Tektronix

MTS400 Series
MPEG Test Systems
Getting Started Manual

071-1505-02

This document applies to version 1.2 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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For product information, sales, service, and technical support:
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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 mainframe power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the 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 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:

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 describes the functions and use of the Tektronix MTS400 Series MPEG Test Systems. The following naming conventions are used in this manual:

- MTS400 Series system - where information applies to both the MTS400, MTS430, and MTS4SA

- MTS400 system - where information applies to only the MTS400

- MTS430 system - where information applies to only the MTS430

- MTS4SA Stand-alone system - where information applies to only the MTS4SA

The manual is organized into the following sections:

- **Getting Started**
  Description and overview of the MTS400 Series System, plus instructions for installing the stand-alone version of the MTS400 Series System.

- **Operating Basics**
  A brief introduction to the software applications installed in the MTS400 Series System. For detailed operating information about the applications, refer to the *MTS400 Series System User Manual*.

- **Appendices**
  Contains the following appendices:

  - Appendix A: Cleaning and Maintenance.

  - Appendix B: System Recovery. Explains how to reinstall the operating system and application software if you encounter problems with the software.

  - Appendix C: Network Troubleshooting. A high-level overview of diagnosing and troubleshooting network connection problems.

- **Glossary**

- **Index**

Related Material

The following table lists the other manuals available for the MTS400 Series System.

Related documentation

Title	Part number	Description
MTS400 Series System User Manual	071-1507-xx	Provides in-depth operating information for the software applications included in the MTS400 Series System.
MTS400 Series System Technical Reference	071-1724-xx	Provides the MTS400 Series System specifications and a performance verification procedure. Available only as a PDF file on the *MTS400 Series Customer Documentation CD-ROM*.
MTS400 Series System Programmers Manual	071-1725-xx	Provides the remote control commands for the Player application. Available only as a PDF file on the *MTS400 Series Customer Documentation CD-ROM*.
MTS400 Series System Release Notes	071-1726-xx	Provides information about software problems and behaviors.
MTS400 Series System Getting Started Manual (Japanese)	071-1727-xx	Provides a Japanese language version of this manual.
MTS4EA Compressed Video Elementary Stream Analyzer User Manual	071-1641-xx	Provides operating information for the optional *MTS4EA Compressed Video ES Analyzer* application.

Additional documentation, such as Read Me files, may be included on the installation disks.

The following URLs access the Web sites for the standards organizations listed (the URLs listed were valid at the time of writing):

- MPEG-2 standards (International Organization for Standards)
  http://www.iso.ch/

- DVB standards (European Technical Standards Institute)
  http://www.etsi.org/

- ATSC standards (Advanced Television Systems Committee)
  http://www.atsc.org/

Manual Conventions

Naming conventions for the interface elements are based on standard Windows naming conventions.

Naming conventions for MPEG-2, ATSC, and DVB structures follow the conventions derived from the standards documents listed on page x.

The following formatting conventions apply to this manual:

- **Bold** text refers to specific interface elements that you are instructed to select, click, or clear.
  Example: Select **Settings** from the Configuration menu.

- Mono-spaced text can indicate the following:

  - Text you enter from a keyboard
    Example: Enter the network identity (`http://TSMonitor01`)

  - Characters you press on your keyboard
    Example: Press `CTRL+C` to copy the selected text.

  - Paths to components on your hard drive
    Example: The program files are installed at the following location:
    `C:\Program Files\Tektronix\`

Getting Started

Product Description

The MTS400 Series MPEG Test Systems provide a comprehensive and integrated suite of real-time and deferred (offline) analysis tools. The tools include TS (transport stream) compliance, buffer, PES, MPEG2, and MPEG4 video and audio elementary stream analyzers. Also included are an editor and a multiplexer for the creation of stream content, and test and error-stressing streams.

Standards compliance is ensured though built-in customizable scripting, which supports a broad range of ratified and evolving DTV standards. New standards and proprietary tables can easily be implemented by loading Tektronix supplied updates, or creating your own custom scripts.

The MTS400 series instruments have a large LCD display with a powerful 2.8 GHz processor with support for multiple physical layer interfaces such as ASI, SPI, SMPTE310M, and Gigabit Ethernet.

On/Stby switch
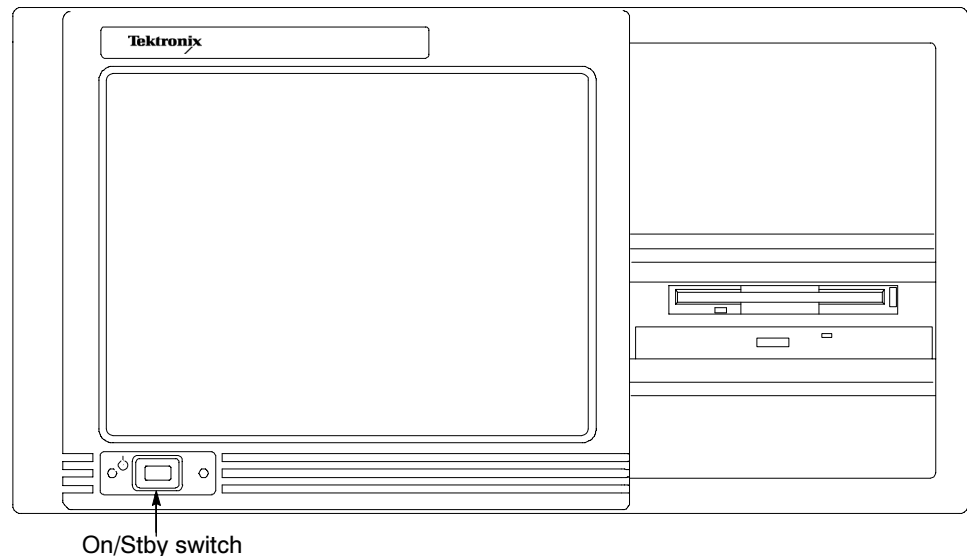
Figure 1-1: MTS400 Series System front panel

There are three variants of the MTS400 Series MPEG Test System; the MTS400 system, the MTS430 system and the MTS4SA Stand-alone system:

- The MTS400 system includes SPI, ASI and SMPTE310M interfaces, real time transport stream analysis and transport stream play and record.

- The MTS430 system includes SPI, ASI and SMPTE310M and 10/100 IP interfaces, real time transport stream analysis, play and record, deferred time

transport stream, packetized elementary stream, and Buffer analysis and Multiplexing.

- MTS4SA Stand-alone system allows the deferred analysis and testing components to be installed on a personal computer.

See *Options*, starting on page 1-4, for the details of each system.

Features and Benefits

- The CaptureVu™ feature captures and analyzes system events in real time and deferred time to debug the intermittent and complex problems that traditional analyzers miss.

- Real-time video over IP analysis and recording for broadband and video on demand applications is supported using the MTS430's built-in Gigabit Ethernet port. (Also available separately as a standalone application to run on your PC with a standard 10/100 or Gigabit Ethernet network interface card).

- High performance analysis engine to analyze transport streams up to 400 Mbps. This greatly reduces the amount of time taken by the deferred time software to analyze large and complex transport stream files. This capability also protects your investment in the MTS400 as the deployment of new services such as VOD and HD will require greater aggregated bandwidth and data rates than are available today.

- The innovative "program centric" user interface brings expert power to the novice user by helping locate network and service related problems fast.

- Broadest and deepest range of analysis of legacy and next generation compressed standards including MPEG-2, MPEG-4, H.264, and SMPTE VC-1 as well as mobile video standards such as 3GPP and DVB-H.

- Support for a full and wide range of current world-wide DTV standards. Rapid implementation and analysis of new and proprietary DTV standards is enabled by a flexible user definable scripting language.

- Modular design allows you to purchase only the performance that you require today and makes it easy to upgrade for changing future needs.

Hardware Features

The basic MTS400 Series instrument consists of:

- One 80 GB IDE hard drive
  (disk space, operating system and software applications)

- Two 72GB SCSI hard drives (disk space, MPEG file storage)

- 2.8 GHz P4 processor

- 1 GB RAM

- DVD drive (-R/-RW,+R/+RW)

- 3.5 inch floppy disk drive (1.44 MB high-density)

- Display: LCD, 1024 x 768, 10.4 inch

- Operating System: Windows XP Pro

- Ethernet connectors
  (one 10/100-base T connector and one 10/100/1000-base T connector)

- USB port

- A170 card, LVDS/ASI/SMPTE310 interface

- A12 card, main MPEG input/output

Options

A range of options is available for the MTS400 Series MPEG Test Systems. The option descriptions begin on the following pages:

- MTS400 System Options (page 1-4)

- MTS430 System Options (page 1-6)

- MTS4SA Stand-alone System (page 1-8)

- MTS4UP Options (page 1-9)

MTS400 System Options

MTS400 platform including SPI, ASI, SMPTE310M interfaces, real time TS analysis and TS play / record.

MTS400 System Basic Application Set

- Transport Stream Compliance Analyzer (TSCA) - Real Time

- Tracer

- Player / Recorder

- TS Editor

- TS Cutter

- Script Pad

Table 1-1: MTS400 System options

Item	Opt	Description
MTS400		MTS400 Series MPEG Test System
	IPE	Add 10/100BaseT Video over IP electrical interface to MTS400
	MX	Add Deferred Time Multiplexer to MTS400
	ES	Add ES Analyzer to MTS400
	PB	Add PES & Buffer Analyzer to MTS400
	DB	Add Carousel Analyzer to MTS400
	CG	Add Carousel Generator to MTS400
	DBCG	Add Carousel Analyzer and Carousel Generator to MTS400
	TSCA	Add Transport Stream Compliance Analyzer to MTS400

Table 1-1: MTS400 System options (cont.)

Item	Opt	Description
	TSCL	Add Transport Stream Compliance Analyzer Lite (file size limited) to MTS400
	R3	Repair Service 3 years
	R5	Repair service 5 years
	L0	English Documentation
	L5	Japanese Documentation
	A0	North American Power
	A1	Universal Euro Power
	A2	United Kingdom Power
	A3	Australia Power
	A4	240 V North America Power
	A5	Switzerland Power
	A6	Japan Power
	A10	China Power
	A99	No Power cord or AC adapter
Additional MTS4EA Options (Compressed Video ES Analyzer) (at order time)		
	4EAB	Base software with video standard package including: MPEG-4 Simple Profile, H.263+, H.263, H.261, CD and Manual
	M4SP	MPEG-4 Advanced Simple Profile (Levels 0 - 5)
	M2ML	MPEG-2 Main Profile Main Level
	M2HL	MPEG-2 Main Profile High Level & High Level 1440 (High Definition)
	AVCE	H.264/AVC Baseline and Extended Profiles (Levels 1 - 5)
	AVCM	H.264/AVC Main Profile (Levels 1 - 5)
	SWSE	First 12 Months Software Subscription on the MTS4EA software and its options loaded on the MTS400, when purchased with a new MTS400. (Does not cover the MTS400 software)
	VC-1	VC-1 (all profiles, all levels) and Windows Media V9 (ASF)
	AUD	Audio (including AAC, HE AAC, AC-3)

MTS430 System Options

MTS430 platform including SPI, ASI, SMPTE310M and 10/100 IP interfaces, real time TS analysis, play / record, deferred time TS, PES and Buffer Analysis and Multiplexing.

MTS430 System Basic Application Set

- Transport Stream Compliance Analyzer (TSCA) - Real Time / Deferred

- Packetized Elementary Stream (PES) Analyzer

- Transport Stream – System Target Decoder (T-STD) Buffer Analyzer

- Tracer

- Player / Recorder

- TS Editor

- Multiplexer (+ Make Seamless Wizard)

- TS Cutter

- Script Pad

Table 1-2: MTS430 System options

Item	Opt	Description
MTS430		MTS430 MPEG Test System
	ES	Add ES Analyzer to MTS430
	DB	Add Carousel Analyzer to MTS430
	CG	Add Carousel Generator to MTS430
	DBCG	Add Carousel Analyzer and Carousel Generator to MTS430
	R3	Repair Service 3 years
	R5	Repair service 5 years
	L0	English Documentation
	L5	Japanese Documentation
	A0	North American Power
	A1	Universal Euro Power
	A2	United Kingdom Power
	A3	Australia Power
	A4	240V North America Power
	A5	Switzerland Power

Table 1-2: MTS430 System options (cont.)

Item	Opt	Description
	A6	Japan Power
	A10	China Power
	A99	No Power cord or AC adapter
Additional MTS4EA Options (Compressed Video ES Analyzer) (at order time)		
	4EAB	Base software with video standard package including: MPEG-4 Simple Profile, H.263+, H.263, H.261, CD and Manual
	M4SP	MPEG-4 Advanced Simple Profile (Levels 0 – 5)
	M2ML	MPEG-2 Main Profile Main Level
	M2HL	MPEG-2 Main Profile High Level & High Level 1440 (High Definition)
	AVCE	H.264/AVC Baseline and Extended Profiles (Levels 1 – 5)
	AVCM	H.264/AVC Main Profile (Levels 1 – 5)
	SWSE	First 12 Months Software Subscription on the MTS4EA software and its options loaded on the MTS430, when purchased with a new MTS430. (Does not cover the MTS430 software)
	VC-1	VC-1 (all profiles, all levels) and Windows Media V9 (ASF)
	AUD	Audio (including AAC, HE AAC, AC-3)

MTS4SA Stand-alone System

Deferred analysis software for stand-alone operation.

MTS4SA Stand-alone System Basic Application Set

- Tracer

- Player

- TS Editor

- TS Cutter

- Script Pad

Table 1-3: MTS4SA Stand-alone System options

Item	Opt	Description	
MTS4SA		Stand Alone Deferred Time Software Package	
	USB	USB Security software key supplied with Stand Alone Software Package	Upgrade requires either USB or PPD (not both).
	PPD	Parallel Port Security software supplied with Stand Alone Software Package	
	MX	Security software key to add Deferred Time Multiplexer to MTS4SA	
	ES	Security software key to add ES Analyzer to MTS4SA	
	PB	Security software key to add PES & Buffer Analyzer to MTS4SA	
	DB	Security software key to add Carousel Analyzer to MTS4SA	
	CG	Security software key to add Carousel Generator to MTS4SA	
	DBCG	Security software key to add Carousel Analyzer and Carousel Generator to MTS4SA	
	TSCA	Security software key to add Deferred Time Transport Stream Compliance Analyzer to MTS4SA	
	TSCL	Security software key to add Deferred Time Transport Stream Compliance Analyzer Lite (file size limited) to MTS4SA	
	TSCR	Security software key to add Real Time Transport Stream Compliance Analyzer to MTS4SA for IP interface only	
	L0	English Documentation	
	L5	Japanese Documentation	

MTS4UP Options

Upgrade to add options after ordering initial MTS400, MTS430 or MTS4SA.

Table 1-4: MTS4UP options

Item	Opt	Description
MTS4UP		MTS4 Series Field Upgrade Kit
	IPE	Add 10/100BaseT Video over IP electrical interface to MTS400
	MX	Upgrade to add Deferred Time Multiplexer to MTS4 series
	ES	Upgrade to add ES Analyzer to MTS4 series
	PB	Upgrade to add PES & Buffer Analyzer to MTS4 series
	DB	Upgrade to add Carousel Analyzer to MTS4 series
	CG	Upgrade to add Carousel Generator to MTS4 series
	DBCG	Upgrade to add Carousel Analyzer and Carousel Generator to MTS4 series
	TSCA	Upgrade to add Transport Stream Compliance Analyzer to MTS4 series
	TSCL	Upgrade to add Transport Stream Compliance Analyzer Lite (file size limited) to MTS4 series
	TSCR	Upgrade to add Real Time Transport Stream Compliance Analyzer to MTS4SA for IP interface only
	UPG	Upgrade to latest version of MTS4 series base software and installed options. Includes CD and Manual (excluding MTS4EA). Requires MTS4UP Opt. SWS1.
	DDP	Software key Upgrade Disk – Parallel (Upgrades to MTS4SA with opt. PPD only) Upgrade requires either DDP or DDU (not both)
	DDU	Software key Upgrade Disk – USB (Upgrades to MTS4SA with opt. USB only)
	IF	Depot install; Tektronix installs MTS4UP
	IFC	Depot install; Tektronix installs MTS4UP with calibration

Accessories

Table 1-5 lists the standard accessories that are shipped with the MTS400 Series System.

Table 1-5: Standard accessories for the MTS400 Series System

Quantity	Description	Part number
1 ea	Reply card	001-1125-xx
1 ea	Compliance certificate	001-1180-xx
1 ea	Easy Restore License	NA
1 ea	Certificate Of Authenticity: Microsoft Windows XP	NA
1 ea	Software package: Restore CD-ROM, MTS400 MPEG Test System (3 discs)	063-3851-xx
1 ea	Keyboard, 105 key layout	119-6989-xx
2 ea	Cable assembly: RF, BNC to BNC, 75 Ohm	174-4954-xx
2 ea	Cable assembly: DB25	174-4955-xx
1 ea	Opt. L0 only: Getting Started Manual (English) with Documentation CD-ROM (including User Manual, Technical Reference, Programmer Manual)	020-2654-xx
1 ea	Opt. L5 only: Getting Started Manual (Japanese) with Documentation CD-ROM (including User Manual, Technical Reference, Programmer Manual)	020-2655-xx
1 ea	User Manual, Volume 1 and 2	071-1507-xx
1 ea	Release Notes	071-1726-xx

Table 1-6 lists the standard accessories that are shipped with the MTS400 Stand-alone System.

Table 1-6: Standard accessories for the MTS400 Stand-Alone System

Quantity	Description	Part number
1 ea	Reply card	001-1125-02
1 ea	Compliance certificate	001-1180-01
1 ea	Software package: CD-ROM, MTS400 MPEG Test System	063-3814-xx
1 ea	Opt. PPD only: Software key (dongle); Parallel port	NA
1 ea	Opt. USB only: Software key (dongle); USB port	NA
1 ea	Opt. L0 only: Getting Started Manual (English) with Documentation CD-ROM (including User Manual, Technical Reference, Programmer Manual)	020-2654-xx
1 ea	Opt. L5 only: Getting Started Manual (Japanese) with Documentation CD-ROM (including User Manual, Technical Reference, Programmer Manual)	020-2655-xx
1 ea	User Manual, Volume 1 and 2	071-1507-xx
1 ea	Release Notes	071-1726-xx

Software Protection

The MTS400 Series System software options require that a software key be installed so that the purchased set of options can be accessed. A software key is a small hardware device; two forms are available, one can be connected to the parallel port, the other to the USB (Universal Serial Bus) port; the form supplied will depend upon the original order. For the MTS400 Series System unit, the (parallel port) software key is initially installed at the factory.

If you subsequently obtain additional options, software (and upgrade instructions) to upgrade the software key will be supplied.

Any printer compatible with the installed operating system can be connected to the unit through the parallel port version of the software key.

MTS400 Series System Installation

This section describes how to install the MTS400 Series System instruments. The analysis functions (where enabled) can be used with no installation other than providing power and making a transport stream available on the hard disk of the unit. The monitoring and real-time analysis functions similarly require power but also require connection to an external transport stream.

The MTS400 Series System is configured with the software and hardware options that you ordered at the time of purchase. Options can be added using upgrade kits available from Tektronix (see *MTS4UP Options*, page 1-9).

Unpacking the MTS400 Series System

Table 1-5 on page 1-10 lists the standard accessories that are shipped with the MTS400 Series System.

Placing the Instrument

⚠ CAUTION. *Do not operate the MTS400 Series System instrument in the vertical position. Using it in the vertical position does not allow sufficient ventilation or clearance for cables at the rear of the unit.*

Test System Interconnections

Use the following procedure to make electrical, signal and network connections:

⚠ CAUTION. *Do not supply power to the instrument until all other connections have been made.*

Figure 1-2 and Table 1-7 show the MTS400 Series System rear panel connectors. When the instrument is mounted securely, make the transport stream, network and peripheral device connections necessary for the working environment.
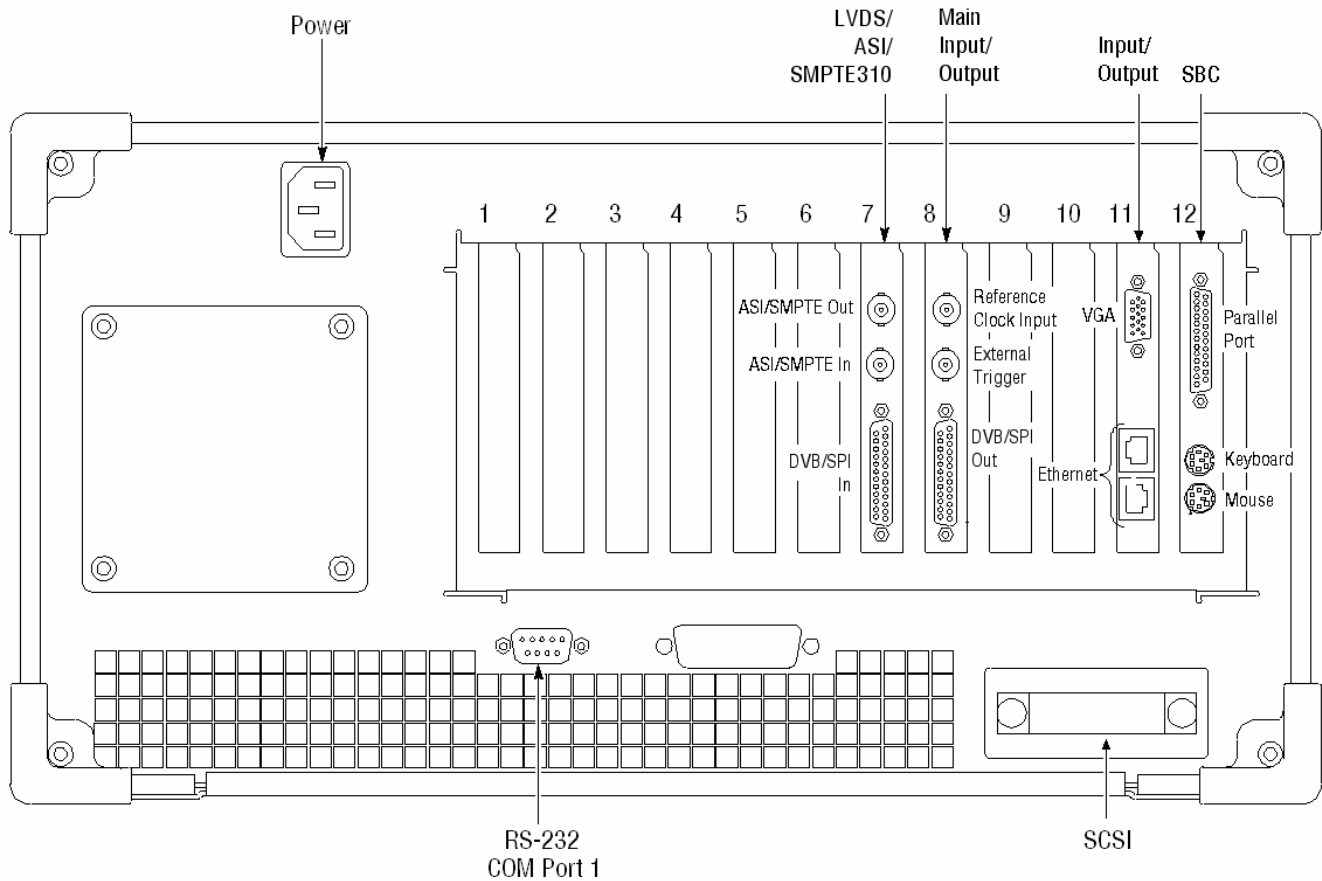

Figure 1-2: MTS400 Series System rear-panel connectors

⚠ **CAUTION**. *To prevent instrument damage from overheating, maintain at least two inches (5.1 cm) of clearance at the rear and sides of the instrument cabinet when locating the instrument on a bench.*

The following table describes the transport stream, network and peripheral device connectors. See the *MTS400 Series System Technical Reference* (071-1724-xx) for more detailed information about each connector and signal input and output formats.

Table 1-7: Rear-panel connectors

Position	Board	Connector function	Description
7	LVDS/ASI/SMPTE310 (A170 Card)	ASI/SMPTE Out	75 Ohm BNC connector
		ASI/SMPTE In	75 Ohm BNC connector
		DVB/SPI In	25-way, D-type connector
8	Main Input/Output (A12 Card)	Reference Clock Input	50 Ohm BNC connector
		External trigger	50 Ohm BNC connector
		DVB/SPI Out	25-way, D-type connector
11	I/O Input/Output	Monitor	15-pin, D-type for SVGA monitor
		Ethernet	10 Base-T/100 Base-T, RJ45 connector for Ethernet communications
		Ethernet	Gigabit connector for Ethernet communications
12	SBC (Single Board Computer)	Parallel	25-way, D-type for parallel communication. The parallel port software key is located here.
		Keyboard	Six-pin mini-DIN connectors for PS2 compatible keyboard (duplicated on side panel)
		Mouse	Six-pin mini-DIN connectors for PS2 compatible keyboard (duplicated on side panel)
Rear panel		RS232	9-pin connector for COM (serial) connections
		SCSI Terminator	Terminates the SCSI bus
		Power	Connect AC Mains power here

Table 1-7: Rear-panel connectors (cont.)

Position	Board	Connector function	Description
Side Panel		Keyboard	Six pin mini-DIN connectors for PS2 compatible keyboard (duplicated on rear panel)
		Mouse	Six pin mini-DIN connectors for PS2 compatible keyboard (duplicated on rear panel)
		USB	Universal Serial Bus
		Headphones	Connector for attach headphones bypassing the internal speaker

Plug the keyboard into the proper rear panel connectors. Note that the keyboard has two connectors at the end of the cable; one connector for the keyboard and one connector for the track pad. Refer to Figure 1-2. Alternative connectors for mouse and keyboard are provided on the side panel of the unit.

Ensure that the software key is in place. If you are using the parallel port software key, ensure that the securing screws are tightened to 4 inch-pounds of torque (45 Newton centimeters).

CAUTION. *To prevent instrument damage from electrostatic discharge, ensure that the parallel port software key securing screws are properly tightened before operating the instrument.*

The MTS400 Series System applications will not run without the software key installed. Do not remove the software key.

To use the Parallel port with the software key installed, attach any parallel port cables (such as a printer cables) directly to the software key. The software key does not interfere with parallel communications.

NOTE. *If you return the test system to a Tektronix Service Center for upgrade or repair, do not remove the software key.*

Supplying Power

The MTS400 Series System and MTS430 units are designed to operate from a single-phase power source having one of its current carrying conductors at or near earth ground (the neutral conductor). Power sources that have both current carrying conductors live with respect to ground, such as phase-to-phase or multiphase systems, are not recommended. A protective ground connection, by way of the grounding conductor in the power cord, is essential for safe operation.

The electrical operating requirements for the MTS400 Series System are shown in Table 1-**8**. See the *MTS400 Series System Technical Reference* (071-1724-xx) for more detailed electrical characteristics.

Table 1-8: Electrical operating requirements

Requirement	Specification
Source Voltage	100 to 240 VAC ± 10% (90 to 264 VAC RMS)
Frequency	50/60 Hz
Maximum Power Consumption	4 Amps
Inrush Surge Current	13 A at 240 VAC, 50 Hz 4.8 A peak at 100 VAC, 60 Hz

After you have installed the MTS400 Series System and completed making the signal and peripheral connections, plug the power cord into the mains.
See Figure 1-2 for the location of the power connector on the rear panel.

Powering On and Off

This section contains the procedure for powering on the instrument for the first time. To power off the instrument, see *Powering Off* (page 1-19).

First Time Power On

Power on the test system as follows:

1. Press the front-panel On/Standby switch to power on the unit.

On/Stby switch
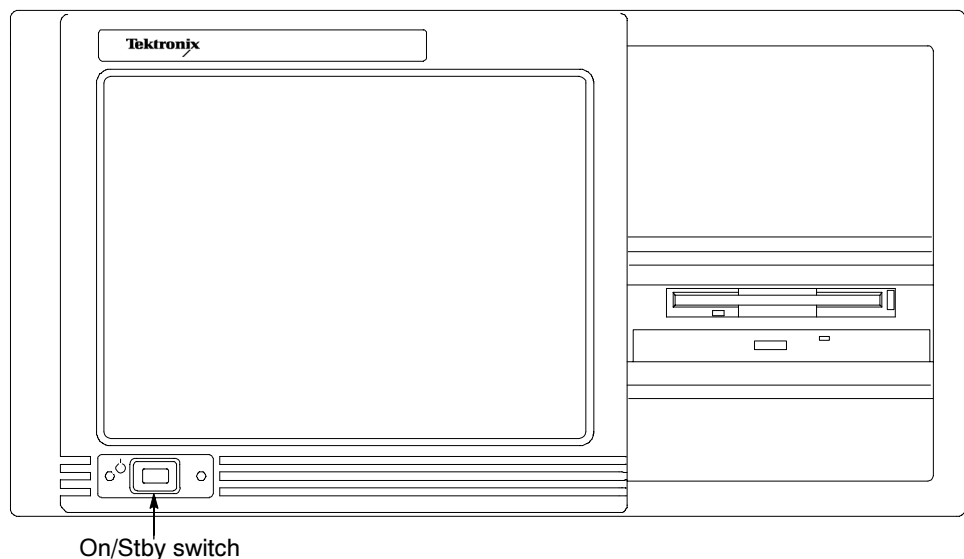
2. Wait for the instrument to complete its power-on self-tests.

The screen displays an Enter Windows Password dialog box prompting you for a logon name and password. However, if a password is entered, then each time you power on the measurement set you will be prompted for logon information. To avoid this, perform the following steps:

a. Enter a user name (for example, MTS400) in the Enter Windows Password dialog box.

b. Click OK, but do not enter a password.

c. Click OK in the Set Windows Password dialog box, but do not enter a password.

NOTE. *If subsequently want to set a password, refer to your Windows documentation.*

Powering Off

Always power off the instrument using the Windows XP shutdown process (select **START** > **Shut down…**). The system (including applications) will shut down automatically. When prompted, press the front panel On/Standby switch to remove power from the unit.

Alternatively, press the front panel On/Standby switch for two seconds and release. The system will shut down and power off automatically with no further intervention.

Network Installation

The MTS400 Series System can be attached to a computer network. Refer to your Network Administrator for details of the correct network configuration. For installation and operating instructions, refer to the documentation that is supplied with the network hardware and software.

Duplex Operation

The MTS400 Series System can be operated in duplex mode. For example, while the Player is playing out a stream, the TS Compliance Analyzer can be analyzing a separate stream or, if the output is looped back to the input, the output of the Player can be monitored by TS Compliance Analyzer (TSCA).

Setting up Loopback

With the following procedure you can:

- Use the MPEG Player to play out a stream.

- Loop the instrument output back to the input.

- Monitor/analyze the incoming stream using the TSCA.

Before starting:

- Identify the stream to be played out (in this example the sym1.mpg test stream is used).

- Choose the output/input interface (ASI/SMPTE310 or DVB SPI) and make the necessary connections (loop between the connectors) at the rear of the instrument (see Figure 1-2 on page 1-14).

In the following example, the stream is looped back using the ASI interface and the stream is looped (to play continuously).

NOTE. *You can choose either ASI or SPMTE310 to be output via the BNC connectors. The DVB SPI output will always be available, whatever the settings are in the player.*

MPEG Player Setup

1. Open the MPEG Player:
   Start menu > **Programs** > **Tektronix MTS400** > **Player** > **MPEG Player**.

2. Open a stream:
   File > Open… > sym1.mpg.

3. Make the following settings in the **Play** menu:
   Packet size: 188
   Update: On
   Sync: TS Packet
   Loop: On
   Other: Standard: DVB

TSCA Setup

1. Open the TSCA:
   Start menu > **Programs** > **Tektronix MTS400** > **Analyzers** > **TS Compliance Analyzer**.

2. In the start-up dialog box (**Open Transport Stream…**), select Stream Interpretation and select the DVB base standard with no extensions.

3. Select Real-time Analysis and select **ASI** from the **Interfaces** drop-down list.

4. Select OK.

Start the Playout/Analysis

1. Return to the MPEG Player window and play the stream by selecting:
   Play > Start/Stop or use the toolbar button.

2. In the Player window, note that the status bar is now displayed and that playout has started.

3. Return to the TSCA window and note that analysis has started.

The MPEG Player is now playing out the sym1.mpg transport stream and, through the ASI input and output on the instrument connector panel, the TSCA is monitoring and analyzing the stream.

For detailed descriptions of the MPEG Player and the TSCA, refer to the *MTS400 Series User Manual* (071-1507-xx).

MTS4SA Stand-Alone System Installation

The MTS4SA Stand-alone system makes the MTS400 Series System applications (except the real-time features) available on a PC. The full specification is given in the *MTS400 Series System Technical Reference* (071-1724-xx).

If the MTS4EA option (MTS4EA Compressed Video ES Analyzer) has been purchased, use the installation procedure provided in the accompanying user manual (MTS4EA Compressed Video ES Analyzer, 071-1641-xx).

If the MTS4SA Stand-alone system software is to be installed on an AD953A MPEG Test System, the following option is offered:
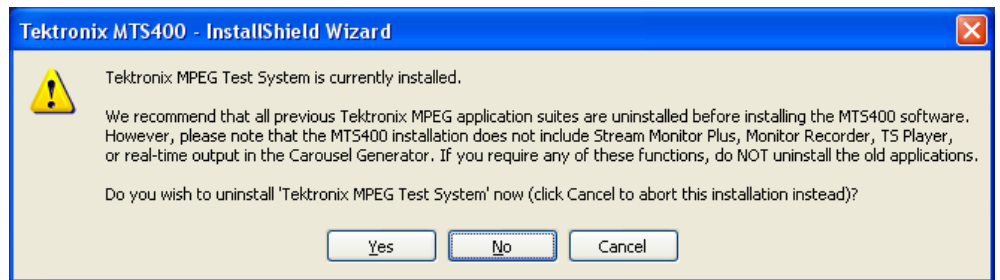
The MTS400 real-time applications will not work with the AD953A hardware. Press No to retain the AD953A real-time software.

System Requirements

The following minimum PC configuration is recommended for installing the MTS4SA Stand-alone system:

- Microsoft Windows™ NT 4.0, Windows 2000 or Windows XP operating system

- Processor speed >1.0 GHz

- Memory at least 256 MB RAM

- Screen resolution at least 1024x768

- 120 MB minimum hard disk space

NOTE. *The MTS4EA MPEG Compressed Video ES Analyzer application will run satisfactorily on a PC with the above specification. However, some of the more intensive operations will benefit from using a more powerful PC. Refer to the MPEG Compressed Video ES Analyzer User Manual (071-1641-xx) for more details.*

NOTE. *All deferred applications will run satisfactorily on the AD953 MPEG Test System.*

Installation

1. Place the MTS4SA CD-ROM in the PC CD-ROM drive.

   The CD will autostart and display a Welcome dialog box.

2. Select **Next**. The Setup Type dialog box will be displayed which allows you to select the type of installation that will be installed.
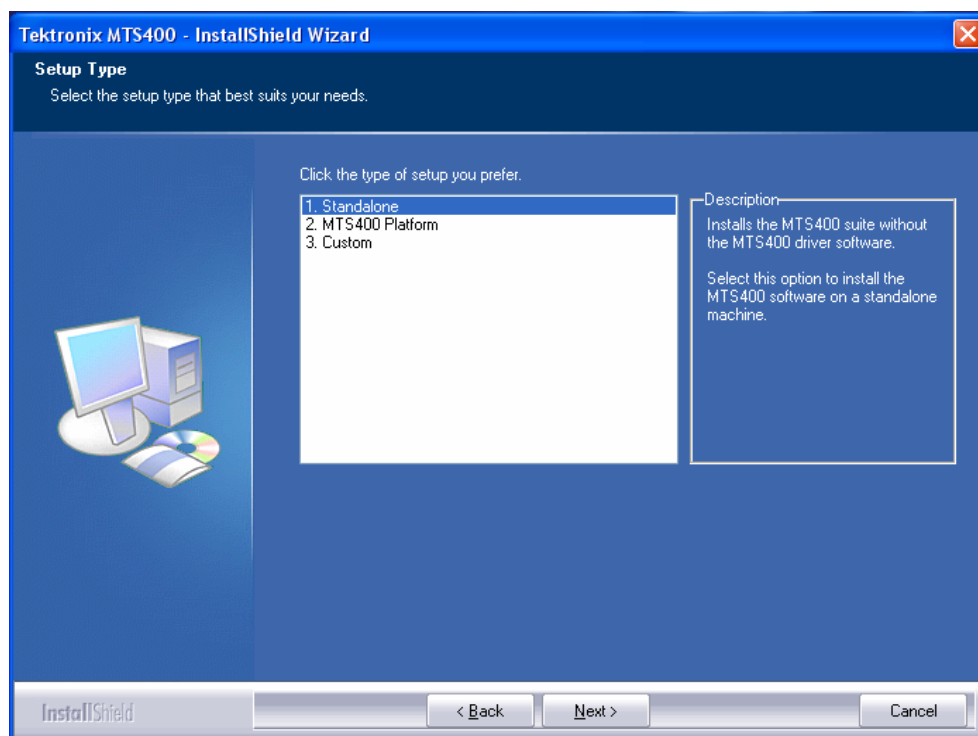
Three options are offered:

Standalone   Installs the MTS400 suite without the hardware driver software.

MTS400 Platform   Installs the entire MTS400 suite, including the hardware drivers.

NOTE. *Although they will be installed, real-time features of the MTS400 test system will not be usable, since the hardware driver software will not be present.*

Custom   Allows you to install any combination of the MTS400 applications.

3. Choose the setup that you require and select **Next**.

NOTE. *Operational access to features is controlled by the licenses available on the software key (see page 1-10). Applications and features can be installed, but will not be available unless the appropriate license has been obtained. Notification of these is provided when the product or additional licenses are purchased.*

4. If the Custom setup has been chosen, refer to *Custom Setup* on page 1-29.

5. Confirm the installation by selecting **Install**.
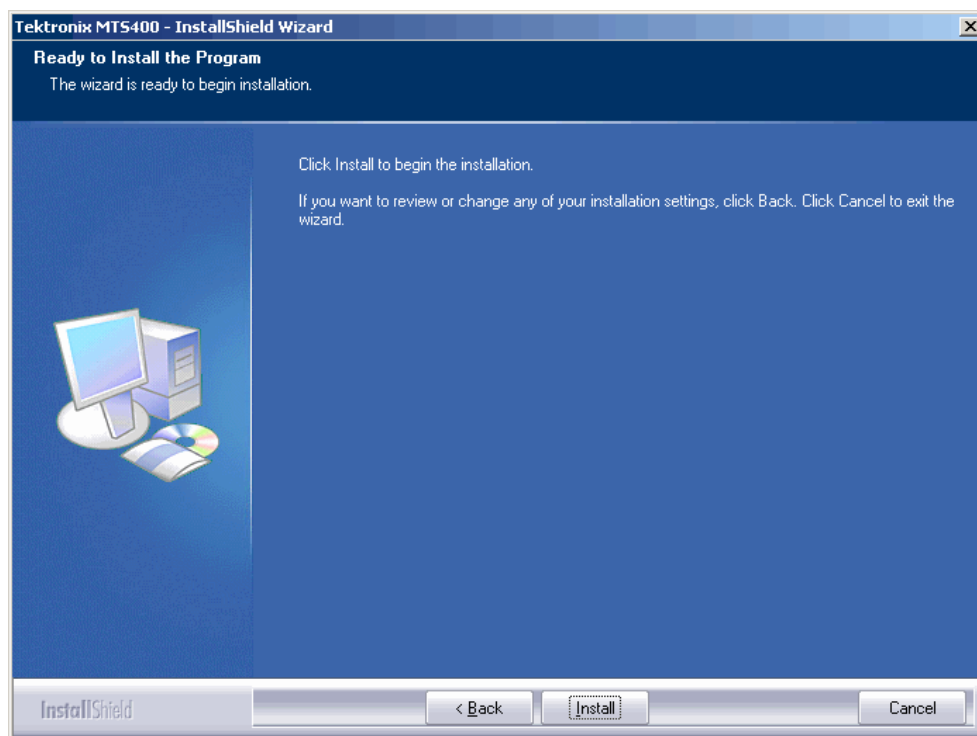
6. Allow the installation process to proceed.

NOTE. *A number of dialog boxes are displayed during the installation process. Normally, no user intervention is required.*

The average installation time is approximately five minutes.

7. When installation is complete, the Installation Complete dialog box is displayed.
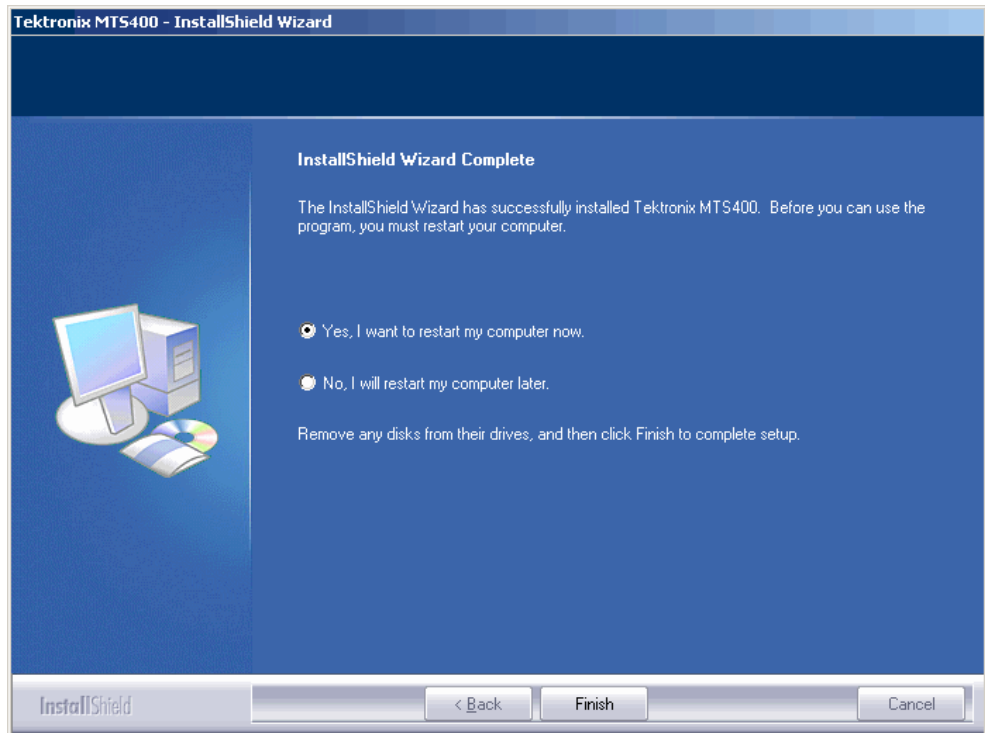
8. Choose the option to restart the PC and then select **Finish**.

The PC will shut down and restart. The licensed MTS400 Stand-alone applications will now be available in the Windows Start menu (see page 1-31).

NOTE. *Desktop icons are not installed for stand-alone operation. Applications can be started from the Windows Start menu.*

The software key must be installed before any of the applications can be opened (see Software Protection, page 1-11).

Custom Setup
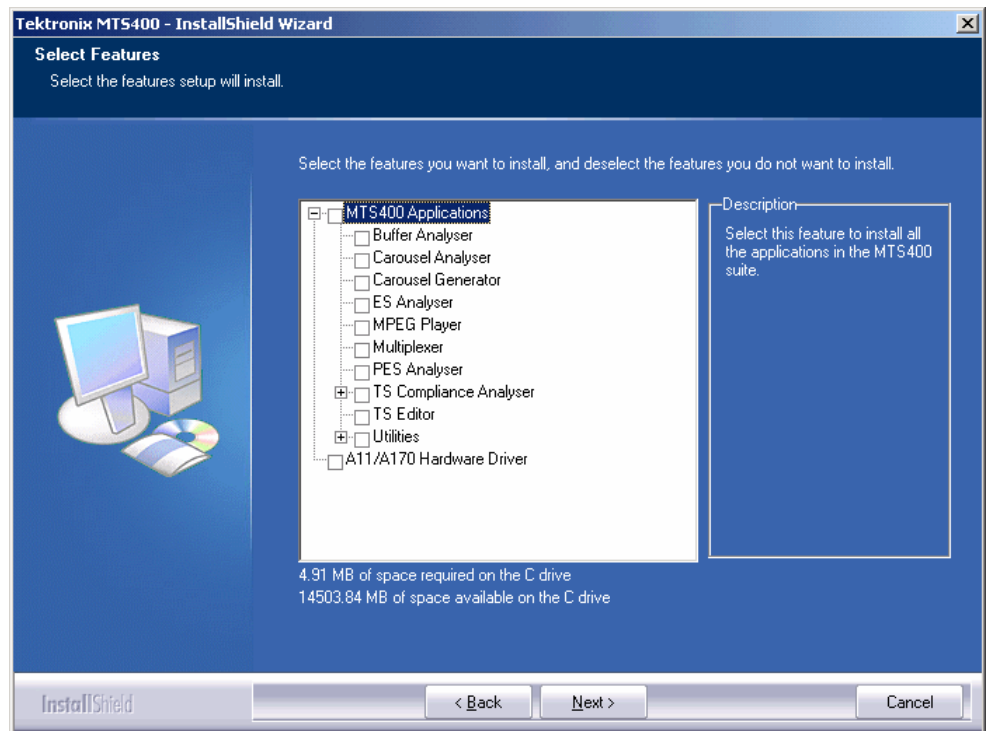
1. Select the check boxes next to the required features.

2. When you have selected all the required features, select **Next** to proceed with the installation.

3. Custom installation allows you to specify MPEG file association using the Transport Stream Compliance Analyzer (part of the MTS400). Associated files can be opened in the compliance analyzer or edited using the TS Editor.
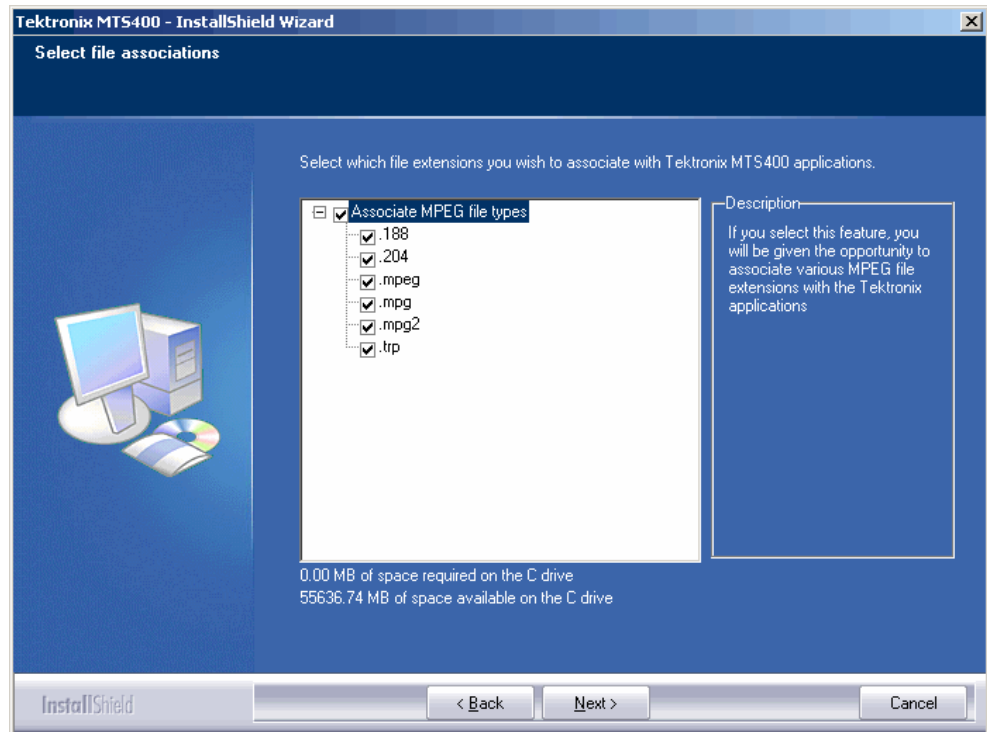
4. Select the check boxes of the files to be associated with the MTS400.

5. Select **Next** to proceed with the installation; the installation continues as for Complete or Deferred installation.

Starting an Application

All applications are started from the **Start > All Programs > Tektronix MTS400** menus.

A brief description of each application is given on page 2-1 of this manual. The *MTS400 Series System User Manual* (071-1507-xx) provides full descriptions of all applications. Table 1-9 shows the hierarchy of applications in the Start menu.

Table 1-9: MTS400 Series System Start menu

Tektronix MTS400 Series System	Analyzers	Buffer Analyzer
		Carousel Analyzer
		ES Analyzer
		PES Analyzer
		TS Compliance Analyzer
	Generators	Carousel Generator
		Multiplexer
		TS Editor
	Player	MPEG Player
	Utilities	Make Seamless Wizard
		ScriptPad
		Stream Cutter
		Tracer

NOTE. *Even though all applications are shown in the Start menu, you can only open those options that have been purchased and licensed.*

This section briefly describes how to set up and analyze off-line and real-time streams using the Transport Stream Compliance Analyzer (TCSA). You can find information on how to interpret the analysis results in the relevant chapter of the user manual.

You must perform the following actions in order to analyze a stream:

- Start the TSCA.

- Verify and, if necessary, select the stream interpretation standard.

- Set the stream transport rate calculation method (off-line only).

- Identify and select the stream to be analyzed (off-line or real-time).

Starting the TSCA

1. From the Start menu, select **Start** > **All Programs** > **Tektronix MTS400** > **Analyzers** > **TS Compliance Analyzer**.
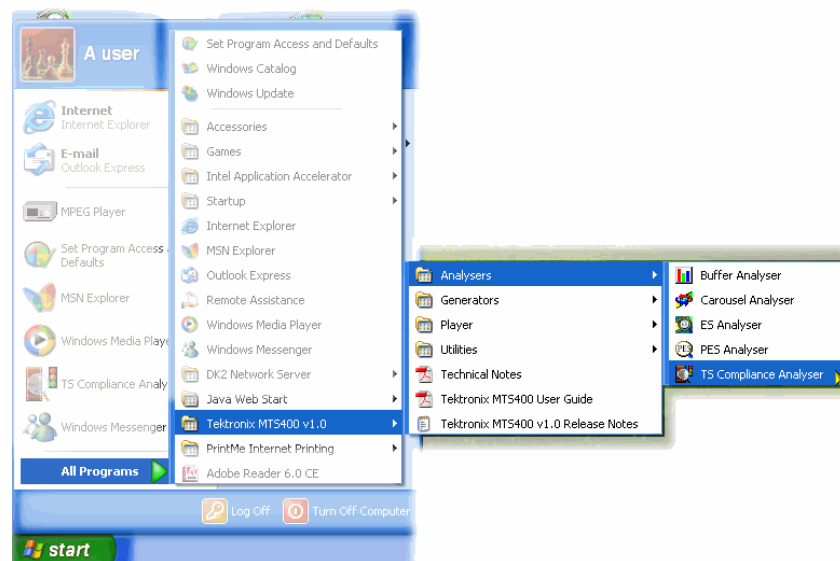

The TSCA is opened immediately overlaid by the **Open Transport Stream…** dialog box.
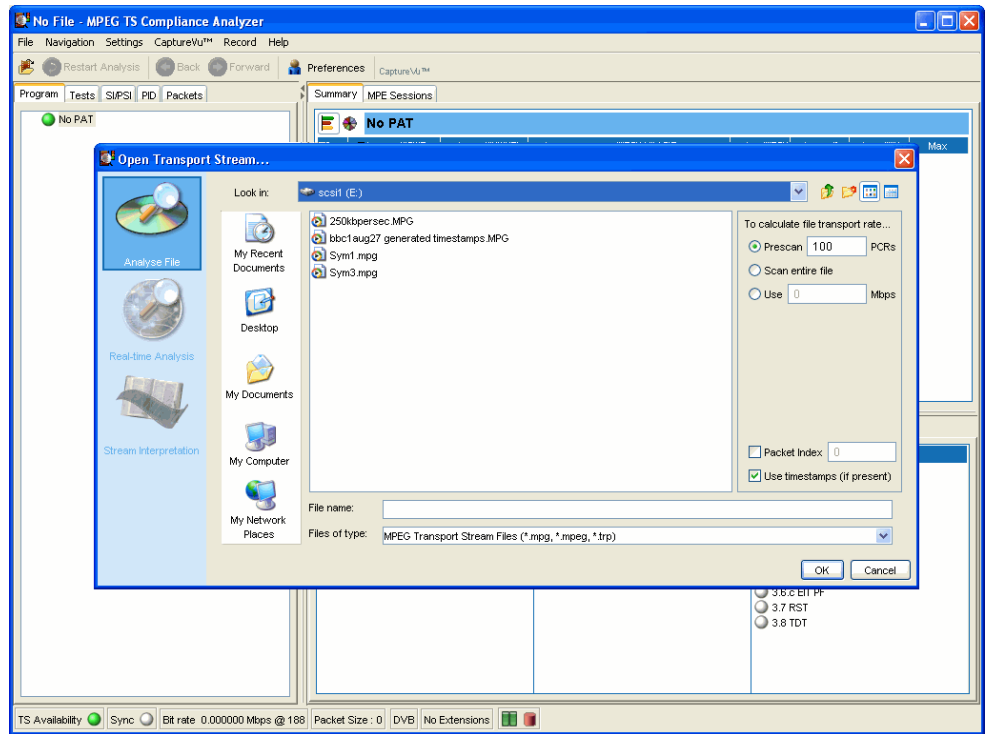
NOTE. *The Real-time Analysis selection in the* **Open Transport Stream…** *dialog box is not available in stand-alone configurations.*

Setting the Interpretation Standard

For a stream to be analyzed correctly, the interpretation standard in the TSCA must be set to be the same as that used to create the stream. You can see the Base Standard and Region currently set for the TSCA by looking at the stream interpretation fields in the status bar of the main window.
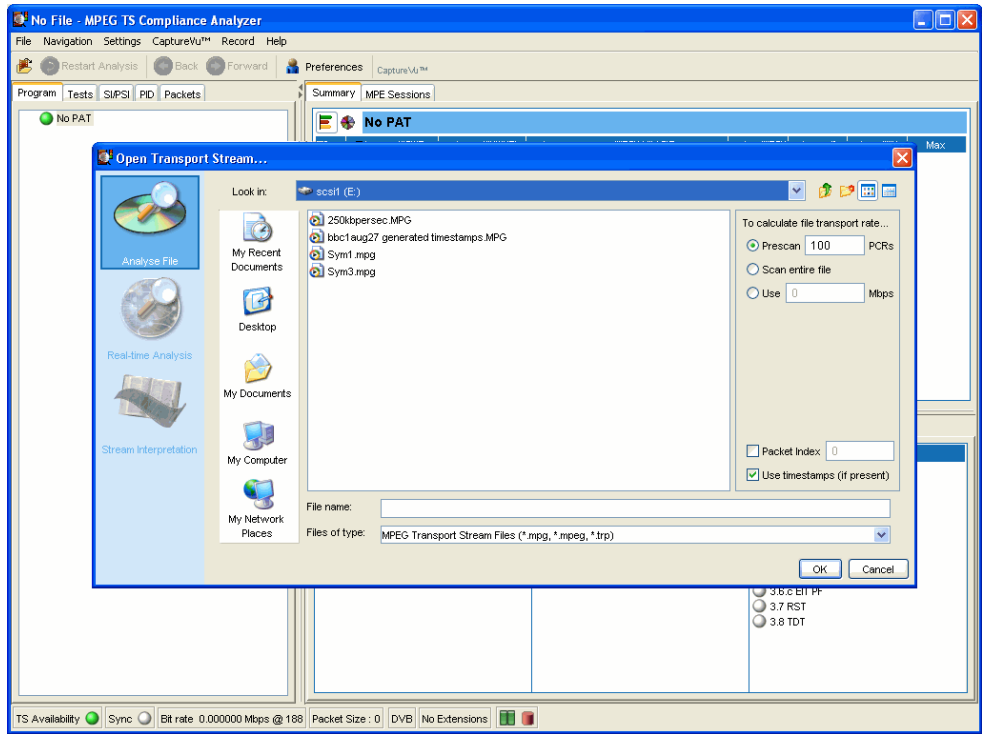
Base Standard ⟍   ⟋ Region

1. If you need to change the interpretation standard, select the **Stream Interpretation** view.
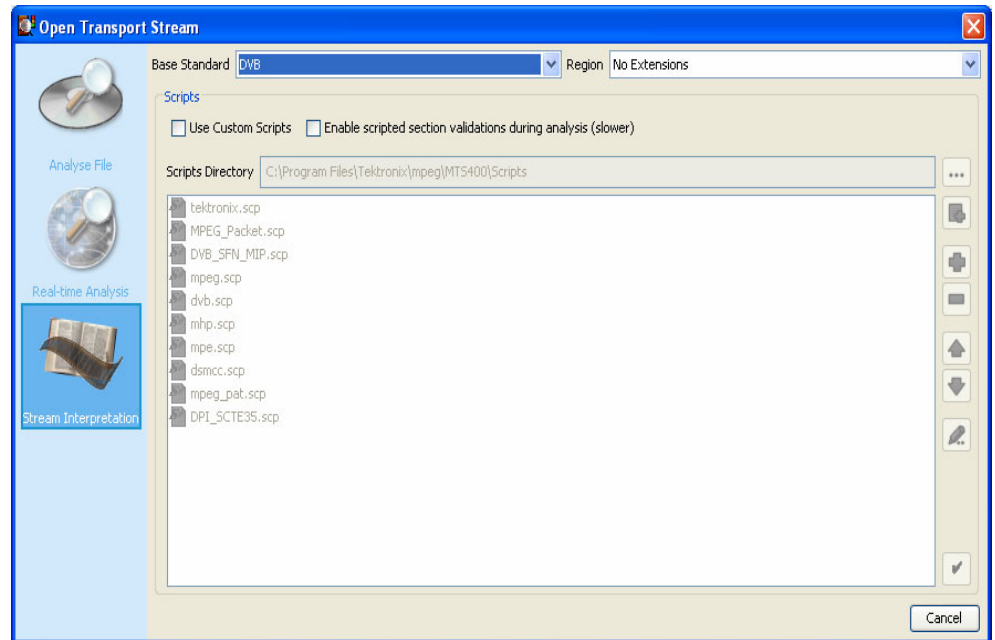
2. Set the **Base Standard** and **Region** as required. Note that the scripts used in the current selection are listed in the **Script Files** pane.

Off-Line Analysis

1. Select the **Analyze File** view.
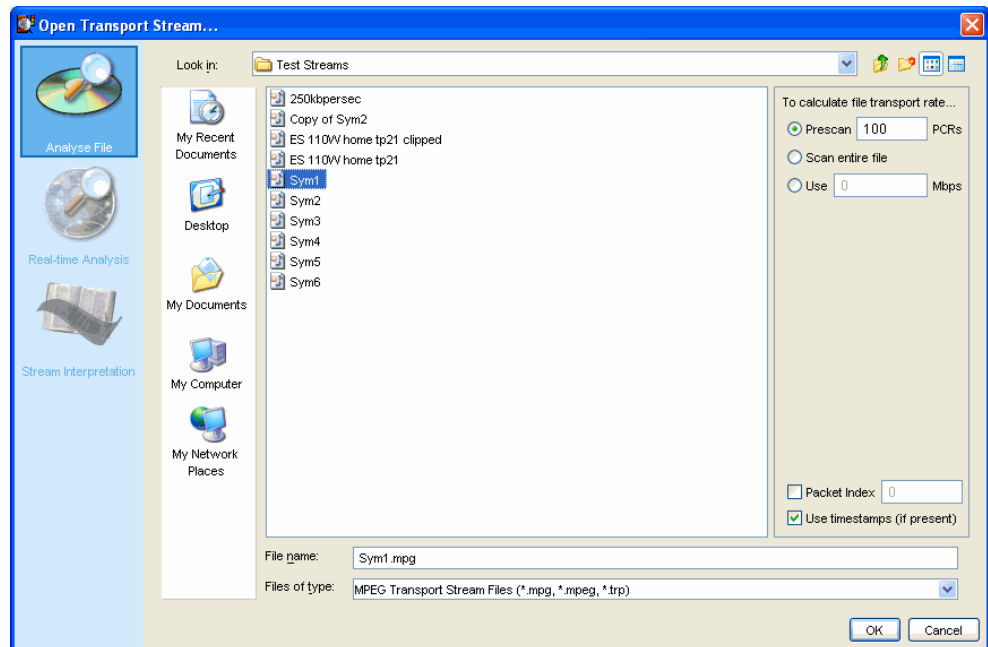
2. Identify and select a file.

    For the file to be analyzed correctly, the bit rate must be known. You can let the TSCA do this automatically or you can set it manually.

    If PCRs (Program Clock Reference) are present in the file, the TSCA is able to calculate the bit rate automatically either by prescanning the first 100 PCRs or by scanning the entire file. Scanning the entire file is a more accurate method of calculating the bit rate but analysis of the file will take longer.

3. Enable the **Use Timestamps** checkbox.

    If timestamping is present in the file to be analyzed, it can be used to provide a more accurate calculation of the bit rate. If timestamps are found not to be present, the bit rate will be calculated using PCRs.

4. Set the packet index.

The packet index field allows you to specify how many packets in the stream are to be analyzed. The value entered will be the last packet analyzed; that is, from packet zero to the value entered. Note that if too small a sample of the stream is analyzed, insufficient service information may be available for meaningful analysis.

Disable the Packet Index checkbox to ensure full stream analysis.

5. Select **OK** to proceed with the off-line file analysis. During analysis of a stream, a progress bar is displayed in the toolbar.

Real-Time Analysis

1. Select the **Real-time Analysis** view.
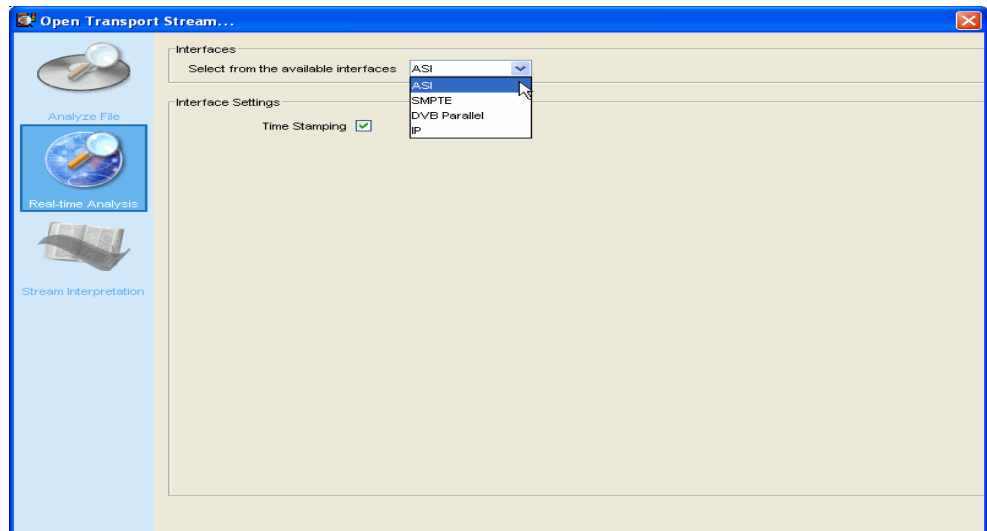
2. Select the MTS400 Series System interface. This is the input on which your real-time stream is being received.

3. If present in the **Interface Settings** pane, enable the **Use Timestamps** checkbox.

    If timestamping is present in the file to be analyzed, it can be used to provide a more accurate calculation of the bit rate. If timestamps are found not to be present, the bit rate will be calculated using PCRs.

    For the IP interface, select the port number.

4. Select **OK** to proceed with the real-time file analysis.

Stream Analysis Results

Figure 1-3 shows the result of off-line analysis. The layout of the real-time analysis view is similar.
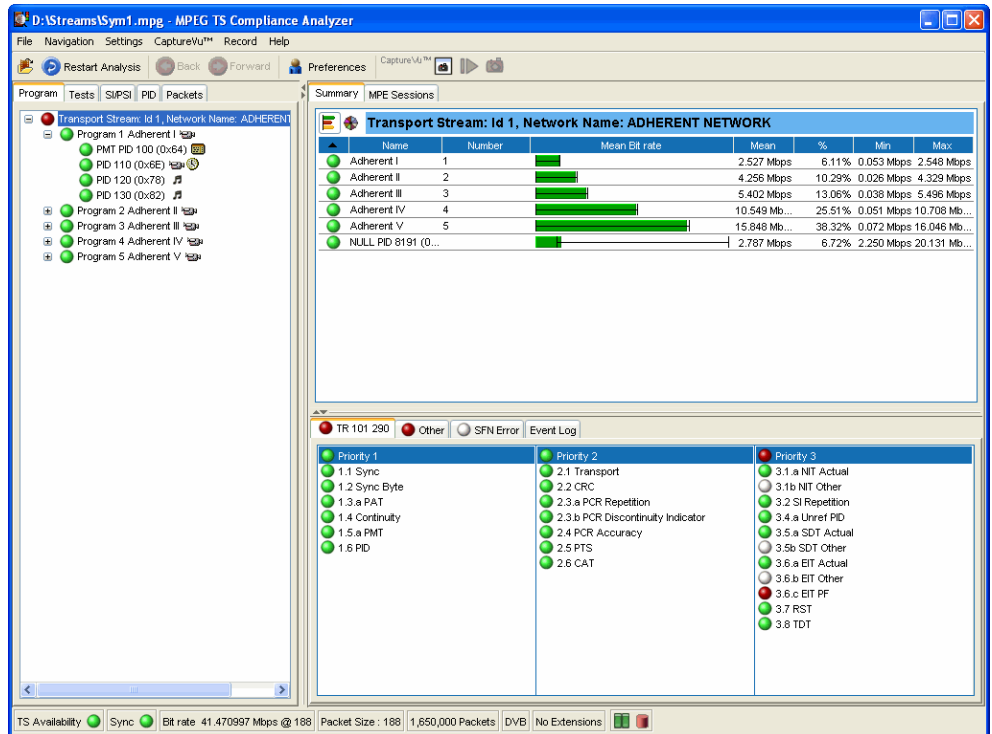
Figure 1-3: TSCA - File Open

Operating Basics

Operating Basics

Software Applications

This section provides a brief overview of the software applications that make up the MTS400 Series MPEG Test Systems. Note that not all options may be enabled. Detailed descriptions of all applications can be found in the *MTS400 Series System MPEG Test System User Manual* (071-1507-xx).

The MTS4EA Compressed Video ES Analyzer options are described in the MTS4EA User Manual (071-1641-xx)

Table 2-1: MTS400 / MTS430 / MTS4 / MTS4UP installed applications

Application	Desktop Icon (where installed)
Analyzers	
Transport Stream Compliance Analyzer (TSCA) - Real Time Real-time transport stream analysis with user-selectable MPEG-2, DVB, ATSC and ISDB conformance tests. Shows transport structure, header contents, hexadecimal packet contents, PCR timing /transport rate graphs and error message logs.	TS Compliance Analyser
Transport Stream Compliance Analyzer (TSCA) - Deferred Deferred transport stream analysis with user-selectable MPEG-2, DVB, ATSC and ISDB conformance tests. Shows transport structure, header contents, hexadecimal packet contents, PCR timing /transport rate graphs and error message logs.	TS Compliance Analyser
Transport Stream Compliance Analyzer Lite (TSCA) - Deferred Same as for the TS Analyzer except that the file size of transport streams to be analyzed is limited to 192 MB.	TS Compliance Analyser
Packetized Elementary Stream (PES) Analyzer PES analysis with selectable test options. Shows PES program structure, header contents, packet contents, PTS/DTS timing graphs and analysis reports.	PES Analyser
Transport Stream – System Target Decoder (T-STD) Buffer Analyzer Analyzes program streams modeling their behavior in, and their conformance to, the MPEG-2 T-STD Buffer Model.	Buffer Analyser
Elementary Stream Analyzer Elementary Stream analysis at video picture and audio level. This includes vector graphs and macroblock picture quality.	ES Analyser

Table 2-1: MTS400 / MTS430 / MTS4 / MTS4UP installed applications (cont.)

Application	Desktop Icon (where installed)
Carousel Analyzer Data analysis showing structure, bit rate, repetition rate, syntax and semantics of data items.	Carousel Analyser
Generators	
Carousel Generator Provides in-depth off-line generation of MPEG-2, DVB transport streams containing a range of data broadcast protocols.	Carousel Generator
Multiplexer Multiplexes table information and packetized elementary streams together to synthesize new transport streams. A fine level of control is provided to allow non-conformances and test cases to be specified for new transport streams.	Multiplexer
TS Editor Viewing and Editing of transport stream packets, using a hexadecimal view of the packet contents and semantic interpretation of the header. Provides facilities to: remap PIDs, recalculate PCR values and introduce PCR inaccuracies.	TS Editor
Players	
MPEG Player Records and Plays out MPEG-2 streams.	MPEG Player
Utilities	
Tracer Views the message log produced by T-STD Buffer Analyzer.	Tracer
Make Seamless Wizard Guides the user through the process of creating an MPEG-2 file for use by Stream Player in continuously looped operation.	Make Seamless Wizard
Stream Cutter Extracts sections of MPEG-2 files to new files.	Stream Cutter
Script Pad Enables users to create and modify System Information (SI) scripts.	ScriptPad

Appendices

Appendix A: Cleaning and Maintenance

This appendix describes general care and service procedures for the MPEG Test System.

- *Preventive Maintenance* provides cleaning instructions.

- *In Case There is a Problem* provides some hints for troubleshooting startup errors.

- *Repackaging for Shipment* gives instructions for packing and shipping the instrument.

General Care

Protect the instrument from adverse weather conditions. The instrument is not waterproof.

⚠ **CAUTION**. *To avoid damage to the instrument, do not expose it to sprays, liquids, or solvents.*

Do not use chemical cleaning agents; they may damage the instrument. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

Preventive Maintenance

Check the electrical performance and verify that the instrument accuracy is certified (calibrated) once a year.

Preventive maintenance mainly consists of periodic cleaning. Periodic cleaning reduces instrument breakdown and increases reliability. You should clean the instrument as needed, based on the operating environment. Dirty conditions may require more frequent cleaning than computer room conditions.

Cleaning the Exterior

Clean the exterior surfaces of the instrument with a dry, lint-free cloth or a soft-bristle brush. If dirt remains, use a cloth or swab dampened with a 75% isopropyl alcohol solution. A swab is useful for cleaning in narrow spaces around the

controls and connectors. Do not use abrasive compounds on any part of the instrument.

⚠️ *CAUTION. Avoid getting moisture inside the instrument during external cleaning and use only enough solution to dampen the cloth or swab. Use a 75% isopropyl alcohol solution as a cleanser and rinse with deionized water.*

Do not wash the front-panel On/Standby switch. Cover the switch while cleaning the instrument.

Cleaning the Compact Disc Drive

The compact disc drive requires routine maintenance to operate at maximum efficiency. The compact discs can be damaged if dirt and dust accumulate on the surface of the discs. Store any discs in their protective containers to keep them from being exposed to dust or dirt.

⚠️ *CAUTION. Electrostatic discharge (ESD) can damage components in the CD-ROM drive. Do not touch lens or exposed metallic parts on the platter, with the exception of the center hub.*

Clean the face of the CD-ROM drive monthly with a cloth dampened with deionized water.

⚠️ *CAUTION. Do not allow moisture to enter the disc drive. When power is applied, the internal components might be damaged.*

Cleaning the Keyboard

Clean the exterior surfaces of the keyboard and integrated tracking device with a dry, lint-free cloth or a soft-bristle brush. A swab is useful for cleaning in narrow spaces around the controls and connectors. Do not use abrasive compounds on any part of the instrument.

⚠️ *CAUTION. Avoid getting moisture inside the keyboard and integrated tracking device during external cleaning and use only enough solution to dampen the cloth or swab. Use a 75% isopropyl alcohol solution as a cleanser and rinse with deionized water.*

In Case of Problems

This section addresses problems that you may encounter while using the test system. This section does not identify specific problems related to performance verification or adjustments. The diagnostic procedures for the MTS400 Series System provided in this section can help you isolate problems. For a performance verification procedure, refer to the *MTS400 Series System MPEG Test System Technical Reference*, supplied as a PDF file on the *MTS400 Series System MPEG Test System Recovery* CD-ROM.

Power-on diagnostics run when you first power on the instrument to start the test system application. These diagnostics check the operating system and hardware for correct operation. If error messages occur during the power-on diagnostics, there may be a system error that prevents the MTS400 Series System software from starting.

Table A-1 lists some of the symptoms of hardware problems (related to the operating system and peripheral devices) and possible solutions.

Table A-1: Troubleshooting power-on failures

Symptom	Possible causes and recommended actions
Instrument does not power on	Verify that the power cord is connected to the instrument and to the power source.
	Check that the instrument receives power when you press the On/Standby switch; check that fans start.
	Check that power is available at the power source.
	Contact your local Tektronix service center.
Instrument powers on but does not complete the power-on sequence	Check for and remove any disk in the floppy disk drive; make sure instrument boots from the hard disk drive.
Power-on diagnostics fail	Contact your local Tektronix service center.
Instrument does not recognize accessories such as monitor, printer, or keyboard	Check that accessories are properly connected or installed.
	Contact your local Tektronix service center.
Instrument will not power off with On/Standby switch	Try powering off the instrument using the Windows XP shutdown procedure. If the instrument still does not power off, use the task manager to close down tasks. Finally, try the hard shutdown procedure; push and hold the On/Standby switch for five seconds to power off the instrument.

Software Problems

Your MPEG Test System comes with software already installed. For any suspected software problems, try to isolate the problem to the test system application software or to other installed software.

Many software problems are due to corrupted or missing software files. In most cases, the easiest way to solve software problems is to reinstall the software. See the *Software Repair and Recovery* appendix.

If you suspect networking problems, see *Appendix C: Network Troubleshooting.*

Hardware Problems

Hardware problems can have several causes. Review the installation instructions in this manual to verify that you have properly installed the instrument. There are no user serviceable parts in the MTS400 Series Systems, so you should contact your local Tektronix Service representative if you have a hardware problem.

Repackaging for Shipment

Your instrument was originally shipped by Tektronix in a carton with packaging components designed to protect the instrument from damage during shipment. If you need to ship the instrument to another location, it is strongly recommended that you use the original shipping carton and packaging components to provide adequate protection during shipment.

CAUTION. *To prevent the invalidation of your instrument's warranties, Tektronix strongly recommends that you use your original shipping carton (one that is in good condition) when you ship the instrument to another location or when you return the instrument to a Tektronix service center for repair.*

Tektronix cannot honor the instrument's warranties if the instrument arrives at the service center damaged and it was not shipped in its original carton or in a replacement carton (and its supporting packaging material) purchased from Tektronix. If you lose your original packaging material, contact your Tektronix representative to obtain replacement packaging.

Packaging Inspection

When preparing to ship your instrument to another location, it is important to inspect your existing packaging materials for condition and missing components.

If the condition of your existing packaging materials is poor, or if you are missing some of the components, it is strongly recommended that you order a new packaging kit.

Replacement Packaging Materials

New packaging materials are available from Tektronix. To obtain these items, contact your Tektronix representative.

The replacement packaging kit, Tektronix part number 065-0714-xx, includes all the packaging material required to properly package the instrument for shipment.

Repackaging Procedure

When the instrument is shipped, it is important to package it well to protect the instrument. It is not necessary to return the accessories received with the instrument when returning the instrument for repair.

1. If the instrument is to be shipped to a Tektronix field office for repair, attach a tag to the instrument showing the following:

   ▪ Owner's name and address

   ▪ Instrument serial number

   ▪ Description of the problem(s) encountered and/or service required.

2. Place the protective front cover on the front of the instrument.

3. Place the instrument in the protective bag. The bag prevents dust, moisture, and other debris from entering the cabinet.

4. Fold the top of the bag neatly over the top of the instrument to make it as flat as possible and seal with packing tape.

5. Place the front cushion over the front of the instrument.

6. Place the rear cushion over the rear of the instrument.

7. Carefully lift the instrument with front and rear cushions attached and lower it into the shipping box.

8. Position the cardboard tray into the top of the box, pressing the tray down until it rests on the tops of the front and rear cushions.

NOTE. *To ensure packaging integrity and product safety, the tray must be installed regardless of whether accessories are being included in the package.*

9. If you are shipping the accessories, arrange the accessories in the tray.

10. Close and tape the shipping box.

11. Attach the appropriate shipping documents needed to ship the instrument to its destination.

Appendix B: MTS400 Series System Recovery

If you have problems with the MTS400 Series System software, use the procedures in this section to restore the system to factory default installation and configuration.

NOTE. *If you are restoring software after replacing the hard disk drive with one that you ordered as a replacement from Tektronix, follow the instructions provided with the hard disk replacement kit.*

Overview

These procedures require the *MTS400 Series System Recovery* CD-ROMs, which were shipped with your system.

Only a qualified technician who is familiar with installing drivers and configuring systems for networking should perform this installation.

These tips apply to the procedures in this section:

- Use default settings unless otherwise indicated in the following procedures.

- These procedures use drive "D:" as the CD-ROM drive.

- At the end of some steps, you are instructed to restart the system. To do this, if you are prompted to restart, select **Yes.** If not prompted, select **Shutdown** from the Start menu and then select **Restart the computer.**

You can use the procedures in this section to do any of the following:

- Restore the complete system, including installation and configuration, to factory defaults.

- Reformat the SCSI drives.

The complete system includes:

- Microsoft Windows XP Professional with Service Pack 2

- Internet Explorer 6.0 SP2

- SigmaTel C-Major Sound Driver

- Mobility Radeon 7500 Display Driver (ATI)

- Tektronix Soft Power Down Driver & Shutdown Service

- Intel EtherExpress PRO/100B and PRO/1000 PCI Adapter Driver

- Symbios SCSI Driver

- Nero CD/DVD recording software

- Intel Application Accelerator

- Intel INF Update

- Media Player 10

- Tektronix MTS400 Series System MPEG Test Systems application software

Restore Hard Disk Contents

In some situations, such as when the power was interrupted or files were mistakenly deleted, the system might fail to boot from the hard drive. If this happens, use the *MTS400 Series System Recovery CD-ROMs* to restore the hard drive to factory default installation status.

> ⚠ **CAUTION**. *To avoid losing access to your licensed applications, you must use the MTS400 Series System Recovery disks supplied with the unit (or subsequent upgrade).*

MTS400 Series System Restore

To restore the MTS400 Series System, use the following steps. This restore process is effective only if the hard disk drive is still good. The process will restore the operations system and the application software. (The process should take less than 30 minutes.)

> ⚠ **CAUTION**. *To prevent data loss, back up your hard drive before you restore the MTS400 Series System. All data on the hard drive will be destroyed during the system restore process.*

1. Power up the MPEG Test System with the *MTS400 Series System Recovery CD-ROM (Disk 1)* in the CD-ROM drive. The system will autostart the recovery application.

2. Press the "1" key to begin the system restore process. The Acquiring Device… dialog box will appear briefly and display a progress bar.

3. When prompted, insert recovery disk 2 in the CD-ROM drive, and then press the "1" key.

4. When prompted, insert recovery disk 3 in the CD-ROM drive, and then press the "1" key.

5. When the system restore is complete, remove disk 3 from the CD-ROM drive, and then press the "4" key.

6. When prompted, press the "Y" key to reboot the instrument.

7. On startup, the system will prompt you to set up Windows XP. Follow the on-screen procedure, accepting defaults where necessary.

8. Allow the system to restart when prompted.

Reinstate the SCSI Drives

After restoring the hard disk, confirm that the SCSI drives (drives E and F) have been recognized by the system. Figure B-1 shows the drives in Windows Explorer.
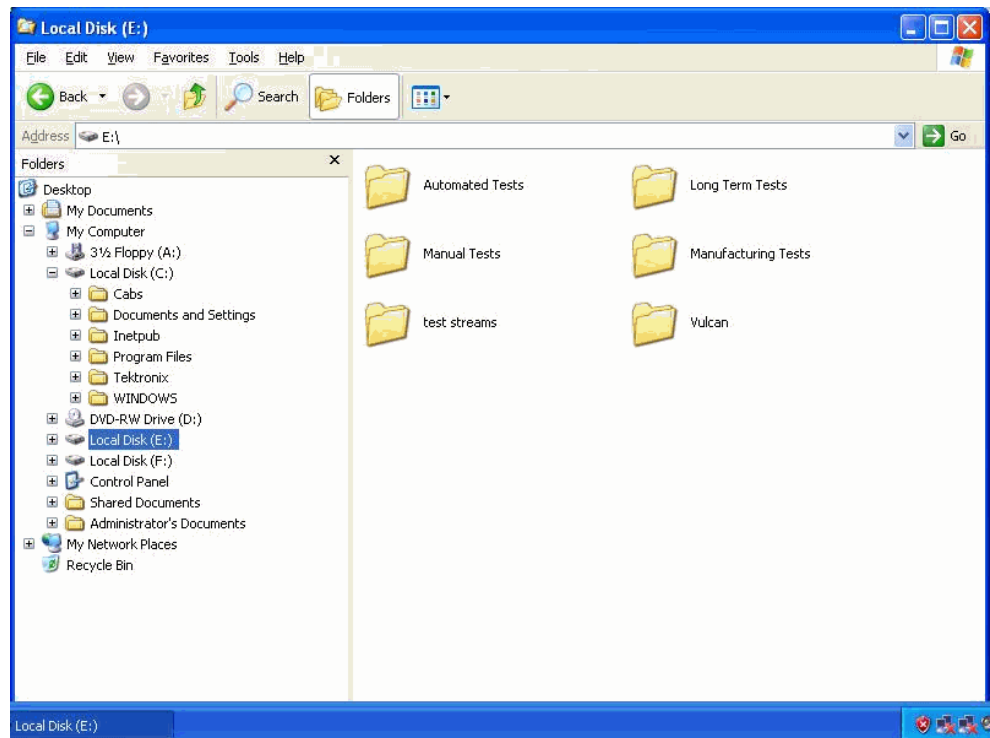

Figure B-1: SCSI drives automatically recognized

If the drives (E and F) are not listed in Windows Explorer, complete the following procedure to allow them to be recognized by the system.

1. Open the Windows Disk Management window (Start > **Control Panel** > **Performance and Maintenance** > **Administrative Tools** > **Computer Management** > **Storage** > **Disk management**).

    Note that Disk 0 and Disk 1 are described as **Foreign**, as shown in Figure B-2.
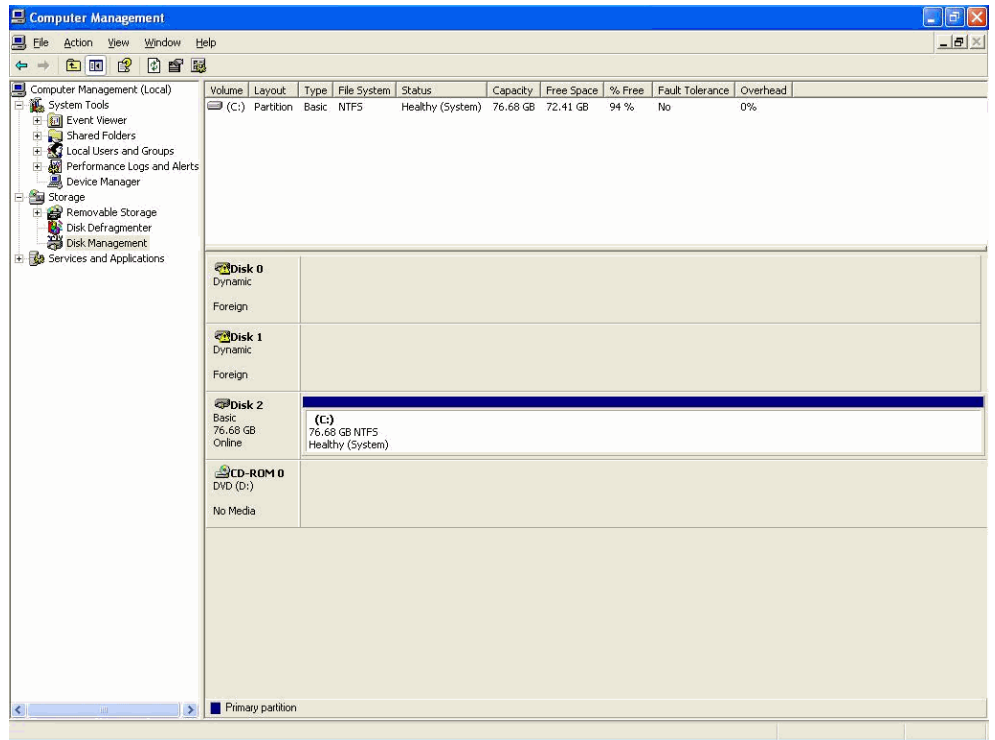
Figure B-2: Computer Management - SCSI drives, foreign

2. Right-click on Disk 0 or Disk 1 and select **Import Foreign Disks…** from the context menu (see Figure B-3).
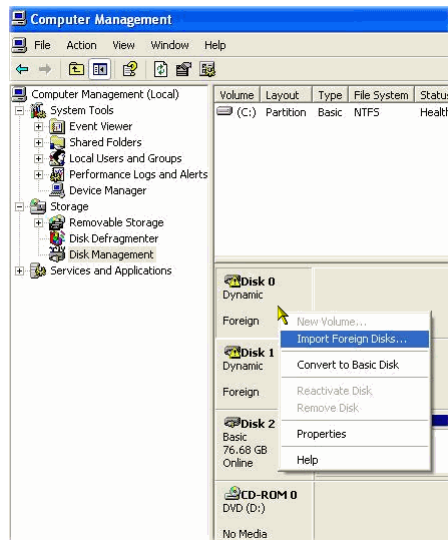

Figure B-3: Select Import Foreign Disks…

3. In the Import Foreign Disks dialog box, ensure that the disk group is checked and select OK.
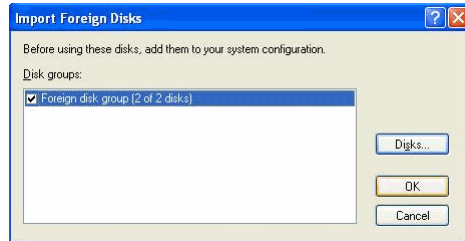

Figure B-4: Import Foreign Disks dialog box

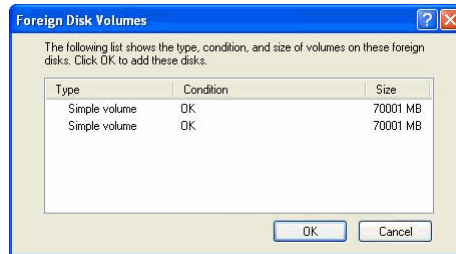**4.** In the Foreign Disk Volumes dialog box, select OK.

Figure B-5: Foreign Disk Volumes dialog box

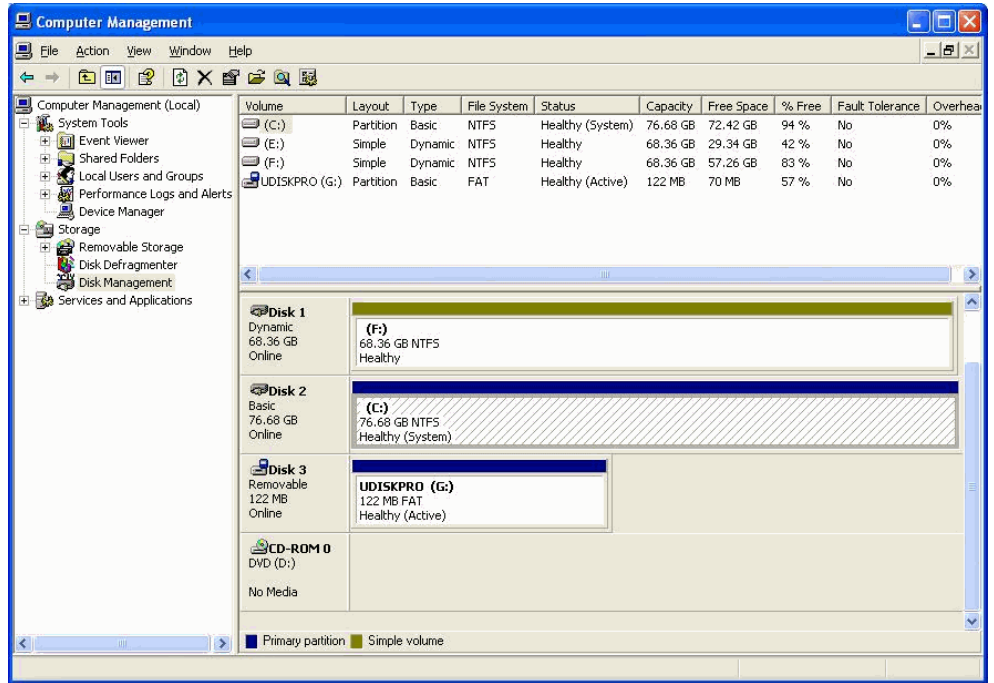**5.** The disk display should now be as shown in Figure B-6.

Figure B-6: SCSI drives manually recognized

This completes the *MTS400 System Recovery Procedure*.

Reformat the SCSI Drives

⚠ *CAUTION. All data stored on the SCSI drives will be lost when they are reset. Ensure that any important data is backed up.*

Two SCSI (small computer system interface) hard drives are used for MPEG file storage. If the drives have become corrupted, they should be reset using the following procedure:

1. Insert the *MTS400 Series System Recovery (Disk 3)* in the CD-ROM drive. Locate the *SCSI_DRV* folder.

2. Copy the whole *SCSI_DRV* folder to the C: drive. The folder contains the following files:

    ▪ `drives.bat`

    ▪ `readme.doc`

    ▪ `complete.txt`

    ▪ `complete2.txt`

3. Remove the MTS400 Series System Recovery CD-ROM.

4. In the *SCSI_DRV* folder, run the file *drives.bat* (double-click on the file name).

5. When the process is complete, restart the instrument.

Appendix C: Network Troubleshooting

Networks are based on standards; however, there are many unique characteristics of each network (LAN or WAN) that make it difficult to troubleshoot without a thorough knowledge of the specific network. Consequently, an expert who knows your network characteristics should perform in-depth network troubleshooting.

This appendix provides some basic procedures that can eliminate some of the more common sources of network errors. If you cannot resolve problems using these procedures, contact your network administrator.

Basic Requirements

Fulfill the following requirements before troubleshooting your host machines:

- Configure your system for use on the network as described in the documentation that is supplied with the Network Adapter card. Contact your network administrator for details.

- Ensure that any applications that you may have loaded on your test system since receiving it are not using the ports assigned to the test system components.

IP Parameters

The illustrations in this section depict how each IP parameter (IP address, subnet mask, and default gateway) can negatively affect network connectivity.

Incorrect IP Address

If the IP address for your test system is incorrect (not unique), then you may not be able to communicate over the network. In Figure C-1, TVTest_1 uses the same IP address as Rennes. If Rennes is started first, TVTest_1 will recognize the IP address conflict and will not load TCP/IP; consequently, the system will not be reachable over the network.

If your IP address is incorrect, and the IP address does not exist on your subnet, you may be able to communicate from the device (system or monitoring station), but you may not be able to communicate to the device.

```
Test system:        Test system:        Test system:
Rennes              TVTest_2            TVTest_1

                           No TCP/IP
                           communication

IP address: 128.181.99.62   IP address: 128.193.99.2   IP address: 128.181.99.62
```
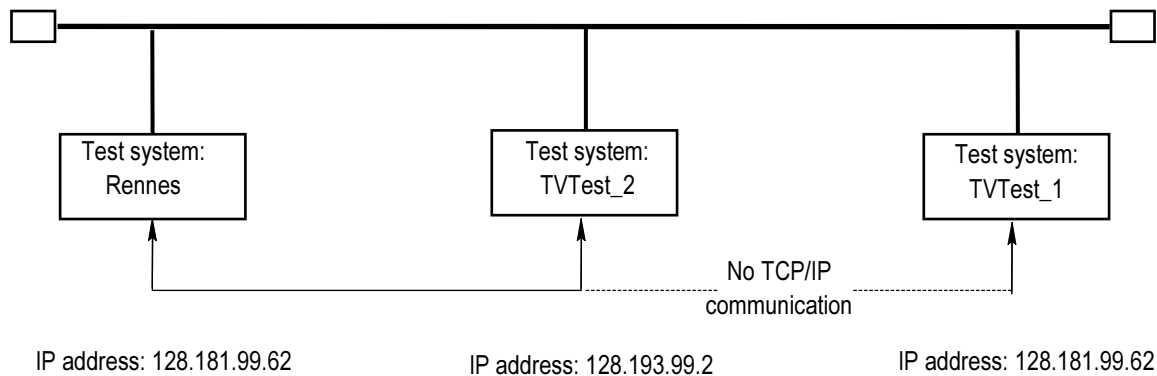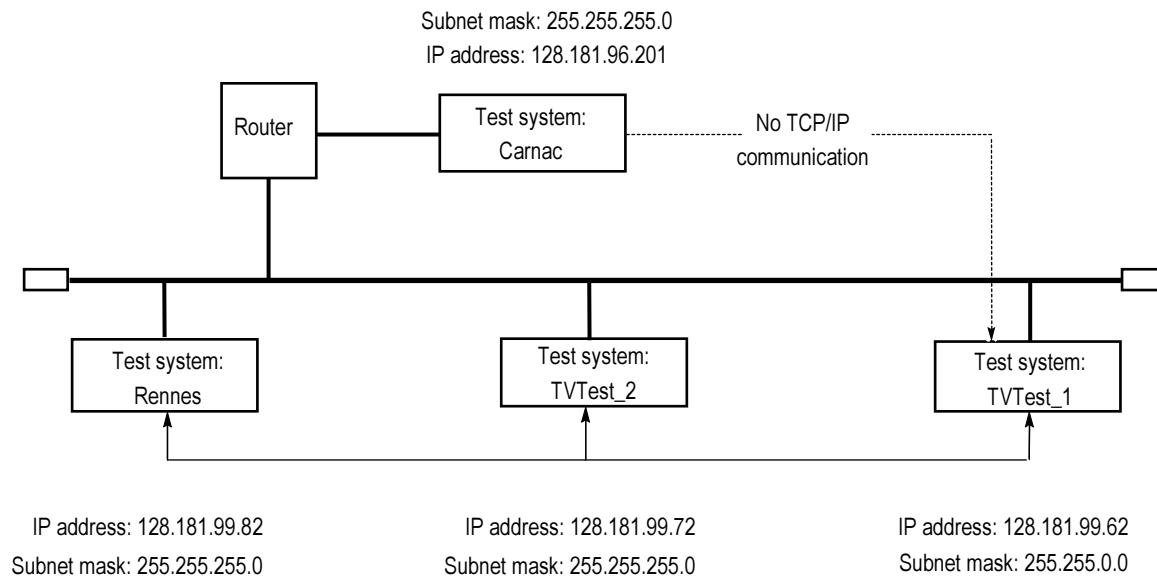
Figure C-1: Incorrect IP address

Incorrect Subnet Mask

Subnets and subnetting networks are complex and require a thorough understanding of IP addressing. Call your network administrator if you think your networking problem involves subnets. Figure 4-8 shows a simple (and fairly common) subnet mask problem.

In Figure C-2, the subnet mask for TVTest_1 indicates that the network address is contained in the first two bytes of the IP address. In dotted decimal notation, the network address is 128.181. This information allows the device to communicate with any other device with the same network address without being routed through a default gateway.

Subnet mask: 255.255.255.0
IP address: 128.181.96.201

```
Router  ──  Test system:      No TCP/IP
            Carnac            communication

Test system:        Test system:        Test system:
Rennes              TVTest_2            TVTest_1
```

IP address: 128.181.99.82   IP address: 128.181.99.72   IP address: 128.181.99.62
Subnet mask: 255.255.255.0   Subnet mask: 255.255.255.0   Subnet mask: 255.255.0.0

Figure C-2: Incorrect subnet mask

TVTest_1 cannot communicate with Carnac, because, according to the subnet mask on TVTest_1, Carnac and TVTest_1 are logically on the same network. Consequently, messages sent from TVTest_1 to Carnac are never routed. Because these two devices do not share a connection, TVTest_1 will never find the correct address for the network card on Carnac and will not be able to reach Carnac.

TVTest_1 can communicate with TVTest_2 and Rennes because these three devices share a connection, so messages from TVTest_1 do not need to be routed. TVTest_1 is therefore able to find the correct addresses for TVTest_2 and Rennes in spite of having an incorrect subnet mask.

Incorrect Default Gateway IP Address

The default gateway you have specified in the TCP/IP Properties dialog box is the device that "knows about" your subnetwork and others on your network. When you send messages (for instance traps from your system to a device on another subnet), the default gateway is able to route the message to the appropriate subnet. If the IP address specified in the TCP/IP Properties dialog box is incorrect, messages to devices on other subnets will not reach their destination (because they never made it to the default gateway). See Figure C-3.

IP address: 128.181.96.201
Subnet mask: 255.255.255.0
Default gateway: 128.181.96.1

Test system: Carmac

Gateway (router)   IP address: 128.181.96.1

WAN

IP address: 128.181.99.1   Gateway (router)

No TCP/IP communication

Test system: Rennes

Test system: TVTest_2

Test system: TVTest_1

IP address: 128.181.99.82
Subnet mask: 255.255.255.0
Default gateway: 128.181.99.1

IP address: 128.181.99.72
Subnet mask: 255.255.255.0
Default gateway: 128.181.99.1

IP address: 128.181.99.62
Subnet mask: 255.255.255.0
Default gateway: 128.181.99.10

Figure C-3: Incorrect default gateway IP address

Common Troubleshooting Procedures

Many of the procedures performed in the following sections are common tasks.

Pinging a Host Machine

One of the utilities provided with all TCP/IP installations is Ping.exe. (Look in the `C:\windows\system32\` directory.) This utility allows you to send communication packets to and record the response from an indicated host machine. This, in essence, determines whether your packets arrived at the destination. To run ping, use the following procedure:

1. Select **Run** from the Start menu. The Run dialog box appears.

2. Type one of the following into the Run text box:

    `ping machineName`

    `ping IPaddress`

    In the examples, machineName and IPaddress represent the host machine name and IP address, respectively, of the networked device you are trying to ping.

3. Click **OK**.

    A DOS window indicates whether or not the machine is responding to the ping. In Figure C-4, the destination machine (Oxford4) is not responding.
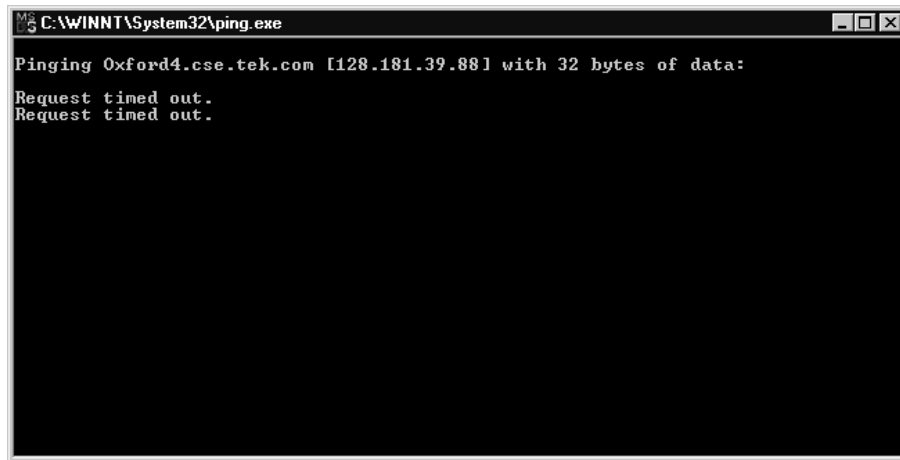
Figure C-4: Ping.exe command window

Ping only runs briefly, and the DOS window closes when the process is complete.

Tracing the Route of TCP/IP Packets

Sometimes it is helpful to know how far your packets made it on the way to a destination machine and which devices the packets pass through on the way. The utility that provides this functionality is `tracert.exe`. Tracert can also indicate a congested point in the network. To run tracert, use the following procedure:

1. Select **Run** from the Start menu. The Run dialog box appears.

2. Type one of the following into the Run text box:

   `tracert machineName`

   `tracert IPaddress`

   In the examples, machineName and IPaddress represent the host machine name and IP address, respectively, of the networked device you are trying to reach.

3. Click **OK**.

   A DOS window (see Figure C-5) indicates the progress of your packets. The far right column indicates the IP address of the nodes on the network that successfully pass your tracert packets. This information indicates the last good node on the path to the destination device.

```
C:\WINNT\System32\tracert.exe                                          _ □ X

Tracing route to ibm.com [204.146.80.99]
over a maximum of 30 hops:

  1    <10 ms    <10 ms    <10 ms  rs39aV106.ens.tek.com [128.181.240.2]
  2    <10 ms    <10 ms    <10 ms  r19a.ens.tek.com [128.181.1.2]
  3    <10 ms    <10 ms    <10 ms  r63a.ens.tek.com [192.65.3.6]
  4    <10 ms    <10 ms    <10 ms  rs63a.ens.tek.com [134.62.1.3]
  5      *         *         *     Request timed out.
  6      *         *         *     Request timed out.
  7      *         *         *     Request timed out.
  8      *         *         *     Request timed out.
  9      *         *         *     Request timed out.
 10      *         *         *     Request timed out.
 11      *         *         *     Request timed out.
 12      *         *         *     Request timed out.
 13      *         *         *     Request timed out.
 14      *         *         *     Request timed out.
 15     94 ms     93 ms      *     204.146.80.99
 16      *         *        78 ms  _
```

Figure C-5: Tracert.exe command window

Finding IP Addresses for Devices on Your Network
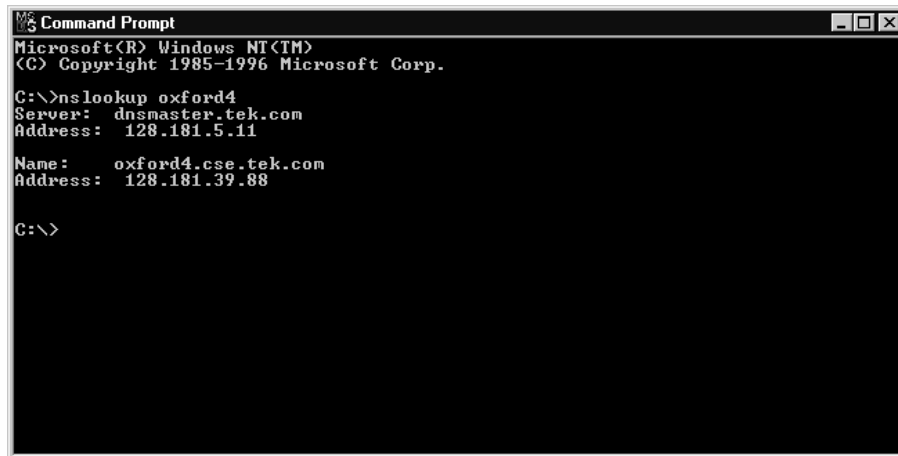
At times, you may need to find or confirm the IP address of a computer on your network (or, conversely, the network name if all you have is an IP address). You may want to find this information to ensure that IP addresses and network names you use in the Hosts file are correct. The utility that will display this information is nslookup.exe. Use nslookup as described below:

1. Select **Run** from the Start menu. The Run dialog box appears.

2. Enter one of the following and press Enter, where machineName or IP address is the network name or IP address, respectively, of the device you are trying to look up.

    nslookup machineName

    nslookup IP address

    The network name and IP address of the device you are trying to lookup is displayed. If your network uses DNS, the IP address and network name of the DNS server is also displayed. See Figure C-6.

Figure C-6: Command prompt with nslookup results

Sources of Network Information

If you need more information about network troubleshooting, some potential resources are listed below.

NOTE. *These resources may provide you with more information. Most of this information is supplied as is, with no warranty as to its fitness, written or implied. The best source of network troubleshooting help is your network administrator.*

▪ Cisco Systems, Inc.   http://www.cisco.com/

   This site is particularly useful for networks that use Cisco devices. (This URL was valid as of January 2005.)

▪ Dulaney, E; Lawrence, S; Scrimger, R; Tilke, A; White, J; Williams, R; Wolford, K. *MCSE Training Guide: TCP/IP*. Indianapolis, IN. New Riders, 1998

   This is a training guide for Microsoft Certified Systems Engineer certification, and covers TCP/IP and network troubleshooting.

▪ Taylor, E. *Network Troubleshooting Handbook*. New York, NY. McGraw–Hill, 1999

Glossary

Glossary

ASI – Asynchronous Serial Interface

ATSC – Advanced Television Systems Committee

Dongle – See Software Key

DVB – Digital Video Broadcasting

GPSI – General Purpose Serial Interface

MIC – MPEG Interface Card

SMPTE – Society of Motion Picture and Television Engineers

Software Key – A security device that enables software options. The key must be connected to an I/O port of the instrument while the program is run.

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