

Read This First



**MTS200 Series
Software Version 4.0**

071-0537-01

www.tektronix.com



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Read This First

Read This First contains information about the MTS200 Series MPEG Test System applications.

This document is organized as follows:

- *CD-ROM Directories* page 1
- *MTS200 Series Software Installation Issues* page 2
- *Applications Supported* page 3
- *MTS200 Series Applications* page 6
- *Performance and Release Issues* page 12

To install the software, follow the software installation instructions included in your user manual or kit instructions.

CD-ROM Directories

The application CD-ROM that accompanies your product or upgrade includes various components in the directories listed below:

- AV Delay** This directory contains audio and video elementary streams and configuration files so that you can create transport streams that can be used to measure audio/video delay with VM700 or VM700A instruments.
- IE501** Microsoft Internet Explorer 5.01 or higher is required to use the Java clients that are part of the MTS200 Series version 4.0 software. Double-click setup.exe in the I386 sub-directory and follow the instructions to install MS IE5.01.
- JRE** The Java Run-Time Environment (version 1.3) is required to use the Java clients that are included with this release. This directory (JRE) contains the executable file you use to install this run-time environment. Your manual or kit instruction that accompanies your product or upgrade kit includes installation instructions.
- Manuals** User manuals for all applications in Adobe Acrobat (.pdf) format are included in this directory. You can read and print the manuals with the Acrobat Reader, which is also included. For additional information about the manuals and installing the reader, refer to the Readme.txt file in the *Manuals* directory.

- SP6A** Windows NT Service Pack 6 is required to run this software. The I386 directory contains the executable file used to install Service Pack 6. Your manual or kit instruction that accompanies your product or upgrade kit includes installation instructions.

MTS200 Series Software Installation Issues

To enable the new version of software on MTS200 Series test systems, you need to update the Flex and DSP code and reboot your test system. Perform the following procedure immediately after you have installed the MTS200 Series Version 4.0 software as described in the installation instructions.

1. Start the RTA firmware update application, C:\MTS200\Service\Flash.exe, either through an exploring window (double click the Flash.exe icon) or through Run... command on the Windows NT Start menu.

NOTE. *If you see a message saying Autotest Failed, dismiss it and continue with the procedure.*

2. Determine DSP and Flex code version numbers, by selecting Get Version Information from the PIA menu.

In the Flash message box, the version dates should look similar to the following illustrations.

Dsp Software informations:	Flex Firmware informations:
Start: 0x00900000	Start: 0x00940000
End: 0x00911C4B	End: 0x0094B73E
Checksum: 0x0032158E	Checksum: 0x0013BD00
File Name: rtadsp.hex	File Name: Fx990505.hex
Date: 04/24/2001 17:43:56	Date: 05/05/1999 12:31:40
Version: 00000000	Version: 00000000

NOTE. *If your DSP version is later than 04/24/2001, skip to step 6.*

3. Load the DSP file:
 - a. Select Load Dsp File from the Flash application File menu.
 - b. In the resulting Open dialog box, double-click the RtaDSP.hex filename.
4. Select DownLoad Dsp software from the Flash application PIA menu. The Dialog window appears in a few seconds.

5. Click OK to accept the version number.

NOTE. *If your Flex code version is later than 05/05/1999, skip to step 10.*

6. Load the Flex file:
 - a. Select Load Flex File from the Flash application File menu.
 - b. In the resulting Open dialog box, double-click the Fx990505.hex filename.
7. Select Download Flex software from the Pia menu.
8. When the Dialog window appears, click OK to accept the version number.
9. The *You must shutdown the PC...* message appears. Click OK to acknowledge the message and close the message window.
10. Select Exit from the Flash File menu to exit the application.
11. Complete the software installation procedure by entering your general license password as described in the installation instructions.

Applications Supported

The MTS200 Series MPEG Test System version 4.0 applications are shown in Table 1.

Table 1: Tektronix MTS200 Series MPEG Test System applications





Icon	Application title	Function	User document
 Expert Client	Expert Client	Continuously monitor an input bitstream for compliance with the MPEG-2, DVB-SI, ARIB, and ATSC PSIP digital television standards.	Real-Time Analyzer User Manual 071-0076-xx
 Configuration Client	Configuration Client	Set, remove, and configure probes for MPEG-2, DVB, ATSC, and ISDB-S/ARIB inputs.	
 Private Syntax Interpreter	Private Syntax Interpreter	Create table definitions used by the Real-Time Analyzer to interpret private syntax sections.	
 Data Store Administrator	Data Store Administrator	Manage the data store (CARB) disks and control acquisition/generation of MPEG-2 transport streams.	MPEG Test System Data Store Administrator User Manual 071-0536-xx

Table 1: Tektronix MTS200 Series MPEG Test System applications (Cont.)




















Icon	Application title	Function	User document
 Deferred-Time Analyzer	MPEG-2 DVB/ATSC System Analyzer	Analyze transport streams and packetized elementary streams saved to system disk or data store (CARB) files.	MPEG-2 DVB/ATSC System Analyzer User Manual 071-0532-xx
 TMCC Deferred Ti...	TMCC Deferred-Time Client	Analyze ISDB-S/ARIB (TMCC) transport stream files saved to the system disk or data store (CARB) files.	
 DVB Channel	DVB Channel Coding and Decoding	Code and decode transport stream files to DVB specifications.	Stream Creation Applications User Manual 071-0534-xx (Information repeated in both manuals)
 Program Strea...	Program Stream Analyzer	Analyze MPEG program stream files.	Series Program Stream Analyzer User Manual 071-0384-xx
 Video Stream Analyzer	MPEG Video Stream Analyzer	Analyze MPEG-1 and MPEG-2 video elementary streams files or streams extracted from the MPEG-2 System Analyzer or Program Stream Analyzer.	MPEG Test System Video Stream Analyzer User Manual 071-0249-xx
 Audio Stream Analyzer	MPEG Audio Stream Analyzer	Analyze MPEG-1 and MPEG-2 audio elementary streams files or streams extracted from the MPEG-2 System Analyzer or Program Stream Analyzer.	MPEG Test System Audio Stream Analyzer User Manual 071-0192-xx
 Dolby Digital Analyzer	Dolby Digital Audio Stream Analyzer	Analyze Dolby Digital (AC-3) audio elementary stream files or streams extracted from the MPEG-2 System Analyzer.	Dolby Digital Audio Stream Analyzer User Manual 071-0535-xx
 Multiplexer	MPEG-2 Transport Stream Multiplexer	Create transport stream files from PSI/SI/PSIP table files, elementary stream files, and data files.	Stream Creation Applications User Manual 071-0534-xx
 DVB Table Editor	DVB Table Editor	Create and edit PSI and DVB SI table files for use with the transport stream multiplexer.	
 ATSC Table Editor	ATSC Table Editor	Create and edit PSI and ATSC PSIP table files for use with the transport stream multiplexer.	
 ARIB Table Editor	ARIB Table Editor	Create and edit PSI and ARIB table files.	

Table 1: Tektronix MTS200 Series MPEG Test System applications (Cont.)

Icon	Application title	Function	User document
 TMCC Combiner	TMCC Combiner	Create transport stream files with TMCC information in the first eight bytes of the 16-byte Reed-Solomon area of 204-byte transport stream packets.	
 Jitter Adder	Jitter Adder	Add jitter to PCR data in MPEG-2 transport stream files.	
 Error Injector	Error Injector	Insert or correct errors in transport stream packets.	
 Real-Time Multiplexer	Real-Time Multiplexer	Configure the real-time multiplexer application to remultiplex system and or elementary streams for immediate output.	
 Open Mux Server	Open Mux Server	Remultiplex various MPEG inputs (system, MPEG-2, DVB, ATSC, and elementary streams) into a valid transport stream for immediate output. The user interface for this application is the Real-Time Multiplexer.	
 License Manager	Tektronix Software Protection	Enter or reenter the general password to enable licensed applications.	Read This First, 071-0537-xx
 MPEG-2 Help	MPEG2_Part1 (ISO/IEC 13818-1)	The international MPEG-2 system standard in Windows Help format.	none
 Uninstall MTS	Uninstall MTS	Remove MPEG Test System software from the system disk.	All User Manuals

MTS200 Series Applications

This section describes the capabilities of each of the MTS200 Series applications.

Expert Client

You will use the Expert Client to analyze transport streams in real time. Start the Expert Client by double-clicking the Expert Client icon in the program group window.

The Expert client characteristics are shown in the following list:

- Graphical displays show the structure (hierarchy) of the input transport stream and display characteristics of each component of the input stream (for example: PID and type allocation, section rate analyses, and timing analyses).
- Report views indicate the types of errors recorded by the Analysis Server and the characteristics of the input stream.
- Error views show specific errors recorded for the various components of the transport stream; for instance, PMT section rate errors and ETR290 errors.

The following structures are now recognized:

- ARIB tables
- AAC audio elementary streams
- Digicipher II video elementary streams
- AC-3 audio elementary streams in DVB mode

Configuration Client

The Configuration Client allows you to specify which transport stream parameters you want monitored, and how you want errors in your system to be reported. Start the Configuration client by double-clicking the Configuration Client icon in the program group window.

The Configuration client allows you to perform the following tasks:

- Specify the standard to which you are testing an input: MPEG-2, DVB, ATSC, or ISDB.
- Set, remove, or modify the probes that test transport streams for valid syntax and semantics and rates.
- Specify the way in which errors are reported in both the Expert and Master clients. You can configure each probe to report an error as Critical, Major, Minor, Warning, or as information only.
- Stop and restart an Analysis Servers running on a transport monitor.

- Set passwords on specific inputs that prevent others from changing the Analysis Server configuration for that input.
- Set parameters for capturing part of an input transport stream.

Using these real-time applications, you can continuously monitor an input bitstream for compliance with the MPEG-2, DVB, ATSC, and ISDB-S/ARIB digital television standards. You can monitor an array of stream parameters to ensure decodability, or you can concentrate on just a few parameters for closer examination.

MPEG-2 DVB/ATSC/ISDB-S/ARIB System Analyzer

This deferred-time analyzer application enables in-depth analysis of MPEG-2, DVB, ATSC, or ISDB-S/ARIB transport stream files for errors in syntax, semantics, rate, timing, and other multiplex characteristics. The application uses several graphical views that provide access to each field, and each bit if you wish, in the transport packets, PES packets, and the various PSI and SI tables.

Hierarchic View. The hierarchic view provides a diagram of the data components carried by the transport stream. Icons are used to identify the PSI, SI, PSIP, and ARIB tables; PES (Packetized Elementary Stream) packets; and three types of elementary streams (video, audio, and data).

Interpreted View. The interpreted view shows all of the fields in the selected transport packet, table section, or PES (packetized elementary stream) packet.

Timing Displays. Two types of timing displays are available: PCR (Program Clock Reference) contained in the transport packet headers and PTS/DTS (Presentation/Decode Time Stamp) contained in PES packet headers. The PCRs are shown in a graphical format indicating their arrival time. The graphical display of the PTS/DTS shows a time line for each access unit (such as a video frame) indicating data arrival and value of each time stamp.

TMCC Deferred-Time Expert Client

The TMCC (Transmission and Multiplexing Configuration Control) Deferred-Time Expert Client is a new application included with version 4.0 of the MTS200 Series Tektronix MPEG Test System. This deferred-time client allows you to analyze an ARIB-compliant transport stream file stored on your local disk.

The TMCC Deferred-Time Expert client has the following characteristics:

- Indicates the presence of sync bytes (0x47 for TMCC basic streams and W1, W2, or W3 sync bytes for TMCC data streams)
- Displays the syntax of TMCC data
- Displays Slot, TSID, TS Name, and Modulation mode information

- Displays information, warning, and error messages
- Indicates the presence of TMCC alarm and update flags in the transport stream
- Displays the overall stream rate

When you use the TMCC client to analyze local transport stream files, the TMCC Configuration Client is automatically started, allowing you to specify the file you need to analyze. The toolbar for the TMCC Deferred-Time Expert Client provides buttons with which you can navigate transitions in the TMCC data and save all or a specific part of the transport stream file to a disk.

TMCC Deferred-Time Configuration Client

The TMCC (Transmission Multiplexing Configuration Control) Deferred-Time Configuration client is a new application included with this version of the MTS200 Series Tektronix MPEG Test System (version 4.0). This deferred-time client allows you to set the monitoring, analysis, and reporting parameters of the TMCC Analysis Servers.

The TMCC Configuration client has the following characteristics:

- Configures the TMCC Analysis Servers to operate in either TMCC basic or TMCC data stream modes
- Enables you to specify a transport stream ID to analyze using the MPEG-2 Analysis Server (only in the TMCC data stream mode)
- Sets parameters for the following TMCC probes:
 - Frame size
 - Super frame size
 - Modulation mode and slot consistency
 - TMCC syntax
 - TMCC update counter (only in TMCC data stream mode)

MPEG-2 DVB / ATSC / ISDB-S Transport Stream Multiplexer

The Multiplexer allows you to create a limitless variety of MPEG transport stream files using the elementary streams provided on the Bit Stream CD-ROM. Up to 40 programs, with 20 elementary streams each, can be included in one transport stream file. A hierarchy display similar to the Analyzer displays the structure of the transport stream.

Elementary stream files containing both stationary test signals and motion sequences are provided on the Bit Stream CD-ROM. Using the multiplexer and table editors, you can create a variety of transport stream files that contain one or more of the provided test signals and motion sequences.

PSIP Table Editor

The PSIP Table Editor allows you to create and change both program specific information tables (PSI tables) and program and system information protocol tables (PSIP tables).

Program and System Information Protocol (PSIP) tables provide information (descriptive and technical) about channels and events multiplexed in transport streams and are used to enable decoders to properly decode the stream. PSIP tables also permit services to be grouped into categories with relevant schedule information and can provide information about channels and events on other physical transmission channels. For example, ATSC-compliant transport streams carried over terrestrial broadcast networks can provide information about channels and events for programs in transport streams carried over cable networks.

DVB Table Editor

Data necessary for the DVB IRD (Digital Video Broadcasting Integrated Receiver Decoder) to automatically configure itself is available in the MPEG-2 Program Specific Information (PSI). Digital Video Broadcasting Specific Information (DVB-SI) adds information that enables DVB IRDs to automatically tune to a particular service and allows services to be grouped into categories with relevant schedule information.

Using the table editor you can enter and change data in SI and PSI tables to fit the requirements for your transport stream and environment.

ARIB Table Editor

The ARIB Table Editor allows you to create and change PSI and ARIB table structures and parameters.

ARIB tables that you can edit using the ARIB Table Editor include the following:

- **Broadcaster Information Table (BIT)**

The BIT provides name and ID parameters and descriptions of the services encoded in the transport stream for each broadcaster.

- **Download Control Table (DCT)**

The DCT provides a list of modules available in the transport stream for download.

- **Download Table (DLT)**

The DLT is used to download code to set top boxes.

- **Software Download Trigger Table (SDTT)**

The SDTT is used to define the service, group, and schedule for items encoded in the transport stream that can be downloaded.

DVB Channel Coder/Decoder

The European Digital Broadcasting Project specifies a baseline system for satellite broadcasting. The Channel Coding portion of the specification has the following coding flow:

- MPEG-2 Transport stream file (Multiplexer)
- Energy Dispersal (randomizing)
- Outer Coder RS (204, 188, byte error correction)
- Interleaver (burst error correction)
- Inner Coder (Viterbi p/q, bit error correction)
- QPSK Modulator

This application provides the defined channel coding for the transport stream file and the decoding to return the file to a standard transport stream file.

TMCC Combiner

The TMCC Combiner is a wizard-like application that helps you configure TMCC information that you want added to the Reed-Solomon area of 204 byte transport stream packets. Once you specify this information, the TMCC Combiner re-multiplexes your transport stream file with the added information, creating a valid TMCC stream.

Jitter Adder

The jitter adder allows you to create transport stream files with simulated timing errors. These errors will affect the clocks derived from the transport file. Create error-free transport streams and transport streams with known errors to test the robustness of decoders under various conditions.

Error Injector

Using the error injector, you can introduce errors into an MPEG-2 transport stream and use the erroneous stream to stress-test MPEG-2 systems and components.

The Error Injector reads the input transport stream file, modifies selected transport packets according to instructions in a user-defined configuration file, and writes the modified stream into another file.

OpenMux Configuration Client

This real-time multiplexer allows you to configure a maximum of 26 inputs and remultiplex all or part of them, in real time, into a valid transport stream. The following list describes the multiplexer inputs:

- MPEG-2, DVB, ATSC, and/or ISDB-S/ARIB transport streams (single or multiple program)
- Elementary streams (MPEG-2 audio and video, and AC-3 audio)
- PSI/SI/ATSC/ARIB tables (generated by the real-time multiplexer)

The OpenMux dynamically manages PID allocation among the inputs, avoiding PID collisions in the output. Using the real-time multiplexer, you can filter input transport streams for specific programs to be included in the remultiplexed transport stream. Finally, when a new transport stream is created, the multiplexer automatically regenerates program clock references.

You can output the remultiplexed transport stream using one of the rear-panel outputs on the test system. The output can be a single-shot or you can continuously loop the transport stream.

Program Stream Analyzer

With the optional MPEG Program Stream Analyzer you can view the fields and values of MPEG-2 program streams and MPEG-1 system streams at the pack and PES packet level, extract and save all or part of program and system streams, and analyze streams for conformance to the MPEG standards.

MPEG Audio Stream Analyzer

With the optional Audio Stream Analyzer you can test MPEG-1 and MPEG-2 audio layer I and II specification streams. The Program Stream Analyzer or the MPEG-2 DVB/ATSC System Analyzer can extract audio elementary streams from transport or program streams and open the analyzer with the extracted elementary stream displayed.

MPEG Video Stream Analyzer

With the optional Video Stream Analyzer you can test MPEG-1 and MPEG-2 video elementary streams. The Program Stream Analyzer or the MPEG-2 DVB/ATSC System Analyzer can extract video elementary streams from program and transport streams and open the analyzer with the extracted elementary stream displayed.

Dolby Digital (AC-3) Audio Stream Analyzer

With the optional Dolby Digital (AC-3) Audio Stream Analyzer you can analyze and save Dolby Digital audio streams files. The Program Stream Analyzer or the MPEG-2 DVB/ATSC System Analyzer can extract AC-3 audio streams from program and transport streams and open the analyzer with the extracted elementary stream displayed.

Performance and Release Issues

This section describes known problems associated with this release of the MTS200 Series software (version 4.0).

Java Clients

When you increase the size of the Java client windows (TMCC Deferred-Time Expert or Configuration clients), the applications may fail to refresh the application window. You can prevent this by leaving the windows at the default size. Alternatively, you can determine the maximum size the window will display while refreshing normally.

ATSC Table Editor

Reference IRSdb05538: ETT Saving & Loading. When you save a new EIT file using the PSIP Table Editor, the following error message may appear when you try to reopen the saved file: “The file name is not correct.” To avoid this error, use the file naming convention: namexxx.ett, where xxx is a number between 0 and 127. For example, toto001.ett.

Data Store Administrator

Reference N/A. Stream length limitations can be encountered when you attempt to generate streams saved on the Loop Partition of the Data Store.

To avoid generating incomplete streams, copy the stream from the Loop Partition to the test system hard drive with the Data Store Administrator. Then copy the stream from the system hard disk to the Single Shot Partition. This will ensure that a complete stream is generated from the Single Shot Partition.

Reference CSEbd12699. All four Data Store disks must read/write at the rate required for acquisition and generation. As a disk ages, its performance can degrade until it cannot always read/write quickly enough for the highest Data Store acquisition and generation rates, even though it continues to meet the disk manufacturer’s specification for average access speed. One degraded disk can prevent acquisition or generation at high data rates; in these circumstances, a “Disk *n* too slow” (where *n* is the number of the inadequate disk) error message appears.

Replace the slow disk to restore the Data Store system’s ability to acquire and generate at the desired data rate.

MPEG-2 DVB/ATSC System Analyzer

While analyzing large transport stream files, the analyzer can appear to be busy with no indication of progress; in addition, the message window can obscure the “Press Escape to abort” reminder. Analysis of large transport stream files can take many minutes; press ESC to suspend or abort most MPEG-2 System Analyzer operations.

Reference CSEdb03373. When displaying a large font, some characters are displayed badly (or not at all) in the packet views. Use a smaller font.

Reference CSEdb17277. Streams generated with the MPEG Test System Multiplexer application can cause buffer overflow during Dynamic Analysis with the MPEG-2 System Analyzer. This can occur because the Dynamic Analysis algorithm uses the “Leak method” to transfer video elementary stream data from the main buffer (MB n) to the elementary stream buffer (EB n); therefore, buffer overflow can occur when analyzing streams, such as those created with the Multiplexer application, that require “VBV delay method” data transfer.

Refer to ISO/IEC 13818-1 for additional information about leak method and VBV delay method buffering.

Transport stream rate for M-TMCC TS files. For M-TMCC transport stream files, the system analyzer is not able to determine the rate of the stream. Use the Deferred-Time TMCC Expert Client to determine the rate, then enter the rate in the Analysis | Multiplex Characteristics | Rate dialog box before performing timing-related analyses using the system analyzer.

Recognizing AC-3 audio streams while in AC-3 mode. When analyzing a transport stream file in ATSC mode, if the first AC-3 audio packet appears after the 3000th packet from beginning of a transport stream file, the system analyzer is not able to recognize the AC-3 elementary stream correctly. The reason is that the PMT itself can not determine the elementary stream type from the ATSC standard, the DT analyzer will need to look into the actual packets containing the AC-3 audio, but the searching is limited to first 3000 packets only.

Open Mux Server

Reference IRSdb05528: PMT video description. In ATSC mode, when the configuration is one PSI/ATSC input and one ES video only input, the video descriptor and smoothing descriptor may be missing.

