Technical Reference

Tektronix

**MTS400 Series
MPEG Test Systems
Specifications and Performance Verification**

071-1724-01

This document applies to firmware version 1.0
and above.

Warning
The servicing instructions are for use by qualified
personnel only. To avoid personal injury, do not
perform any servicing unless you are qualified to
do so. Refer to all safety summaries prior to
performing service.

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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 the system. Read the *General Safety Summary* in other system 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.

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

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 apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Powering Off. The power cord provides Mains disconnect.

Replace Batteries Properly. Replace batteries only with the proper type and rating specified.

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

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

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

Wear Eye Protection. Wear eye protection if exposure to high-intensity rays or laser radiation exists.

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

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.

Symbols and Terms

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.

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.

Symbols on the Product. The following symbols may appear on the product:

CAUTION
Refer to Manual

WARNING
High Voltage

Protective Ground
(Earth) Terminal

Standby

Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

Do Not Service Alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect Power. To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

Preface

This manual lists the electrical, mechanical, and environmental specifications and the certification and compliance statements for the Tektronix MTS400 Series MPEG Test Systems instruments. Also provided are procedures for verifying the performance of the instrument.

Related Manuals

The following manuals are also available to use with the MTS400 Series MPEG Test Systems. These manuals are shipped with each system, and are also available on the Tektronix Web site.

- *MTS400 Series MPEG Test Systems Getting Started Manual* (Tektronix part numbers: 071-1505-xx, English; 071-1727-xx, Japanese). This manual describes the functions and use of the instrument and provides software recovery and network troubleshooting information.

- *MTS400 Series MPEG Test Systems User Manual* (Tektronix part number 071-1507-xx). This manual provides in-depth operating information for the software applications included in the MTS400 Series system.

- *MTS400 Series MPEG Test Systems Programmers Manual* (Tektronix part number 071-1725-xx). This manual describes the remote control commands available for the MPEG Player application.

- *MTS400 Series MPEG Test Systems Release Notes* (Tektronix part number 071-1726-xx). This manual provides information about software problems and behaviors.

MTS400 Series MPEG Test Systems Technical Reference

Specifications

This chapter contains specifications for the MTS400 Series MPEG Test Systems

All specifications are guaranteed unless labeled "typical." Typical specifications are provided for your convenience but are not guaranteed.

Unless otherwise stated, all specifications apply to both the MTS400 and MTS430 MPEG Test Systems.

To meet specifications, the following conditions must be met:

■ The system must have been calibrated/adjusted in an ambient temperature between 20 °C and 30 °C (68 °F and 86 °F).

■ The system must be kept within the environmental limits specified in this document.

■ The system must be powered from a source maintaining voltage and frequency within the limits described in this document.

■ The system must have been operating continuously for at least 20 minutes within the specified operating temperature range.

■ The instrument must have had its signal-path-compensation routine last executed after at least a 20 minute warm-up period at an ambient temperature within 5 °C of the current ambient temperature.

Any conditions that are unique to a particular characteristic are expressly stated as part of that characteristic.

NOTE. This system's product calibration classification is List 2; no calibration data reports are available. However, all measurement equipment used to establish or verify conformance of the product with published specifications is maintained traceable.

Electrical Specifications

The following tables list the published specifications for the MTS400 Series MPEG Test Systems.

Platform Characteristics Table 1-1 lists the electrical characteristics of the MTS400 Series platform.

Table 1-1: Platform characteristics

Characteristic	Description
Operating system	Microsoft Windows XP Professional with Service Pack 2
Processor	P4, 2.8 GHz
Disk space	
Operating system and software applications	82 GB, Ultra ATA100 IDE hard drive
MPEG file storage	144 GB total (two 72 GB SCSI hard drives, one for Playout and one for Record)
MPEG storage disk I/O port	SCSI-3 (Ultra 160), Micro D68 connector, 68 pin
RAM	1 GB (one SIM of DDRS memory)
CD-ROM drive	CD-R/W, DVD-R/RW, DVD+R/RW
Floppy disk drive	3.5 inch, 1.44 MB high density, double-sided (2HD)
Display	LCD, 1024 X 768, 10.4 inch
Ethernet	
10/100	One 10/100Base-T; RJ45 connector
	Supported protocol: Ethernet/IP/UDP/ MPEG-TS and VLAN
	When used in MPEG-TS protocol, the minimum and maximum link bit rates are 250 kbps and 100 Mbps respectively.
	Supported TS analysis and record only. IP playout is not supported.
10/100/1000 (GigE)	One 10/100/1000Base-T; RJ45 connector
	Supported protocol: Ethernet/IP/UDP/ MPEG-TS and VLAN
	When used in MPEG-TS protocol, the minimum and maximum link bit rates are 250 kbps and 100 Mbps respectively.
	Supported TS analysis and record only. IP playout is not supported.

Table 1‑1: Platform characteristics (Cont.)

Characteristic	Description
Keyboard port	Mini DIN, PS-2, one on the rear panel and one on the left front side panel; not hot pluggable
Mouse port	Mini DIN, PS-2; one on the rear panel and one on the left front side panel; not hot pluggable
Printer port	IEEE P1284
External VGA Output	15-pin, high density, Sub-D; resolution needs to be set to the same as the integral LCD display, 1024 x 768
COM port	RS-232
USB port	USB

A11 and A12 Main MPEG I/O Board Characteristics

The electrical characteristics listed in Table 1‑2 apply to both the A11 and A12 Main MPEG I/O boards.

Table 1‑2: A11 and A12 Main MPEG I/O board characteristics

Characteristic	Description
Internal reference clock; typical	27 MHz $\pm$ 1 ppm
	This clock is used for the following functions: output clock, PCR/PTS/DTS timing, packet operation timing, TDT/STT timing
External reference / clock input	
Input connector type	BNC, 50 Ω, AC coupled
Frequency	
External reference input	8.12698 MHz, 10 MHz, 27 MHz
External clock input	160 kHz to 25 MHz (parallel clock), 1.28 MHz to 32 MHz (serial clock)
Amplitude	
External reference input; typical	0 $\pm$ 6 dBm (peak to peak, sine wave), 0.5 V to 3.0 V (square wave)
External clock input; typical	0.5 V to 3.0 V (square wave)
External TTL trigger input	
Input connector type	BNC, 1 kΩ
Threshold level	
High level	>3.5 V (maximum voltage limit is 7.0 V)
Low level	<0.8 V
PPL	
Frequency range	64 MHz to 128 MHz
Output clock	
Maximum rate	64 MHz (serial clock), 25 MHz (parallel clock)
Internal and external 27 MHz	Output clock = $(X / (2 * Y * Z)) * 27$ MHz $512 < X < 131071, 3400 < Y < 6000, 2 <= Z <= 65536$ (second power)
External parallel clock	Output clock = 108 MHz * Y / X, $512 < X < 131071, 8 < Y < 16383$
External serial clock	Output clock = 864 MHz * Y / X, $512 < X < 131071, 8 < Y < 16383$
Output data rate	250 kbps minimum, 214 Mbps maximum
P/N and jitter (serial clock)	<-104 dBc/Hz, RBW = 300 Hz, @21.455707 MHz + 20 kHz

Table 1‑2: A11 and A12 Main MPEG I/O board characteristics (Cont.)

Characteristic	Description
DVB–SPI Interface	
Input/output configuration	Output only
Connector type	D-sub, 25-pin
Data rate	250 kbps to 108 Mbps (107 Mbps maximum in duplex mode)
Pin assignment	1 DCLK 2 Ground 3 to10 DATA 7 to 0 11 DVALID 12 PSYNC 13 Shield 14 /DCLK 15 Ground 16 to 23 /DATA 7 to 0 24 /DVALID 25 /PSYNC
Output amplitude; typical	240 mV to 550 mV (BUS LVDS with 100 Ω termination)
Output offset	1.1 V to 1.5 V
Output impedance	100 Ω, between differential outputs with output off
Data delay	$\pm$ 5 ns from DCLK falling edge
Input level	>200 mVpp, (RI+)–(RI-) with 100 Ω termination
Data hold time	T/2 $\pm$ T/10, T=1/f, data latch on DCLK rising edge

**A170
LVDS/ASI/SMPTE310M
Interface Board**

Table 1-3 lists the electrical characteristics of the A170 LVDS/ASI/
SMPTE310M Interface board.

Table 1-3: A170 LVDS/ASI/SMPTE310M Interface board characteristics

Characteristic	Description
Internal reference clock; typical	27 MHz $\pm$ 1 ppm
ASI interface	
Connector type	BNC (common connector with SMPTE310M interface)
Bit rate	250 kbps to 214 Mbps (107 Mbps maximum in duplex mode)
Output	
Output impedance	75 Ω transformer coupled
Voltage	800 mV $\pm$ 10% into 75 Ω load
Jitter	$\leq$ 0.2 UI
Maximum rise/fall time	$\leq$ 1.2 ns, 20% to 80%
Return loss; typical	>17 dB (5 MHz to 270 MHz) into 75 Ω load
Transmission format	Packet mode or Burst mode
Input	
Input impedance	75 Ω transformer coupled
Voltage	200 mV to 880 mV (maximum limit: 3 V_{pp} @AC, 15 mA @DC)
Data format	Accepts both Packet mode and Burst mode ASI signals
Return loss; typical	>17 dB (5 MHz to 270 MHz) into 75 Ω load
SMPTE310M interface	
Connector type	BNC (common connector with ASI interface)
Bit rate	19,392,658.5 bps
Output	
Output impedance	75 Ω transformer coupled
Voltage	800 mV $\pm$ 10% into 75 Ω load
Jitter; typical	<2 ns p-p logic 0 rising edge when triggered on negative edge (EN50083-9.1998 Figure A.4)
	<1.4 ns p-p logic 1 rising edge when triggered on negative edge (EN50083-9.1998 Figure A.5)
Rise/fall time	0.4 ns $\leq$ X $\leq$ 5 ns, 20% to 80%
Return loss; typical	>30 dB (5 MHz to 38.785316 MHz) into 75 Ω load

Table 1‑3: A170 LVDS/ASI/SMPTE310M Interface board characteristics (Cont.)

Characteristic	Description
SMPTE310M interface (cont.)	
Input	
Input impedance	75 Ω transformer coupled
Voltage	200 mV to 880 mV (maximum limit: 3 V_{pp} @AC, 15 mA @DC)
Data format	Bi-phase coded, compliant with SMPTE310M
Input bit rate	19,392,658.5 bps
Return loss; typical	>17 dB (5 MHz to 38.785316 MHz) into 75 Ω load
DVB–SPI Interface	
Input/output configuration	Input only
Connector type	D-sub, 25-pin
Data rate	250 kbps to 108 Mbps (107 Mbps maximum in duplex mode)
Pin assignment	1 DCLK 2 Ground 3 to10 DATA 7 to 0 11 DVALID 12 PSYNC 13 Shield 14 /DCLK 15 Ground 16 to 23 /DATA 7 to 0 24 /DVALID 25 /PSYNC
Data delay	± 5 ns from DCLK falling edge
Input level	>200 mVpp, (RI+)–(RI–) with 100 Ω termination
Input impedance	100 Ω, between differential inputs
Clock pulse width	T/2 ± T/10, T=1/f (f = byte clock frequency)
Data hold time	T/2 ± T/10, T=1/f, data latch on DCLK rising edge

AC Power Source Characteristics

Table 1-4 lists the electrical AC power source characteristics.

Table 1- 4: AC power source characteristics

Characteristic	Description
Source voltage	100 to 240 VAC $\pm$ 10% (90 to 264 VAC RMS)
Frequency range	50/60 Hz
Power consumption	4 A maximum (marked on rear panel)
Peak inrush current	13 A peak at 240 VAC, 50 Hz
Mains fuse value	T6.3AH, 250 V, Fast; not operator replaceable. Refer servicing to qualified service personnel.

Mechanical Characteristics

Table 1-5 lists the mechanical characteristics of the MTS400 Series platform.

Table 1- 5: Mechanical characteristics

Characteristic	Description
Classification	Fixed location benchtop
Cooling airflow	Intake is from the front and sides of the instrument. Exhaust is to the bottom and rear of the instrument. For proper cooling, at least two inches (5.1 cm) of clearance is needed on the rear and sides of the instrument cabinet.
Overall dimensions	Height 226 mm (8.9 in), without bottom feet Width: 432 mm (17 in) Depth: 560 mm (22 in), with rear feet
Weight	15.5 kg (34 lb)
Shipping weight	27 kg (59.5 lb)

Environmental Characteristics

Table 1–6 lists the environmental characteristics of the MTS400 Series platform.

Table 1‑6: Environmental characteristics

Characteristic	Description
Atmospherics	
Temperature	
Operating	+5 °C to +40 °C, 30 °C per hour maximum gradient; temperature of the intake air at the front and sides of the instrument
Non-operating	–20 °C to +60 °C, 30 °C per hour maximum gradient
Humidity	
Operating	10% to 80% relative humidity up to 31 °C. Above 31 °C, derate linearly to 50% at 40 °C
Non-operating	10% to 95% relative humidity, non-condensing
Altitude	
Operating	0 to 3000 m (9800 ft)
Non-operating	0 to 12,000 m (40,000 ft)
Dynamics	
Random vibration	
Operating	0.27 g_{rms} total from 5 to 500 Hz
Non-operating	2.28 g_{rms} total from 5 to 500 Hz
Sine vibration, operating	0.013 inch peak-to-peak displacement 5 to 55 Hz
Functional shock, non-operating	20 g, 11 ms half-sine
Transportation package material	Transportation Package material meets recycling criteria as described in Environmental Guidelines for Package Design (Tektronix 063-1290-00) and Environmentally Responsible Packaging Handbook (Tektronix 063-1302-00).

Certifications and Compliances

Table 1–7 lists the certifications and compliances that apply to the MTS400 Series instrument.

Table 1-7: Certifications and compliances

Category	Standards or description
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
	EN 61000-3-3 Flicker
Australia / New Zealand Declaration of Conformity – EMC	Complies with EMC provision of Radiocommunications Act per the following standard(s):
	AS/NZS 2064.1/2 Industrial, Scientific, and Medical Equipment: 1992
FCC	Emissions are within FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A limits
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
	EN 61010-1 : 2001 Safety requirements for electrical equipment for measurement control and laboratory use.
U.S. Nationally Recognized Testing Laboratory Listing	UL61010B-1 : 2003 Equipment for measurement use.
Canadian Certification	CAN/CSA C22.2 No. 1010.1 : 1992 and No. 1010.1 : 1997
	Safety requirements for electrical equipment for measurement, control, and laboratory use.
Additional Compliance	ANSI/ISA S82.02.01:1999 Safety standard for electrical and electronic test, measuring, controlling, and related equipment.
	IEC61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use.

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

Table 1‑7: Certifications and compliances (cont.)

Category	Standards or description
Installation (Overvoltage) Category Descriptions	Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:
	CAT III Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location.
	CAT II Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected.
	CAT I Secondary (signal level) or battery operated circuits of electronic equipment.
Overvoltage Category	Overvoltage Category II (as defined in IEC 61010-1)
Pollution Degree Descriptions	A measure of the contaminates 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	Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor use only.
Equipment Type	Test and measuring
Safety Class	Class 1 (as defined in IEC 61010-1) – grounded product

Performance Verification

The procedures in this section allow you to verify the performance of the following MTS400 Series MPEG Test System components:

- ASI, SMPTE310M, and SPI signal interfaces

- MPEG Player (play and record functions)

- TS Compliance Analyzer

Preparation

Before you begin the *Performance Verification* procedures, perform the following steps:

- Ensure that the procedures are performed only by qualified service personnel who have read the *General Safety Summary* at the front of this manual.

- Ensure that the service personnel are familiar with system operation (refer to the *MTS400 Series MPEG Test System Getting Started Manual*).

Required Equipment

The following equipment is required to perform the verification procedures:

- 75 Ω BNC-to-BNC cable (quantity of one)
  Tektronix part number 174-4954-00

- DB25-to-DB25 cable (quantity of one)
  Tektronix part number 174-4955-00

- A copy of the "sym1.mpg" transport stream file on the E:\ drive of the MTS400 Series system being tested.

NOTE. The "sym1.mpg" transport stream file is supplied with every instrument in the following directory: E:\Test Streams.

If this file has been deleted from the E:\ drive of the instrument, you will need to copy this file from the MTS400 Series MPEG Test System Recovery CD-ROM *(Tektronix part number 063-3851-xx) to the E:\ drive of the instrument to be able to perform these procedures. This CD-ROM is supplied as a standard accessory with the MTS400 Series system.*

Preparing the Instrument   Perform the following steps to prepare the instrument to be tested:

1. Make sure the dongle is securely installed on the parallel port.

2. Connect the keyboard and mouse to the appropriate side panel or rear panel connectors.

3. Connect the power cord to the rear-panel power input connector.

4. Make the following cable connections on the instrument (see Figure 2–1):

    ■ Connect the 75 Ω BNC-to-BNC cable between the ASI/SMPTE In connector and the ASI/SMPTE Out connector.

    ■ Connect the DB25-to-DB25 cable between the DVB/SPI In connector and the DVB/SPI Out connector.

5. Power on the MTS400 Series system by pushing the front panel ON/STBY switch.

6. After the Windows XP desktop appears, launch Windows Explorer from the Start menu.

7. Use Windows Explorer to locate the transport stream file named "sym1.mpg" in the E:\Test Streams directory. All instruments are shipped with this file.

8. Perform the following steps if the sym1.mpg transport stream file has been deleted from the instrument:

    a. Insert the *MTS400 Series MPEG Test System Recovery CD-ROM* into the DVD drive of the MTS400 Series system.

    b. Use Windows Explorer to copy the transport stream file named "sym1.mpg" from the CD-ROM to a location on the E:\ drive of the MTS400 Series system.

9. Close Windows Explorer.
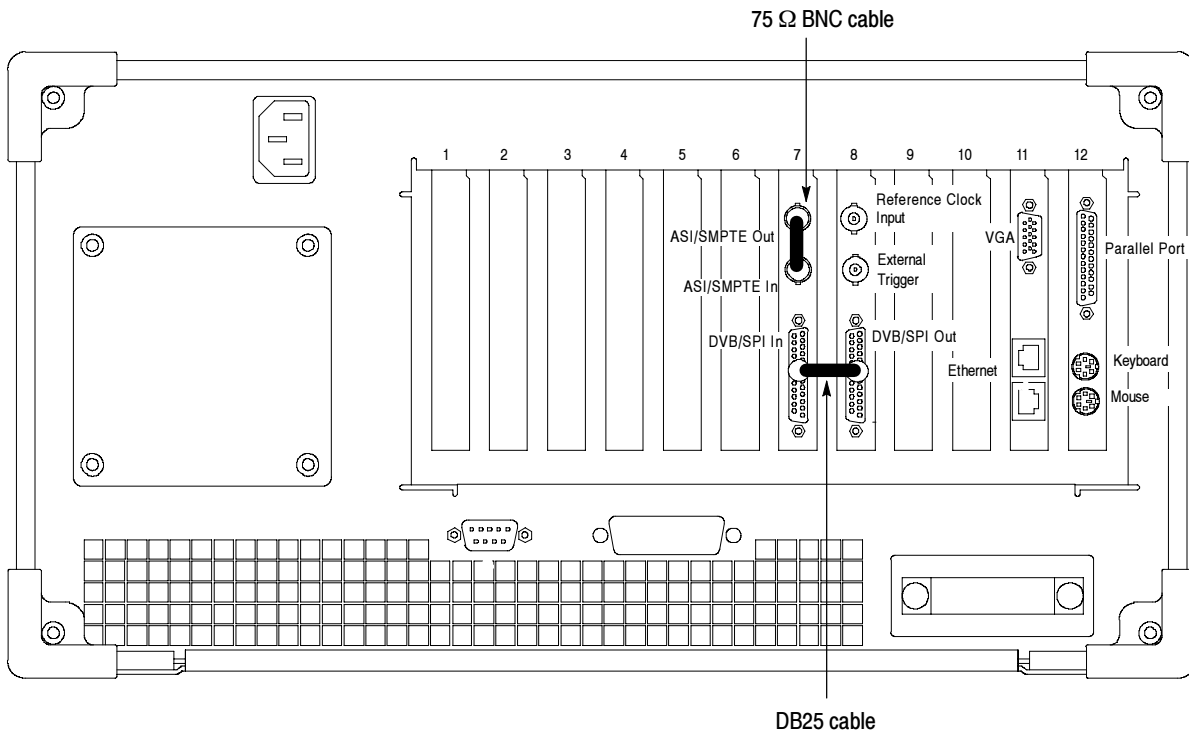
Figure 2-1: Cable connections on the MTS400 Series system

Verification Procedures

Perform the following steps to verify that the MTS400 Series system is operating properly. The steps are written with the assumption that you are performing all of the steps in order. If you start the procedures in the middle, you will have to review previous steps for instrument set up.

Verifying the ASI Interface

1. Start the MPEG Player by double clicking the MPEG Player icon on the desktop.

2. Make the following changes in the SPI/ASI/310M menu:

   a. Click BNC Port and then click ASI.

   b. Click ASI Format and then click Byte.

NOTE. *In the SPI/ASI/310M menu, you do not need to make any setting changes to the Through Out parameter.*

---

3. Use the File menu to select the transport stream file to play:

    a. Click Open... to display the Open dialog box.

    b. Use the Open dialog box to navigate to the E:\ drive directory where the transport stream file named "sym1.mpg" is located.

    c. Select the sym1.mpg file, and then click Open to close the Open dialog box. The transport stream file name (sym1) will appear in the title of the MPEG Player window.

4. In the Play menu, verify that the Packet Size is set to 188.

NOTE. *In the MPEG Player menus, a check mark appears next to the selected setting for some menu parameters.*

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5. In the Play menu, click Clock... to open the Clock dialog box shown in Figure 2-2.

    a. Click Internal to set the Clock Source to internal.

    b. Verify that the Data Rate is set to 41.470998 Mbps as shown in Figure 2-2.

    c. If necessary, click the Fixed ES Rate box so that a check mark appears in the box.

    d. Click OK to close the Clock dialog box.
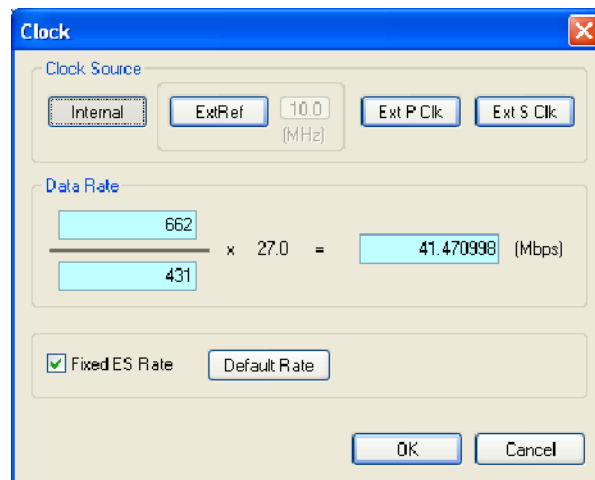
Figure 2-2: Clock dialog box settings

6. In the Play menu, click Update and then click On.

7. In the Play menu, click Sync and then click TS Packet.

8. In the Play menu, click PCR Initial Value... to open the dialog box shown in Figure 2--3.

    a. Enter 0 in the Base Value entry box.

    b. Enter 0 in the Extension Value entry box.

    c. Click OK to close the PCR Initial Value dialog box.
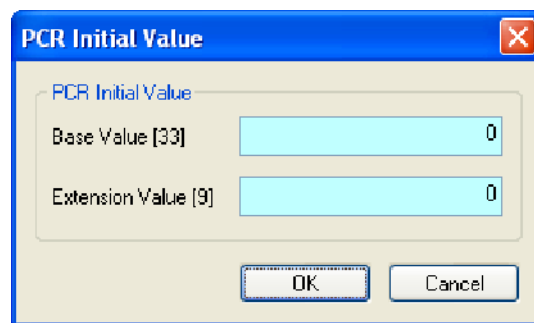
**Figure 2--3: PCR Initial Value dialog box settings**

9. In the Play menu, click Source and then click Disk.

10. In the Play menu, click Loop and then click On.

11. In the Play menu, click Auto Play and then click Off.

NOTE. *In the Play menu, you do not need to make any setting changes to the Start/Stop parameters or for the Timer Play parameters.*

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12. In the Play menu, click Other... to open the Others dialog box shown in Figure 2‑4.

   a. Use the Standard drop down box to select DVB.

   b. Use the Numeric drop down box to select Hex.

   c. The Ext Play Start setting does not matter.

   d. Click on the SPI Output Enable box until a check mark appears.

   e. Click Update to open the Select Update Item dialog box shown in Figure 2‑4.

   ■ Click on Continuity Counter until a check mark appears.

   ■ Click on PCR/PTS/DTS until a check mark appears.

   ■ TDS/TOT/STT until a check mark appears.

   ■ Click on NPT until no check mark appears.

   ■ Click on Reed Solomon until no check mark appears.

   ■ Use the Update Method drop down box to select Hardware.

   ■ Click OK to close the Select Update Item dialog box.

   f. Click OK to close the Others dialog box.
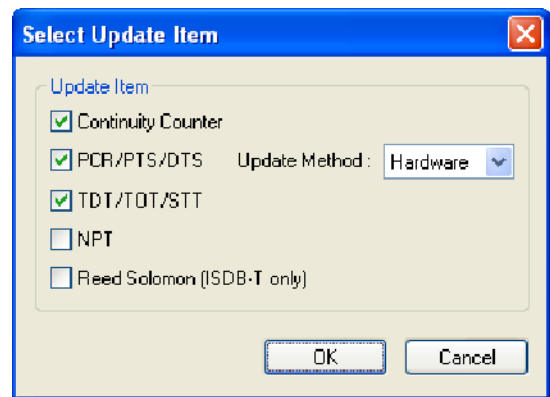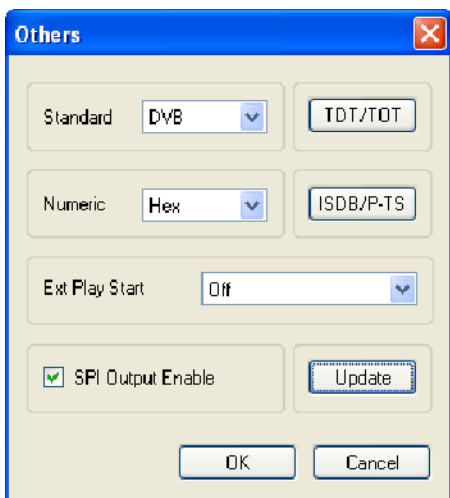
Figure 2‑ 4: Others dialog box settings and Select Update Item dialog box settings

13. Start the TS Compliance Analyzer by double clicking the icon on the desktop.

14. In the MPEG Player tool bar, click the green Play arrow to start playing the transport stream file.

15. In the Open Transport Stream window, click Stream Interpretation.

16. Make the following setting changes in the Stream Interpretation display (see Figure 2-5).

    a. Select DVB as the Base Standard.

    b. Select No Extensions as the Region.
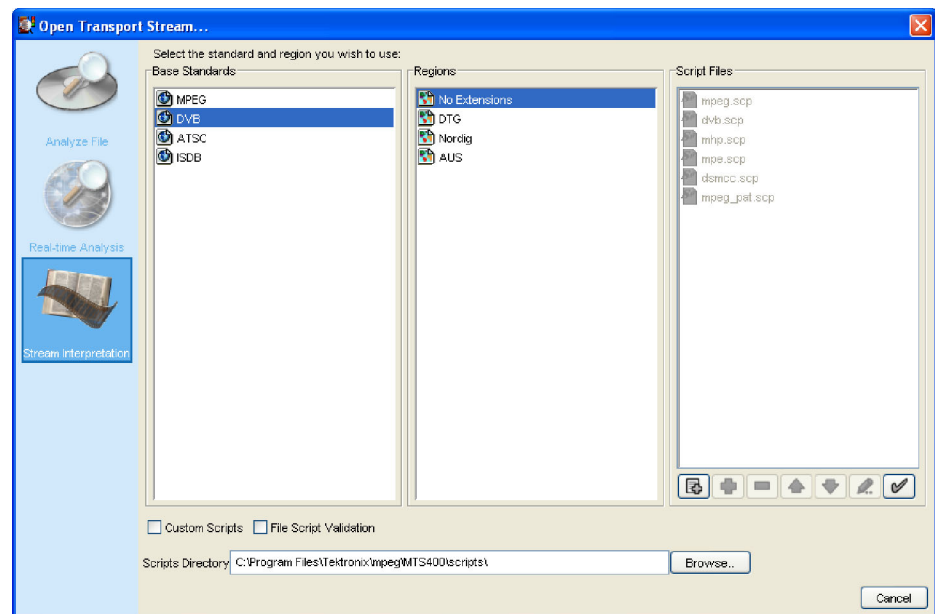
Figure 2-5: Steam Interpretation display in the Open Transport Stream window

17. In the Open Transport Stream window, click Real Time Analysis.

18. Make the following setting changes in the Real Time Analysis display (see Figure 2-6).

    a. In the Interfaces drop-down box, select ASI.

    b. In the Interfaces Settings section, click on the Time Stamping box until a check mark appears.
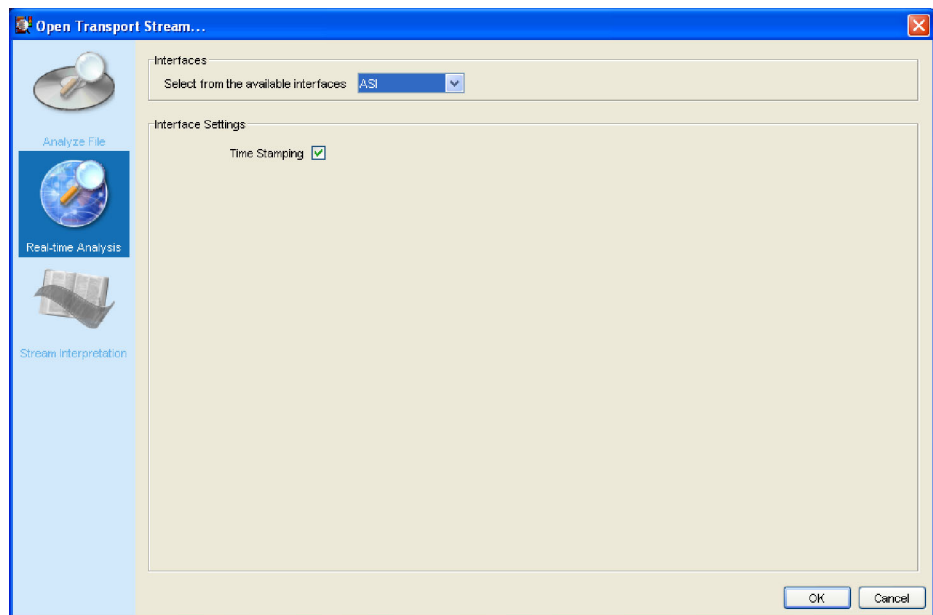
**Figure 2-6: Real Time Analysis display in the Open Transport Stream window**

19. Click OK to close the Open Transport Stream window.

20. After a few seconds, the TS Compliance Analyzer window opens with the analysis results of the ASI transport stream (see Figure 2-7).

21. Verify the following in the analyzer window:

- The TS Availability and Sync indicators at the bottom left of the analyzer window are green.

- The bit rate readout at the bottom of the window reads 41.471 Mbps.

NOTE. It is normal if indicators other than the TS Availability and Sync turn red. This merely indicates that the software is operating and has detected errors in the transport stream.
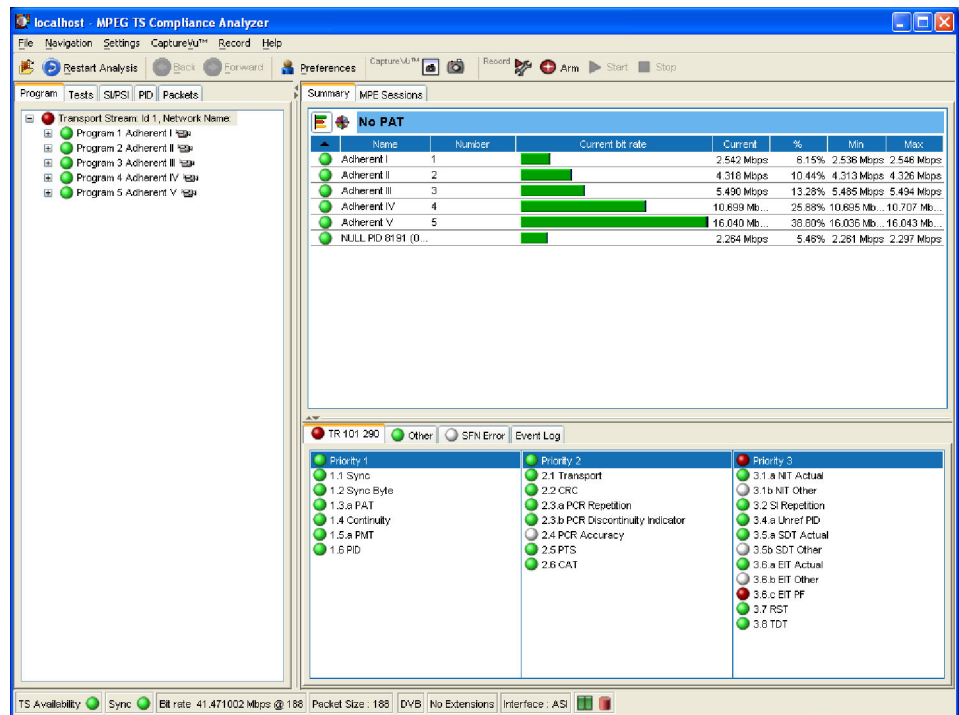

Figure 2-7: ASI interface analysis results

Verifying the MPEG Record Function

22. In the Record menu of the TS Compliance Analyzer, click Record Settings to open the dialog box shown in Figure 2-8. Make the following setting changes in the dialog box:

   a. Click on the ellipse box at the far right of the Path entry box to open the Set Recording Name window.

   b. In the Set Recording Name window, navigate to the F:\ drive on the MTS400 Series system.

   c. In the file name box, enter the following file name:

   record test.mpeg

   d. Click Save to close the Set Recording Name window.

   e. In Record Settings window, enter 300 in the File Size entry box.

   f. Select Manual as the Trigger type (a green dot appears next to the selected trigger type).

   g. Click on the "Activate this dialog when recording starts" box until a check mark appears.
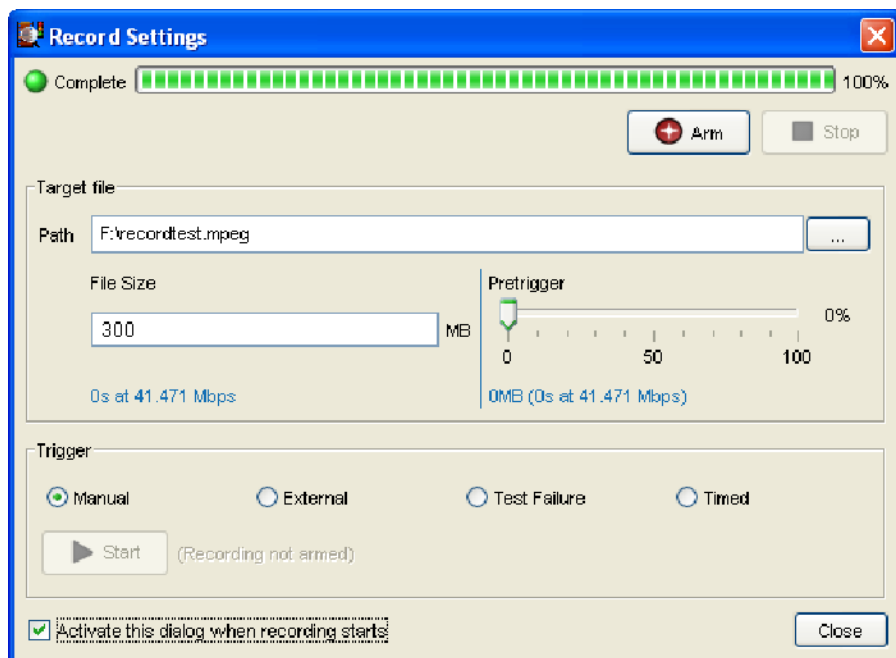
Figure 2-8: Record Settings dialog box

23. Click the Arm button. A red message appears in the Record Settings window stating that the recording function is armed (see Figure 2‑9).
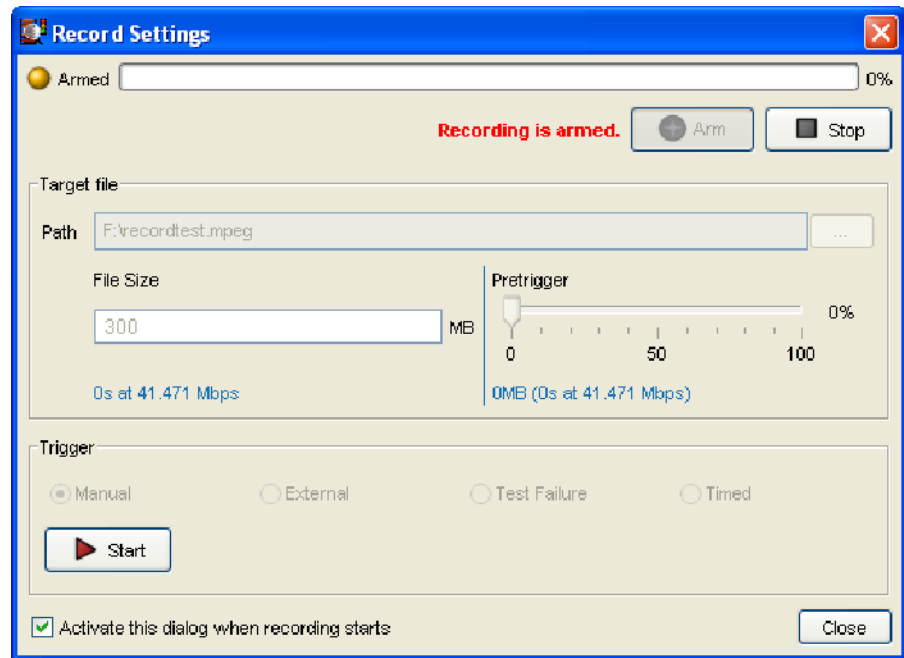
Figure 2‑9: Record Settings window with the recording function armed

24. Click the Start button. A red message appears in the Record Settings window stating that the recording is currently in progress.

25. Observe the green bar showing the recording progress across the top of the window. The recording should take about 30 seconds to complete. When the recording is done, the progress bar says "Complete" as shown in Figure 2‑8.

26. After the recording is finished, click Close to close the Record Settings window.

27. Perform the following steps to verify that the transport stream file was recorded to the F:\ drive of the instrument:

    a. In the Record menu of the TS Compliance Analyzer, click Record Settings to open the dialog box shown in Figure 2–8 on page 2-10.

    b. Click on the ellipse box at the far right of the Path entry box to open the Set Recording Name window.

    c. In the Set Recording Name window, use the up arrow to navigate to the F:\ drive on the MTS400 Series system.

    d. Verify that the following file name appears:

        record test.mpeg

    e. Click Cancel to close the Set Recording Name window.

    f. Click Close to close the Record Settings window.

28. Close the TS Compliance Analyzer by clicking Exit in the File menu.

Verifying the SMPTE310M Interface

29. In the MPEG Player window, stop the player by clicking on the black Stop button on the tool bar.

30. In the SPI/ASI/310M menu, click BNC Port and then click 310M 8VSB.

31. Start the TS Compliance Analyzer by double clicking the [TS Compliance Analyser] icon on the desktop.

32. In the MPEG Player tool bar, click the green Play arrow to start playing the transport stream file.

33. Verify that the TS rate displayed at the bottom of the MPEG Player window displays the SMPTE310M rate of 19.392658 Mbps (see Figure 2–10).
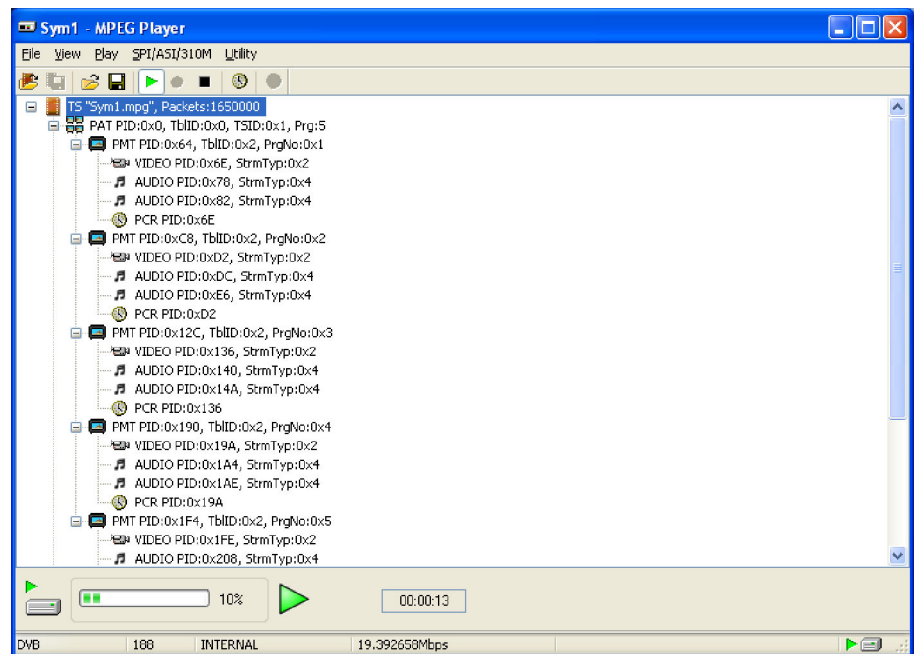

Figure 2‑10: MPEG Player playing a SMPTE310M transport stream

34. In the Open Transport Stream window, click Real Time Analysis.

35. In the Interfaces drop-down box, select SMPTE.

36. Click OK to close the Open Transport Stream window.

37. After a few seconds, the TS Compliance Analyzer window opens with the analysis results of the SMPTE310M transport stream (see Figure 2‑11).

38. Verify the following in the analyzer window:

- The TS Availability and Sync indicators at the bottom left of the analyzer window are green.

- The bit rate readout at the bottom of the window reads 19.393 Mbps.

NOTE. *It is normal if indicators other than the TS Availability and Sync turn red. This merely indicates that the software is operating and has detected errors in the transport stream.*

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39. Close the TS Compliance Analyzer by clicking Exit in the File menu.
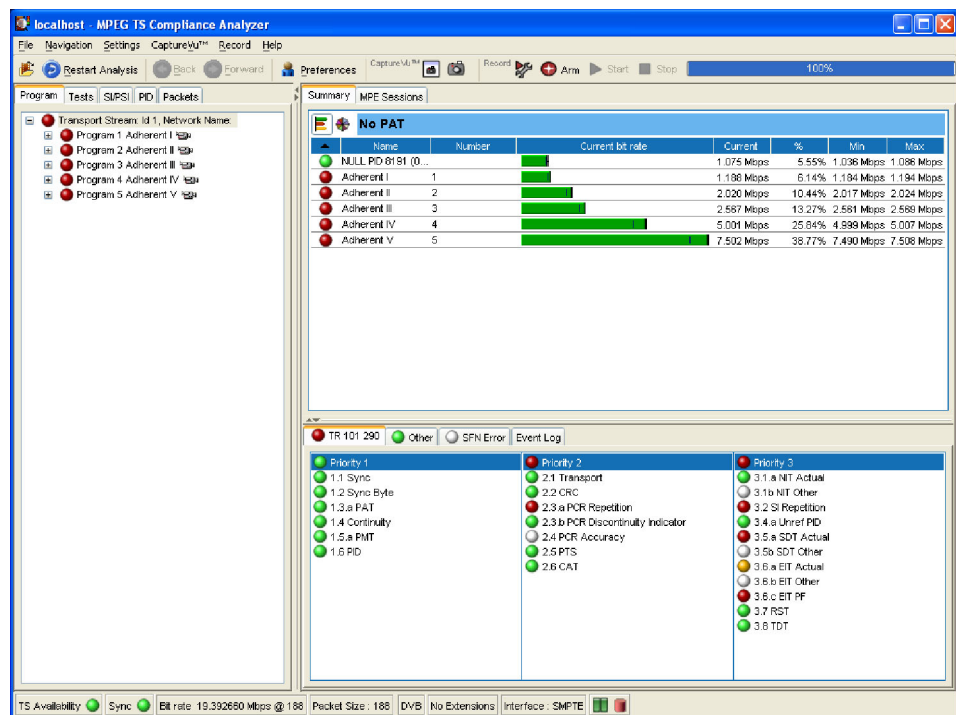

Figure 2‑11: SMPTE310M interface analysis results

Verifying the SPI Interface

40. In the MPEG Player window, stop the player by clicking on the black Stop button on the tool bar.

41. Start the TS Compliance Analyzer by double clicking the icon on the desktop.

42. In the MPEG Player tool bar, click the green Play arrow to start playing the transport stream file.

43. In the Open Transport Stream window, click Real Time Analysis.

44. In the Interfaces drop-down box, select DVB Parallel.

45. Click OK to close the Open Transport Stream window.

46. After a few seconds, the TS Compliance Analyzer window opens with the analysis results of the SPI transport stream (see Figure 2-12).

47. Verify the following in the analyzer window:

   ■ The TS Availability and Sync indicators at the bottom left of the analyzer window are green.

   ■ The bit rate readout at the bottom of the window reads 19.393 Mbps.

NOTE. *It is normal if indicators other than the TS Availability and Sync turn red. This merely indicates that the software is operating and has detected errors in the transport stream.*

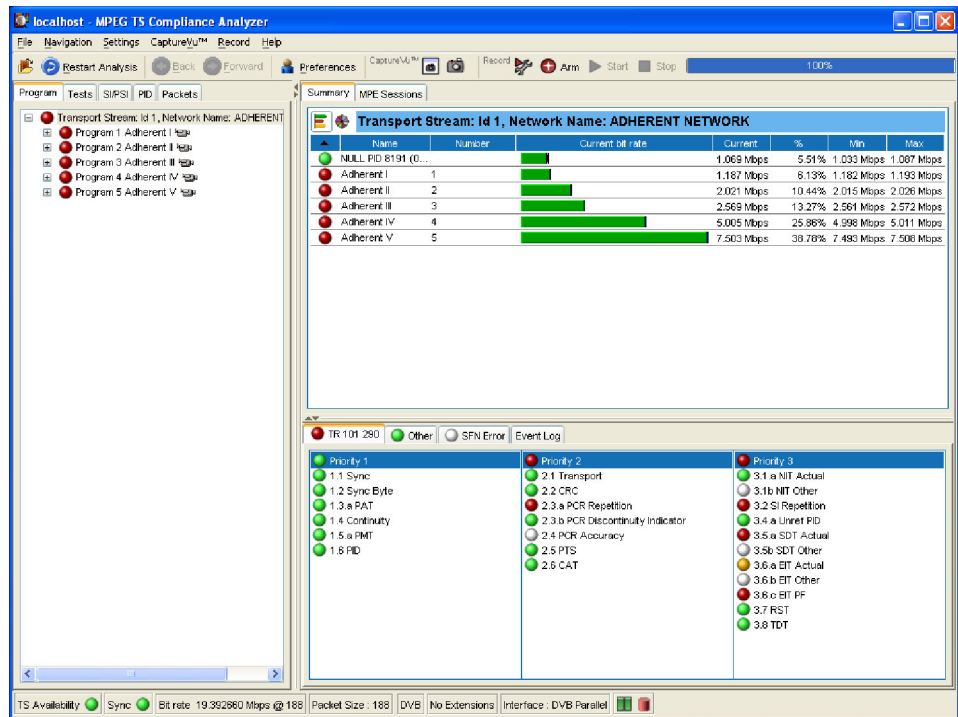48. Close the TS Compliance Analyzer by clicking Exit in the File menu.

Figure 2- 12: SPI interface analysis results

Shutting Down the Instrument

49. After you have checked the SPI interface, you have completed the Performance Verification procedures. Perform the following steps to power down the instrument:

    a. Select Shutdown from the Start menu. After the instrument shuts down, you will see a message saying its safe to turn off the instrument.

    b. Use the front-panel power switch to turn the instrument off.

    c. Remove the two signal cables from the rear panel of the instrument.

    d. Remove the power cord from the instrument.

■■ **End of document** ■■