RTX100B Series
RF Signal Generators
Specifications and Performance Verification

Technical Reference

077-0193-01

Tektronix

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RF Signal Generators
Specifications and Performance Verification

Technical Reference

www.tektronix.com
077-0193-01

Tektronix

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- Worldwide, visit www.tektronix.com to find contacts in your area.

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General Safety Summary

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

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

Only qualified personnel should perform service procedures.

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

To Avoid Fire or Personal Injury

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

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

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

The inputs are not rated for connection to mains or Category II, III, or IV circuits.

Power Disconnect. The power switch disconnects the product from the power source. See instructions for the location. Do not block the power switch; it must remain accessible to the user at all times.

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

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

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

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

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

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Terms in this Manual

These terms may appear in this manual:

WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*

CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and Terms on the Product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

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

Preface

This manual provides operational instructions for both the RTX100B and the RTX130B generators.

Manual Structure

This manual is divided into the following sections:

- *Specifications* – Contains a description of the generator and characteristics that apply to it.
- *Performance Verification* – Contains procedures for confirming that the generator functions properly and meets warranted characteristics.

Related User Documents

The following related documentation is available:

Item	Purpose	Location
RTX100B Series RF Signal Generators Specifications and Performance Verification Technical Reference Manual (077-0193-xx)	Provides complete product specifications and a procedure for verifying the operation of the instrument	 +  www.Tektronix.com
RTX100B Series RF Signal Generators Quick Start User Manual (071-2595-00 English, 071-2596-xx Japanese)	Provides installation and high-level operational overviews.	 +  +  www.Tektronix.com
RTX100B Series RF Signal Generators Technical Reference (077-0192-xx)	Provides in-depth operating information.	 +  www.Tektronix.com
RTX100B Series RF Signal Generators Service Manual (077-0194-xx)	Optional manual supporting module-level servicing of the instrument.	 +  www.Tektronix.com
MTX/RTX Release Notes (077-0195-xx)		

Terms Used in This Manual

This manual uses the following terms:

- **Stream** Generic term for transport streams and data streams of Non-TS format (data format other than transport stream format).
- **RTX130B (QAM & VSB RF Signal Generator)** references in the document refer to the information that is specific to the RTX130B instrument.
- **RTX100B (ISDB-T RF Signal Generator)** references in the document refer to the information that is specific to the RTX100B instrument.
- **RTX100B Series** references in the document refer to information that is shared between the RTX100B generator and the RTX130B generator.

Specifications

Specifications

Tables 1 through 6 list the functional, electrical, mechanical, and environmental characteristics of the generator. All listed specifications are guaranteed unless labeled “typical”. Typical specifications are provided for your convenience but are not guaranteed.

The generator software options require that a software key, and beginning with V10.1, an OptionDongle be installed so that the purchased set of options can be accessed.

Software Protection

CAUTION. *The software key/OptionDongle must be installed on the generator before the software application will operate.*

The software key is the character string that is entered into the Option Update Key string field. Beginning with V10.1, an OptionDongle is also provided. The OptionDongle is a small hardware device that is available in parallel port form. The software key and the OptionDongle work together; the software polls the OptionDongle at the beginning of the application and during the Play and Record to verify the option coding. The type of software key used by your test system is determined at the time of the original product order.

Any printer compatible with the installed operating system can be connected to the unit that is through the parallel port version of the OptionDongle.

Performance Conditions

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

- The generator must be in an environment where the temperature, altitude, humidity, and vibration conditions are within the operating limits described in Table 1-4.
- The generator must have a warm-up period of at least 20 minutes.
- The generator must be operating at an ambient temperature between +5 °C to +40 °C, unless otherwise noted.

Functional Specifications

Table 1-1: RTX100B and RTX130B functional specifications

Characteristics		Description
System configuration	System OS	Windows XP Professional
	CPU	1.3 GHz
	System memory	1 GB
	Display	6.3 inch, XGA (1024 x 768), Windows Control Panel setting is SVGA (800 x 600)
	Hard disk drive	250 GB
	Expansion slot	1 PCI slot

Electrical Specifications

Table 1-2: RTX100B and RTX130B common mainframe characteristics

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
Internal reference clock			For Output_clock, PCR/PTS/DTS, packet operation timing, and TDT/STT time.
	Frequency		27 MHz ± 1 ppm when manufactured
	Stability		± 0.5 ppm per year ± 1 ppm over temperature range
External reference/clock input	Connector type		BNC
	Input impedance, typical		50 Ω
	Reference input		
		Frequency	8.129698 MHz, 10 MHz, and 27 MHz
		Input level, typical	Sine wave: 0 ± 6 dBm Square wave: 0.5 Vp-p to 3.0 Vp-p
	Clock input		
		Frequency	160 kHz to 25 MHz (parallel clock) 1.28 MHz to 32 MHz (serial clock)
		Input level, typical	0.5 V to 3.0 V

Table 1-2: RTX100B and RTX130B common mainframe characteristics (cont.)

Characteristics			Description
External trigger input/MISC output	Connector type		BNC
	Input impedance, typical		1 kΩ
	Threshold level		Rising and falling edges are programmable.
		High level	>3.5 V (maximum input voltage: 7 V)
		Low level	<0.8 V
	Output level		
		High level	>2.2 V (with 50 Ω termination)
		Low level	<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 (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
	(External parallel clock)		TS clock = (X / (2 * Y * Z)) * external parallel clock, 214 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)
SPI interface	Connector type		D-sub, 25 pin
	Data rate		256 Kbps to 214 Mbps

Table 1-2: RTX100B and RTX130B common mainframe characteristics (cont.)

Characteristics			Description
	Pin assignments		1 DCLK 2 GND 3 to 10 DATA 7 to DATA 0 11 DVALID 12 PSYNC 13 Shield 14 DCLK 15 GND 16 to 23 DATA 7 to DATA 0 24 DVALID 25 PSYNC
	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 1-1 on page 1-7.)
	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 1-1 on page 1-7.)
		Data hold time, typical	T/2 ± T/10, T=1/f (f=byte clock frequency, data are latched on DCLK rising edge) (See Figure 1-1 on page 1-7.)
VGA output	Connector type		D-sub, 15 pin
	Pin assignments		1 RED 2 GREEN 3 BLUE 3 NC 5 GND 6 GND 6 GND 8 GND 9 NC 10 GND 11 NC 12 NC 13 HSYNC 14 VSYNC 15 NC

Table 1-2: RTX100B and RTX130B common mainframe characteristics (cont.)

Characteristics		Description	
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	1 STROBE 2 D0 3 D1 4 D2 5 D3 6 D4 7 D5 8 D6 9 D7 10 ACK 11 BUSY 12 Paper Empty 13 SELECT	14 AUTOLF 15 ERR 16 INIT 17 SELECT 18 GND 19 GND 20 GND 21 GND 22 GND 23 GND 24 GND 25 GND
USB 2.0 interface	Number of connectors	2	
	Pin assignments	1 VCC 2 –DATA 3 +DATA 4 GND	
LAN interface		10/100/1000 Base-T Ethernet interface	
	Connector type	RJ45	
	Pin assignments	1 MDI_0+ 2 MDI_0– 3 MDI_1+ 4 MDI_2+	5 MDI_2– 6 MDI_1– 7 MDI_3+ 8 MDI_3–
Serial interface		RS-232C	
	Connector type	D-sub, 9 pin	
	Pin assignments	1 DCD 2 RX 3 TX 4 DTR 5 GND	6 DSR 7 RTS 8 CTS 9 RI
IEEE1394B interface	Compliant	IEEE1394B–2002	
	Pin assignments	1 TPB– 2 TPB+ 3 TPA- 4 TPA+ 5 TPA(R)	6 VG 7 NC 8 VP 9 TPB(R)

Table 1-2: RTX100B and RTX130B common mainframe characteristics (cont.)

Characteristics		Description
AC line power	Rating Voltage	100 VAC to 240 VAC, CAT II
	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	5 A Time-delayed, 250 V (not operator replaceable) 2 A Time-delayed, 250 V (not operator replaceable)

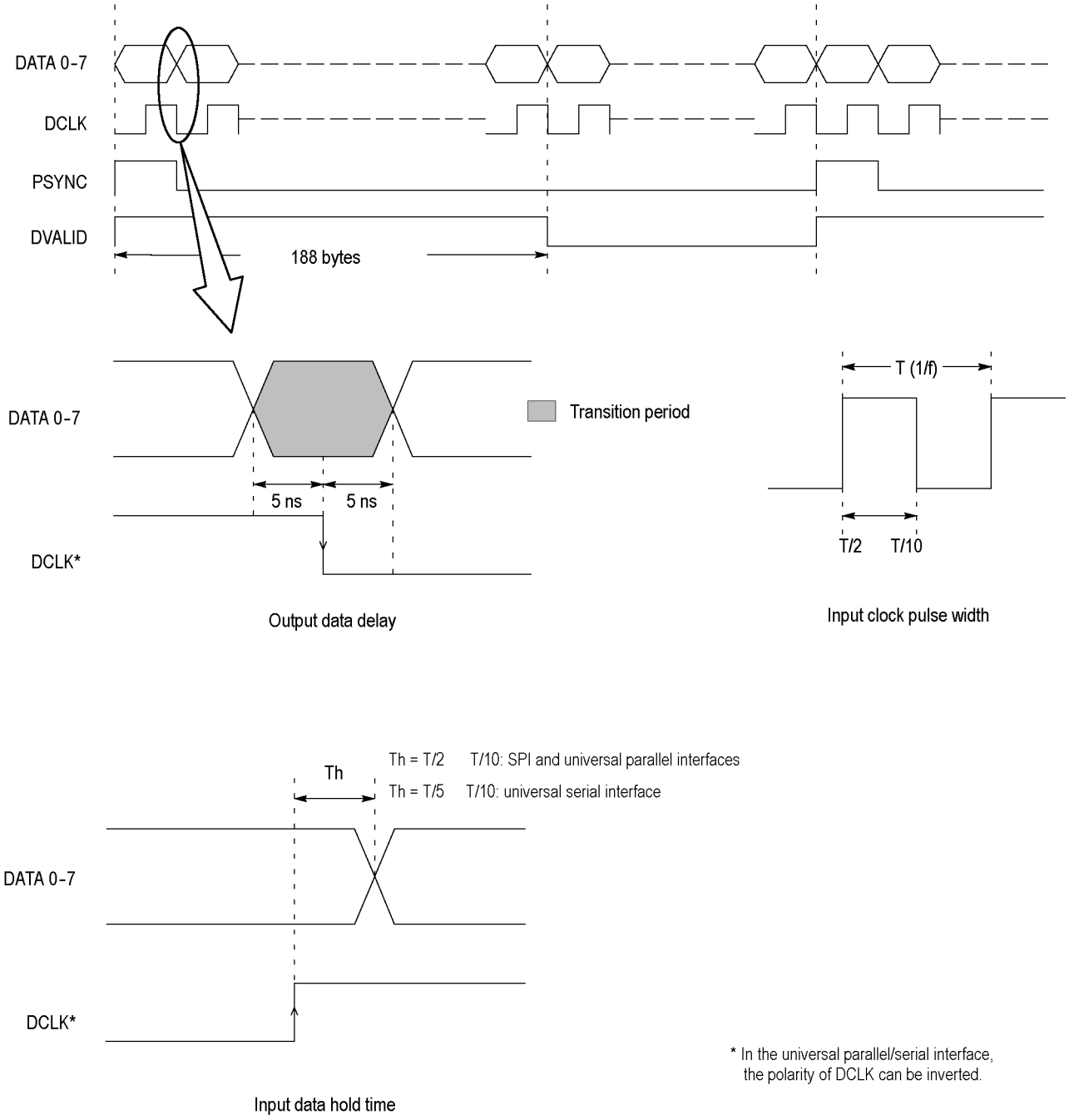


Figure 1-1: Timing diagram of the DVB-SPI interface

Table 1-3: RTX100B-only mainframe characteristics

Characteristics			Description
ASI interface	Standard conformance		EN 50083-9 Annex B
	Connector type		BNC
	Impedance		75 Ω
	Impedance		75 Ω
	Data rate		256 Kbps to 214 Mbps
	Output	Number of outputs	1
		Output voltage	800 mV ± 10%
		Jitter	≤ 0.2 UI p-p
		Rise/fall time	≤ 1.2 ns (20% to 80%)
		Return loss	< –17 dB (5 MHz to 270 MHz) into 75 Ω load
	Input	Number of inputs	1
		Input voltage, typical	200 mV to 800 mV
		Return loss	<–17 dB (5 MHz to 270 MHz) into 75 Ω load
Internal RF reference clock	Frequency		27 MHz ± 1 ppm when manufactured
	Stability		± 0.5 ppm per year ± 1 ppm over temperature range
External RF reference input	Connector type		BNC
	Input impedance, typical		50 Ω
	Reference input	Frequency	10 MHz, 27 MHz 8.126948 MHz
		Input level, typical	160 kHz to 26.75 MHz (parallel clock) 1.28 MHz to 32 MHz (serial clock)
RF output	Connector type		BNC
	Output impedance, typical		75 Ω
	Digital modulation	Standard	ARIB B31 V1.1
		Mode	1/2/3
		Bandwidth	6 MHz
		Number of segments	13
		Carrier modulation	QPSK, 16 QAM, 64 QAM ***NOTE.*** *DPQSK is not supported. If DPQSK modulation is used in a broadcast transport stream, the stream is modulated into QPSK. However, the signal output from the ASI connector is not modulated into QPSK.*
		Inner coding	Vitervi (1/2, 2/3, 3/4, 5/6, 7/8)
		Outer coding	Reed Solomon (204, 188)
		Time interval	0,1, 2, 4, 8, 16
		Guard interval	1/4, 1/8, 1/16, 1/32

Table 1-3: RTX100B-only mainframe characteristics (cont.)

Characteristics		Description
UHF output	Frequency	470 to 806 MHz (channel plan steps) (See Table 2-3 on page 2-43.) (See Table 2-4 on page 2-43.)
	Output amplitude	Mode 1: -21 dBm to -29 dBm at 13 ch Mode 2: -18 dBm to -26 dBm at 13 ch Mode 3: -15 dBm to -23 dBm at 13 ch
	Bit error rate, typical	< 2.0 –E4 after Vitervi

Table 1-4: RTX130B-only mainframe characteristics

Characteristics			Description
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	ASI: ≤ 1.2 ns (20% to 80%) SMPTE310M: 0.4 ns ≤ X ≤ 5 ns (20% to 80%)
		Return loss	ASI: <–17 dB (5 MHz to 270 MHz) into 75 Ω load SMPTE310M: <–30 dB (5 MHz to 38.7 MHz) into 75 Ω load
	Input	Input voltage, typical	200 mV to 880 mV
		Input voltage, typical	200 mV to 880 mV
		Return loss	ASI: < –17 dB (5 MHz to 270 MHz) into 75 Ω load SMPTE310M: <–17 dB (5 MHz to 38.785316 MHz) into 75 Ω load
		Data format	Accepts both byte and packet modes

Table 1-4: RTX130B-only mainframe characteristics (cont.)

Characteristics		Description	
RF/IF output	Connector type	BNC	
	Output impedance, typical	75 Ω	
	Digital modulation standard	DVB-T/ITU-T J8.3 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 cording: RS (204, 188) Roll off: 0.15 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 cording: RS (204, 188) Roll off: 0.13 ITU-T J.83 Annex C-JCTEA The following parameters conform to the standard: Symbol rate: 5.274 Msps Modulation: 64QAM Outer cording: RS (204, 188) Roll off: 0.13 ATSC (Option M4) The following parameters conform to the standard: Symbol rate: 10.762238 Msps Modulation: 8VSB Outer cording: RS (187, 207) Roll off: 0.1152	ITU-T J.83 Annex B (Option M2) 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 cording: RS (204, 188) Roll off: 0.15 Interleaving: Level 1 (64 QAM only) I=128, J=1 I=128, J=1 (Control Word: 0001) I=164, 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)

Table 1-4: RTX130B-only mainframe characteristics (cont.)

Characteristics			Description
	RF output	Frequency	50 MHz to 860 MHz (setting resolution: 12.5 kHz steps)
		Output amplitude, typical	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 dB mV > 25.0 dB, 190 MHz to 860 MHz @ > 52 dB mV > 25.0 dB, < 190 MHz @ 45 dB mV to 58 dBmV
		Return loss	<–12 dB @ 50 MHz to 860 MHz
	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: <0.9% (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

Mechanical (Physical) Characteristics

Table 1-5: RTX100B and RTX130B mechanical characteristics

Characteristics		Description
Net weight	Standard	Approximately 6 kg (13.2 lb)
Dimensions	Height	132 mm (5.2 in), without feet
	Width	214 mm (8.4 in)
	Length	435 mm (17.1 in)

Environmental Characteristics

Table 1-6: RTX100B and RTX130B environmental characteristics

Characteristics			Description
Temperature	Operating		+5 °C to +40 °C
	Non-operating		-20 °C to +60 °C
Relative humidity	Operating		20% to 80% (No condensation) Maximum wet-bulb temperature 29 °C
	Non-operating		5% to 90% (No condensation) Maximum wet-bulb temperature 29 °C
Altitude	Operating		Up to 3 km (approximately 10,000 feet) Maximum operating temperature decreases by 1 °C each 300 m above 1.5 km
	Non-operating		Up to 15 km (approximately 50,000 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	Non-operating	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 clearance	5 cm (2 in)
		Side clearance	5 cm (2 in)
		Rear clearance	5 cm (2 in) from the fan guard

Performance Verification

Performance Verification

This section provides procedures to verify the performance and functionality of the generator network interface.

Connecting to a Network

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

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

Connecting the Generator to your PC or MTS400 system

The generator uses the rear panel LAN port to communicate with a PC or an MTS400 system. Use one of the following methods to connect the generator to your PC or MTS400 system:

- If you are connecting the generator directly to a single PC, use a crossover Ethernet cable to connect between the LAN port on the generator 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.

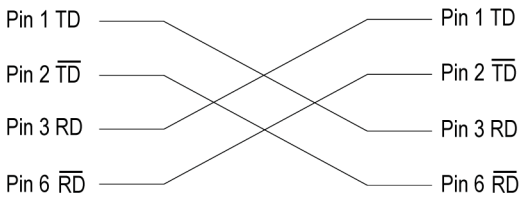


Figure 2-1: Pin connections for a crossover Ethernet cable

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

Setting Ethernet Network Parameters

You can set the network parameters for the generator 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.*

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

1. Connect the keyboard and the mouse provided with the instrument to the USB connectors on the front panel. You can connect them to either of the connectors.
2. Select **File** > **Minimize** or **File** > **Exit** to close the MPEG player. The Windows XP desktop appears.
3. Select **Settings** > **Control Panel** from the Start menu to display the Control Panel window.

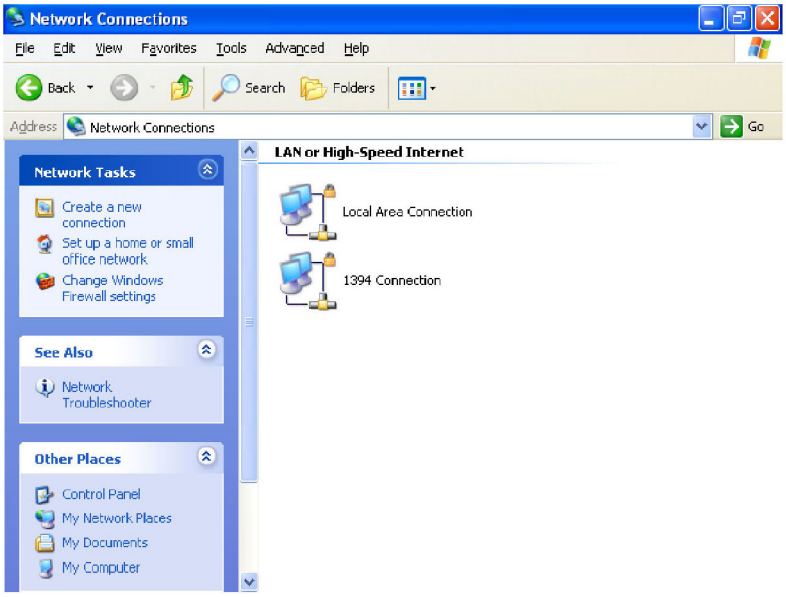


Figure 2-2: Network Connections window

4. Double-click the **Network Connections** icon in the window to display the Network Connections window.

5. Double-click the **Local Area Connection** icon. The Local Area Connection Status dialog box appears.

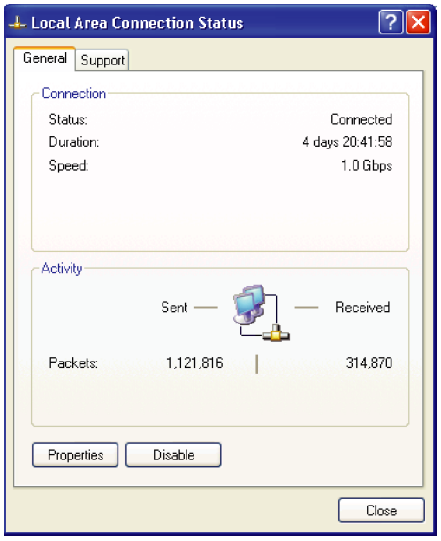


Figure 2-3: Local Area Connection Status dialog box

6. Click the **Properties** button. The Local Area Connection Properties dialog box appears.

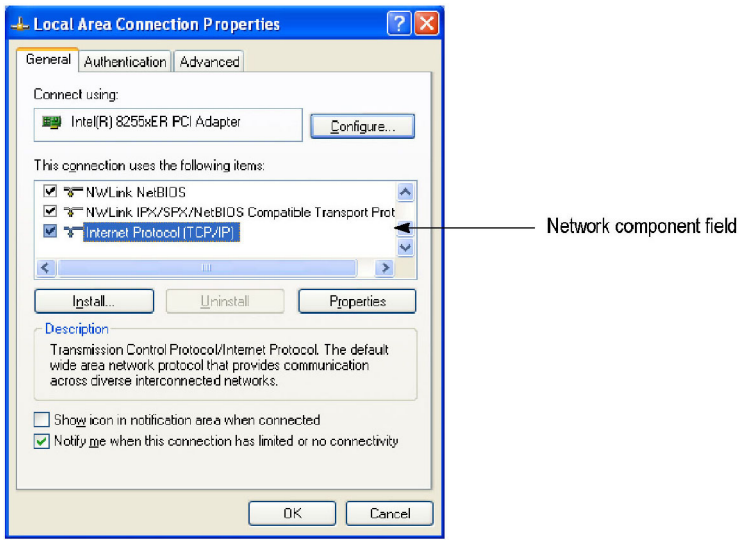


Figure 2-4: Local Area Connection Properties dialog box

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

8. Click the **Properties** button. The Internet Protocol (TCP/IP) Properties dialog box appears.

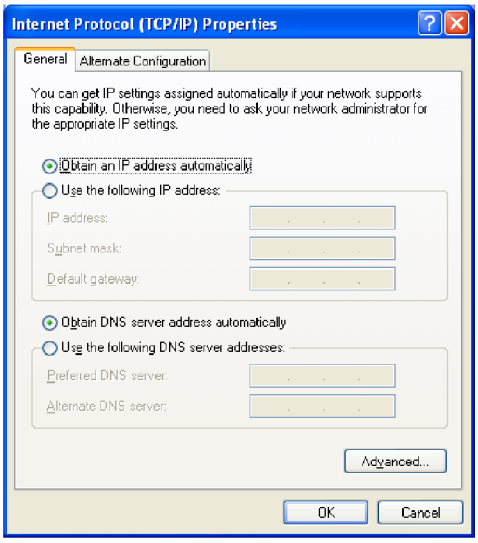


Figure 2-5: Internet Protocol (TCP/IP) Properties dialog box

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

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

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

10. Click the **OK** button.

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

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

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

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

11. If you connect the generator directly to a single PC or an MTS400:

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 or the MTS400 Series MPEG Test systems address except for the last number. The last digit must be different from the last number in the PC or MTS400 Series MPEG Test Systems IP address.

c. Set the **Subnet mask** parameter to be the same net mask (subnet mask) used by the PC or the MTS400. Do not enter a number if the PC or the MTS400 Series MPEG Test Systems 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 or an MTS400.

12. If you connect the generator 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 generator to your local Ethernet network.*

13. Verify the Ethernet connection by using a ping command from the PC or the MTS400.

Required Equipment

The following table lists the test equipment required to perform the performance verification procedures. The table identifies examples of recommended equipment and lists the required precision where applicable. If you substitute other test equipment for the examples listed, the equipment must meet or exceed the listed tolerances.

Table 2-1: Equipment required for performance verification

Item	Qty.	Minimum requirements	Recommended equipment
RTX100B and RTX130B common requirements			
Frequency counter	1 ea.	Frequency range: 0.1 Hz to 1.25 GHz Precision: 8 digits or higher	Agilent Technologies 53181A Option 015
MPEG analyzer	1 ea.		Tektronix MTS415 or MTS430
Function generator	1 ea.	Frequency: 40 M clock pattern Amplitude: 3 V Outputs: 2 channel	Tektronix AFG3102
Oscilloscope	1 ea.	Bandwidth: 1 GHz or higher	Tektronix TDS5104B
ISDB-T analyzer	1 ea.		Panasonic VP8480A
MPEG transport stream monitor	1 ea.		Tektronix MTM400A Option QA/QB2/QC/VS [1]
PC	1 ea.	Microsoft Internet Explorer (Version 5) and Java Virtual Machine (Version 5) must be installed	
75 Ω signal adapter	1 ea.	Bandwidth: 1 GHz Amplitude precision: –3 dB	Tektronix AMT75
50 Ω BNC cable	2 ea.	Length: 42 inches	Tektronix part number 012-0057-01
75 Ω BNC cable	2 ea.	5C-2V, 1 m	Canare DH5C01-S-SA
Parallel interface cable	1 ea.	25-pin, D-type	Tektronix part number 012-A220-00 (supplied with the RTX100B)
IEEE1394b cable	1 ea.	9 pin-9 pin	
IEEE1394b hard disk drive	1 ea.		Novac NV-HD352WB and hard disk drive (Tektronix part number 119-7146-00)
RTX100B only requiremnets			
Spectrum analyzer	1 ea.	Resolution bandwidth: 10 Hz	Agilent Technologies E4402B-COM
MPEG-2 measurement decoder	1 ea.		Rohde & Schwarz DVMD
Video monitor	1 ea.	SD-SDI video input	Sony LMD-1420 and BKM-320D (SDI input adapter)
Probe	1 ea.		Tektronix P5050
50 Ω SMA cable	1 ea.		Candox Systems 5B-010-19-19-1000
50 Ω N(Ma)-to-SMA(Fe) adapter	2 ea.		Stack Electronics BA045

Table 2-1: Equipment required for performance verification (cont.)

Item	Qty.	Minimum requirements	Recommended equipment
50 Ω N(Fe)-to-75 Ω N(Fe) adapter	1 ea.	Bandwidth: 2 GHz or higher	Agilent Technologies 11852B
75 Ω BNC(Ma)-to-NC(Fe) adapter	1 ea.		Stack Electronics BA045
RTX130B only requirements			
Crossover Ethernet cable	1 ea.		
BNC(Fe)-to-F(Ma) adapter	1 ea.	75 Ω	Tektronix part number 103-0158-00
20 dB attenuator	2 ea.	75 Ω	Mini-Circuits HAT-20-75

* MTM400 option(s) required depends on the modulation option(s) installed in the instrument to be tested as follows:
RTX130B Option M1: Option QA
RTX130B Option M2: Option QB2
RTX130B Option M3: Option QC
RTX130B Option M4: Option VS

Test Record

Print this page and use it to record the performance test result.

Table 2-2: Generator test record

Serial Number:	Cal Date:	Temperature:	Humidity:

Performance Test	Minimum	Measured		Maximum
Internal Clock Frequency	26.999924 MHZ		MHz	27.000076 MHz

* Test record limits are based on the SMPTE 310M frequency accuracy requirement.

Procedure Conventions

The following conventions are used in the performance verification procedures:

- Each test lists the characteristic that is being tested and the equipment required to perform the test.
- Each test contains complete setup instructions, which allows you to perform each test individually or in order.
- The equipment connection illustrations are specific to the recommended equipment (equipment nomenclature is labeled). If you are using substitute equipment, the location of your signal connections may vary from those in the illustrations.

NOTE. *Before you begin the performance verification procedures, ensure that the generator is operating in an environment that is within the operating limits. (See Table 1-6.)*

In addition, the generator and the test equipment must be warmed up for at least 20 minutes to ensure accurate test results.

RTX100B and RTX130B Common Procedures

Internal Clock Output Level and Frequency Accuracy

This test verifies the internal clock output level and frequency accuracy.

Required Equipment:

- Oscilloscope
- Frequency counter
- 50 Ω BNC cable

1. Use the 50 Ω BNC cable to connect the Trig In/Out connector on the generator to the oscilloscope CH1 input.

Figure 2-6: Equipment connection for checking the internal clock output level

2. Select **Play** > **Others** on the generator to open the **Others** dialog box.
3. In the dialog box, select the **Ext Trigger BNC** button to open the Ext Trigger BNC dialog box.
4. In the dialog box, set **BNC IN/OUT** to **Output** and **BNC OUT Selection** to **27 MHz**.
5. Set the oscilloscope as follows:

Control	Setting
Vertical Scale	1 V/div (CH1)
Input impedance	50 Ω
Horizontal scale	10 ns/div
Trigger position	50%
Acquire mode	Average 16
Trigger mode	Auto
Trigger level	1.20 V
Trigger source	CH1
Trigger slope	Rising Edge 34
Input coupling	DC
Measure	High Level, Low level

6. Verify that the measured values are as follows:

Control	Setting
High Level	> 2.2 V

Control	Setting
Low Level	< 0.8 V

7. Disconnect the 50 Ω BNC cable from the oscilloscope CH1 input, and then connect the BNC cable to the CH1 connector on the frequency counter.

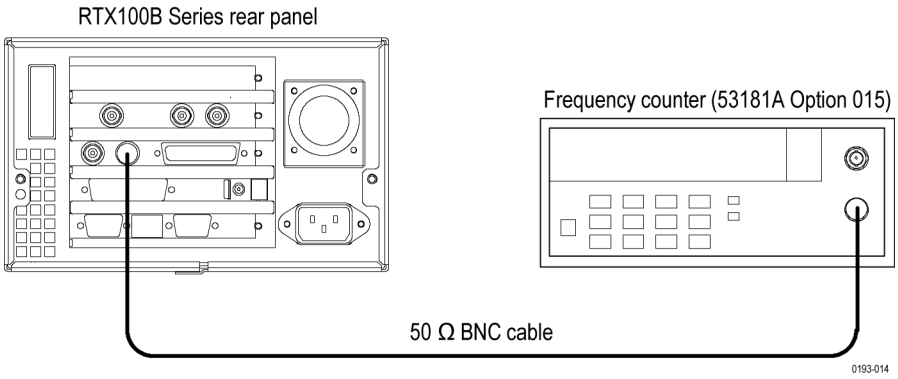


Figure 2-7: Equipment connection for checking the internal clock frequency

8. Set the frequency counter settings as follows:

Control	Setting
MEASURE	Frequency1
Gate Time	0.20 s
CHANNEL1	Coupling: DC
Impedance	50 Ω
Trigger	AUTO TRIG ON

9. Record the frequency counter reading in the test record. (See page 2-7.)
10. In the Ext Trigger BNC dialog box, change **BNC IN/OUT** to **Input**.
11. Disconnect the BNC cable from the generator and frequency counter.

SPI Interface

This test verifies that the transport stream data is correctly played from and recorded through the SPI In/Out connector on the generator.

Required Equipment

- MPEG Analyzer
- Parallel interface cable
- Test40.TRP file

Checking the Play Operation.

1. Use the parallel interface cable to connect the SPI In/Out connector on the generator to the DVB SPI In connector on the MPEG analyzer.

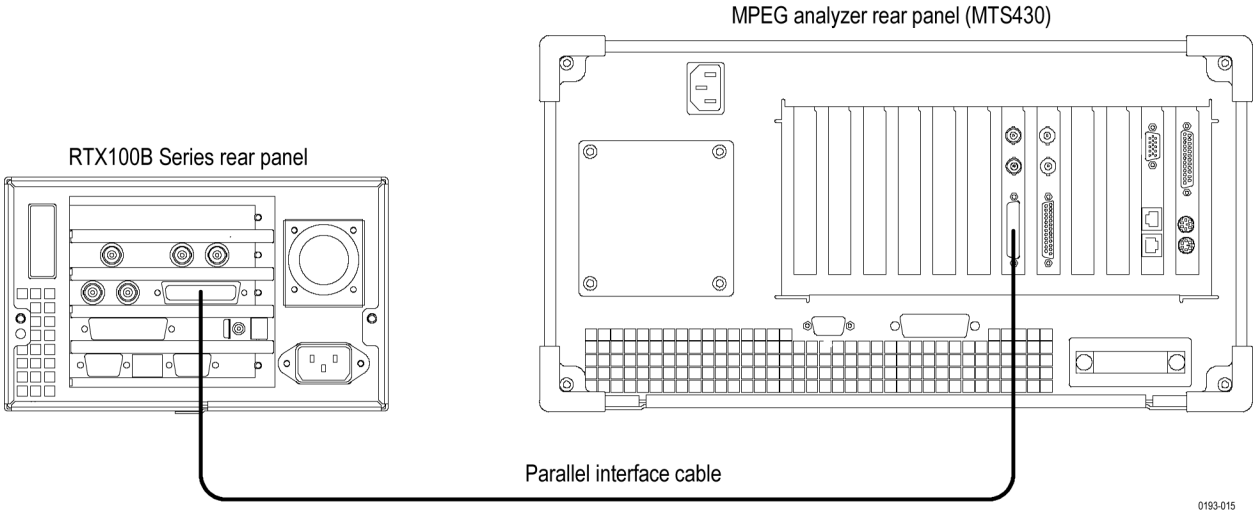


Figure 2-8: Equipment connection for checking the play operation- SPI interface

2. Start the **MPEG Player** application on the MPEG analyzer.
3. Set the application to the **Record** mode.
4. Open the **test40.TRP** file on the generator.
   a. Select **File** > **Open** in the Play screen to open the **Select File** dialog box.
   b. In the dialog box, select the **test40.TRP** file.
5. On the generator, make the following settings in the Play menu:

Control	Setting
Data rate	214 Mbps
Update	Off
Source	RAM

6. On the MPEG analyzer, make the following settings:

Control		Setting
Record	Source	SPI
	Target	RAM
	Record Size	100 MB
File	Save Mode	Over Write
	Save	E:\MTXRTX_Test streams\Record_Files\ SPI214Mbps

7. Press the **Play/Pause** button on the generator to start playing the **test40.TRP** file.
8. Verify that the hierarchical view is displayed on the MPEG analyzer screen. In addition, verify that the bit rate is **214** Mbps and that the packet size is **188** bytes.
9. Click the **Record** button on the MPEG Player application to record the file.
10. After the recording is complete, press the **Stop** button on the generator.

Checking the Record Operation.

11. Change the interface cable connection from DVB/SPI In connector to DVB/SPI Out connector on the MPEG analyzer.
12. Press the **Record** button on the generator to display the Record screen.
13. On the generator, make the following settings:

Control		Setting
Record menu	Source	SPI
	Target	RAM
	Record Size	100 MB
File menu	Save Mode	Over Write
	Save	D:\Record_Files\SPI214Mbps

14. Change the MPEG analyzer to the Play mode.
15. Select **File** > **Open** on the MPEG analyzer to display the Open dialog box.
16. In the dialog box, navigate to the **E:\MTXRTX_Test streams\ Record_Files**, and then select the **SPI214Mbps.TRP** file.

17. On the MPEG analyzer, make the following settings in the Play menu:

Control	Setting
Data Rate	214 Mbps
Update	Off
Source	RAM

18. Click the **PLAY** button on the MPEG Analyzer to start playing the **SPI214Mbps.TRP** file.

19. Verify that the hierarchic view is displayed on the generator screen. In addition, verify that the bit rate display is **214 Mbps** and the packet size display is **188** bytes.

20. Press the **Record** button on the generator to record the file.

21. After the recording is complete, click the **Stop** button on the MPEG analyzer.

22. Exit the MPEG Player application on the MPEG analyzer.

Checking the Recorded File.

23. Change the interface cable connection from DVB/SPI Out connector to DVB/SPI In connector on the MPEG analyzer.

24. Start the **TS Compliance Analyzer** on the MPEG analyzer.

25. In the **Open Transport Stream** dialog box, select **Real-time Analysis**, and then make the following settings:

Control	Setting
Interface	DVB Parallel
Interface Settings	Time Stamping

26. Click the **OK** button.

27. Press the **Play/Pause** button on the generator to display the Play screen.

28. Select **File** > **Open** to open the Select File dialog box.

29. In the dialog box, navigate to the **D:\ Record_Files** directory, and then select the **SPI214Mbps.TRP** file.

30. Select **Play** > **Update** > **On** on the generator.

31. Press the **Play/Pause** button on the generator to start playing the **SPI214Mbps.TRP** file.

32. Verify that the hierarchical view is displayed on the screen and that no error messages appear. In addition, verify that the bit rate is **40** Mbps and that the transport stream packet size is **188** bytes.

NOTE. *Ignore Program 3 and PID 120 (0x78) errors in the hierarchical view because these are caused by the original test40.TRP file.*

33. Press the **Stop** button on the generator.

34. Close the TS Compliance Analyzer window.

External Clock/Reference and External Trigger Inputs

This test confirms that the external clock/reference input (Clock/Ref In) and external trigger input (Trig In/Out) on the generator are functioning correctly.

Required Equipment

- MPEG Analyzer
- Function generator
- Two 50 Ω BNC cables
- Parallel interface cable
- test64.TRP file

1. Use a 50 Ω BNC cable to connect the Clock/Ref In connector on the generator to the Ch1 connector on the function generator.
2. Use the 50 Ω BNC cable to connect the Trig In/Out connector on the generator to the Ch2 connector on the function generator.

3. Use the parallel interface cable to connect the SPI In/Out connector on the generator to the DVB/SPI In connector on the MPEG analyzer.

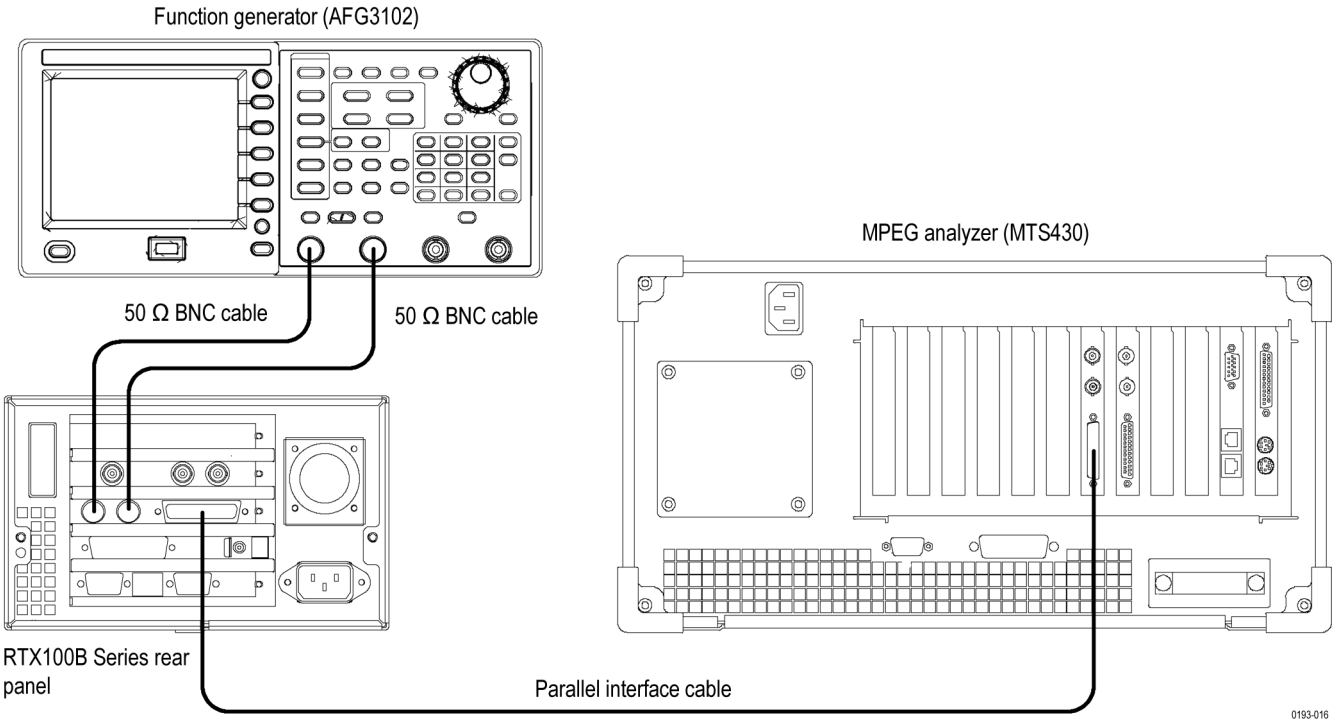


Figure 2-9: Equipment connections for checking the external clock/reference and trigger inputs

4. Set the function generator as indicated below:

Control		Setting
Ch 1 output	Function	Square
	Run Mode	Continuous
	Frequency	10 MHz
	Output Amplitude	0.5 V
	Output Offset	2.0 V
Ch 2 output	Function	Arb (Edit: Point Number: 100, All Data: 16382)
	Run Mode	Continuous
	Output Menu	Load Impedance: 1 kΩ
	Output Amplitude	1.75 V
	Output Offset	0.875 V

5. Press the **On** button of the Ch1 output on the function generator.
6. To open the **test64.TRP** file on the generator, do the following:
   a. Select **File** > **Open** in the Play screen to open the Select File dialog box.
   b. In the dialog box, select the **test64.TRP** file.
7. Set **Play** > **Update** > **On**.
8. Select **Play** > **Clock** to open the Clock dialog box.
9. In the Clock dialog box, select **ExtRef 10**.
10. Press the **Play/Pause** button on the generator to start playing the **test64.TRP** file.
11. Verify that PLL unlock error does not occur on the generator.
12. Start the **TS Compliance Analyzer** on the MPEG analyzer.
13. In the **Open Transport Stream** dialog box, select **Real-time Analysis**, and then make the following settings:

Control	Setting
Interfaces	DVD parallel
Interfaces Settings	Time Stamping

14. Click the **OK** button.
15. Verify that the hierarchical view is displayed on the MPEG analyzer screen and that no error messages appear. In addition, verify that the bit rate is **64** Mbps and that the packet size is **188** bytes.

NOTE. *Ignore Program 3 and PID 120 (0x78) errors in the hierarchical view because these are caused by the original test40.TRP file.*

16. Change the clock source setting on the generator and output frequency setting on the function generator with the following and then repeat step 15.

Clock source setting	Output frequency setting (function generator)
ExtRef 27	27 MHz
Ext Ref 8.126984 MHz	8.126984 MHz
Ext P Clk	8 MHz

17. Change the output frequency of the function generator to 32 MHz.

NOTE. *You have to click the Ext S Clk to select the Ext P Clk.*

18. Select **Play** > **Clock** on the generator to open the **Clock** dialog box.
19. In the dialog box, select **Ext S Clk**.
20. Repeat step 15 and verify that all items in the **Priority 1** row are green.

NOTE. *Ignore 2.3.a PCR Repetition and 2.5 PTS errors in the Priority 2 row.*

21. Press the **Stop** button on the generator to stop the stream output.
22. Select **Play** > **Clock** on the generator to open the **Clock** dialog box.
23. In the dialog box, select **Internal**.
24. Press the **On** button of the Ch1 output on the function generator to stop the signal output.
25. Press the **On** button of the Ch2 output on the function generator to start the signal output.
26. Select **Play** > **Others** on the generator to open the Others dialog box.
27. In the dialog box, set **Ext Play Start** to **Rise**.
28. Verify that the generator starts playing when the **Output** menu is set to **Invert** on the function generator.
29. Press the **Stop** button on the generator to stop the stream output.
30. Press the **On** button of the Ch2 output on the function generator to stop the signal output.
31. Return **Ext Play Start** to **Off** on the generator.
32. Disconnect all cables from the generator, the function generator, and the MPEG analyzer.

IEEE1394b Interface

This test verifies that the IEEE1394b interface is functioning correctly.

Required Equipment

- IEEE1394b hard disk drive
- IEEE1394b cable (9 pin-9 pin))
- test40.TRP file

1. Use the IEEE1394b cable to connect the IEEE1394b connector on the generator to the IEEE1394b hard disk drive.

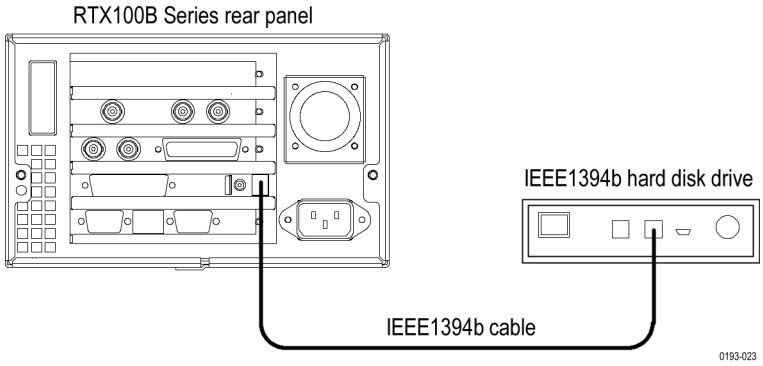


Figure 2-10: Equipment connection for checking the IEEE1394b interface

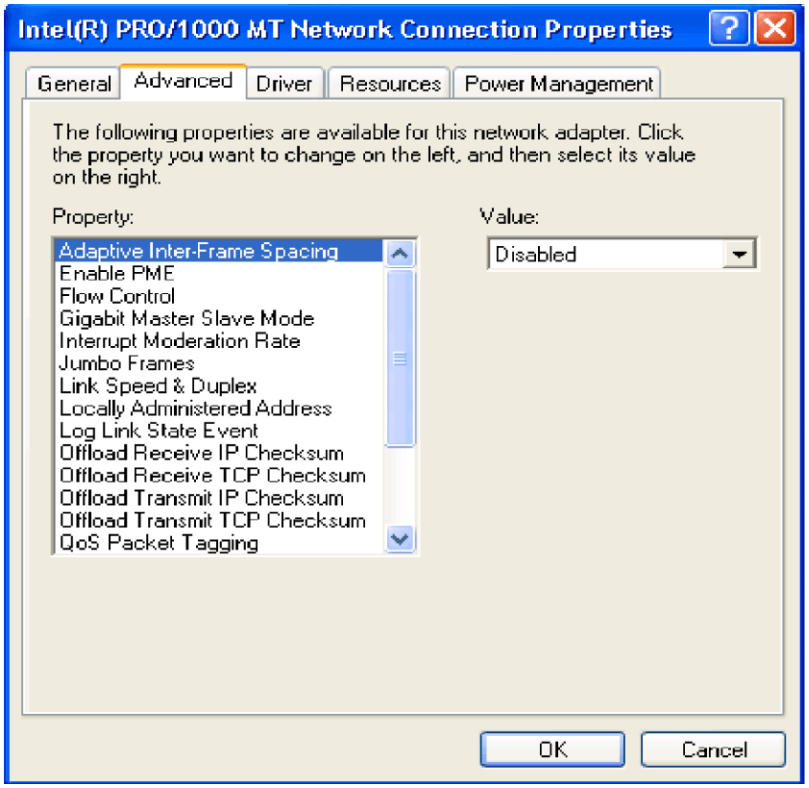
2. Select **Play** > **Minimize** to minimize the generator application.
3. Power on the IEEE1394b hard disk drive.
4. Double-click the **My Computer** icon on the Windows desktop to open the My Computer window.
5. In the window, verify that the hard disk drive is recognized as the **F:** (or **G:)** drive.
6. Use the Windows file copy operation to copy the **test40.TRP** file on the **D:** drive to **F:** (or **G:)** drive.
7. Verify that the test40.TRP file is copied to the F: (or G:) drive correctly.
8. Delete the test40.TRP file from the F: (or G:) drive.
9. Power off the IEEE1394b hard disk drive.

IP Interface

The following tests verify that transport stream data is correctly output from the generator instrument.

Recommended Settings for MPEG Player in IP mode. Perform this procedure in Category/Classic view to check the settings of Intel/Pro 1000 MT drivers:

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** and check if the following options are set in the dialog box:

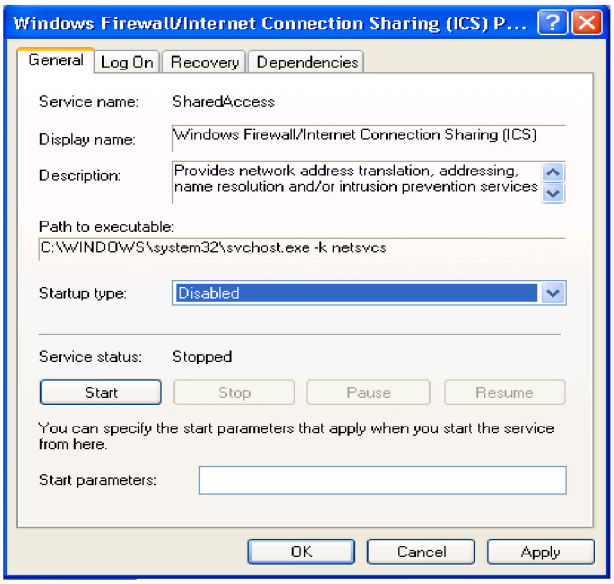


Control	Setting
Adaptive Inter-Frame Spacing	Disabled
Flow Control	Off
Interrupt Moderation Rate	Off
Jumbo Frames	16128

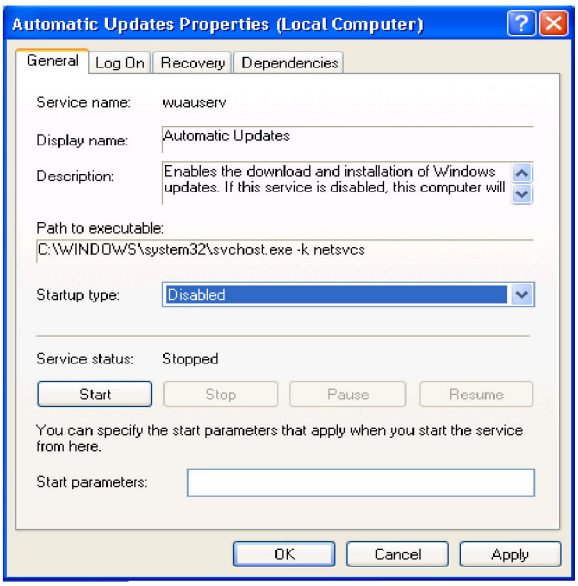
Control	Setting
Link Speed and Duplex	Auto-negotiate 1000Mbps ***NOTE.*** *If the MPEG system is connected to a 100 Mbps network, select "Auto Detect" for Link Speed and Duplex option.*
Receive Descriptors	2048

Perform this procedure to check the settings of Administrative tools for improved performance during the Playout:

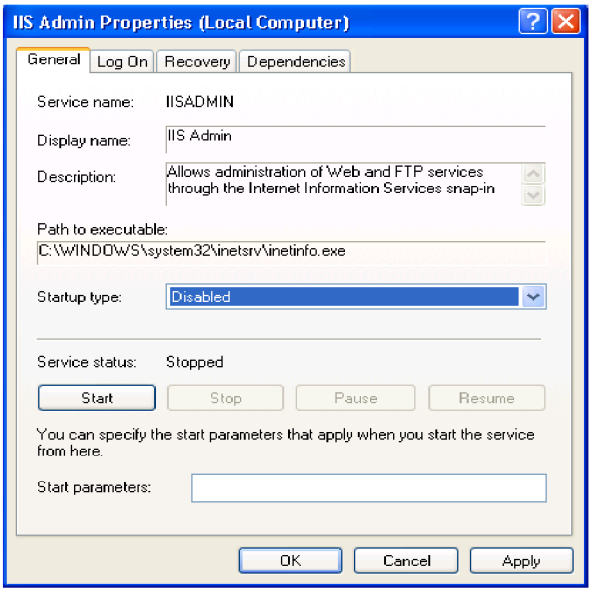
1. Click **Control Panel** > **Administrative Tools** > **Services** in Classic view.
2. Select **Windows Firewall/Internet Connection Sharing (ICS)** to open the dialog box. Check if the Startup type is set to **Disabled**.



3. Select **Automatic Updates** to open the dialog box. Check if the Startup type is set to **Disabled**.

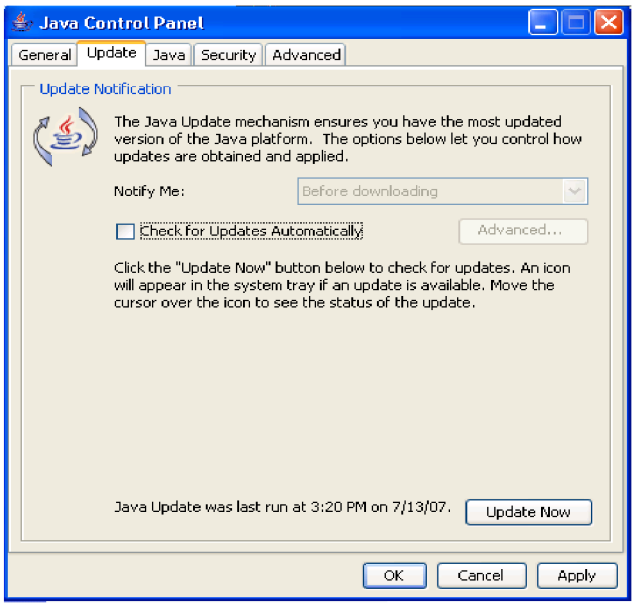


4. Select IIS admin to open the dialog box. Check if the Startup type is set to **Disabled**.



Perform this procedure to check if the automatic Java updates are disabled:

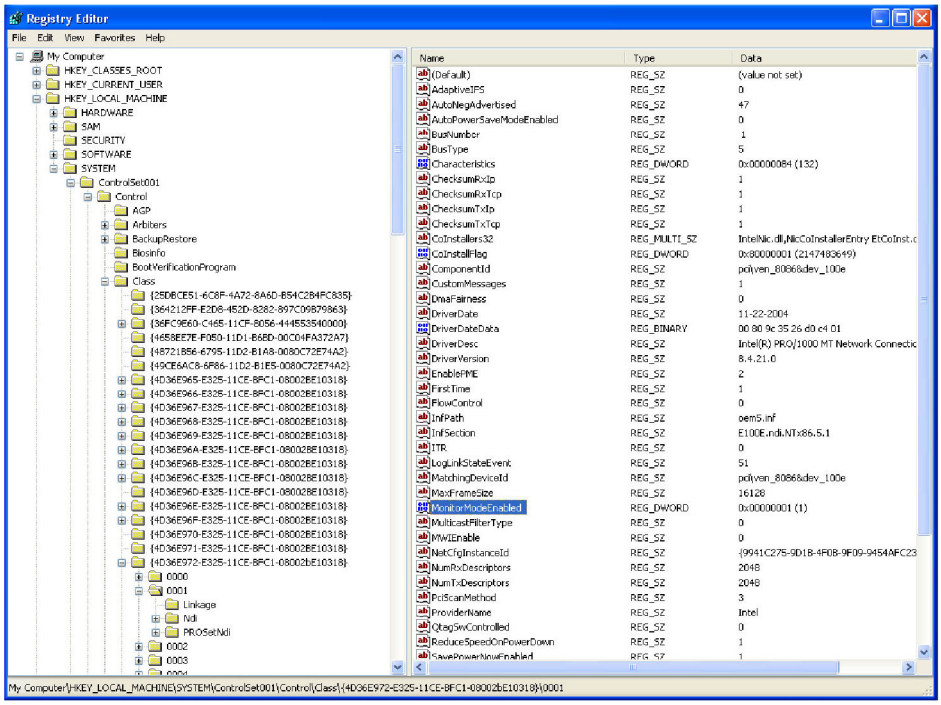
1. Click **Control Panel** > **Java**.
2. Select the **Update** tab and check if the **Check for Updates Automatically** check box is deselected.



Perform this procedure to check for the settings of VLAN:

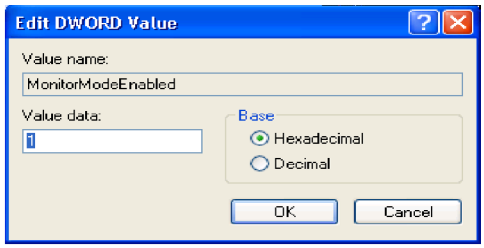
1. Click **Start** > **Run** and type **regedit**. Press **OK** to display the Registry Editor Window.

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 (DriverDesc value should be Intel(R) PRO/1000 MT Network Connection).



3. Select MonitorModeEnabled DWORD Value that you created.

4. Double-click the DWORD Value to open the Edit DWORD Value dialog box. Check if the Value data is set to 1.



Checking Option GbE performance. Perform this procedure to check that the GbE Gigabit Ethernet interface of generator is operating properly. This test checks that the transport stream data is correctly output from the generator instrument.

1. Connect the equipment as shown in (See Figure 2-11.)

NOTE. *Check that V10.1 or greater generator software is installed.*

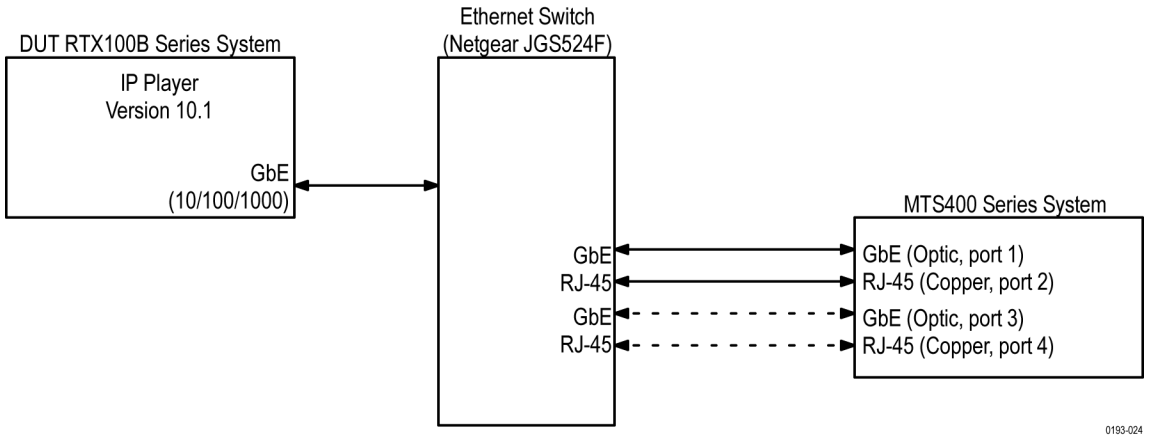


Figure 2-11: Equipment setup for Option GbE performance verification

Required Equipment

- MTS400 Series MPEG system
- RJ-45 cables
- Crossover RJ-45 cable
- test40.TRP file

2. Power on the MTS400 Series MPEG system and allow the Windows operating system to boot completely. Wait an additional 90 seconds for the MPEG system to complete the Option GbE firmware loading process.
3. Configure the DUT generator system with the following settings for GbE testing:
   a. Double-click the MPEG player icon on the desktop to start the player.

MPEGPlayer.lnk

   b. From the File menu, select **Open** > **Look in** (dropdown menu) > **Local Disk** (D) > **test streams** > **test40.TRP** > **Open**.
   c. Make the following selections in the Play menu:

- Interface > IP
- Packet Size >188
- Clock dialog box
- Make sure the Internal button is selected
- Make sure the "Data Rate" section shows: $\frac{40}{27}$ X 27.0 = 40.000000
- Play > Update > On (checked)
- Play > PCR Initial Value... dialog box:
  - Base Value (33): 0
  - Extension Value (9): 0
- Click the OK button
- Play > Source > Disk (checked)
- Play > Loop > On (checked)
- Start > Stop... dialog box:
  - Start radio button selected
  - 0% text-entry-box set to 0
  - 100% text-entry-box set to 386555
  - Format set to Packets
- Play > Auto Play > Off (checked)
- Play > Timer Play... (ignore this; it should show the current date and time)

4. Select Configuration in the IP menu, to launch the IP Playout Configuration dialog box, and make the following entries/selections:

Control	Setting
Device Name	Intel(R) PRO/1000 MT Network Connection
Transmission Mode	Multicast
Destination IP Address	239.1.1.1
Protocol	UDP
Destination Port	1234

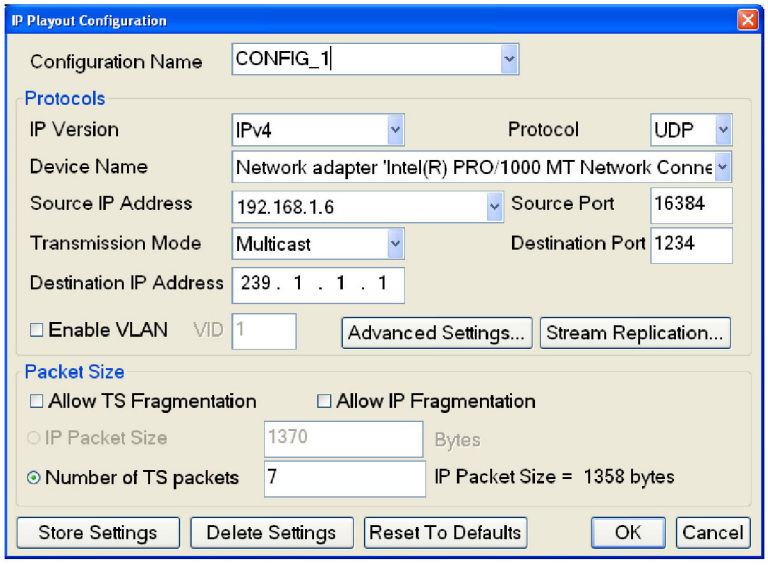
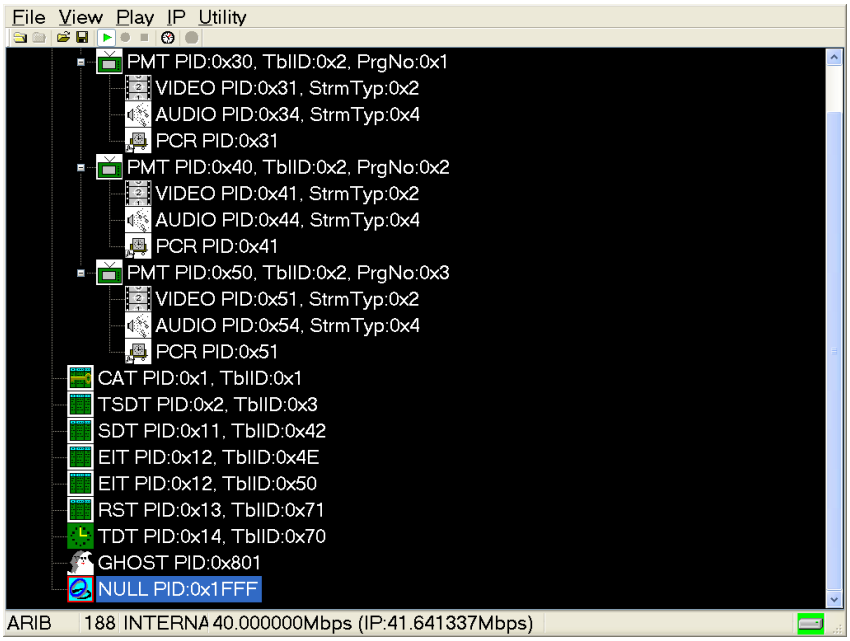


Figure 2-12: IP Playout Configuration dialog box

Now the RTX100B series player should appear as the following figure.

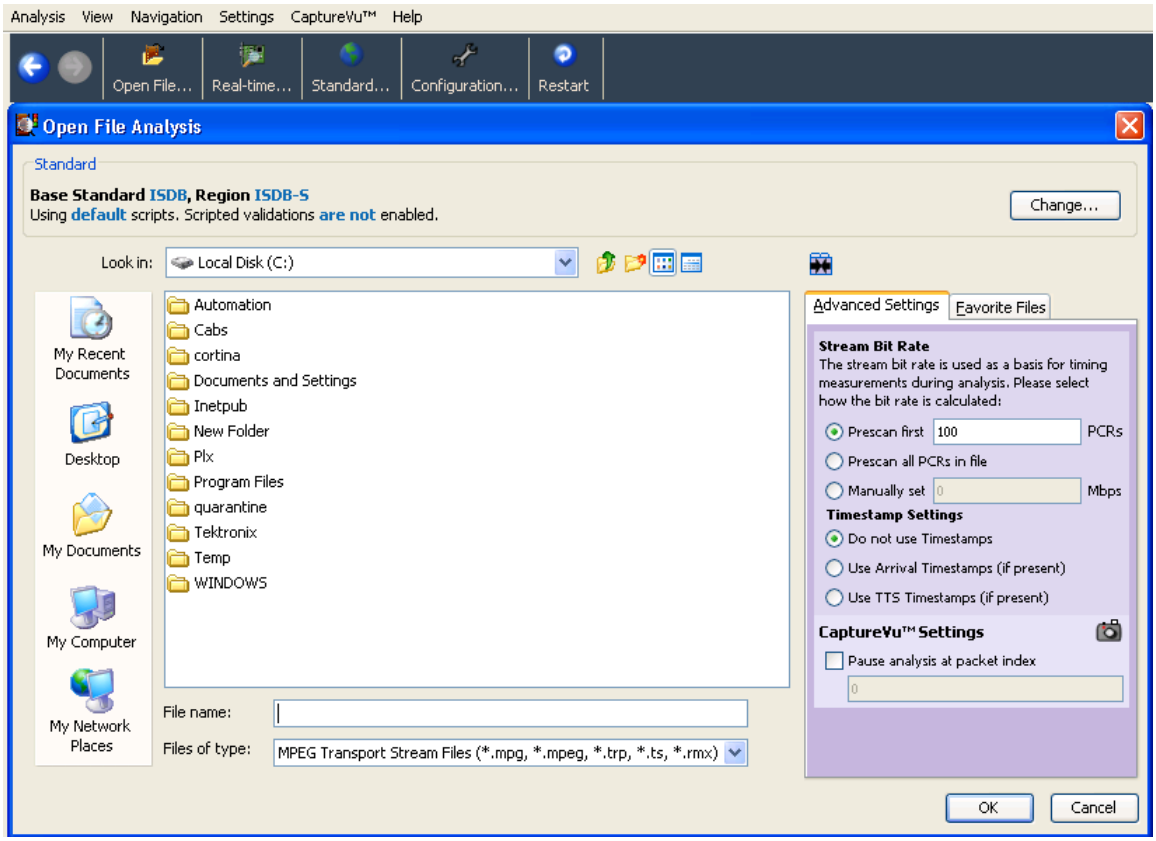


5. Click the **Start** button to start the stream playout. The Start button is the button with the green horizontally oriented triangle.

6. Double-click the MTS400 Series MPEG Test Systems system's **TS**

Compliance Analyzer desktop icon `TS Compliance Analyser.lnk` to launch the

TS Compliance Analyzer application (TSCA). This starts with the Open Transport Stream dialog box as shown in the following figure.



7. Select the **Real-time...** menu. The Select Real time Interface dialog box appears.

8. In the Select Real-time Interface dialog box, select **IP** from the Interfaces drop-down menu.

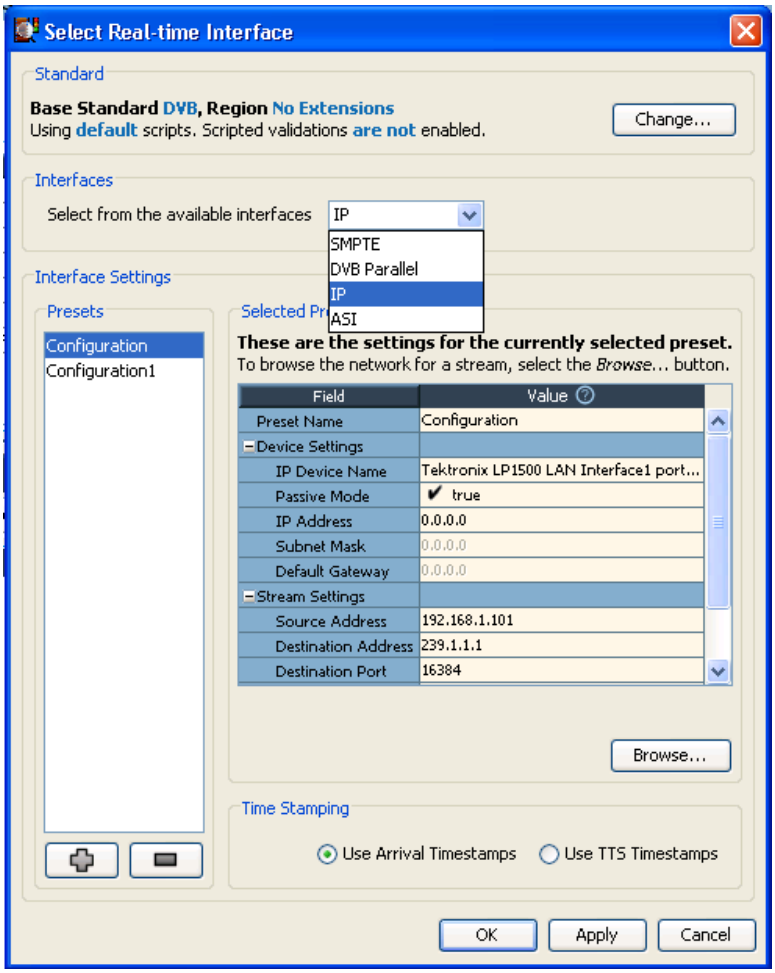


Figure 2-13: Selecting the IP interface

9. Click the **Browse** button to open the Browse for IP Flow dialog box.

10. Select Tektronix LP1500 LAN Interface Port 4 from the **Browse Device** drop-down menu.

11. In the Browse for UDP flow dialog box, make these selections.

(See Figure 2-14.)

a. Select the Passive mode.

b. In the Detected UDP Flows pane, select the IP stream with a Destination IP Address of 239.1.1.1.

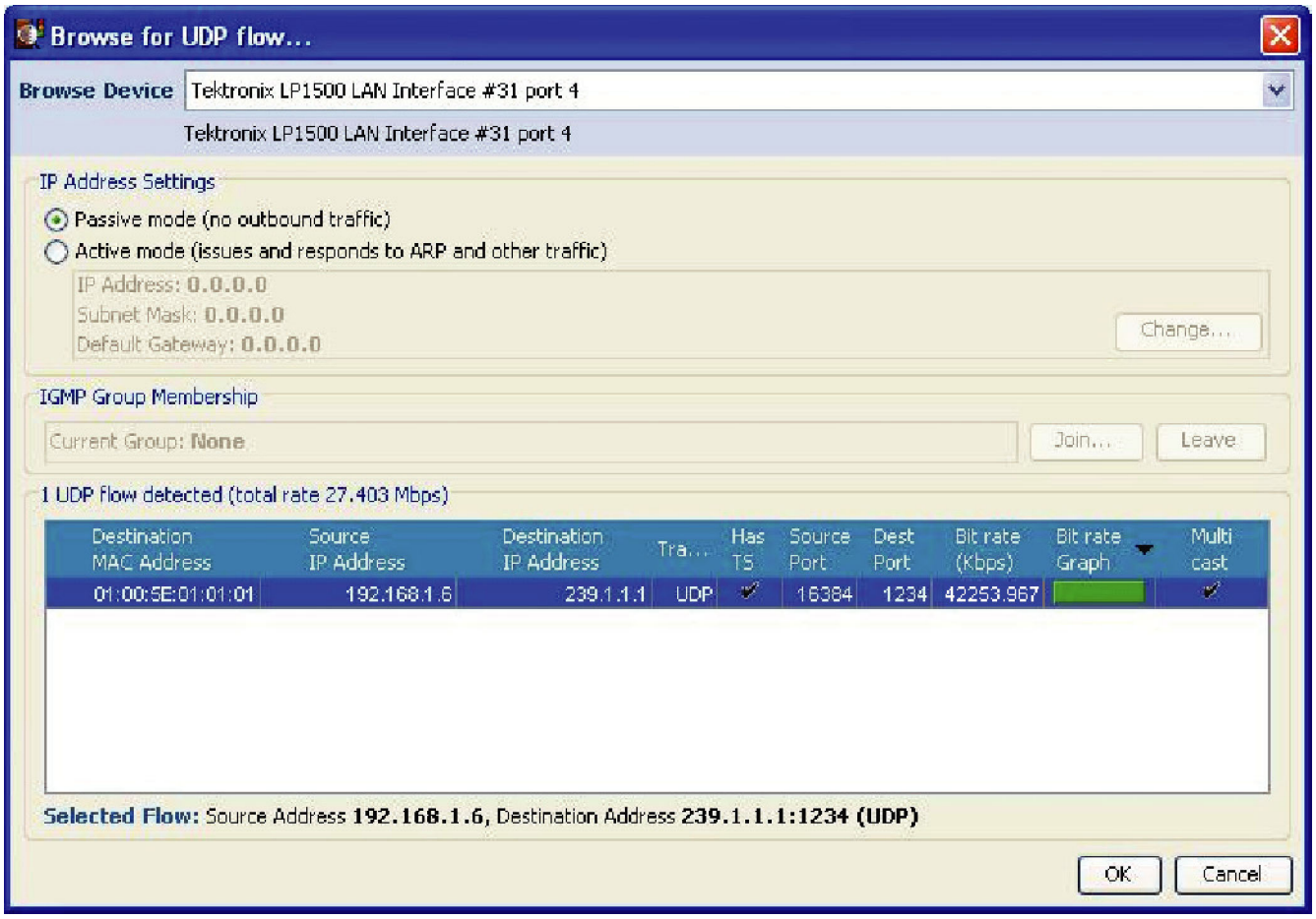


Figure 2-14: IP Flow selection

c. Click the **OK** button. The MTS400 Series MPEG Test Systems TS Compliance Analyzer dialog box opens.

12. Allow the DUT generator MPEG system to loop at least three times.

13. On the MTS400 Series MPEG system, verify that the TS Availability and Sync indicators, in the bottom left corner of the Compliance Analyzer display, remain green.

14. Check that all the parameters under **Priority 1** of the Compliance Analyzer display are green. The TS bit rate displayed in the status bar should be approximately equal to 40.00000 Mbps, which was set in the generator instrument.

NOTE. *Ignore the 2.5 PTS errors as they are generated by the test40.TRP file.*

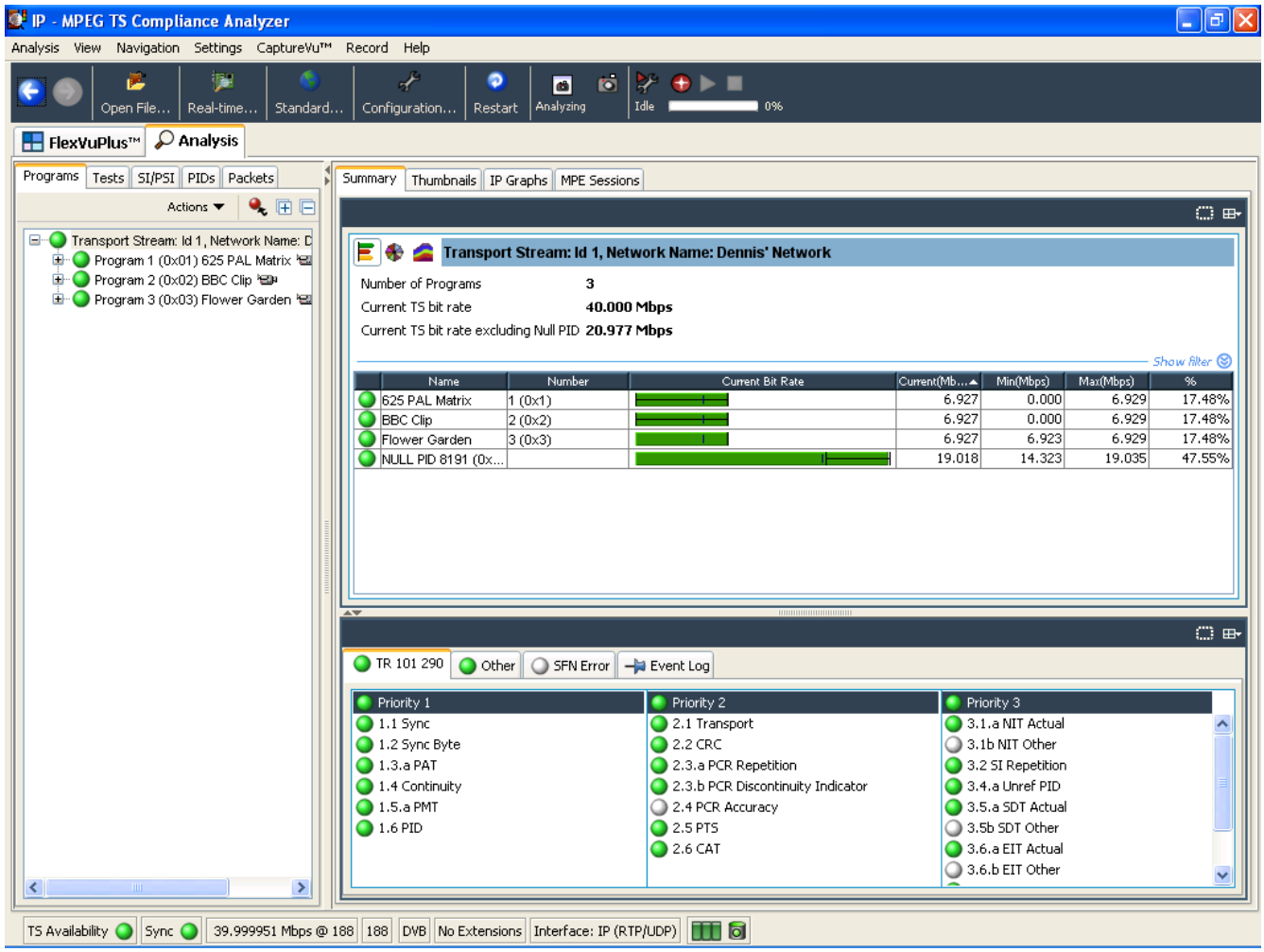


Figure 2-15: MTS400 Series TS Compliance Analyzer display

15. Disconnect the DUT generator MPEG system from the test setup and turn it off using the front panel POWER switch. After the Windows shutdown completes, unplug the power cord from the system.

16. Disconnect the MTS400 Series MPEG system from the test setup:

    a. Disconnect the cable to the SFP module.

    b. Remove the SFP module.

    c. Close all applications running on the MTS400 Series MPEG system and turn it off using the front panel POWER switch. After the Windows shutdown completes, unplug the power cord from the system.

Checking maximum bit rate performance. Perform this test to check that the maximum transport stream data is correctly output from the generator.

NOTE. *You can perform the maximum bit rate performance test on MTS400 Series MPEG Test Systems with a Cheetah card only.*

1. Perform steps 1 through 4 listed in the *Checking Option GbE performance*. (See page 2-24.)
2. Set the TS bit rate value to 160.000000 Mbps. (See Figure 2-16.)

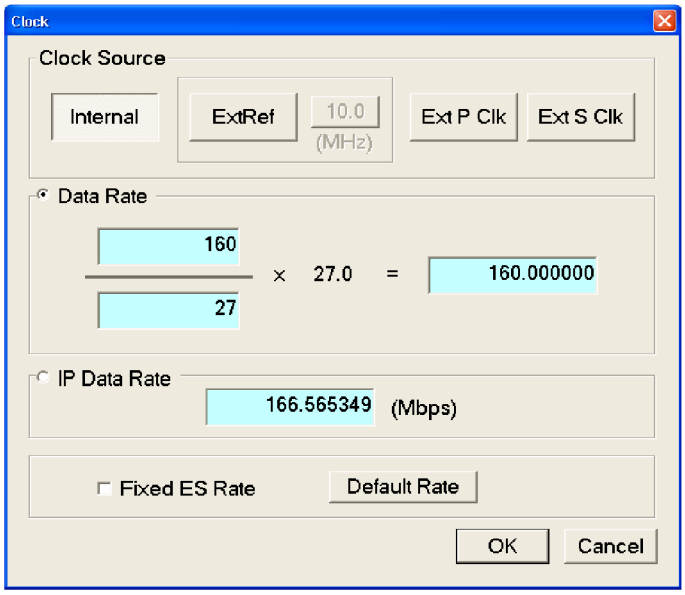
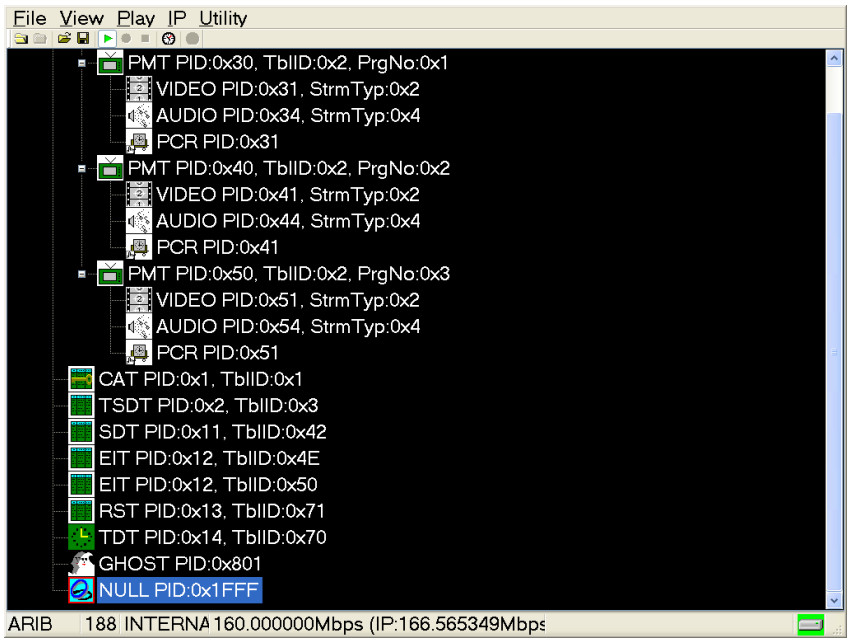


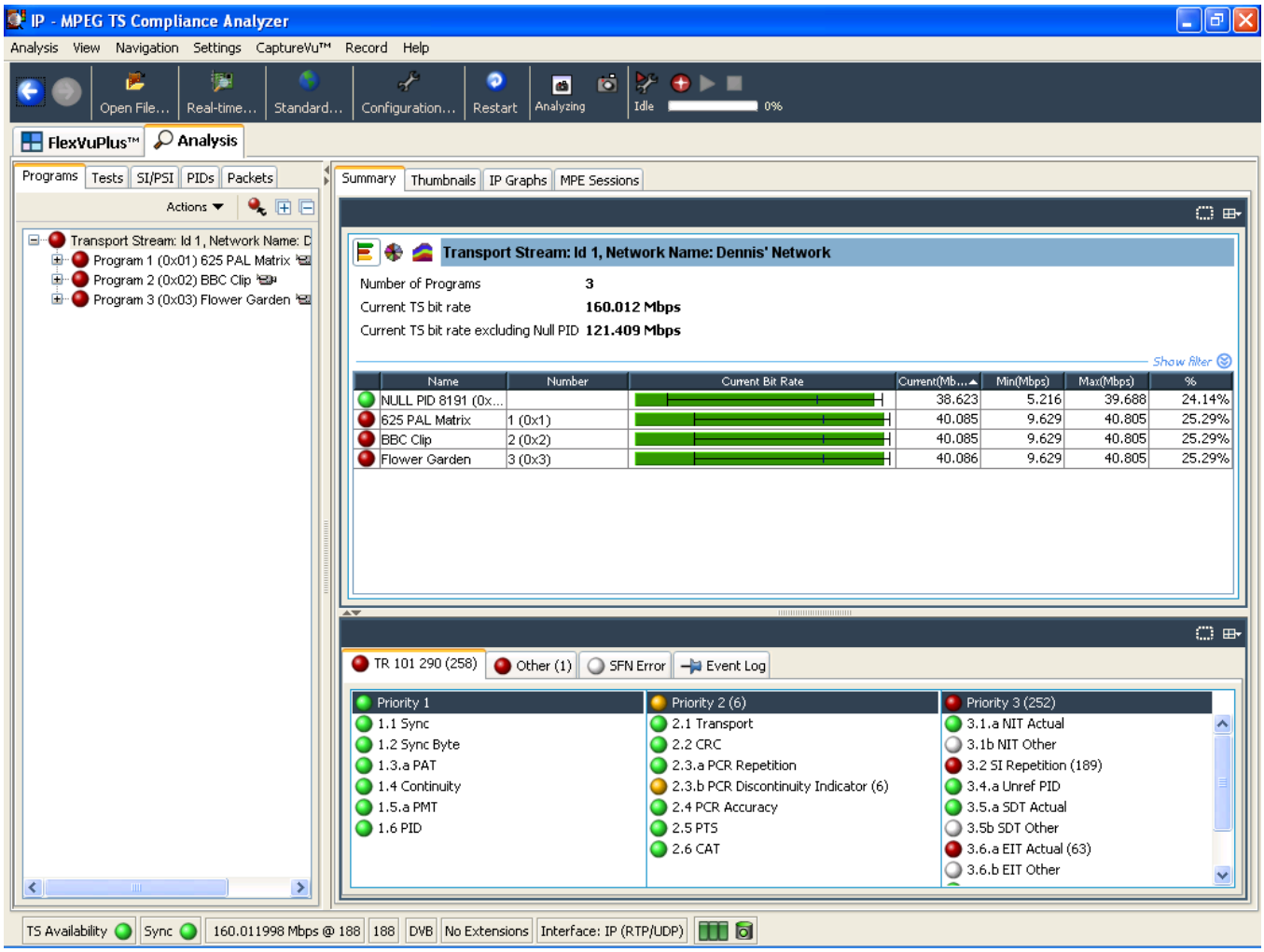
Figure 2-16: Clock dialog box

The status bar displays the TS bit rate as 160.0000000 Mbps.



3. Perform steps 6 through 15, listed in the *Checking Option GbE performance*. (See page 2-24.)

4. Check that the TS bit rate displayed in the status bar is approximately equal to 160.000000 Mbps as set in the generator.



5. Disconnect the DUT generator MPEG system from the test setup and turn it off using the front panel POWER switch. After the Windows shutdown completes, unplug the power cord from the system.

6. Disconnect the MTS400 Series MPEG system from the test setup:

   a. Disconnect the cable to the SFP module.

   b. Remove the SFP module.

   c. Close all applications running on the MTS400 Series MPEG system and turn off using the front panel POWER switch. After the Windows shutdown completes, unplug the power cord from the system.

RTX100B Only Procedures

ASI Interface

This test verifies that transport stream data is correctly played from and is recorded through the ASI interface on the generator.

Required Equipment

- MPEG analyzer
- Oscilloscope
- MPEG-2 measurement decoder
- Video monitor
- Two 75 Ω BNC cables
- 75 Ω signal adapter
- test40.TRP file

Checking the Output Signal.

1. Use the 75 Ω BNC cable and the 75 Ω signal adapter to connect the ASI Out connector on the generator to the oscilloscope CH1 input.

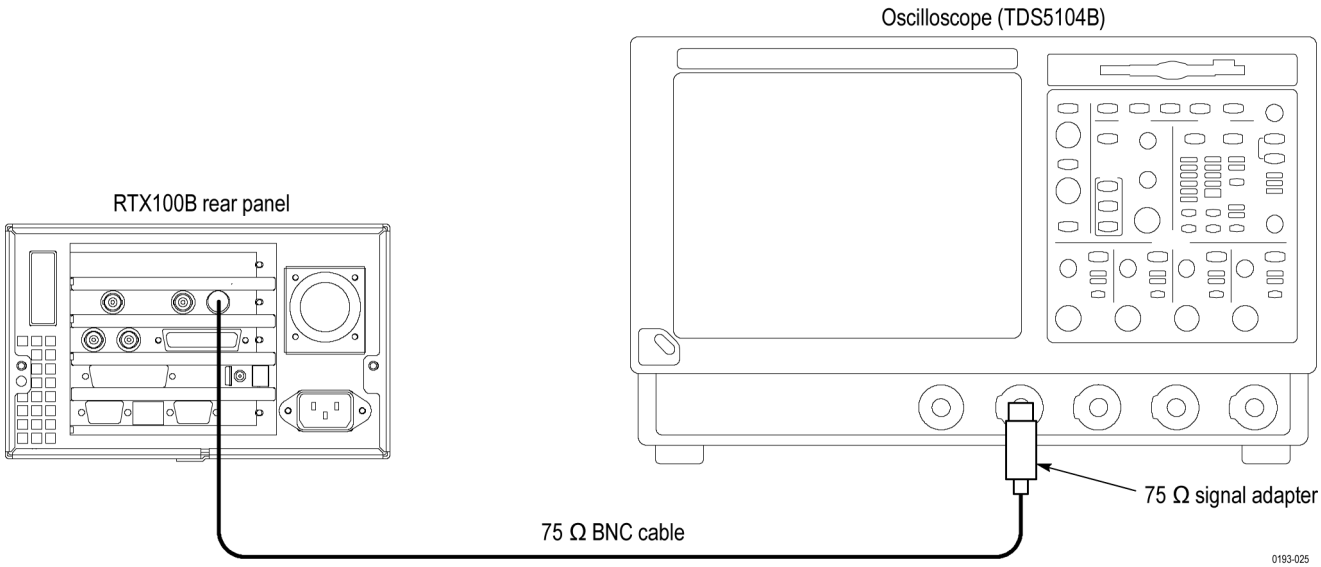


Figure 2-17: Equipment connection for checking the output signal- ASI interface

2. Set the oscilloscope as follows:

Control	Setting
Vertical scale	200 mV/div
Input impedance	50 Ω
Horizontal scale	1.25 ns/div

Control	Setting
Trigger position	50%
Acquire mode	Average 32
Trigger mode	AUTO
Trigger source	CH1
Trigger level	0 V
Trigger slope	Rising Edge
Input coupling	DC
Measure	Amplitude, Rise Time, Fall Time
Ref Level	High Ref 80%, Low Ref 20%
Gating	Cursor Curs1 Pos1: –2.5 ns/Curs2: 2.75 ns

3. Open the **test40.TRP** file on the generator.
   a. Select **File** > **Open** in the Play screen to open the Select File dialog box.
   b. In the dialog box, select the **test40.TRP** file.
4. Press the **Play/Pause** button to start playing the **test40.TRP** file.
5. Use the oscilloscope to verify that the amplitude, rise and fall times are as follows:

Control	Setting
Amplitude	720 mV to 880 mV
Rise and fall time	≤ 1.2 ns

Checking the Play Operation.

1. Disconnect the BNC cable from the 75 Ω signal adapter on the oscilloscope, and then connect the cable to the ASI/SMPTE In connector on the MPEG analyzer.

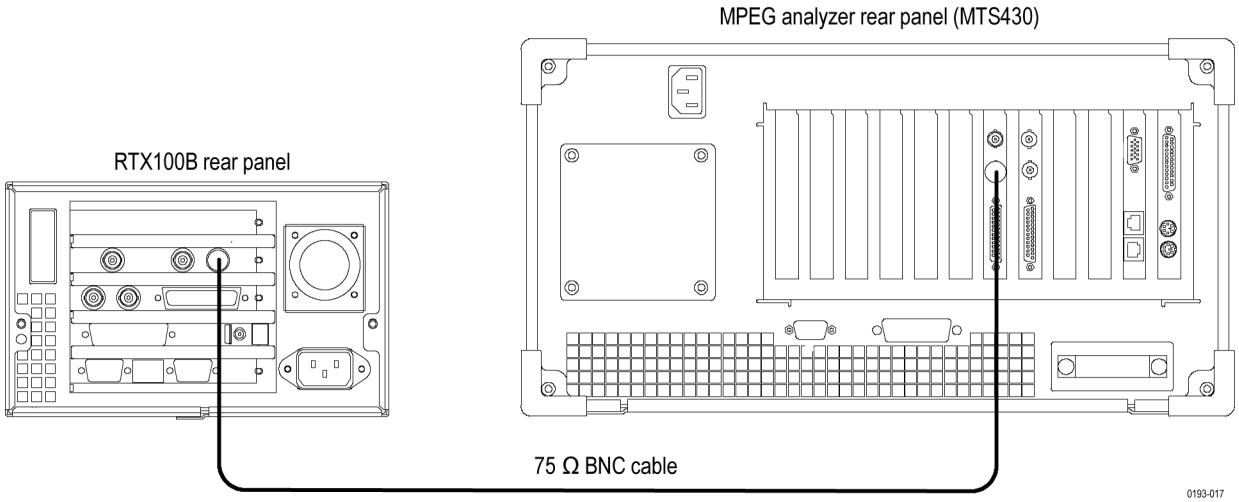


Figure 2-18: Equipment connections for checking the play operation-ASI interface

2. Start the **MPEG Player** application on the MPEG analyzer.
3. Set the application to the **Record** mode.
4. Set the MPEG analyzer as follows:

Control		Setting
Record	Source	SPI/ASI/310M
	Target	RAM
	Record Size	100 MB
File	Save Mode	Overwrite
	Save	E:\MTXRTX_Test streams\Record_Files\ ASI214Mbps.TRP
SPI/ASI/310M	Input Port	BNC
	BNC Port	ASI

5. On the generator, make the following settings:

Control		Setting
Play	Clock	Data Rate: 214 Mbps
	Update	Off
	Source	RAM

6. Press the **Play/Pause** button on the generator to start playing the **test40.TRP** file.
7. Verify that the hierarchical view is displayed on the MPEG analyzer screen. In addition, verify that the bit rate is **214** Mbps and that the packet size is **188** bytes.
8. Click the **Record** button on the MPEG Player application to record the file.
9. After the recording is complete, press the **Stop** button on the generator.
10. Disconnect the 75 Ω BNC cable from the generator and the MPEG analyzer.

Checking the Record Operation.

1. Use a 75 Ω BNC cable to connect the ASI In connector on the generator to the ASI/SMPTE Out connector on the MPEG analyzer.

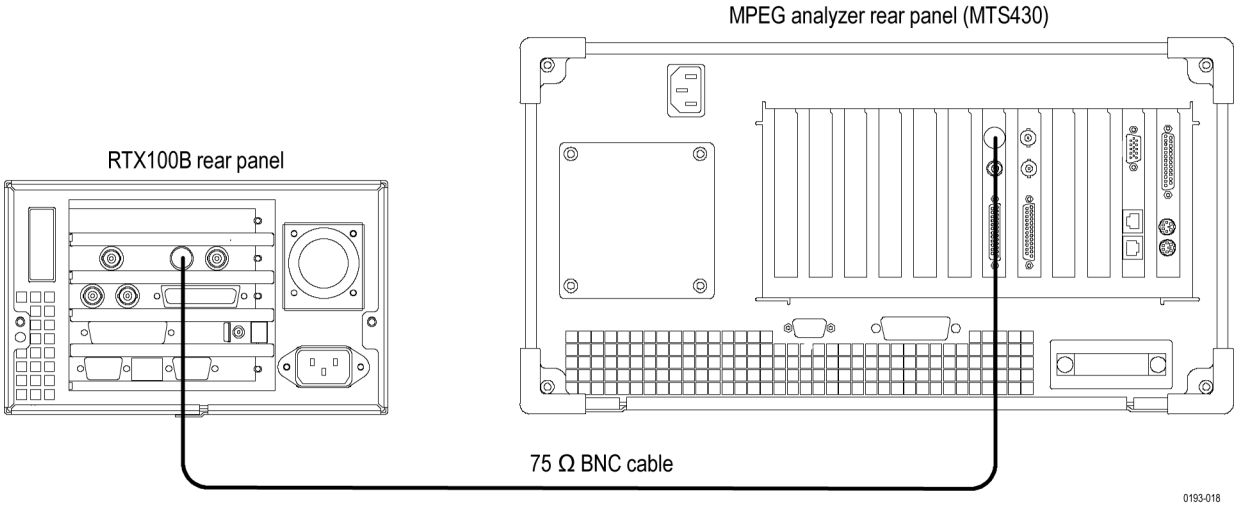


Figure 2-19: Equipment connection for checking the record operation-ASI interface

2. Press the **Record** button on the generator to display the Record screen.
3. On the generator, make the following settings:

Control		Setting
Record menu	Source	ASI
	Target	RAM
	Record Size	100 MB
File menu	Save Mode	Ove Write
	Save	D:\Record_Files\ASI214Mbps.TRP

4. Set the MPEG analyzer to the Play mode.

5. Select **File** > **Open** on the MPEG analyzer to display the Open dialog box.
6. In the dialog box, navigate to the **E:\MTXRTX_Test Streams\ Record_Files** directory, and select the **ASI214Mbps.TRP** file.
7. Set the following settings on the MPEG analyzer:

Control		Setting
Play	Clock	Data Rate: 214 Mbps
	Update	Off
	Source	RAM
SPI/ASI/310M	BNC Port	ASI
	Through Out	Off

8. Click the **Play** button on the MPEG analyzer to start playing the **ASI214Mbps.TRP** file.
9. Verify that the hierarchical view is displayed on the generator screen. In addition, verify that the bit rate is **214** Mbps and packet size is **188** bytes.
10. Press the **Record** button on the generator to record the file.
11. After recording is complete, click the **Stop** button on the MPEG analyzer.
12. Exit the MPEG Player application on the MPEG analyzer.
13. Disconnect the 75 Ω BNC cable from the generator and the MPEG analyzer.

Checking the Recorded File.

1. Use the 75 Ω BNC cable to connect the ASI Out connector on the generator to the ASI/SMPTE In connector on the MPEG analyzer.

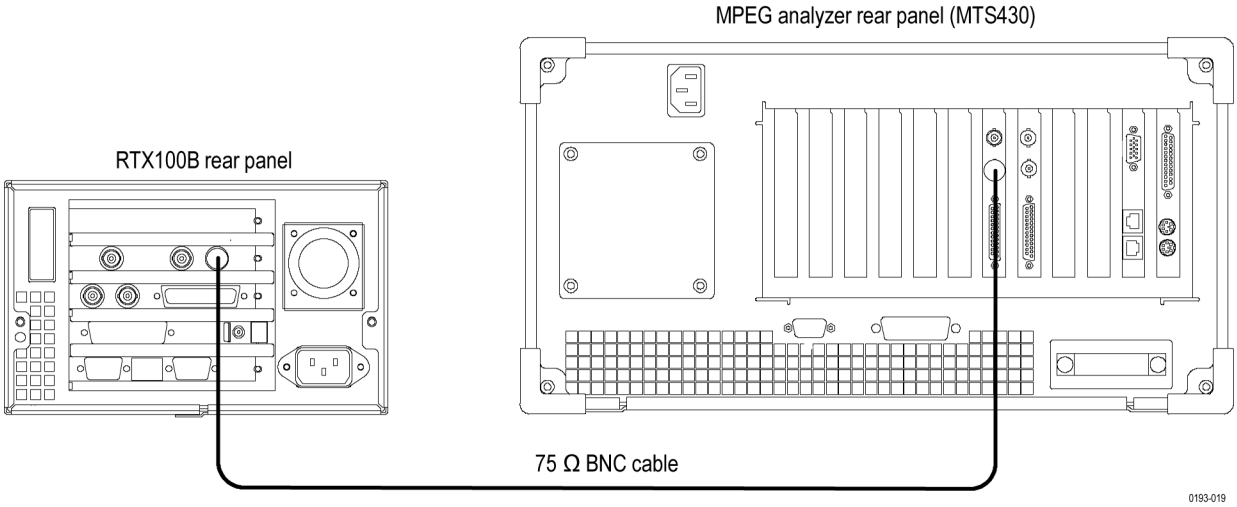


Figure 2-20: Equipment connection for checking the recorded file-ASI interface

2. Press the **Play/Pause** button on the generator to display the Play screen.
3. Select **Play** > **Update** > **On**.
4. Open the **ASI214Mbps** file on the generator.
   a. Select **File** > **Open** to open the **Select File** dialog box.
   b. In the dialog box, navigate to the **D:\Record_Files** directory, and then select the **ASI214Mbps.TRP** file.
5. Press the **Play/Pause** button to start playing the file.
6. Start the **TS Compliance Analyzer** on the MPEG analyzer.
7. In the **Open Transport Stream** dialog box, select **Real-time Analysis**, and make the following settings:

Control	Setting
Interfaces	ASI
Interface Settings	Time Stamping

8. Click the **OK** button.

9. Verify that the hierarchical view is displayed on the MPEG analyzer screen and that no error messages appear. In addition, verify that the bit rate is **40 Mbps** and that the transport stream packet size is **188 bytes**.

NOTE. *Ignore Program 3 and PID 120 (0x78) errors in the Navigation view because these are caused by the original test40.TRP file.*

10. Press the **Stop** button on the generator to stop the stream output.

11. Disconnect the 75 Ω BNC cable from the generator and MPEG analyzer.

Checking a Moving Picture.

1. Use a 75 Ω BNC cable to connect the ASI Out connector on the generator to the TS ASI connector on the MPEG-2 measurement decoder.

2. Use the 75 Ω BNC cable to connect the SER75 Ω connector on the MPEG-2 measurement decoder to the SDI input on the video monitor.

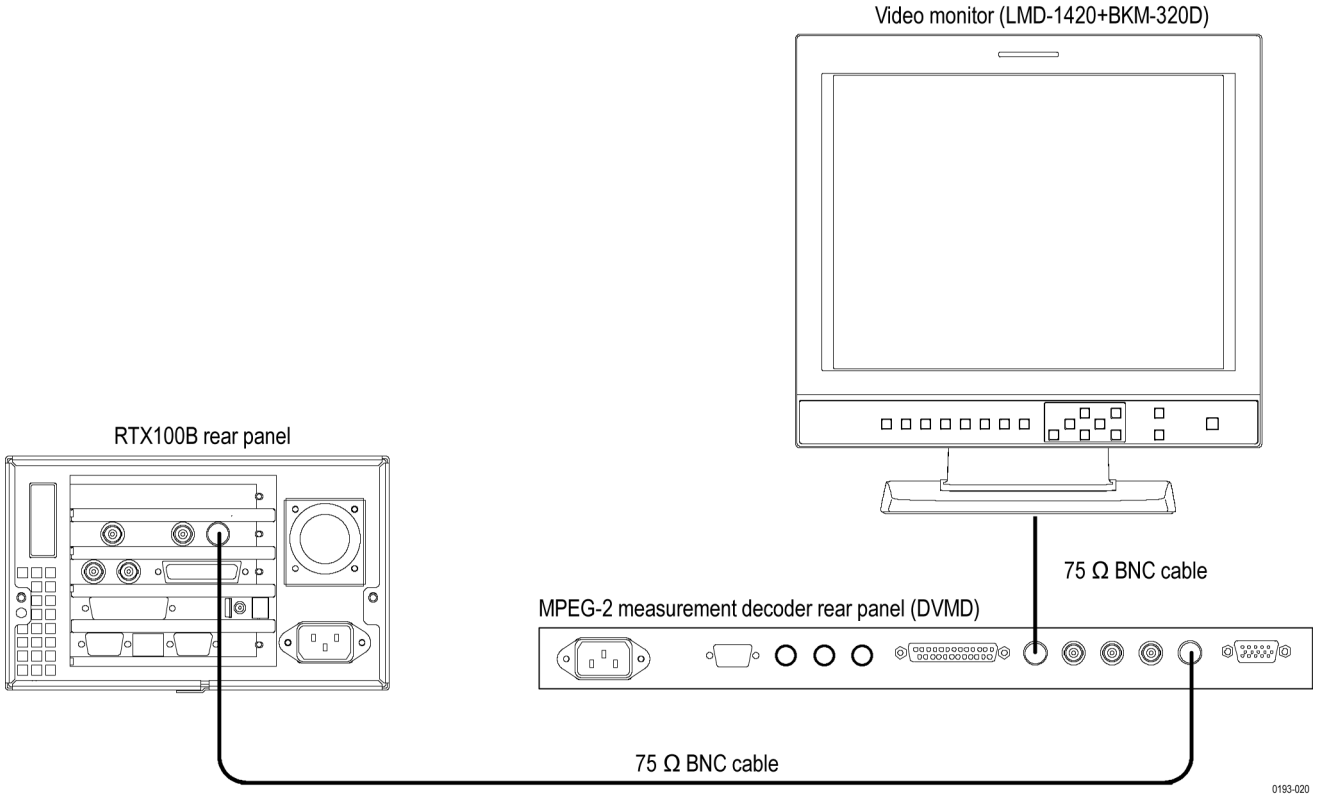


Figure 2-21: Fifth equipment connection for checking the ASI interface

3. Set **TS INPUT** to **SERIAL REAR** on the decoder.
4. Select **Play** > **Update** > **Off** on the generator.
5. Press the **Play/Pause** button on the generator to start playing the **ASI214Mbps.TRP** file.
6. Verify that a moving picture is displayed on the video monitor. In addition, verify that there is no flicker or block noise in the displayed picture.
7. Press the **Stop** button on the generator to stop the stream output.
8. Disconnect 75 Ω BNC cables from the generator, the MPEG-2 measurement decoder, and the video monitor.

RF Output

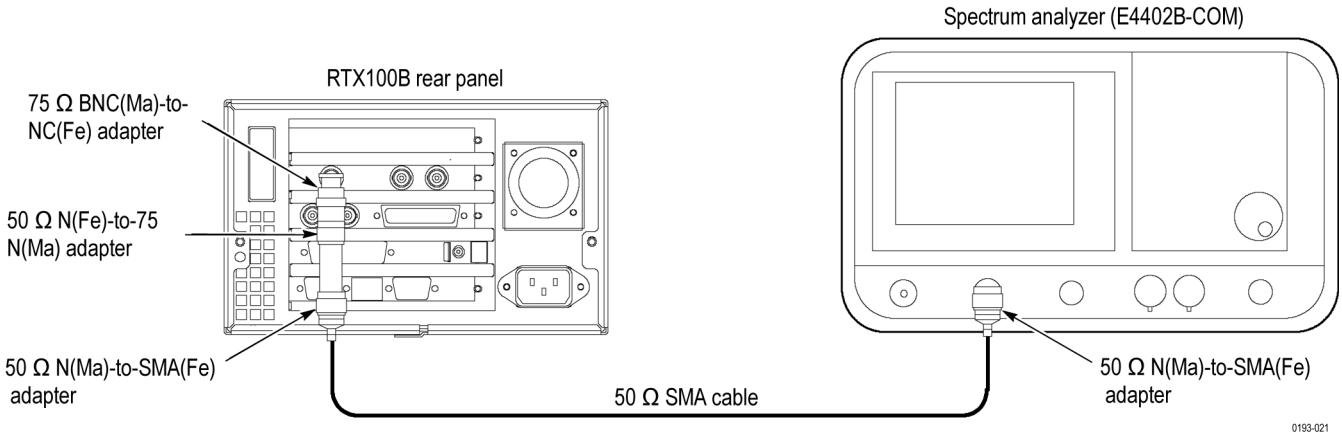
This test verifies the carrier frequency, carrier leakage, and output level/error of the RF output. The following equipment is required for this test:

Required Equipment

- Frequency counter
- Spectrum analyzer
- ISDB-T analyzer
- 75 Ω BNC cable
- 50 Ω SMA cable
- 50 Ω N(Fe)-to-75 Ω N(Ma) adapter
- 75 Ω BNC(Ma)-to-NC(Fe) adapter
- Two 50 Ω N(Ma)-to-SMA(Fe) adapters
- ISDB_T_M1.rmx, ISDB_T_M2.rmx, and ISDB_T_M3.rmx files

Checking the Carrier Leakage.

1. Use the 75 Ω BNC(Ma)-to-NC(Fe) adapter, 50 Ω N(Fe)-to-75Ω N(Ma) adapter, 50 Ω SMA cable, and two 50 Ω N(Ma)-to-SMA(Fe) adapters to connect the RF Out connector on the generator to the RF Input on the spectrum analyzer.



2. Set the spectrum analyzer as follows:

Control	Setting
CENTER FREQ	473.143 MHz
.FREQ SPAN	2 MHz
RBW	10 kHz
VBW	300 Hz
SWP Speed	2.0 s
REF Level	–20 dBm
ATT	10 dB

3. Select **ISDB-T/ASI** > **Calibration** on the generator. The ISDB-T Calibration Password dialog box appears.
4. In the dialog box, enter **rtx100cal** for a password. The **ISDB-T Calibration** dialog box appears.
5. In the dialog box, set **Reference Frequency** to **13**.
6. Verify that the carrier leakage value on the spectrum analyzer is less than –80 dBm.
7. Change Reference Frequency (output channel) on the generator and center frequency on the spectrum analyzer as listed in the following, and then verify that the carrier leakage value is less than –80 dB.

Table 2-3: Output channel and center frequency settings (ISDB-T)

CH	Center Frequency (MHz)	CH	Center frequency (MHz)	CH	Center frequency (MHz)
13	473.143	30	575.143	47	677.143
14	479.143	31	581.143	48	683.143
15	485.143	32	587.143	49	689.143
16	491.143	33	593.143	50	695.143
17	497.143	34	599.143	51	701.143
18	503.143	35	605.143	52	707.143
19	509.143	36	611.143	53	713.143
20	515.143	37	617.143	54	719.143
21	521.143	38	623.143	55	725.143
22	527.143	39	629.143	56	731.143
23	533.143	40	635.143	57	737.143
24	539.143	41	641.143	58	743.143
25	545.143	42	647.143	59	749.143
26	551.143	43	653.143	60	755.143
27	557.143	44	659.143	61	761.143
28	563.143	45	665.143	62	767.143
29	569.143	46	671.143		

Table 2-4: Output channel and center frequency settings (ISDB-TB)

CH	Center Frequency (MHz)	CH	Center frequency (MHz)	CH	Center frequency (MHz)
14	473.143	33	587.143	52	701.143
15	479.143	34	593.143	53	707.143
16	485.143	35	599.143	54	713.143
17	491.143	36	605.143	55	719.143
18	497.143	37	611.143	56	725.143
19	503.143	38	617.143	57	731.143
20	509.143	39	623.143	58	737.143
21	515.143	40	629.143	59	743.143
22	521.143	41	635.143	60	749.143
23	527.143	42	641.143	61	755.143
24	533.143	43	647.143	62	761.143
25	539.143	44	653.143	63	767.143
26	545.143	45	659.143	64	773.143
27	551.143	46	665.143	65	779.143
28	557.143	47	671.143	66	785.143

Table 2-4: Output channel and center frequency settings (ISDB-TB) (cont.)

CH	Center Frequency (MHz)	CH	Center frequency (MHz)	CH	Center frequency (MHz)
29	563.143	48	677.143	67	791.143
30	569.143	49	683.143	68	797.143
31	575.143	50	689.143	69	803.143
32	581.143	51	695.143		

Checking the Spectrum Mask.

1. Select **ISDB-T/ASI** > **RF** parameter on the generator to open the ISDB-T RF Parameter dialog box.
2. In the dialog box, set **Center Frequency** to **13**.
3. To open the **ISDB_T_M3.rmx** file on the generator, do the following:
   a. Select **File** > **Open** to open the **Select File** dialog box.
   b. In the dialog box, navigate to the **D:\ISDB-T** directory, and then select the **ISDB_T_M3.rmx** file.
4. Press the **Play/Pause** button to start playing the file.
5. Set the spectrum analyzer as follows:

Control	Setting
CENTER FREQ	473.143 MHz
.FREQ SPAN	15 MHz
RBW	10 kHz
VBW	300 Hz
SWP Speed	10 s
REF Level	–30 dBm
ATT	0 dB
Average	10

6. Use the delta marker to measure the difference between the marker frequency set in step 5 and the specified frequency offset of each marker. Verify that each value meets the condition as follows:
   Delta marker-Marker 1(–2.86 MHz): <–20 dB
   Delta marker-Marker 2 <–3.00 MHz): <–27 dB
   Delta marker-Marker 3 (–4.36 MHz): <–49 dB

7. Change frequency offset of each marker, and verify that each value meets the condition as follows:
   Delta marker-Marker 1 (–2.86 MHz): <–20 dB
   Delta marker-Marker 1 (2.86 MHz): <–20 dB
   Delta marker-Marker 3 (4.36 MHz): <–49 dB
8. Change **Center Frequency** to **38** on the generator.
9. Change the **Center Frequency** to **623.143** MHz on the spectrum analyzer.
10. Repeat steps 6 and 7.
11. Change **Center Frequency** to **62** on the generator.
12. Change the **Center Frequency** to **767.143 MHz** on the spectrum analyzer.
13. Repeat steps 6 and 7.
14. Disconnect the 75 Ω BNC (Ma)-to-NC(Fe) adapter, 50 Ω SMA cable, and 50 Ω N(Ma)-to-SMA(Fe) adapter from the generator and spectrum analyzer.

Checking the Output Level and Error.

1. Use the 75 Ω BNC cable to connect the RF Out connector on the generator to the RF INPUT on the ISDB-T analyzer.

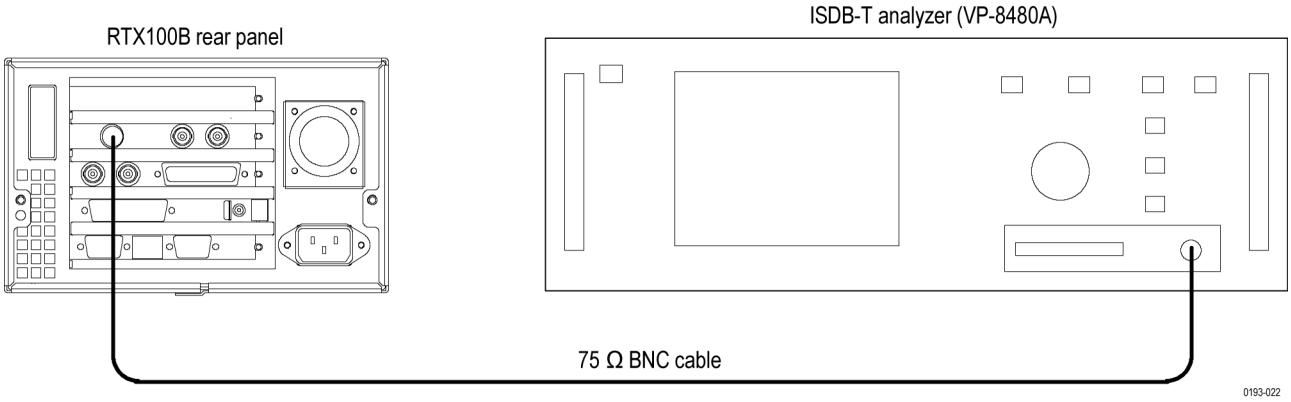


Figure 2-22: Equipment connection for checking the output level and error

2. Select **ISDB-T/ASI** > **RF** parameter on the generator to open the **ISDB-T RF Parameter** dialog box.
3. In the dialog box, set **Center Frequency** to **13**.
4. To open the **ISDB_T_M3.rmx** file on the generator, do the following:
   a. Select **File** > **Open** to open the Select File dialog box.
   b. In the dialog box, navigate to the **D:\ISDB-T** directory, and then select the **ISDB_T_M3.rmx** file.
5. Press the **Play/Pause** button to start playing the file.

6. Set the ISDB-T analyzer demodulation (DEMODSET) as follows:

Control	Settings
Mode	3
GI	1/4
Data	AIR
RS	ON
Carrier	ALL (Loss: OFF)

7. Set the ISDB-T analyzer other settings as follows:

Control	Settings
Display	Constellation
Measurement mode	REPEAT Mode
Input CH	13

8. After the Synchronization Detect status is “locked”, start the measurement.

9. Verify that the measurement values are as follows:

   POWER (Mode 3): –22 to –16 dBm

   POWER (Mode 2): –25 to–19 dBm

   POWER (Mode 1): –28 to –22 dBm

   Plane A, B (BER): 0.00E-7 (8)

   Plane C (BER): < 8.00E-5

   Plane A, B, C (VIT): 0.00E-7 (8)

NOTE. *If errors occur over Planes A to C when a bit error (BER) is detected, stop the measurement and then restart.*

10. Change **Center Frequency** to **14** (Channel 14) on the generator.

11. Change **Input CH** to **14** on the ISDB-T analyzer.

12. Repeat steps 8 and 9.

13. Repeat steps 10 through 12 for Channel 15 to Channel 62.

14. Change the demodulation (DEMODSET) settings to Mode: 2 on the ISDB-T analyzer.

15. Open the **ISDB_T_M2.rmx file** on the generator.
    a. Select **File** > **Open** to open the Select File dialog box.
    b. In the dialog box, navigate to the **D:\ISDB-T** directory, and then select the **ISDB_T_M2.rmx** file.
16. Press the **Play/Pause** button on the generator to start playing the file.
17. Repeat steps 8 and 9.
18. Change the demodulation (DEMODSET) settings to Mode: 1 on the ISDB-T analyzer.
19. Open the **ISDB_T_M1.rmx** file on the generator.
    a. Select **File** > **Open** to open the Select File dialog box.
    b. In the dialog box, navigate to the **D:\ISDB-T** directory, and then select the **ISDB_T_M1.rmx** file.
20. Press the **Play/Pause** button on the generator to start playing the file.
21. Repeat steps 8 and 9.

RTX130B Only Procedures

ASI/SMPTE310M Interface

This test verifies that transport stream data is correctly played from and is recorded through the ASI/SMPTE310M interface on the generator.

Required Equipment

- MPEG analyzer
- Oscilloscope
- 75 Ω BNC cable
- 75 Ω signal adapter
- Flower.TRP file
- test40.TRP file

Checking the Output Signal.

1. Use the 75 Ω BNC cable and the 75 Ω signal adapter to connect the ASI/SMPTE Out connector on the generator to the oscilloscope CH1 input.

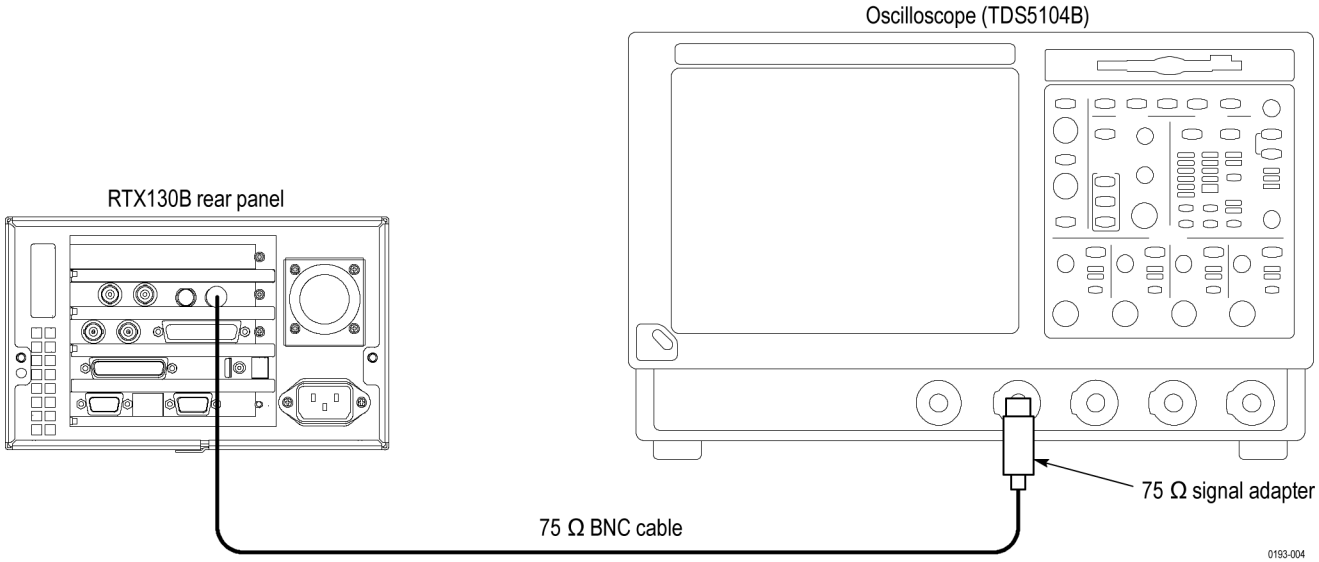


Figure 2-23: Equipment connection for checking the output signal-ASI interface

2. Set the oscilloscope as follows:

Control	Setting
Vertical scale	200 mV/div
Input impedance	50 Ω
Horizontal scale	1.25 ns/div
Trigger position	50%
Acquire mode	Average 32
Trigger mode	AUTO
Trigger source	CH1
Trigger level	0 V
Trigger slope	Rising Edge
Input coupling	DC
Measure	Amplitude, Rise Time, Fall Time
Ref Level	High Ref 80%, Low Ref 20%
Gating	Cursor Curs1 Pos1: –2.5 ns/Curs2: 2.75 ns

3. To open the **test40.TRP** file on the generator, do the following:
   a. Select **File** > **Open** in the Play screen to open the Select File dialog box.
   b. In the dialog box, select the **test40.TRP** file.

4. Press the **Play/Pause** button to start playing the **test40.TRP** file.
5. Use the oscilloscope to verify that the amplitude, rise and fall times are as follows:

Control	Setting
Amplitude	720 mV to 880 mV
Rise and fall time	≤ 1.2 ns

Checking the ASI Play Operation.

1. Disconnect the BNC cable from the 75 Ω signal adapter on the oscilloscope, and then connect the cable to the ASI/SMPTE In connector on the MPEG analyzer.

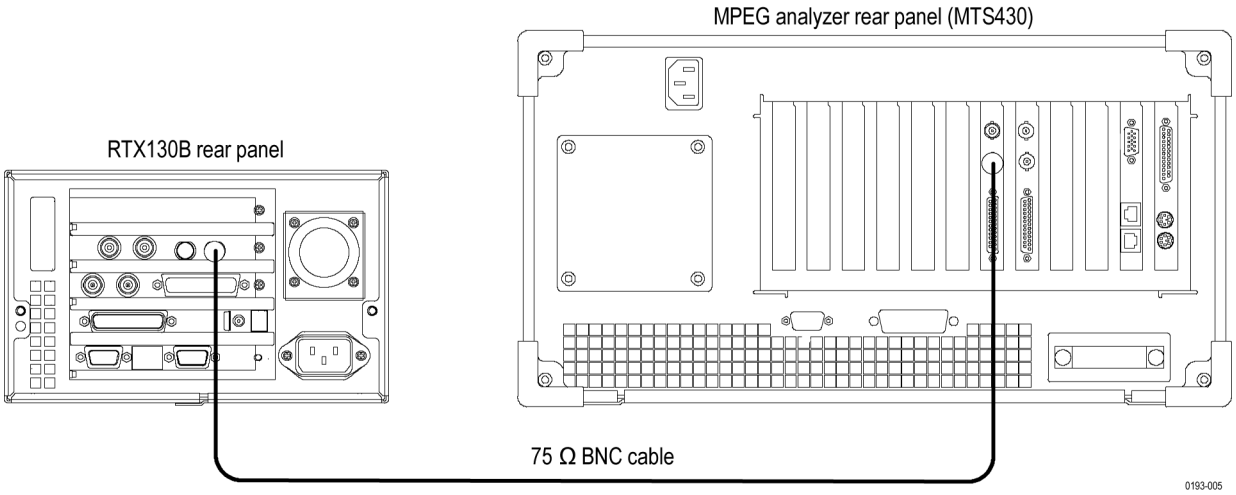


Figure 2-24: Equipment connections for checking the ASI play operation

2. Start the **MPEG Player** application on the MPEG analyzer.
3. Set the application to the **Record** mode.
4. Set the MPEG analyzer as indicated below:

Control		Setting
Record menu	Source	SPI/ /ASI/310M
	Target	RAM
	Record Size	100 MB
File menu	Save Mode	Ove Write
	Save	E:\MTXRTX_Test streams\Record_Files\ ASI214Mbps.TRP
SPI/ASI/310M menu	Input Port	BNC
	BNC Port	ASI

5. On the generator, make the following settings:

Control		Setting
Play	Clock	Data Rate: 214 Mbps
	Update	Off
	Source	RAM
QAM/VSB menu	BNC Port	ASI
	Through Out	Off
	RF Out	Off

6. Press the **Play/Pause** button on the generator to start playing the **test40.TRP** file.
7. Verify that the hierarchical view is displayed on the MPEG analyzer screen. In addition, verify that the bit rate is **214** Mbps and that the packet size is **188** bytes.
8. Click the **Record** button on the MPEG Player application to record the file.
9. After the recording is complete, press the **Stop** button on the generator.
10. Disconnect the 75 Ω BNC cable from the generator and the MPEG analyzer.

Checking the ASI Record Operation.

1. Use a 75 Ω BNC cable to connect the ASI/SMPTE Input connector on the generator to the ASI/SMPTE Out connector on the MPEG analyzer.

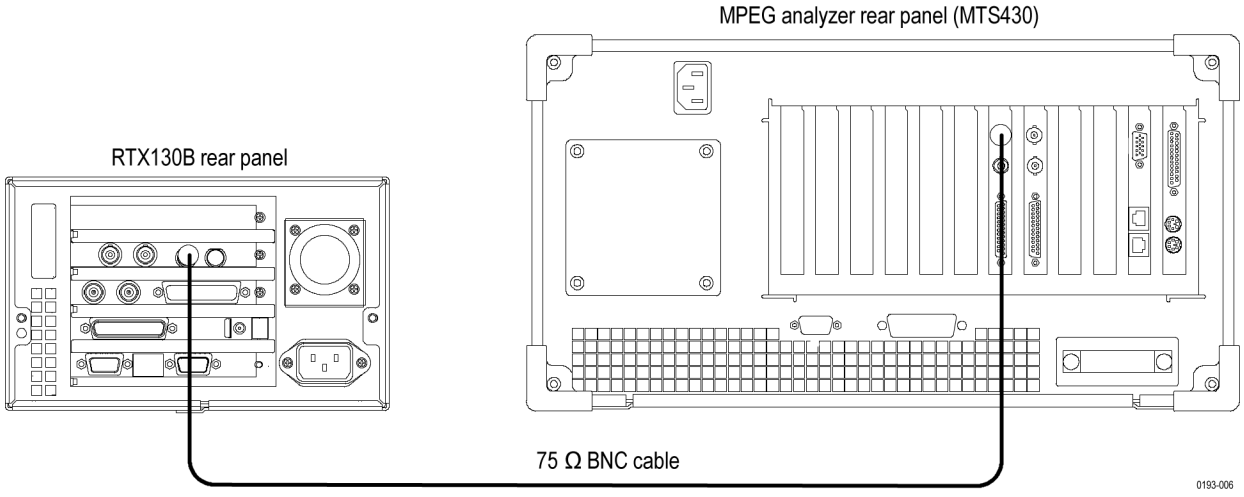


Figure 2-25: Equipment connection for checking the ASI record operation

2. Press the **Record** button on the generator to display the Record screen.

3. On the generator, make the following settings:

Control		Setting
Record menu	Source	ASI
	Target	RAM
	Record Size	100 MB
File menu	Save Mode	Ove Write
	Save	D:\Record_Files\ASI214Mbps.TRP
QAM/VSB menu	BNC Port	ASI

4. Set the MPEG analyzer to the Play mode.

5. Select **File** > **Open** on the MPEG analyzer to display the Open dialog box.

6. In the dialog box, navigate to the **E:\MTXRTX_Test Streams\ Record_Files** directory, and then select the **ASI214Mbps.TRP** file.

7. Set the following settings on the MPEG analyzer:

Control		Setting
Play	Clock	Data Rate: 214 Mbps
	Update	Off
	Source	RAM
SPI/ASI/310M	BNC Port	ASI
	Through Out	Off

8. Click the **Play** button on the MPEG analyzer to start playing the **ASI214Mbps.TRP** file.

9. Verify that the hierarchical view is displayed on the generator screen. In addition, verify that the bit rate is **214 Mbps** and that the packet size is **188** bytes.

10. Press the **Record** button on the generator to record the file.

11. After the recording is complete, click the **Stop** button on the MPEG analyzer.

12. Exit the MPEG Player application on the MPEG analyzer.

13. Disconnect the 75 Ω BNC cable from the generator and the MPEG analyzer.

Checking the Recorded File.

1. Use the 75 Ω BNC cable to connect the ASI/SMPTE Out 2 connector on the generator to the ASI/SMPTE In connector on the MPEG analyzer.

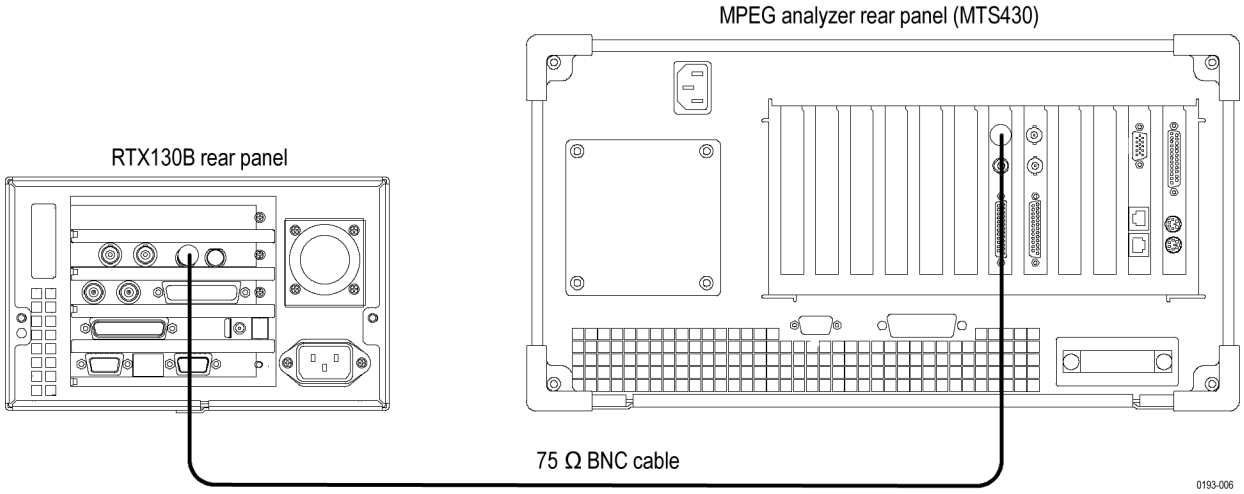


Figure 2-26: Equipment connection for checking the recorded file-ASI interface

2. Press the **Play/Pause** button on the generator to display the Play screen.
3. Select **Play** > **Update** > **On**.
4. Open the **ASI214Mbps** file on the generator.
   a. Select **File** > **Open** to open the **Select File** dialog box.
   b. In the dialog box, navigate to the **D:\Record_Files** directory, and then select the **ASI214Mbps.TRP** file.
5. Press the **Play/Pause** button to start playing the file.
6. Start the **TS Compliance Analyzer** on the MPEG analyzer.
7. In the **Open Transport Stream** dialog box, select **Real-time Analysis**, and then make the following settings:

Control	Setting
Interfaces	ASI
Interface Settings	Time Stamping

8. Click the **OK** button.

9. Verify that the hierarchical view is displayed on the MPEG analyzer screen and that no error messages appear. In addition, verify that the bit rate is **40** Mbps and that the transport stream packet size is **188** bytes.

NOTE. *Ignore Program 3 and PID 120 (0x78) errors in the Navigation view because these are caused by the original test40.TRP file.*

10. Press the **Stop** button on the generator to stop the stream output.

11. Disconnect the 75 Ω BNC cable from the generator and the MPEG analyzer.

Checking the 8VSB Play Operation.

12. Use the 75 Ω BNC cable to connect the ASI/SMPTE Output connector on the generator to the ASI/SMPTE In connector on the MPEG analyzer.

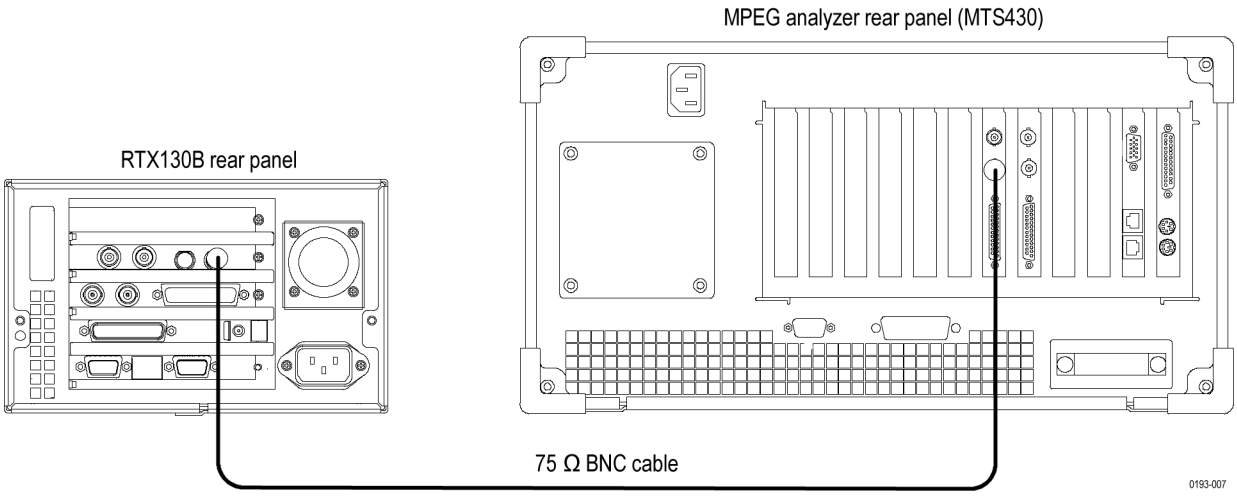


Figure 2-27: Equipment connection for verifying the 8VSB play operation

13. Start the **MPEG Player** application on the MPEG analyzer.

14. Set the application to the Record mode.

15. Set the MPEG analyzer as indicated below:

Control		Settings
Record menu	Source	SPI//ASI/310M
	Target	RAM
	Record Size	100 MB
SPI/ASI/310M menu	Input Port	BNC
	BNC Port	310M
File menu	Save Mode	Overwrite
	Save	E:\MTXRTX_Test streams\Record_Files\ S310M.TRP

16. To open the **Flower.TRP** file on the generator, do the following:

a. Select **File** > **Open** to open the **Select File** dialog box.

b. In the dialog box, navigate to the **D:\525** directory, and then select the **Flower.TRP** file.

17. On the generator, make the following settings:

Control		Settings
Play menu	Data Rate	19.392658 Mbps
	Update	Off
	Source	RAM
QAM/VSB menu	BNC Port	310M 8VSB
	Through Out	Off
	RF Out	Off

18. Press the **Play/Pause** button on the generator to start playing the **Flower.TRP** file.

19. Verify that the hierarchical view is displayed on the MPEG analyzer screen. In addition, verify that the bit rate is **19.392** Mbps and that the packet size is **188** bytes.

20. Click the **Record** button on the MPEG Player application to record the file.

21. After the recording is complete, press the **Stop** button on the generator.

22. Disconnect the 75 Ω BNC cable from the generator and MPEG analyzer.

Checking the 8VSB Record Operation.

23. Use the 75 Ω BNC cable to connect the ASI/SMPTE Input connector on the generator to the ASI/SMPTE Out connector on the MPEG analyzer.

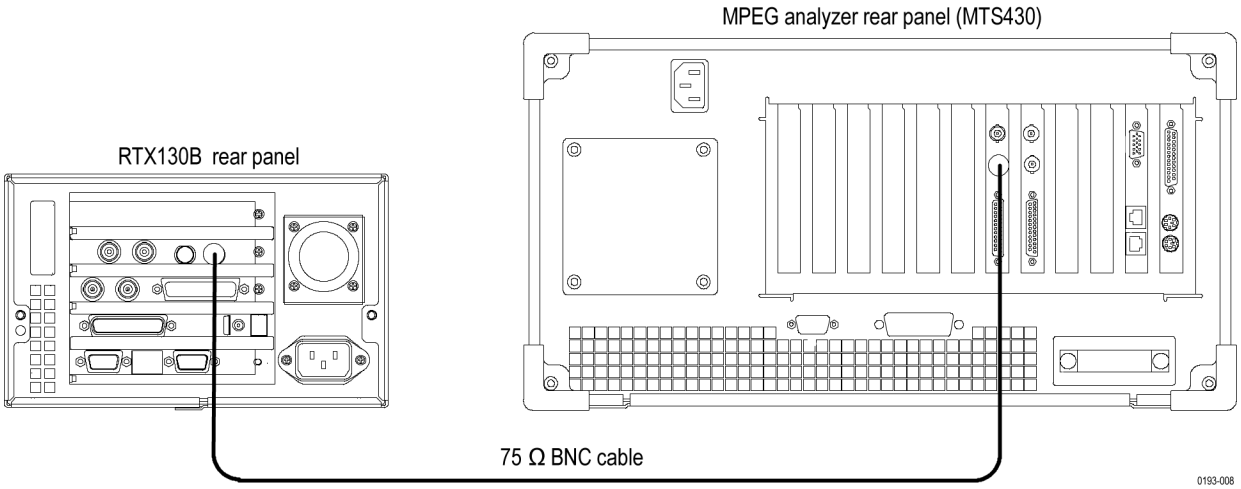


Figure 2-28: Equipment connection for verifying the 8VSB record operation

24. Press the **Record** button on the generator to display the Record screen.

25. On the generator, make the following settings:

Control		Settings
Record menu	Source	QAM/VSB
	Record size	100 MB
	Target	RAM
QAM/VSB menu	BNC Port	310M 8VSB
File menu	Save Mode	Over Write
	Save	D:\Record_Files\S310M.TRP

26. Set the MPEG analyzer to the Play mode.

27. Select **File** > **Open** on the MPEG analyzer to display the Open dialog box.

28. In the dialog box, navigate to the **E:\MTXRTX_Test Streams\Record_ Files** directory, and then select the **S310M.TRP** file.

29. On the MPEG player, make the following settings:

Control		Settings
Play menu	Update	Off
	Source	RAM
SPI/ASI/310M menu	BNC Port	310M 8VSB
	Through Out	Off

30. Click the **Play** button on the MPEG analyzer to start playing the **S310M.TRP** file.
31. Verify that the hierarchical view is displayed on the generator screen. In addition, verify that the bit rate is **19.392** Mbps and that the packet size is **188** bytes.
32. Press the **Record** button on the generator to record the file.
33. After the recording is complete, click the **Stop** button on the MPEG analyzer.
34. Exit the MPEG Player application on the MPEG analyzer.
35. Disconnect the 75 Ω BNC cable from the generator and the MPEG analyzer.

Checking the Recorded File.

1. Use the 75 Ω BNC cable to connect the ASI/SMPTE Output connector on the generator to the ASI/SMPTE In connector on the MPEG analyzer.

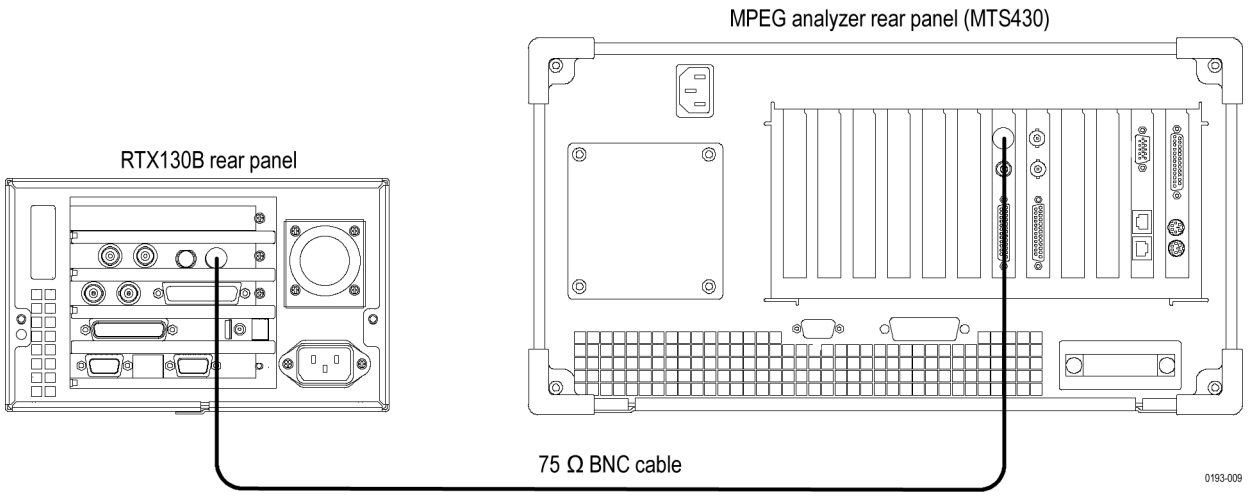


Figure 2-29: Equipment connection for verifying the recorded file- SMPTE310M interface

2. Press the **Play/Pause** button on the generator to display the Play screen.
3. To open the **310M.TRP** file on the generator, do the following:
   a. Select **File** > **Open** to open the **Select File** dialog box.
   b. In the dialog box, navigate to the **D:\Record_Files** directory, and then select the **310M.TRP** file.
4. Select **Play** > **Update** > **On**.

5. Press the **Play/Pause** button to start playing the file.
6. Start the **TS Compliance Analyzer** on the MPEG analyzer.
7. In the **Open Transport Stream** dialog box, select **Real-time Analysis**, and then make the following settings:

Control	Setting
Interfaces	ASI
Interface Settings	Time Stamping

8. Verify that the hierarchical view is displayed on the MPEG analyzer screen and that no error messages appear. In addition, verify that the bit rate is **19.392 Mbps** and that the transport stream packet size is **188** bytes.

NOTE. *Ignore 3.4.a Unref PID error in the Priority 3 row.*

9. Press the **Stop** button on the generator to stop the stream output.
10. Disconnect the 75 Ω BNC cable from the generator and MPEG analyzer.
11. Delete the **Record_Files** folder on the D: drive of the generator.

RF Output

This test verifies the RF output. If the generator has more than one modulation option, then repeat this procedure for each option. The following equipment is required for this test:

Required Equipment

- MPEG transport stream monitor
- PC (for controlling the MPEG transport stream monitor)
- Two 20 dB attenuators (75 Ω)
- BNC(Fe)-to-F(Ma) adapter
- 75 Ω BNC cable
- Crossover Ethernet cable
- Flower.TRP file

Initial Setup for the RTX130B Generator.

1. To open the **Flower.TRP** file on the generator, do the following:
   a. Select **File** > **Open** to open the Select File dialog box.
   b. In the dialog box, navigate to the **D:\525** directory, and then select the **Flower.TRP** file.
2. Select **Play** > **Clock** to open the **Clock** dialog box.
3. In the dialog box, select the **Fixed ES Rate** check box.
4. Select **Play** > **Update** > **On**.
5. Select **Play** > **Other** to open the Others dialog box.
   a. Set **Standard** to **MPEG2**.
   b. Select **Update**, and then set **Update Method** to **Hardware** in the Select Update Item dialog box.
6. Select **QAM/VSB** > **RF Output** > **On**.
7. Select **QAM/VSB** > **Modulation** to open the **Modulation** dialog box.
8. In the dialog box, make the following settings:

Control	Settings
Standard	to match the standard to be tested
Modulation	64 QAM (except for the ATSC standard)
Symbol Rate	5 M sps (for Annex A or C)
RF Center Frequency	200 MHz
RF Level	45 dBmV
Output	RF

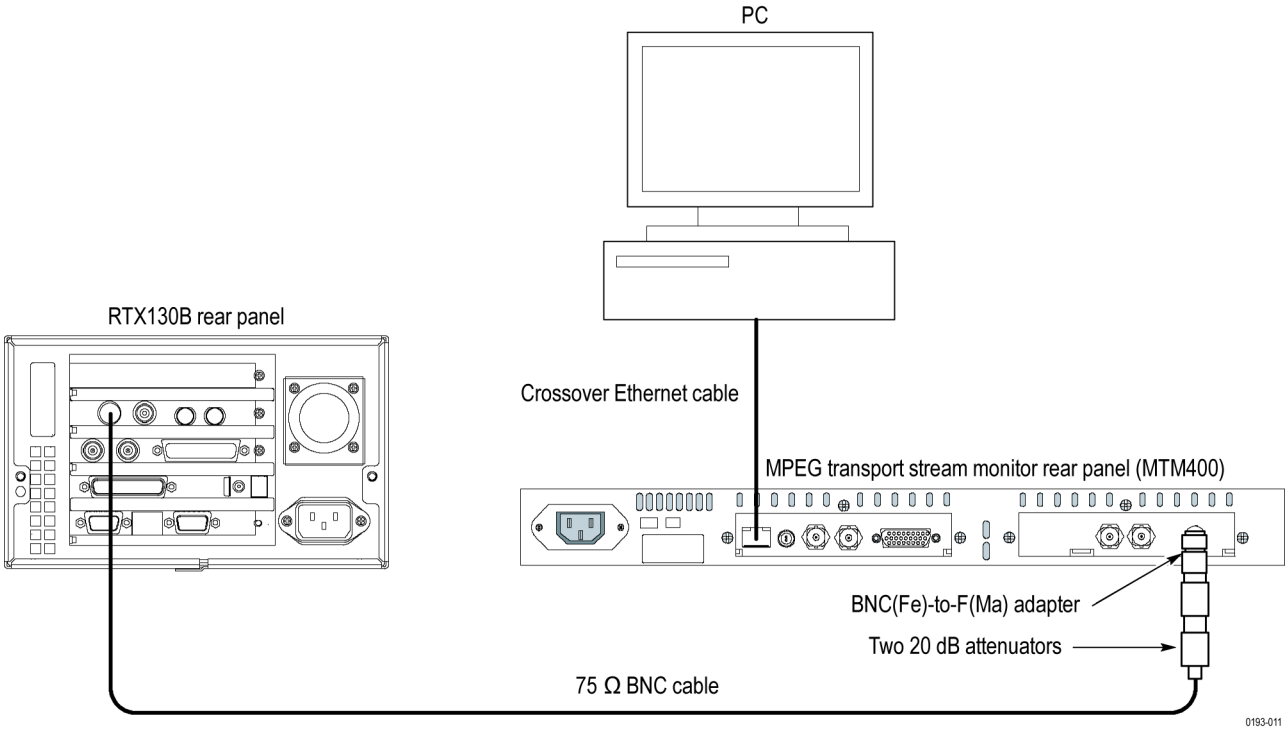
9. Press the **Play/Pause** button on the generator to start playing the **FlowerTRP** file.

Checking the Output for Errors.

10. Use the 75 Ω BNC cable, two 20 dB attenuator, and BNC(Fe)-to-F(Ma) adapter to connect the RF Out connector on the generator to the RF input on the MPEG transport stream monitor.

NOTE. *For the MTM400 Option QB2 and Option VS, use the RF cable (Tektronix part number 174-5135-00) to connect the ASI/SMPTE OUT connector on the interface card to the ASI/SMPT IN connector on the Transport Processor card.*

11. Use the crossover Ethernet cable to connect the MPEG transport stream monitor to a PC.



12. Set the MPEG transport stream monitor as follows by clicking the item button:

Control			Settings
Configuration Screen	Standard		DVM (QAM module) or MPEG (8 VSB module)
	Region (or Type)		Standard
	Interface		QAM A/B/C or 8 VSB
	Stream Name		don't care
	Template Checking		unchecked
	Maintenance Mode		unchecked
QAM Settings or Interface Settings dialog box: (click the Config... button on the Configuration screen.)	For Annex A and C:	Rx Frequency [MHz]	200.0

Control			Settings
		Symbol Rate [MS/s]	5.0
		Constellation	64
		Inversion	unchecked
		PLL Bandwidth	Normal
		AFG Range	Normal
		Analysis Mode	MPEG
	For Annex B:	Tuner Frequency	200000 kHz
		Modulation Format	auto
		Interleaving Mode	auto
		Carrier Lock	normal
		Tuner Phase Noise	high
		Equalization Range	normal
	For ATSC:	Tuner Frequency	200000 kHz
		IF Spectrum	normal
		Channel State	auto
		NTSC Rejection Filter	auto
		Carrier Lock	normal
		Tuner Phase Noise	normal
		Signal Detection	VSB

Tests Grouped by Priority 1 2 3 screen

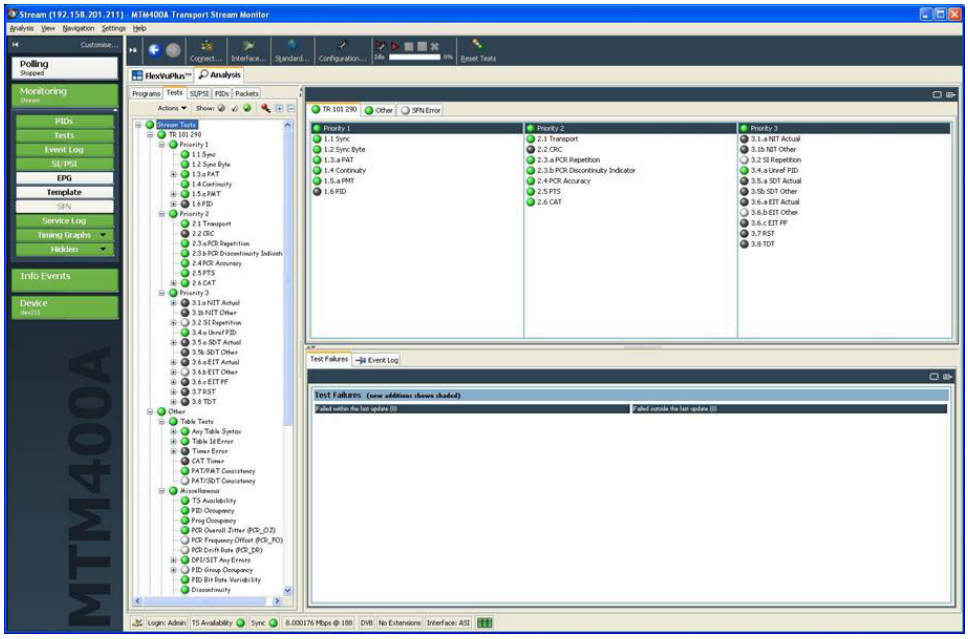


Figure 2-30: Tests Grouped by Priority 1 2 3 screen (Annex A)

All tests should be enabled, with the following exceptions: 1.6 PID and 2.2 CRC should be disabled. Any Table test that refers to a table other than PAT or PMT should also be disabled. For example, disable any reference to NIT, SDT, EIT, RST, and TDT. (These are Priority 3 tests.) Right-click the state icon for 2.3a PCR Repetition, select Properties, and set the time value to 50 ms.

NOTE. *Some status icons may turn white by themselves. This is acceptable and indicates that these tests do not apply.*

PIDs screen: (only for the ATSC standard)

Unref PID test should be disabled.

13. When the status icon in the Tests screen have all turned yellow or green (except for disabled or not applicable tests), right-click the **TS Availability** status icon, and then select **Reset**. Within a minute, all status icons turn green.
14. Click the **Input Card** button on the Configuration screen.
15. Verify that the measurement values are as follows (wait for a few minutes until the values become stable):

Control	Settings
EVM (QAM A/B/C):	< 2.7%
EVM (8 VSB):	< 4.5%

16. Change **RF Center Frequency** to **450 MHz** on the generator.
    a. Select **QAM/VSB** > **Modulation** to open the **Modulation** dialog box.
    b. In the dialog box, set the **RF Center Frequency** to **450 MHz**.
    c. Select the **OK** button.
    d. Press the **Play/Pause** button to output the RF signal.
17. Change **Tuner Frequency** in the Input Card dialog box to **450 MHz** on the MPEG transport stream monitor.
18. When the status icons in the Tests screen have all turned yellow or green (except for disabled or not applicable tests), right-click the **TS Availability** status icon, and select **Reset**. Within a minute, all status icons turn green.
19. Repeat steps 14 and 15.
20. Repeat steps 16 through 19 for the frequency of 750 MHz.
21. Disconnect the 75 Ω BNC cable from the generator.

This completes the generator performance verification.