent-and-water solution. Do not use abrasive cleaners.
3. Clean the monitor screen with a lint-free cloth dampened with a gentle, general purpose detergent-and-water solution.

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Glossary

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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.

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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.

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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

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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.

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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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