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Technical Reference

Tektronix

AD951A & AD953A
MPEG Test System
Specifications and Performance Verification

071-1425-00

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 same type and rating.

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.*

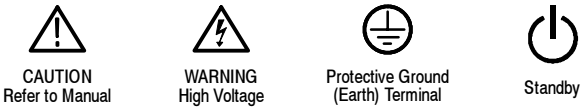
Terms on the Product. These terms may appear on the product:

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:



Specifications

This chapter contains specifications for the AD951A and AD953A MPEG Test Systems

All specifications are guaranteed unless labeled “typical.” Typical specifications are provided for your convenience but are not guaranteed. Specifications marked with the ✓ symbol are verified in the *Performance Verification* section.

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.

***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.*

Related Manuals

The following manuals are also available to use with the AD951A and AD953A MPEG Test Systems. These manuals are shipped with each system, and are also available on the Tektronix Web site.

- *AD951A & AD953A MPEG Test System Getting Started Manual*, 071-1422-xx, which provides system installation and operating instructions.
- *AD951A & AD953A MPEG Test System User Manual*, 071-1423-xx, which provides detailed reference information about the system.

Product Description

The AD951A or AD953A MPEG Test Systems are MPEG Test Systems that play, record and multiplex MPEG-2 Transport Streams. The AD953A also includes a protocol analyzer capable of analyzing transport streams in MPEG-2, DVB, ATSC and ISDB environments. With the addition of Option RM, the systems can be rack mounted.

AD953A System

The base AD953A system includes one MIC card and one SCSI hard drive for MPEG file storage. The base system includes the following software:

- Record and Play
- MUX
- Make seamless
- Cutter
- Maker
- Editor
- TSA
- PES and Buffer Analysis
- Monitor Plus

AD951A System

The AD951A system is in the same physical platform as the AD953A and also has one MIC card and one SCSI hard drive for MPEG file storage. The base system includes the following software:

- Record and Play
- MUX
- Make seamless
- Cutter
- Maker
- Editor

Options

Several software and hardware options can be purchased to add functionality to the system. For a complete list of options, refer to the *AD951A & AD953A MPEG Test System Getting Started Manual*.

Electrical Specifications

Table 1-1: Platform characteristics

Characteristic	Description
Operating system	Microsoft Windows NT 4.0, Service pack 6a
Processor	P4, 2.53 GHz minimum
Disk space	
Operating system and software applications	80 GB, IDE hard drive
MPEG file storage	
With one MIC card installed With two MIC cards installed	36 GB, one SCSI hard drive 72 GB, two SCSI hard drives
MPEG storage disk I/O Port	SCSI-3, Micro D68 connector, 68 pin
RAM	1 GB
CD-ROM drive	DVD-R only / CD-R/W
Floppy disk drive	3.5 in, 1.44 MB high density double-sided (2HD)
Display	LCD, 1024 X 768, 10.4 inches
Ethernet	One 10/100-base T; RJ45 connector and one 10/100/1000-base T; RJ45 connector
Keyboard port	Mini DIN, PS-2, one on the rear and one on the left front side.
Mouse port	Mini DIN, PS-2, one on the rear and one on the left front side.
Printer port	IEEE P1284
EXT VGA Output	15-pin, high density, Sub-D
COM port	RS-232

MIC Board Characteristics

Table 1-2: Pin allocation of the 15 pin I/O connector

Characteristic	Description
Pin 1	Ground
Pin 2	External Clock Input +
Pin 3	Not used
Pin 4	Precision Clock Output –
Pin 5	Not used
Pin 6	Trigger Output
Pin 7	Ground
Pin 9	External Clock Input –
Pin 10	Ground
Pin 11	Precision Clock Output +
Pin 12	Not used
Pin 13	Not used
Pin 14	Trigger Input
Pin 15	Not used

Table 1-3: Precision clock output characteristics

Characteristic	Description
Frequency range	31.25 kHz minimum 12.5 MHz maximum
Resolution	1 bps
≠ Accuracy	±1 ppm above 2.5 Mbps ±2 ppm below 2.5 Mbps
Drift, typical	±1 ppm per year maximum typical. Can be adjusted to remove the drift.
Signal level at BNC output	1.045 V minimum 1.155 V maximum Into 50 Ω load
Signal level at 15-pin sub D connector	LVDS levels into 100 Ω differential load

Table 1-4: External clock input characteristics

Characteristic	Description
Frequency	31.25 kHz minimum 90 MHz maximum
Duty cycle	50%-50% nominal 45%-55% maximum
Signal level of BNC input	200 mV minimum 5.0 V maximum Triggers on falling edge Minimum slope of 7.5 V/ μs
Input impedance of BNC input	50 Ω AC coupled
Signal level of 15 pin sub D-connector clock input	200 mV_{p-p} minimum 2.4 V_{p-p} maximum LVDS levels
Input impedance of 15 pin sub D-connector clock input	100 Ω differential

Table 1-5: Trigger input/output characteristics

Characteristic	Description
Input signal level	VIL: 0 V minimum, 0.8 V maximum VIH: 2.4 V minimum, 5 V maximum
Output signal level	VIL: 0 V minimum, 0.8 V maximum VIH: 2.4 V minimum, 5 V maximum

Table 1-6: DVB parallel interface characteristics

Characteristic	Description
DVB Parallel Input	
Connector	D-25
✓ Transport stream rate	250 kbps minimum 90 Mbps maximum
Packet length	188 and 204 byte
Physical interface type	LVDS
Signal amplitude	5.0 V_{p-p} maximum differential 200 mV_{p-p} minimum differential
Termination	100 Ω line to line of differential pair
Clock period for recording	85 ns minimum 100 μs maximum
DVB Parallel Output	
Connector	D-25
Physical interface type	LVDS
Signal amplitude, typical	600 mV typical, differential into 100 Ω load 5.0 V maximum differential

ASI Interface Card Characteristics

Table 1-7: ASI input

Characteristic	Description
Connector	BNC
Link rate	270 Mbaud ± 100 ppm
⌿ Transport stream rate	250 kpbs minimum 90 Mbps maximum
Data format	ASI format: accepts both burst and packet mode M2S (DIVICOM)
Signal amplitude	200 mV_{p-p} minimum 2.0 V_{p-p} maximum
Termination	75 Ω nominal, transformer coupled

Table 1-8: ASI output

Characteristic	Description
Connector	BNC
Impedance	75 Ω nominal, transformer coupled
⌿ Transport stream rate	250 kpbs minimum 90 Mbps maximum
Signal amplitude	720 mV_{p-p} minimum 880 V_{p-p} maximum Into 75 Ω load

GPSI Interface Card Characteristics

Table 1-9: SMPTE310M input

Characteristic	Description
Connector	BNC
Termination	75 Ω, transformer coupled
Data format	Bi-phase coded Compliant with SMPTE310M
Input bit rate	1 Mbps minimum 44 Mbps maximum
Signal amplitude	200 mV_{p-p} minimum 5.0 V_{p-p} maximum

Table 1-10: SMPTE310M output

Characteristic	Description
Connector	BNC
Output impedance	75 Ω, transformer coupled
Output bit rate	Adjustable from 1 Mbps to 44 Mbps
When set for 8VSB	19,392,658.46 bps ± 2.8 ppm
When set for 16VSB	38,785,316.92 bps ± 2.8 ppm
Signal amplitude	800 mV_{p-p} nominal 1.0 V_{p-p} maximum Into 75 Ω load

Table 1-11: SSI input

Characteristic	Description
Connector	BNC
Termination	75 Ω, transformer coupled
Data format	Bi-phase coded NRZ data
✓ Input bit rate	1 Mbps minimum 44 Mbps maximum
Signal amplitude	200 mV_{p-p} minimum 5.0 V_{p-p} maximum

Table 1-12: SSI output

Characteristic	Description
Connector	BNC
Output impedance	75 Ω, transformer coupled
↙ Output bit rate	1 Mbps minimum 44 Mbps maximum
Signal amplitude	800 mV_{p-p} nominal 1.0 V_{p-p} maximum Into 75 Ω load

Table 1-13: RS422/RS485 input

Characteristic	Description
Data format	NRZ
Termination	120 Ω line to line of differential pair
Input bit rate	1 Mbps minimum 40 Mbps maximum
Signal amplitude	200 mV_{p-p} minimum differential 10.0 V_{p-p} maximum differential

Table 1-14: RS422/RS485 output

Characteristic	Description
Data format	NRZ
Output impedance	120 Ω line to line of differential pair
Output bit rate	1 Mbps minimum 40 Mbps maximum
Signal amplitude	600 mV_{p-p} nominal 5.0 V_{p-p} maximum Into 120 Ω differential load

Table 1-15: ECL input

Characteristic	Description
Data format	NRZ
Coupling	Can be configured to be AC or DC coupled
⩘ Input bit rate	1 Mbps minimum 50 Mbps maximum
Signal amplitude	200 mV_{p-p} minimum 5.0 V_{p-p} maximum

Table 1-16: ECL output

Characteristic	Description
Data format	NRZ
Coupling	Can be configured to be AC or DC coupled
⩘ Output bit rate	1 Mbps minimum 50 Mbps maximum
Signal amplitude	800 mV_{p-p} nominal 1.0 V_{p-p} maximum

Table 1-17: DHEI input

Characteristic	Description
Data format	NRZ
Coupling	DC coupled, differential pair, ECL levels
Input bit rate	1 Mbps minimum 50 Mbps maximum
Signal amplitude	200 mV_{p-p} minimum 5.0 V_{p-p} maximum

Table 1-18: DHEI output

Characteristic	Description
Data format	NRZ
Coupling	DC coupled, differential pair, ECL levels
Output bit rate	1 Mbps minimum 50 Mbps maximum 48 Mbps maximum when using external clock
Signal amplitude	800 mV_{p-p} nominal

AC Power Source Characteristics

Table 1-19: AC power source characteristics

Characteristic	Description
Source voltage	100 to 240 VAC ±10% (90 to 264 VAC RMS)
Frequency range	50/60 Hz
Power consumption	4 Amps maximum 105 watts typical 120 watts typical with Option DU installed
Peak inrush current	13 Amp at 240 VAC, 50 Hz
Mains fuse value	T6.3AH, 250V, Fast; Not operator replaceable. Refer servicing to qualified service personnel.

Mechanical Characteristics

Table 1-20: Mechanical characteristics

Characteristic	Description
Classification	Fixed location benchtop or rack-mounted use.
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 1-21: Atmospherics

Characteristic	Description
Temperature	
Operating	5 °C to 40 °C, 30 °C per hour maximum gradient
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)

Table 1-22: Dynamics

Characteristic	Description
Random vibration	
Operating	0.27 grms total from 5 to 500 Hz
Non-operating	2.28 grms 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

Table 1-23: Transportation and storage in the shipping container

Characteristic	Description
Transportation package material	Transportation package material meets recycling criteria as described in Environmental Guidelines for Package Design (Tektronix part number 063-1290-00) and Environmentally Responsible Packaging Handbook (Tektronix part number 063-1302-00).

Certificates and Compliances

Table 1-24: 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
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. 1010.1B : 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.
	IEC61010-1:2000	Safety requirements for electrical equipment for measurement, control, and laboratory use.
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.

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

Table 1-24: Certifications and compliances (cont.)

Category	Standards or description	
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

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

Preparation

- 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 *AD951A & AD953A MPEG Test System Getting Started Manual*).

Required Equipment

- A test system (can be either one of these two systems):
  - AD953A with options ASPT, GPPC, and DU installed
  - AD953 with ASPT, GPPC, and DU installed
- 75 Ω BNC-to-BNC cable (quantity of four)
  Tektronix part number 174-4954-00
- DB25 to DB25 cable (quantity of four)
  Tektronix part number 174-4955-00

Connect the Systems

Connect the following on both the test system and the system under test:

1. Make sure the dongle is securely installed on the parallel port.
2. Connect the keyboard to the side or rear panel keyboard connector.
3. Connect the mouse to the side or rear panel mouse connector.
4. Connect the power cord to the rear panel power input connector.
5. Connect the test system to the unit under test as shown in Figure 2–1.

Power On

1. Power on both systems by pushing the front panel ON/STBY switch.
2. When the Microsoft NT window appears, press CTRL-ALT-DEL to bring up the login window and then click OK.

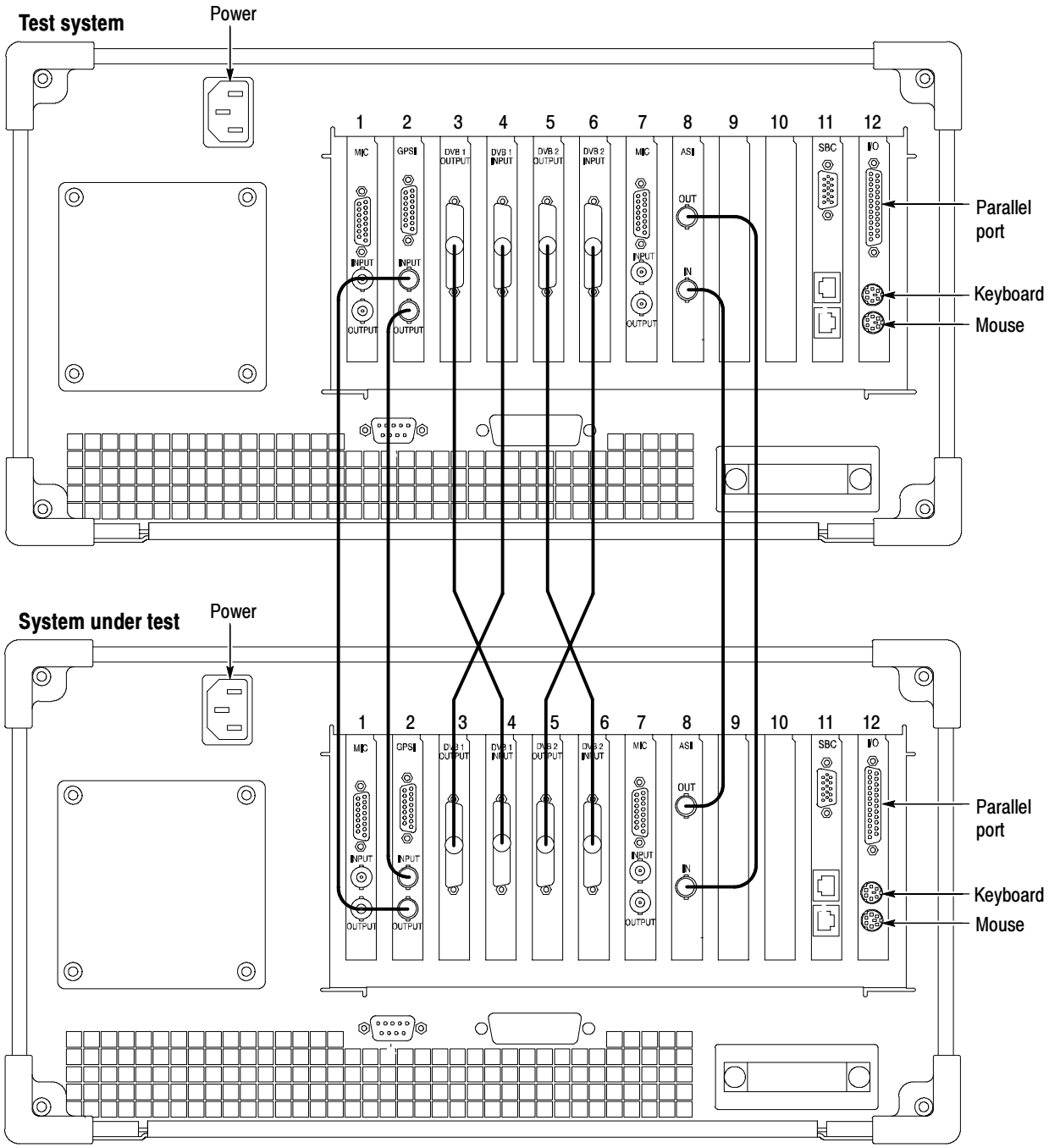


Figure 2- 1: Connecting the test equipment to the unit under test

Load Test Streams

1. Load the test streams onto the system as follows:

   a. Insert the AD951A and AD953A MPEG Test System Recovery CD–ROM (Tektronix part number 063-3744-xx) into the CD-RW drive of the test system.

   b. Launch Windows Explorer.

   c. Locate the Test Streams directory on the CD-ROM (D: drive) and run Setup.exe.

   d. Follow the setup instructions, accepting all of the default values.

   e. Verify that all of the mpg files on the disc were copied to the Test Streams folder on the E: drive.

   f. If there are two MIC cards installed, copy the “Test Streams” folder from the E: drive to the F: drive.

   g. Close Windows NT Explorer.

Check ASI+TS Interface

Perform these checks only if you have an ASI card installed in your system. Before you proceed, perform the preparation steps beginning on page 2–1.

***NOTE**. Each screen, button, or window is illustrated the first time it appears.*

Check the Player

System Under Test

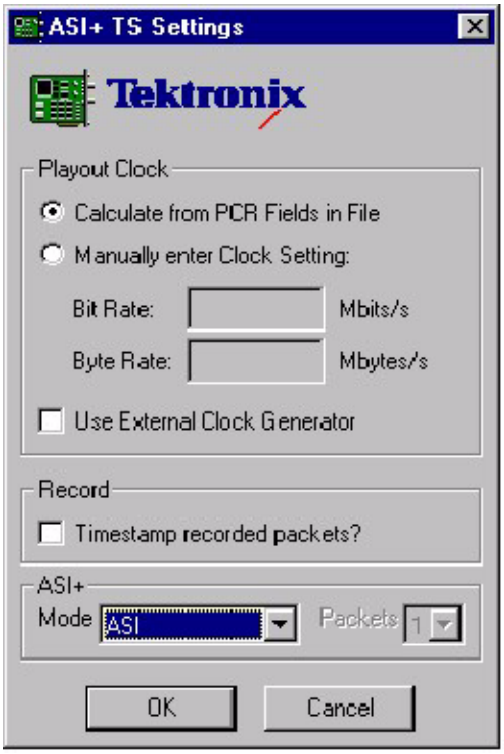
1. Launch the player by double-clicking the TS Player icon.
2. Click the Change Interface icon as shown below:



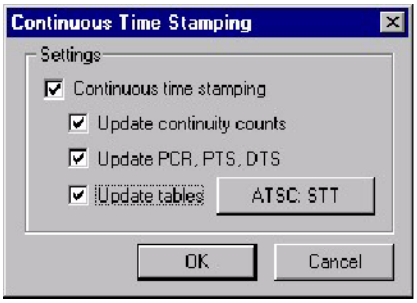
3. Select ASI+TS on the card that is connected to the ASI.



4. Click Settings...
5. In the Settings window, select Calculate from PCR Field in File.



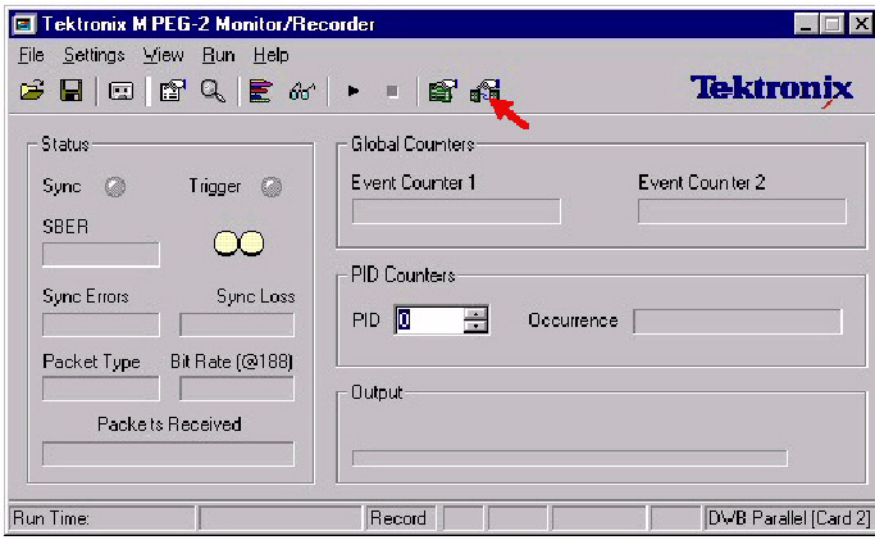
6. Close the Settings window and the Card Configuration window.
7. In the MPEG-2 Player menu:
   a. Select File > Open and open the Sym1.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.
   c. Enable Settings > Loop Mode.
   d. Select Settings > Continuous Time Stamping... and enable all options in that window.



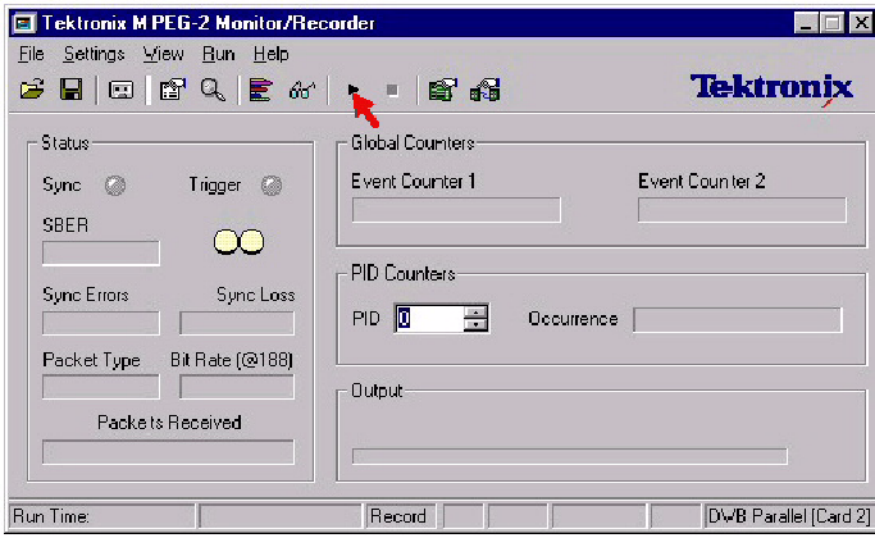
8. Click the play button.

Test System

1. Double-click the TS Monitor-Recorder icon to launch the monitor.
2. Click the change interface icon, as shown below:

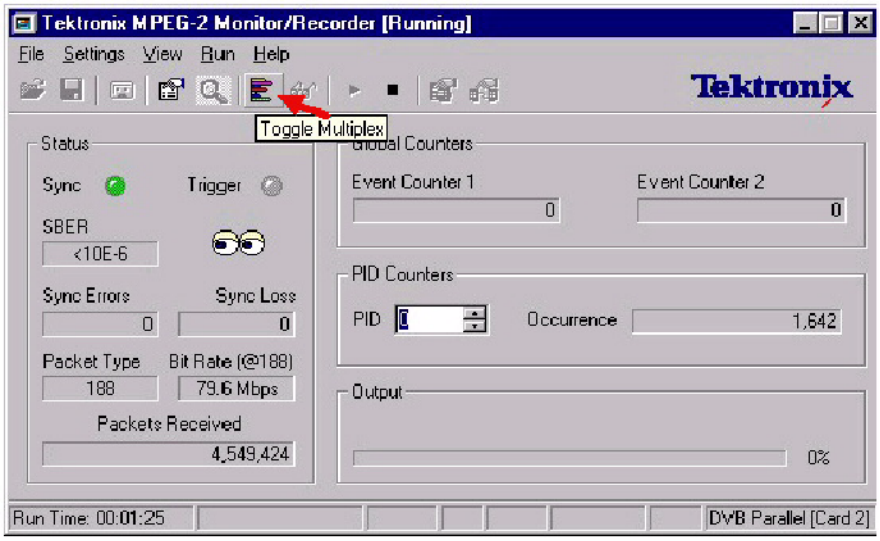


3. Select ASI+TS for the card that is connected to the ASI.
4. Set Settings > Mode to Monitor.
5. Click the play button, as shown below.



6. Verify that the monitor displays a green sync indicator and that the sync errors are zero.

7. Click the toggle multiplex icon, as shown below.

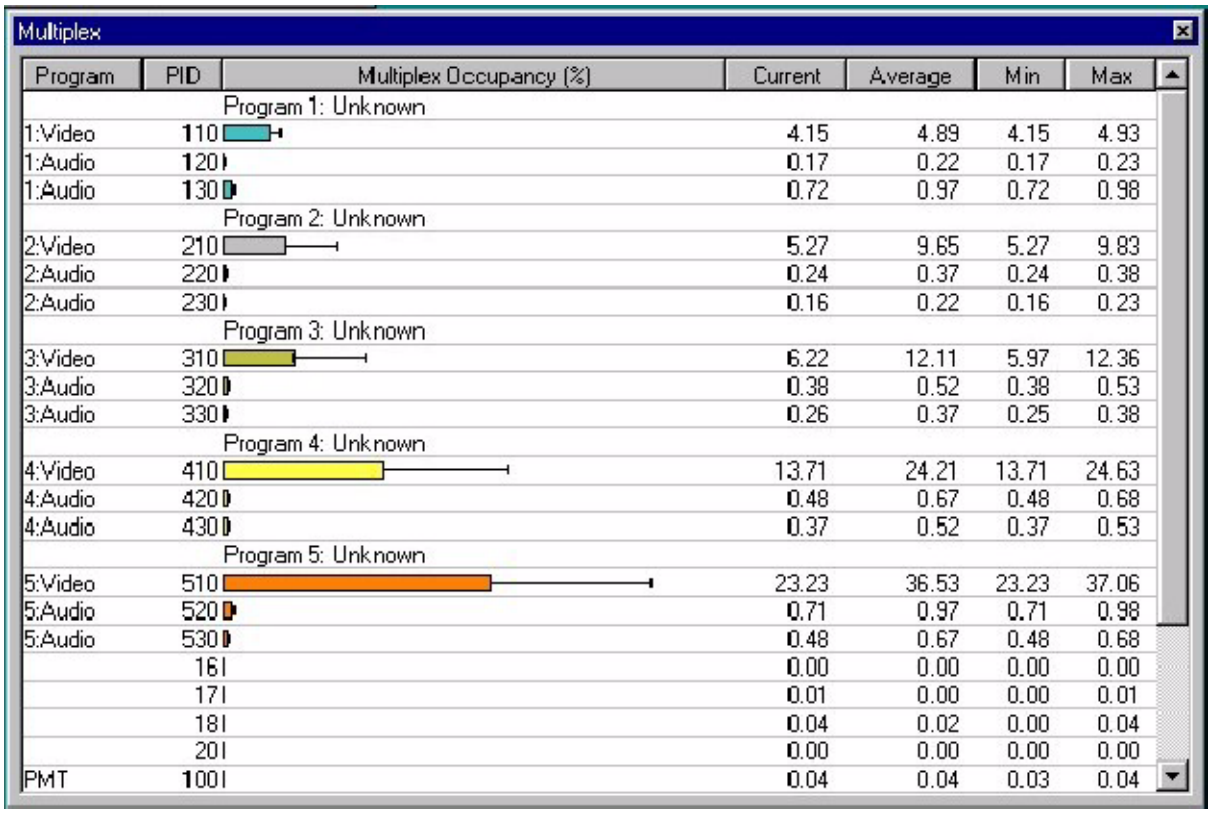


Check the Monitor

Test System

1. Launch the player by double-clicking the TS Player icon.
2. Click the Change Interface icon.
3. Select ASI+TS on the card that is connected to the ASI and then click Settings...
4. In the Settings window, select Calculate from PCR Field in File.
5. Close the Settings window and the Card Configuration window.
6. In the MPEG–2 Player menu:
   a. Select File > Open and open the Sym1.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.
   c. Enable Settings > Loop Mode.
7. Select Settings > Continuous Time Stamping... and enable all options in that window.
8. Click the play button.

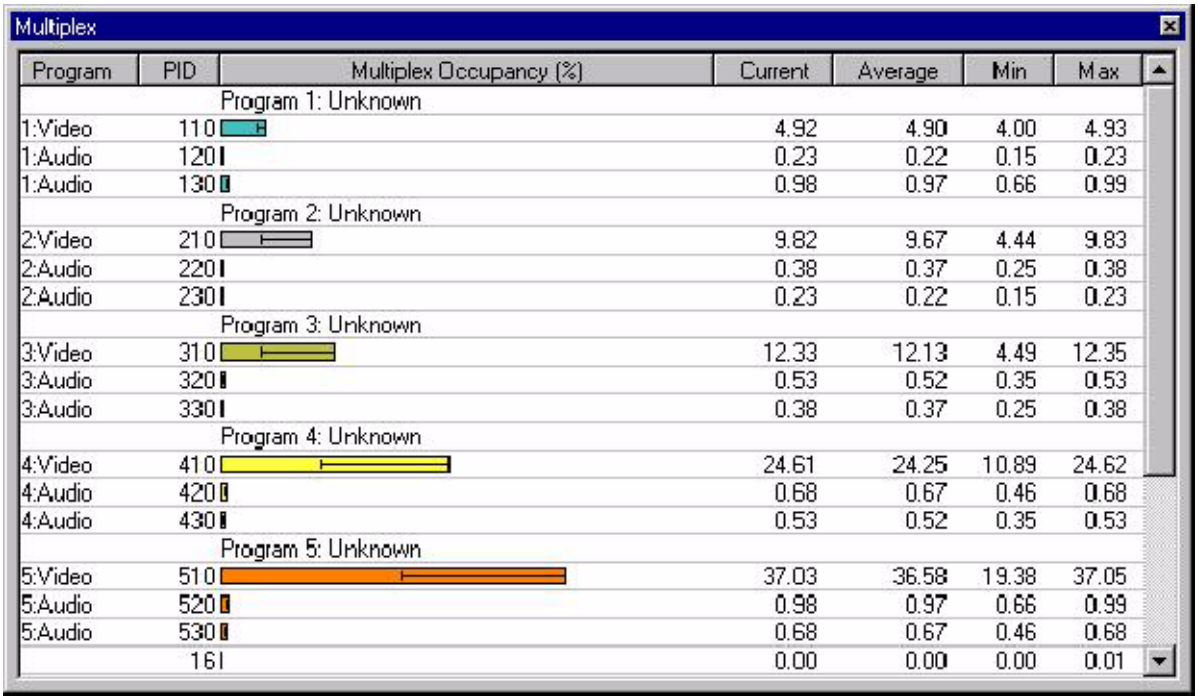
9. Verify that the multiplexer is displaying the picture information.



System Under Test

1. Double-click the TS Monitor-Recorder icon to launch the monitor.
2. Click the change interface icon.
3. Select ASI+TS for the card that is connected to the ASI.
4. Set Settings > Mode to Monitor.
5. Click the play button.
6. Click the toggle multiplex icon.

7. Verify that the multiplexer is displaying the picture information.



Second ASI Card If there is a second ASI card installed, repeat the procedure.

Close Select the stop button (next to the play button) to stop both applications. Then close both applications by clicking the X in the upper right corner.

Check the Recorder

Test System

1. Launch the ASI player by double-clicking the TS Player icon.
2. Click the Change Interface icon.
3. Select ASI+TS on the card that is connected to the ASI and then click Settings...
4. In the Settings window, select Calculate from PCR Field in File.
5. Close the Settings window and the Card Configuration window.
6. In the Player menu:
   a. Select File > Open and open the Sym1.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.
   c. Enable Settings > Loop Mode.
7. Select Settings > Continuous Time Stamping... and enable all options in that window.

System Under Test

1. Double-click the TS Monitor-Recorder icon to launch the monitor.
2. Click the change interface icon.
3. Select ASI+TS for the card that is connected to the ASI.
4. Set Settings > Mode to Monitor.
5. Select File > Create File...

6. The Stream Make Wizard opens. In this window, click Next>.

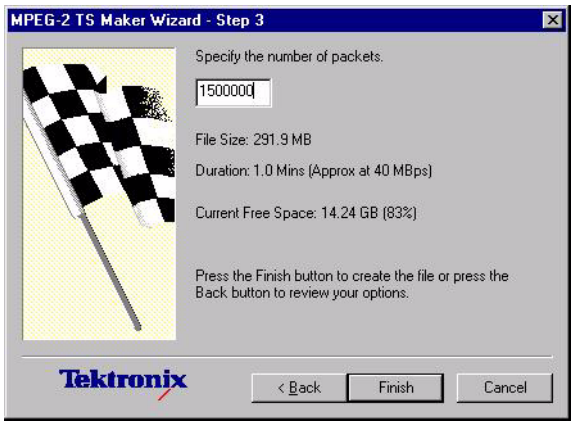


7. Enter the filename “E:\Test Streams\test.mpg”

8. Set the packet size to 204 Byte Packets.

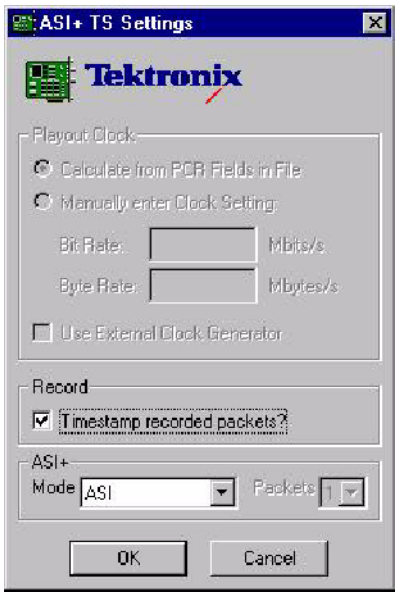


9. Set the number of packets to 1500000. Click Finish.



10. Set the Settings > Mode to Trigger.

11. Select Settings > ASI+ TS Settings...and enable Timestamp recorded packets.



12. Select File > Set Output and open E:\Test Streams\test.mpg.

13. Select Settings > Mode Settings...to open the Settings window.

14. In the Settings window, do the following:
    a. In the Control tab, enable Record under Specify Actions to Perform.
    b. In the Global Events tab, enable Global Event 1. All other options should be disabled.
    c. In the PID Events tab, enable PID's in Set under Apply to. All other options should be disabled.
    d. Exit the Settings window.
15. Click the play button and wait for the recording to complete.

Close Applications

1. Click the stop button on the monitor and wait for the recording to complete.
2. Click the stop button on the player.
3. Close the monitor and the player applications by clicking the X in the upper right corner.

System Under Test

1. Double-click the TS Player icon to launch the player.
2. Click the change interface icon.
3. Select ASI+ TS on the card that is connected to the ASI.
4. Select Settings...
5. In the Settings window, enable Calculate from PCR Fields in File.
6. Close the Settings window and the Card Configuration window.
7. In the MPEG-2 Player menu:
    a. Select File > Open and open the Sym1.mpg file (on drive F).
    b. Enable Settings > Auto Rewind.
    c. Enable Settings > Loop Mode.
    d. Select Settings > Continuous Time Stamping... and enable all options in that window.
8. Click the play button to start the player.

Test System

1. Double-click the TS Monitor-Recorder to launch the monitor.
2. Click the change interface icon.
3. Select ASI+ TS on the card that is connected to the ASI.
4. Set the Settings > Mode to Monitor.
5. Click the play button on the monitor.
6. Click the toggle multiplex icon on the monitor.
7. Verify that the multiplexer is displaying the picture information.

Close Applications

1. Click the stop button on the monitor and the player.
2. Close the monitor and the player applications by clicking the X in the upper right corner.

Check SMPTE 310M Interface (SSI)

Perform these checks only if you have an GPSI card installed in your system.

Before you perform these checks, perform the preparation steps on page 2–1 and set up the test system and the system under test as shown on page 2–2.

***NOTE**. Each screen, button, or window is illustrated the first time it appears.*

Check the Player

System Under Test

1. Launch the player by double-clicking the TS Player icon.
2. Click the change interface icon as shown below:



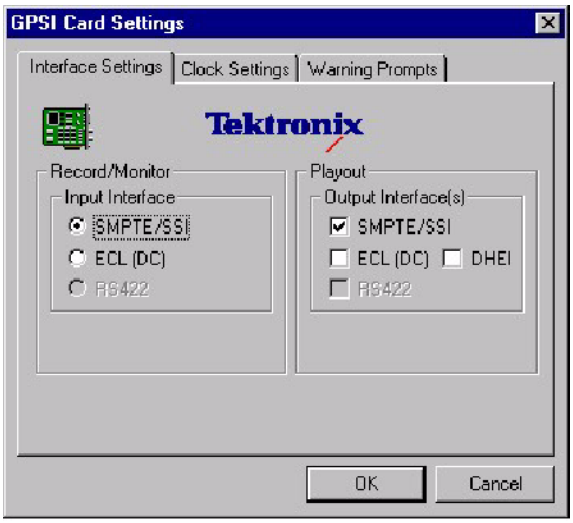
3. Select GPSI on the card that is connected to the GPSI.



4. Click Settings...

5. In the GPSI Card Settings window, do the following:

   a. In the Interface Settings tab, set the Input Interface and the Output Interface(s) to SMPTE/SSI.



   b. In the Clock Settings tab, set the Clock Source to Internal MIC Clock and set the Bit rate to 19.39265846 Mbits/s.

   c. Click OK to exit the settings window and save the settings.

6. Close the Card Configuration window.

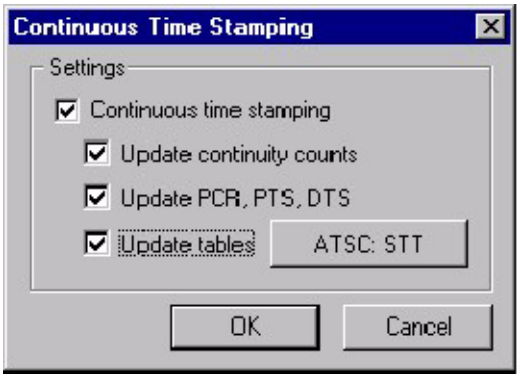
7. In the Player menu:

   a. Select File > Open and open the Sym1.mpg file (on drive F).

   b. Enable Settings > Auto Rewind.

   c. Enable Settings > Loop Mode.

8. Select Settings > Continuous Time Stamping... and enable all options in that window.



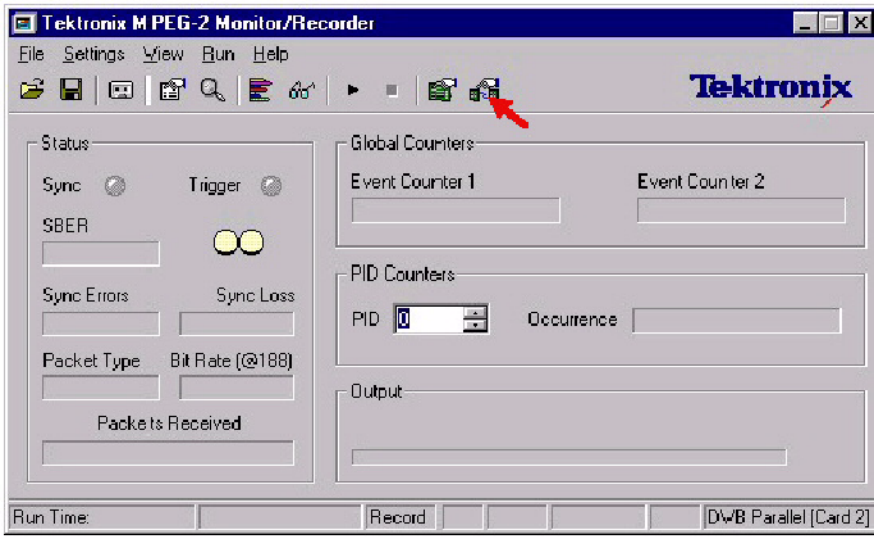
9. Click the play button as shown below:



Test System

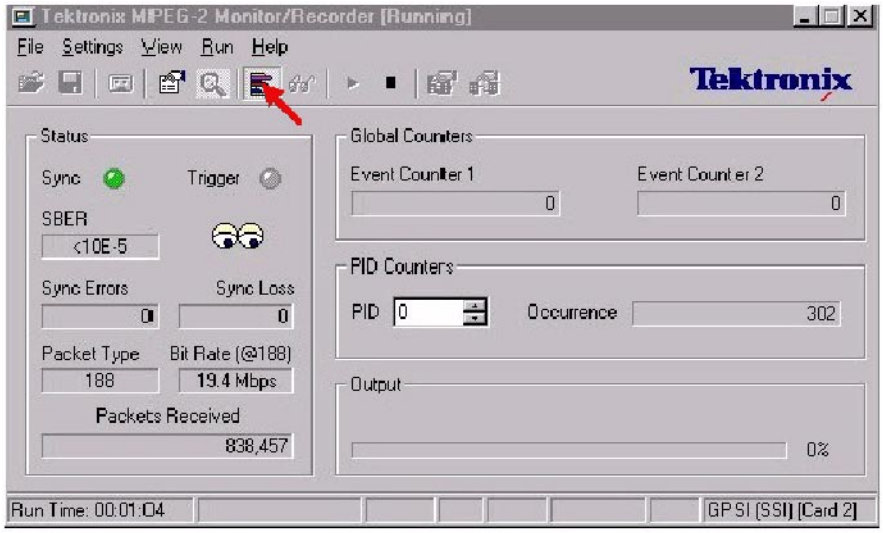
1. Double-click the TS Monitor-Recorder icon to launch the monitor.

2. Click the change interface icon, as shown below:



3. Set Settings > Mode to Monitor.
4. Select GPSI for the card that is connected to the GPSI.
5. Click Settings...
6. In the GPSI Card Settings window, do the following:
   a. In the Interface Settings tab, set the Input Interface and the Output Interface(s) to SMPTE/SSI.
   b. In the Clock Settings tab, set the Clock Source to Recover Clock and set the Bit rate to 19.39265836 Mbits/s.
   c. Click OK to exit the settings window and save the settings.
7. Click the play button on the monitor.
8. Verify that the monitor displays a green sync indicator and that the sync errors are zero.

9. Click the toggle multiplexer icon as shown below:



10. Verify that the multiplexer is displaying the picture information.

Second GPSI Card If there is a second GPSI card installed, click the start button again to stop the applications and repeat the procedure.

Close Close both applications by clicking the X in the upper right corner.

Check the Monitor

Test System

1. Launch the player by double-clicking the TS Player icon.
2. Click the change interface icon.
3. Select GPSI on the card that is connected to the GPSI.
4. Click Settings...
5. In the GPSI Card Settings window, do the following:
   a. In the Interface Settings tab, set the Input Interface and the Output Interface(s) to SMPTE/SSI.
   b. In the Clock Settings tab, set the Clock Source to Internal MIC Clock and set the Bit rate to 19.39265836 Mbits/s.
   c. Click OK to exit the settings window and save the settings.
   d. Exit the Card Configuration window.
6. In the Player menu:
   a. Select File > Open and open the Sym1.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.
   c. Enable Settings > Loop Mode.
7. Select Settings > Continuous Time Stamping... and enable all options in that window.
8. Click the play button.

System Under Test

1. Double-click the TS Monitor-Recorder icon to launch the monitor
2. Click the change interface icon.
3. Set Settings > Mode to Monitor.
4. Select GPSI for the card that is connected to the GPSI.
5. Click Settings...
6. In the GPSI Card Settings window, do the following:
   a. In the Interface Settings tab, set the Input Interface and the Output Interface(s) to SMPTE/SSI.
   b. In the Clock Settings tab, set the Clock Source to Recover Clock and set the Bit rate to 19.39265836 Mbits/s.

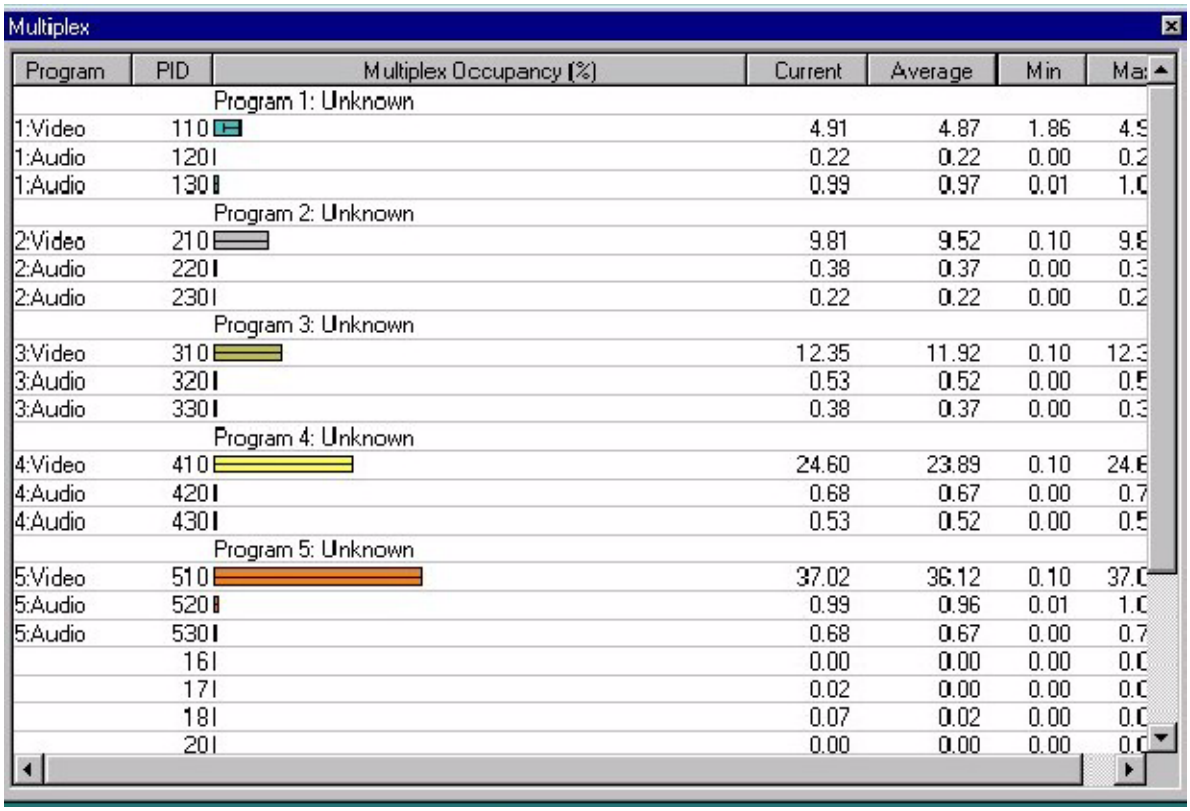
c. Click OK to exit the settings window and save the settings.

7. Click the play button.

8. Verify that the monitor displays a green sync indicator and that the sync errors are zero.

9. Click the toggle multiplex icon.

10. Verify that the multiplexer is displaying the picture information.



Second GPSI Card If there is a second GPSI card installed, click the start button again to stop the applications and repeat the procedure.

Close Close both applications by clicking the X in the upper right corner.

Check the Recorder

Test System

1. Launch the player by double-clicking the TS Player icon.
2. Click the change interface icon.
3. Select GPSI on the card that is connected to the GPSI.
4. Click Settings...
5. In the GPSI Card Settings window, do the following:
   a. In the Interface Settings tab, set the Input Interface and the Output Interface(s) to SMPTE/SSI.
   b. In the Clock Settings tab, set the Clock Source to Recover Clock and set the Bit rate to 19.39265836 Mbits/s.
   c. Click OK to exit the settings window and save the settings.
6. In the Player menu:
   a. Select File > Open and open the Sym1.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.
   c. Enable Settings > Loop Mode.
7. Select Settings > Continuous Time Stamping... and enable all options in that window.

System Under Test

1. Double-click the TS Monitor-Recorder icon to launch the monitor.
2. Click the change interface icon.
3. Select GPSI for the card that is connected to the GPSI.
4. Select File > Create File...
5. The Stream Make Wizard opens. In this window, click Next>.



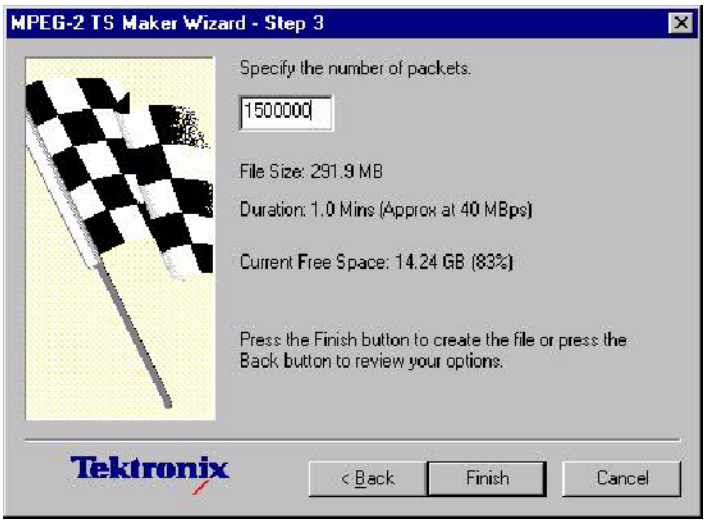
a. Enter the filename “E:\Test Streams\test.mpg”

b. Set the packet size to 204 Byte Packets.



c. Set the number of packets to 1500000.

d. Click Finish.



6. Select Settings > Mode > Trigger.

7. Select File > Set Output and open E:\Test Streams\test.mpg.

8. Select Settings > Mode Settings...to open the Settings window.

9. In the Settings window, do the following:
   a. In the Control tab, enable Record under Specify Actions to Perform.
   b. In the Global Events tab, enable Global Event 1. All other options should be disabled.
   c. In the PID Events tab, enable PID's in Set under Apply to. All other options should be disabled.
   d. Exit the Settings window.
10. Click the play button and wait for the recording to complete.

Close Applications

1. Click the play button again to stop the player.
2. Close the monitor and the player applications by clicking the X in the upper right corner.

System Under Test

1. Double-click the TS Player icon to launch the player.
2. Click the change interface icon.
3. Select GPSI on the card that is connected to the GPSI.
4. Select Settings...
5. In the Settings window, do the following:
   a. In the Control tab, enable Record under Specify Actions to Perform.
   b. In the Global Events tab, enable Global Event 1. All other options should be disabled.
   c. In the PID Events tab, enable PID's in Set under Apply to. All other options should be disabled.
   d. Exit the Settings window.
6. In the Player menu:
   a. Select File > Open and open the test.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.
   c. Enable Settings > Loop Mode.
7. Select Settings > Continuous Time Stamping... and enable all options in that window.
8. Click the play button to start the player.

Test System

1. Double-click the TS Monitor-Recorder to launch the monitor.
2. Click the change interface icon.
3. Select GPSI on the card that is connected to the GPSI.
4. In the Settings window, do the following:
   a. In the Control tab, enable Record under Specify Actions to Perform.
   b. In the Global Events tab, enable Global Event 1. All other options should be disabled.
   c. In the PID Events tab, enable PID's in Set under Apply to. All other options should be disabled.
   d. Exit the Settings window.
5. Select Settings > Mode > Monitor.
6. Click the play button on the monitor.
7. Click the toggle multiplex icon on the monitor.
8. Verify that the multiplexer is displaying the picture information.

Second GPSI Card

If there is a second GPSI card installed, stop the player and monitor and then repeat the procedure.

Close Applications

Close both the player and the monitor applications by clicking the X in the upper right corner.

Check DVB SPI Interface

Perform these checks on all AD951A and AD953A MPEG Test Systems.

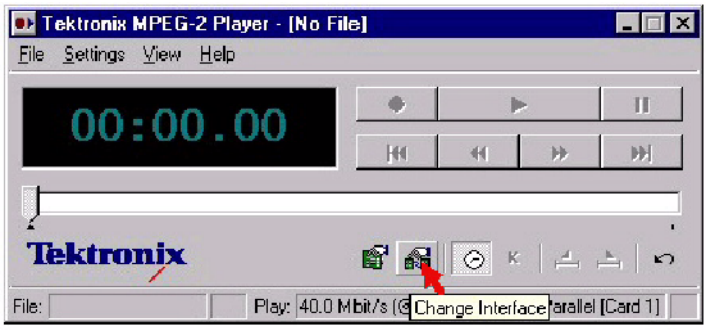
Before proceeding, perform the preparation steps beginning on page 2–1.

***NOTE**. Each screen, button, or window is illustrated the first time it appears.*

Check the Player

System Under Test

1. Double click the TS Player icon to launch the player.
2. Click the change interface icon as shown below:

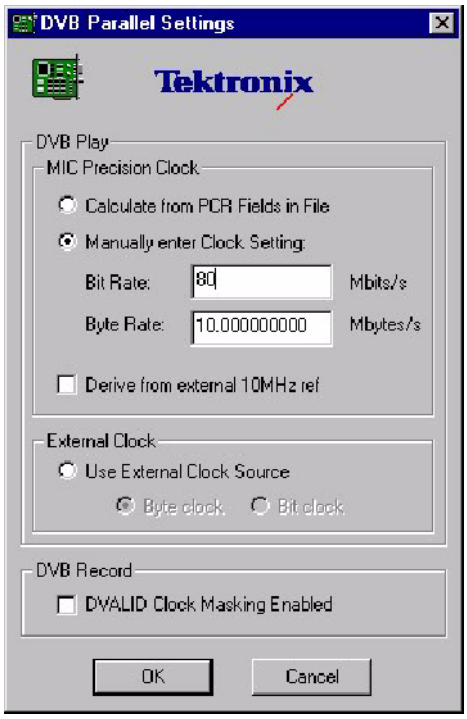


3. Select DVB parallel on the card that is available and then click Settings..



4. Select Manually enter Clock Setting and then enter 80 for the Bit Rate.

5. Click OK to exit the Settings window and again to exit the Card Configuration window.



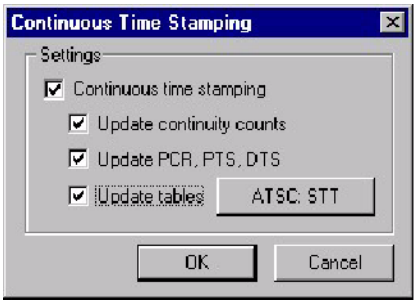
6. In the MPEG-2 Player menu:

   a. Select File > Open and open the Sym1.mpg file (on drive F).

   b. Enable Settings > Auto Rewind.

   c. Enable Settings > Loop Mode.

   d. Select Settings > Continuous Time Stamping... and enable all options in that window.

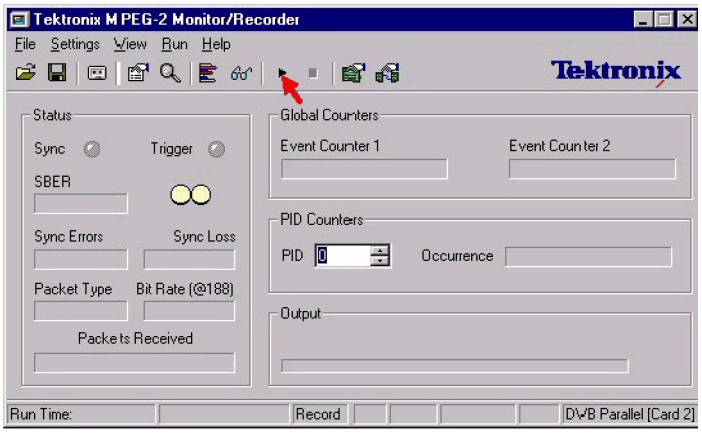


7. Click the play button as shown below:



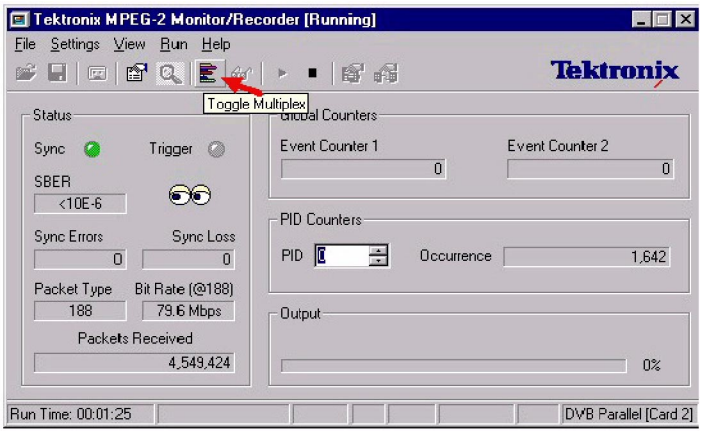
Test System

1. Double-click the TS Monitor-Recorder to launch the monitor.
2. Click the change interface icon.
3. Select DVB parallel on the card that is available.
4. Select Settings > Mode > Monitor.
5. Click the play button on the monitor as shown below:



6. Verify that the monitor displays a green sync indicator and that the sync errors are zero.

7. Click the toggle multiplex icon as shown below:



8. Verify that the multiplexer is displaying the picture information.

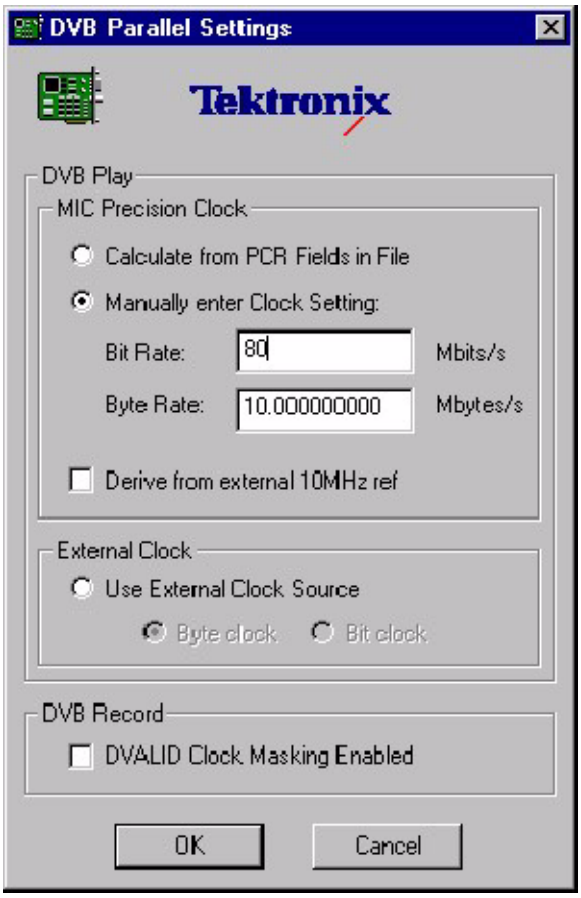
Multiplex

Program	PID	Multiplex Occupancy (%)	Current	Average	Min	Max
		Program 1: Unknown				
1:Video	110		4.15	4.89	4.15	4.93
1:Audio	120		0.17	0.22	0.17	0.23
1:Audio	130		0.72	0.97	0.72	0.98
		Program 2: Unknown				
2:Video	210		5.27	9.65	5.27	9.83
2:Audio	220		0.24	0.37	0.24	0.38
2:Audio	230		0.16	0.22	0.16	0.23
		Program 3: Unknown				
3:Video	310		6.22	12.11	5.97	12.36
3:Audio	320		0.38	0.52	0.38	0.53
3:Audio	330		0.26	0.37	0.25	0.38
		Program 4: Unknown				
4:Video	410		13.71	24.21	13.71	24.63
4:Audio	420		0.48	0.67	0.48	0.68
4:Audio	430		0.37	0.52	0.37	0.53
		Program 5: Unknown				
5:Video	510		23.23	36.53	23.23	37.06
5:Audio	520		0.71	0.97	0.71	0.98
5:Audio	530		0.48	0.67	0.48	0.68
	161		0.00	0.00	0.00	0.00
	171		0.01	0.00	0.00	0.01
	181		0.04	0.02	0.00	0.04
	201		0.00	0.00	0.00	0.00
PMT	1001		0.04	0.04	0.03	0.04

Check the Monitor

System Under Test

1. Double-click the TS Monitor–Recorder icon to launch the monitor.
2. Select DVB parallel on the card that is available.
3. Click Settings..
4. In the DVB Parallel Settings window, Select Manually enter Clock Setting and enter a bit rate of 80.



5. Click OK to exit the Settings window and again to exit the Card Configuration window.
6. In the MPEG–2 Player menu:
   a. Select File > Open and open the Sym1.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.

c. Enable Settings > Loop Mode.

d. Select Settings > Continuous Time Stamping... and enable all options in that window.

7. Click the play button to start the player.

Test System

1. Double-click the TS Player icon to launch the player.

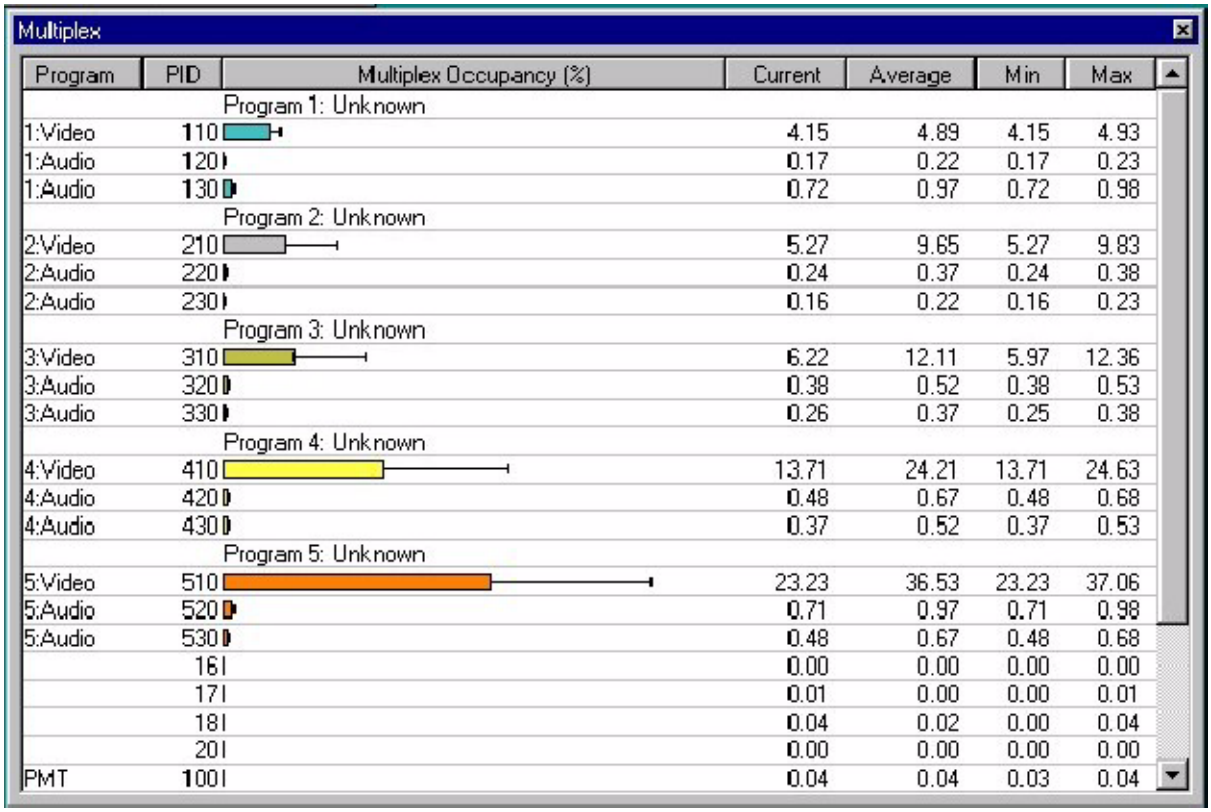
2. Click the change interface icon.

3. Select DVB parallel on the card that is available.

4. Click the play button on the monitor.

5. Click the toggle multiplex button on the monitor.

6. Verify that the Multiplexer is displaying the picture information.



Second MIC Card (Option DU)

If Option DU is installed, stop the player and monitor applications and repeat the procedure for the second MIC card.

Check the Recorder

Test System

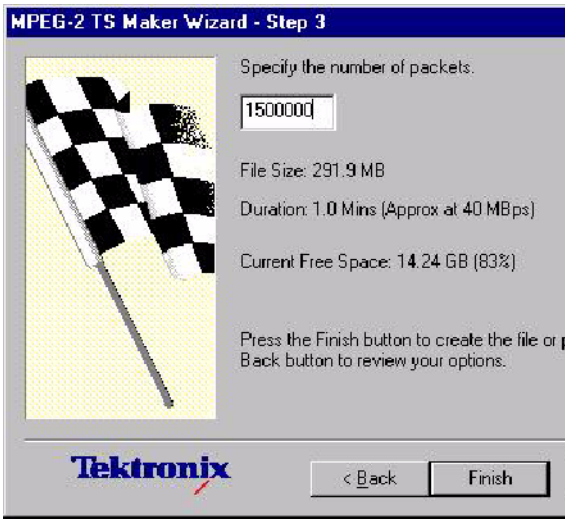
1. Double-click on the TS Player icon to launch the player.
2. Click the change interface icon.
3. Select DVB Parallel on the card that is being tested.
4. Click Settings..
5. In the DVB Parallel Settings window, Select Manually enter Clock Setting and enter a bit rate of 80.
6. Click OK to exit the Settings window and again to exit the Card Configuration window.
7. In the MPEG–2 Player menu:
   a. Select File > Open and open the Sym1.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.
   c. Enable Settings > Loop Mode.
   d. Select Settings > Continuous Time Stamping... and enable all options in that window.
8. Click the play button to start the player.

System Under Test

1. Double-click on the TS Monitor-Recorder icon to launch the monitor.
2. Click the change interface icon.
3. Select DVB Parallel on the card that is being tested.
4. Select File > Create File...
5. Click Next> in the Stream Make Wizard window.



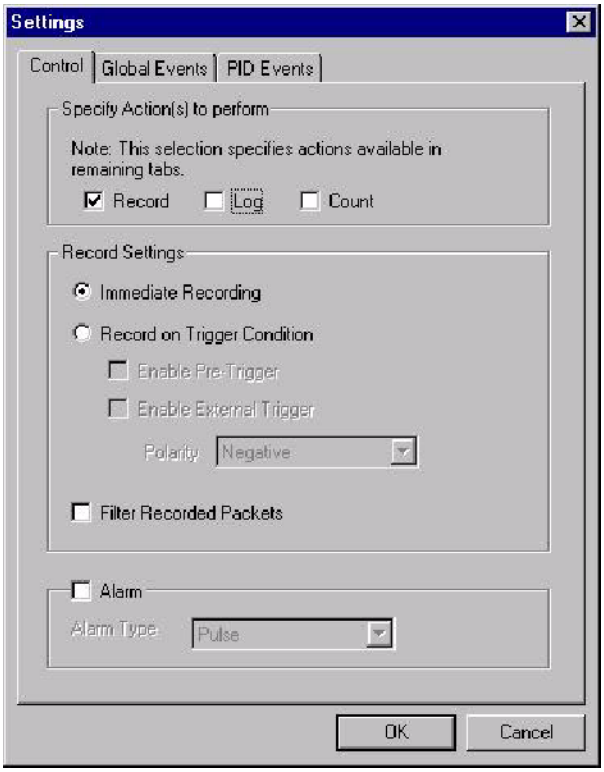
6. Enter the filename "E:\Test Streams\test.mpg".
7. Set the packet size to 204 Byte Packets.
8. Set the number of packets to 1500000
9. Click Finish.



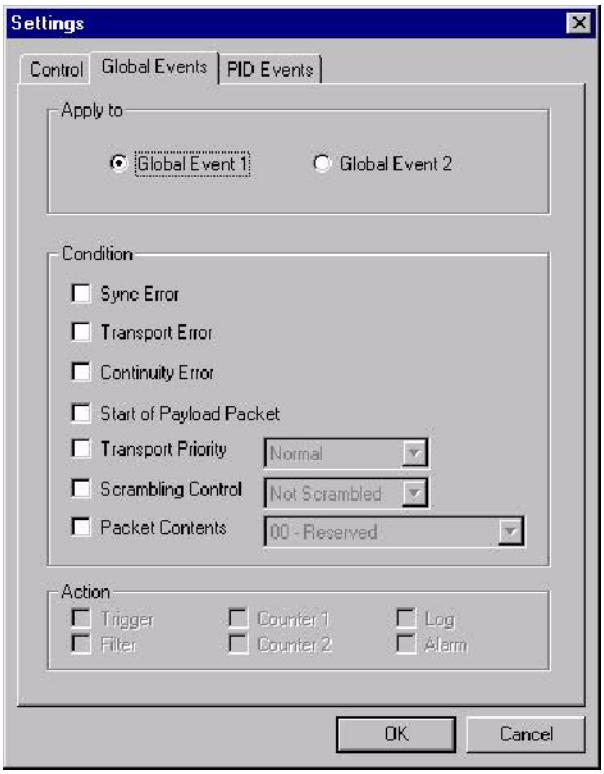
10. Select Settings > Mode > Trigger.
11. Select Settings > DVB Parallel Setting.
12. In the DVB Parallel Settings window, enable DVALID Clock Masking and click OK.
13. Select File > Set Output and open the file "E:\Test Streams\test.mpg".

14. Select Settings > Mode Settings...

a. In the Control tab, enable Record under Specify Actions to perform.



b. In the Global events tab, enable Global Event 1. All other options should be disabled.



c. In the PID events tab, enable PID's in Set. All other options should be disabled.

d. Click OK to close the Settings window.

e. Click the play button to start the monitor and wait for the recording to complete.

15. Stop the player on the test system by clicking the play button.

Close Applications

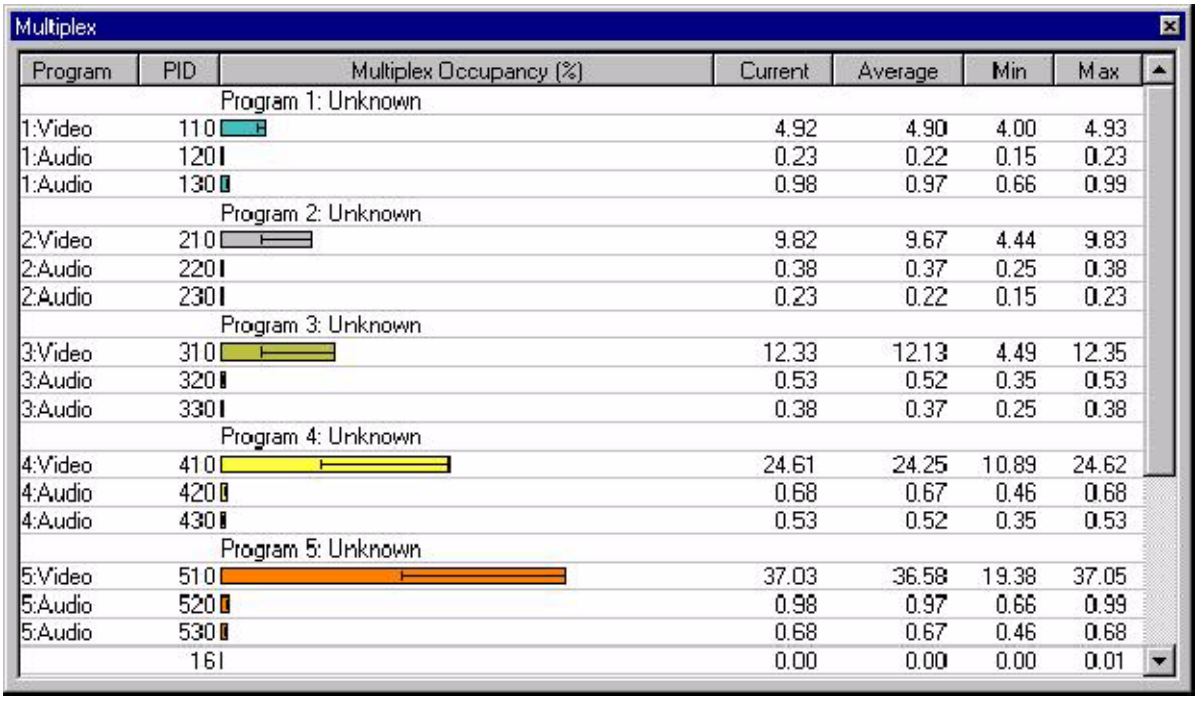
Close both the applications on both systems.

System Under Test

1. Double-click the TS Player icon to launch the player.
2. Click the change interface icon.
3. Select DVB Parallel on the card that is being tested.
4. Click Setting...
5. In the DVB Parallel Settings window, Select Manually enter Clock Setting and enter a bit rate of 80.
6. Click OK to exit the Settings window and again to exit the Card Configuration window.
7. In the MPEG-2 Player menu:
   a. Select File > Open and open the test.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.
   c. Enable Settings > Loop Mode.
   d. Select Settings > Continuous Time Stamping... and enable all options in that window.
8. Click the play button to start the player.

Test System

1. On the test system launch the monitor by double clicking on Tektronix TS Monitor-Recorder.
2. Click the change interface icon.
3. Select DVB Parallel on the card that is being tested.
4. Select Settings > Mode > Monitor.
5. Click the play button to start the monitor.
6. Click the toggle multiplex button on the monitor.
7. Verify that the multiplexer is displaying picture information.



Second MIC Card

If Option DU is installed, stop the system under test player and test system monitor and then repeat this procedure for the second MIC card.

Close Applications

1. Stop the applications on both systems.
2. Close the applications on both systems by clicking the X in the upper right corner.

Test SM+ Duplex (AD953A or AD951A with Option MPLUS)

Test System

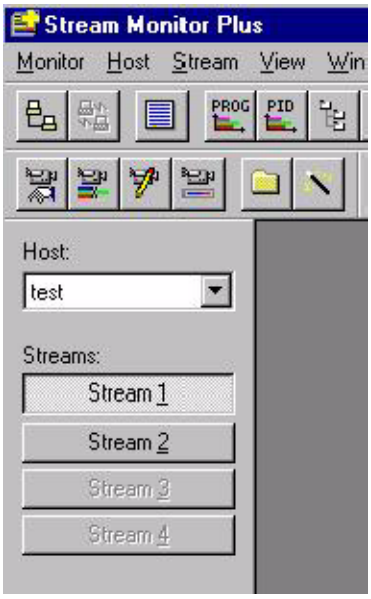
1. Double-click the TS Player icon to launch the player.
2. Click the change interface icon.
3. Select DVB on the card that is available.
4. Click Settings...
5. In the DVB Parallel Settings window, Select Manually enter Clock Setting and enter a bit rate of 60.
6. Click OK to exit the Settings window and again to exit the Card Configuration window.
7. In the MPEG-2 Player menu:
   a. Select File > Open and open the Sym1.mpg file (on drive F).
   b. Enable Settings > Auto Rewind.
   c. Enable Settings > Loop Mode.
   d. Select Settings > Continuous Time Stamping... and enable all options in that window.
8. Click the play button to start the player.
9. Repeat steps 3. through 8. for the second player.

System Under Test

1. Double-click the TS Monitor Plus icon to launch the application.
2. Click Connect to Local Host to connect to both MIC cards.



3. Check for a message that the connection has been made. Click OK.
4. Verify that Stream1 and Stream2 are available.



5. Click on Stream 1.

   a. From Stream menu, select configuration.

   b. In the Configuration of stream window, select DVB Parallel and set the Stream Mode to DVB.

   c. Click OK.



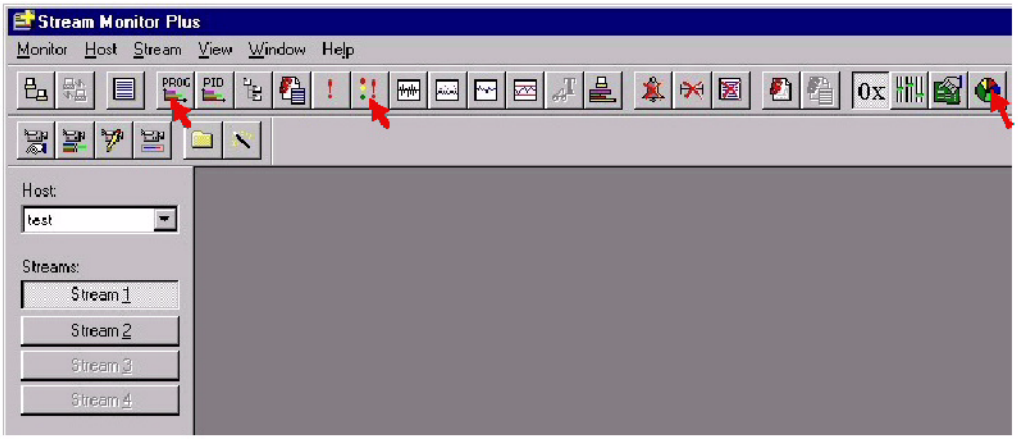
6. Click on Stream 2 and repeat the substeps in step 5.

7. Click on Stream 1.

   a. Click PROG in the toolbar as shown below:

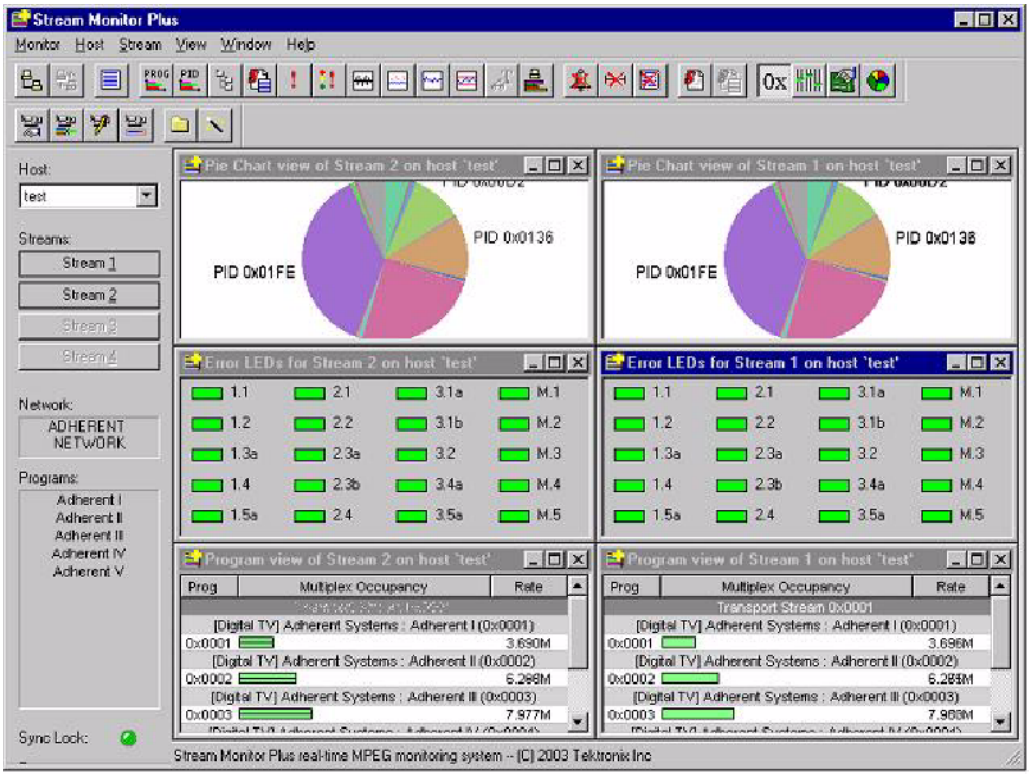
   b. Click the Error LED View icon in the toolbar (looks like stoplights).

   c. Click the pie chart in the toolbar.



8. Click on Stream 2 and repeat the substeps in step 7.

9. Verify that the Stream monitor is processing both streams.



Close Applications

1. Stop both players on the test system.
2. Verify that the streams are no longer being received on the stream monitor.
3. Close the Stream plus monitor.

Power Down

1. Click Start and then select Shut Down.
2. From the Shut down menu select Shut Down then click Yes.
3. Press the ON/STBY button when prompted that it is OK to shut down.
4. Disconnect all cables from the instrument.

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