

# User Manual



## MPEG Test System Audio Stream Analyzer

**071-0192-00**

Copyright © Tektronix, Inc. All rights reserved. Licensed software products are owned by Tektronix or its suppliers and are protected by United States copyright laws and international treaty provisions.

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013, or subparagraphs (c)(1) and (2) of the Commercial Computer Software – Restricted Rights clause at FAR 52.227-19, as applicable.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supercedes that in all previously published material. Specifications and price change privileges reserved.

Printed in the U.S.A.

Tektronix, Inc., P.O. Box 1000, Wilsonville, OR 97070–1000

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

Microsoft, MS, MS-DOS, Windows, Windows NT, and Win 32 are registered trademarks of Microsoft Corporation.

## WARRANTY

Tektronix warrants that the media on which this software product is furnished and the encoding of the programs on the media will be free from defects in materials and workmanship for a period of three (3) months from the date of shipment. If a medium or encoding proves defective during the warranty period, Tektronix will provide a replacement in exchange for the defective medium. Except as to the media on which this software product is furnished, this software product is provided "as is" without warranty of any kind, either express or implied. Tektronix does not warrant that the functions contained in this software product will meet Customer's requirements or that the operation of the programs will be uninterrupted or error-free.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period. If Tektronix is unable to provide a replacement that is free from defects in materials and workmanship within a reasonable time thereafter, Customer may terminate the license for this software product and return this software product and any associated materials for credit or refund.

**THIS WARRANTY IS GIVEN BY TEKTRONIX IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPLACE DEFECTIVE MEDIA OR REFUND CUSTOMER'S PAYMENT IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.**



# Table of Contents

<b>List of Tables</b> .....	<b>iii</b>
<b>Preface</b> .....	<b>v</b>
<b>Contacting Tektronix</b> .....	<b>vi</b>

## Getting Started

Product Description .....	1-1
Interpreted Views .....	1-1
Analyses .....	1-2
Limitations .....	1-2
First Time Operation .....	1-2

## Operating Basics

Starting the MPEG Audio Stream Analyzer .....	2-1
Functional Overview .....	2-2
Application Window .....	2-2
View Windows .....	2-5
MPEG Audio Stream Analyzer Views .....	2-7
Main Characteristics View .....	2-7
First Level View .....	2-8
Interpreted Views .....	2-9
Binary and Hexadecimal Views .....	2-10
Channel View .....	2-10
Wave Editor View .....	2-11
Adding Views .....	2-12
Basic Operations .....	2-13
Opening Audio Stream Files .....	2-13
Saving Audio Stream Files .....	2-15
Analyzing Audio Stream Files .....	2-17
Decoding Audio Stream Files .....	2-18
Printing Audio Stream Data .....	2-19
Quitting the MPEG Audio Stream Analyzer .....	2-20
Menu Selections .....	2-21

## Reference

Interpreted Views .....	3-1
Interpreted View Displays .....	3-1
Allocation Table (AAT) .....	3-5
Ancillary Data (AD) .....	3-5
Audio Header (AH) .....	3-6
Cyclic Redundancy Check (CRC) .....	3-6
Delay Compensation (DC) .....	3-6
Low Frequency Enhancement Allocation (LFEA) .....	3-6
Low Frequency Enhancement Sample Table (SPL) .....	3-7
Low Frequency Scalefactor (LFSCF) .....	3-7
Multichannel Allocation Table (AAT) .....	3-7
Multichannel Composite Status Information (MCCSI) .....	3-7
Multichannel Cyclic Redundancy Check (CRC) .....	3-8
Multichannel Header (MCH) .....	3-8
Multichannel Sample Table (SPL) .....	3-9
Multichannel Scalefactor Selection Information (SCFSI) .....	3-9
Multichannel Scalefactor Table (SCF) .....	3-9
Multilingual Allocation Table (AAT) .....	3-10
Multilingual Sample Table (SPL) .....	3-10
Multilingual Scalefactor Selection Information (SCFSI) .....	3-10
Multilingual Scalefactor Table (SCF) .....	3-10
Predictor Coefficient (PC) .....	3-10
Sample Table (SPL) .....	3-11
Scalefactor Selection Information (SCFSI) .....	3-11
Scalefactor Table (SCF) .....	3-11
Transmission Channel Allocation (TC) .....	3-11
Additional Views .....	3-12
Binary and Hexadecimal Views .....	3-12
Channel View .....	3-13
Wave Editor View .....	3-16
Analyzing Audio Elementary Streams .....	3-18
Syntactic Analysis .....	3-19
Semantic Analysis .....	3-19
Automatic Analysis .....	3-20
CRC Error Check .....	3-20
Options Menu Reference .....	3-21

## Index

## List of Tables

<b>Table 1–1: MPEG Audio Stream Analyzer interpreted views</b> . . . . .	<b>1–1</b>
<b>Table 2–1: Upper toolbar buttons</b> . . . . .	<b>2–3</b>
<b>Table 2–2: Edit toolbar buttons</b> . . . . .	<b>2–4</b>
<b>Table 2–3: Interpreted view icons</b> . . . . .	<b>2–9</b>
<b>Table 2–4: Channel view icons</b> . . . . .	<b>2–10</b>
<b>Table 2–5: Add view options</b> . . . . .	<b>2–12</b>
<b>Table 2–6: Menu selections</b> . . . . .	<b>2–21</b>
<b>Table 3–1: Wave Editor toolbar elements</b> . . . . .	<b>3–17</b>







# Preface

This document applies to the MPEG Audio Stream Analyzer application.

For information about other MTS 200 Series test system applications, refer to the user manuals provided with test system. For information about MTS 200 Series test system hardware installation, specifications, and first-time operation, refer to the *MTS 200 Series MPEG Test System Hardware Installation and Specifications Manual*, Tektronix part number 061-4143-0X.

For information about the Windows NT Workstation operating system, refer to the Microsoft documentation that accompanied your test system.

For information about the Compaq Proliant computer, refer to the Compaq documentation that accompanied your test system.

## Contacting Tektronix

Product Support	<p>For application-oriented questions about a Tektronix measurement product, call toll free in North America: 1-800-TEK-WIDE (1-800-835-9433 ext. 2400) 6:00 a.m. – 5:00 p.m. Pacific time</p> <p>Or contact us by e-mail: tm_app_supp@tek.com</p> <p>For product support outside of North America, contact your local Tektronix distributor or sales office. You can also call 1-503-627-2400 between 14:00 and 01:00 UTC (GMT).</p>
Service Support	<p>Contact your local Tektronix distributor or sales office. Or visit our web site for a listing of worldwide service locations.</p> <p><a href="http://www.tek.com">http://www.tek.com</a></p>
For other information	<p>In North America: 1-800-TEK-WIDE (1-800-835-9433) An operator will direct your call.</p>
To write us	<p>Tektronix, Inc. P.O. Box 1000 Wilsonville, OR 97070-1000</p>



# Getting Started



# Getting Started

## Product Description

The MPEG Audio Stream Analyzer analyzes MPEG-1 and MPEG-2 audio layer I and II specification binary streams. You can analyze an MPEG audio stream at different levels for conformance of the bitstream to specifications using the interpreted views and analysis functions enabled by the analyzer application.

### Interpreted Views

The analyzer displays MPEG audio stream structures, items, and values in graphical views, called *interpreted views*, as shown in Table 1–1. Page references indicate where you can find more information about the specific view. See *Interpreted Views* beginning on page 3–1 for general information on the types of displays used for the interpreted views.

**Table 1–1: MPEG Audio Stream Analyzer interpreted views**

MPEG-1 structures	MPEG-2 structures
Audio Header (page 3–6)	Multichannel Header (page 3–8)
Error Check (Cyclic Redundancy Check) (page 3–6)	Multichannel Error Check (Cyclic Redundancy Check) (page 3–8)
Audio Allocation Table (page 3–5)	Multichannel Composite Status Information (page 3–7)
Scalefactor Selection Information (page 3–11)	Low Frequency Enhancement Allocation (page 3–6)
Scalefactor Table (page 3–11)	Multichannel Allocation Table (page 3–7)
Sample Table (page 3–11)	Multichannel Scalefactor Selection Information (page 3–9)
Ancillary Data (page 3–5)	Delay Compensation (page 3–6)
	Predictor Coefficient (page 3–10)
	Low Frequency Scalefactor (page 3–7)
	Multichannel Scalefactor Table (page 3–9)
	Low Frequency Enhancement Sample Table (page 3–7)
	Multichannel Sample Table (page 3–9)
	Multilingual Allocation Table (page 3–10)
	Multilingual Scalefactor Selection Information (page 3–10)
	Multilingual Scalefactor Table (page 3–10)
	Multilingual Sample Table (page 3–10)

- Analyses** For each of the MPEG items listed in Table 1–1, one or more of the following analyses may be available:
- Syntactic Analysis (conformance of the parameters to the MPEG standards)
  - Semantic Analysis (conformance of the MPEG structure to the standards)
  - CRC Analysis (adequate transmission performance)

- Limitations** The following list indicates the limitations of the analyzer:
- The analyzer cannot support a variable bitrate or a free bitrate.
  - In an MPEG Layer III audio bitstream, the audio header is the only processed syntax.
  - The `copyright_identification_bit` and the `copyright_identification_start` fields in the Multi-channel Header are not taken into account.

## First Time Operation

The MPEG Audio Stream Analyzer is part of a suite of hardware and software components used to create, generate, acquire, and analyze MPEG and DVB transport and program streams. Before you can use the analyzer, you need to ensure that you have entered the correct password for your software configuration. To enable the test system configuration you have purchased, use the procedure for entering the general password described in the *MPEG Test System Software MTS2ES, MTS2AN, MTS2CR, and MTS2TS Installation Manual*.

---

**NOTE.** *If you have already performed the procedure described in the installation manual, you do not need to perform it again.*

---



# Operating Basics





# Operating Basics

This chapter is organized into the following sections:

---

**NOTE.** For basic Windows operating techniques such as minimizing windows or using the scroll bars, refer to your Windows documentation.

---

- *Starting the MPEG Audio Stream Analyzer* describes how to start the application.
- *Functional Overview* describes the application window types and the application interface elements.
- *MPEG Audio Stream Analyzer Views* describes each of the views used in the application and how to access them.
- *Basic Operations* describes common procedures used to display, analyze, and decode audio streams.
- *Menu Selections* provides a table that summarizes the menu selections.

## Starting the MPEG Audio Stream Analyzer

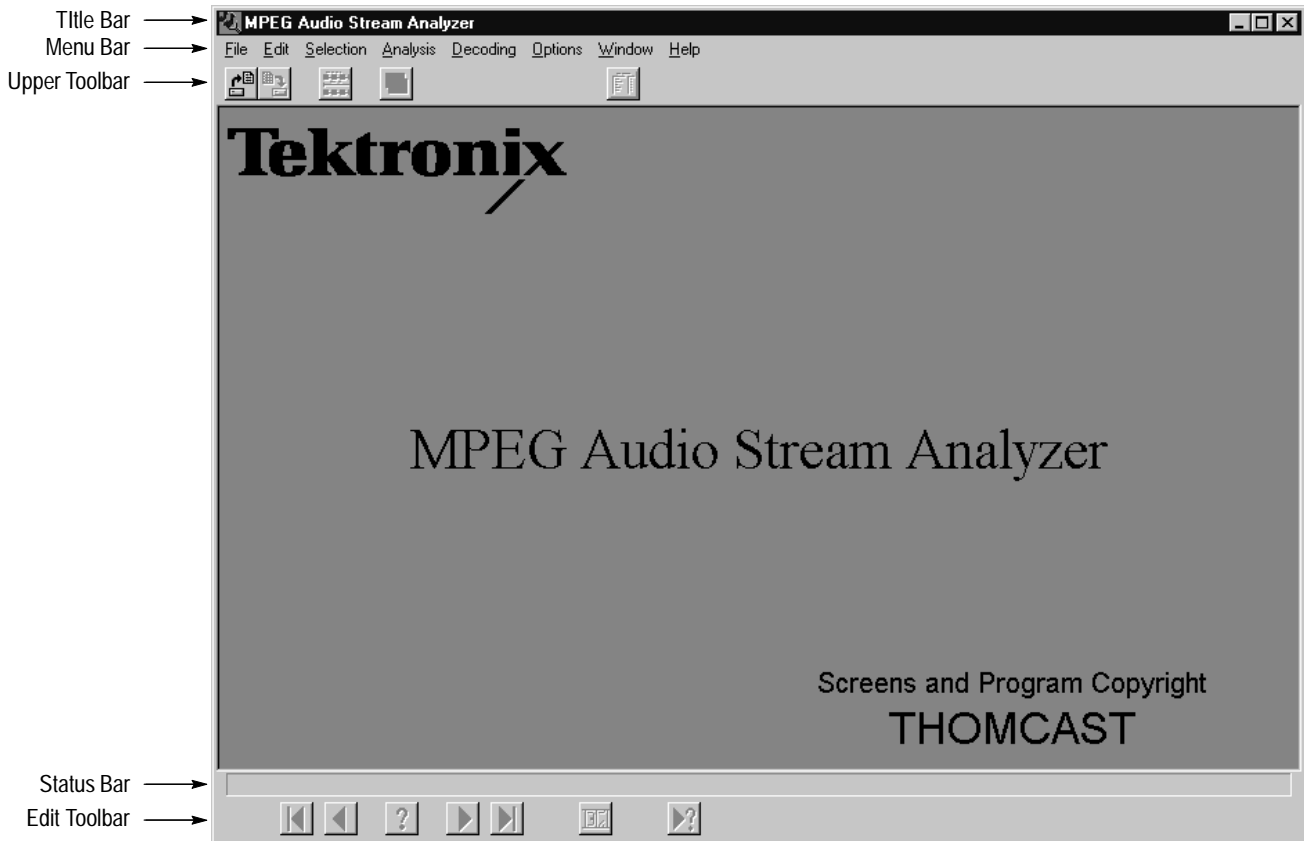


Double click the MPEG Audio Stream Analyzer icon in the MPEG Test System program group window.

## Functional Overview

The MPEG Audio Stream Analyzer uses two window types to display audio streams: an application window and secondary windows called *view windows*.

**Application Window** The basic application window looks similar to the following illustration.








The following sections describe the elements of the application window.

**Title Bar.** The title bar displays the application name and application icon. The window control buttons are standard window controls and allow you to minimize, maximize, and close the application window.

**Menu Bar.** The menu bar provides access to the commands you use to control the display, analysis, and look of the MPEG Audio Stream Analyzer. A list of menu selections is provided in *Menu Selections* beginning on page 2–21. Complete descriptions of each menu selection are provided in the *Menu Reference* section beginning on page 3–21.

**Upper Toolbar.** The Upper toolbar provides shortcut buttons to five commonly used menu selections. These buttons, and the menu selection they represent, are described in Table 2–1.








**Table 2–1: Upper toolbar buttons**

Button	Name	Description
	<b>Open</b>	Displays the Open dialog box. Selecting this button is the same as selecting <b>Open</b> from the File menu. See <i>Opening an Audio Stream File</i> beginning on page 2–13.
	<b>Save as</b>	Displays the Save As dialog box. Selecting this button is the same as selecting <b>Save As</b> from the File menu. See <i>Saving Audio Stream Files</i> beginning on page 2–15.
	<b>First level view</b>	Displays the First Level view window for the active audio stream. Selecting this button is the same as selecting <b>First level view</b> from the Selection menu. See <i>First Level View</i> beginning on page 2–8.
	<b>Add view</b>	Displays a submenu from which you specify a view to be displayed. Selecting this button is the same as selecting <b>Add view</b> from the Window menu. See <i>Adding Views</i> beginning on page 2–12.
	<b>Main characteristics view</b>	Displays the Main Characteristics window for the active audio stream. Selecting this button is the same as selecting <b>Main characteristics</b> from the Selection Window. See <i>Main Characteristics View</i> beginning on page 2–7.

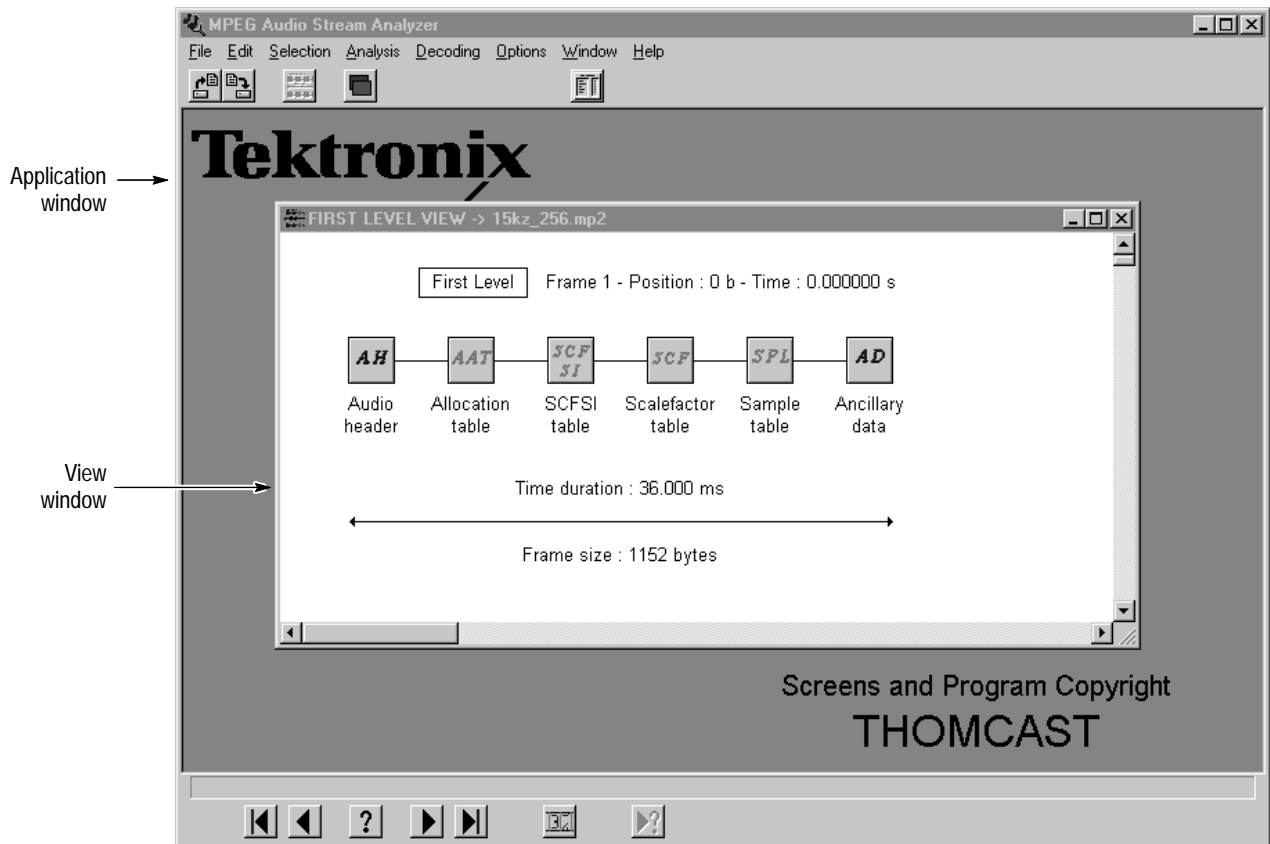
**Status Bar.** The Status bar, located just above the Edit toolbar, provides you with first level help on using the menus. As you highlight a menu item, the status bar briefly describes the selection.

**Edit Toolbar.** The Edit toolbar provides shortcut buttons to selections found in the Edit menu. These buttons, described in Table 2–2, allow you to move through the items of the displayed view and to view the errors in the audio stream file.

**Table 2–2: Edit toolbar buttons**

Button	Name	Description
	First	Displays the first item in the active view. Selecting this button is the same as selecting <b>First</b> from the Edit menu.
	Previous	Displays the previous item in the active view. Selecting this button is the same as selecting <b>Previous</b> from the Edit menu.
	Go to	Displays a dialog box that allows you to select the item number of the active view you want displayed. Selecting this button is the same as selecting <b>Go to</b> from the Edit menu.
	Next	Displays the next item in the active view. Selecting this button is the same as selecting <b>Next</b> from the Edit menu.
	Last	Displays the last item in the active view. Selecting this button is the same as selecting <b>Last</b> from the Edit menu.
	Number of Items	Counts the number of items in the element and displays the number at the top of the Interpreted view. Selecting this button is the same as selecting <b>Number of Items</b> from the Edit menu.
	Next error	Displays the next item that has an error in the audio stream file. Selecting this button is the same as selecting <b>Next error</b> from the Edit menu.

**View Windows** View windows are used to display the structures of audio stream files at different levels.



**Common View Window Elements.** In addition to standard window controls, the title bar of the view windows provides the following information:

- View type. The view type indicates the type of view displayed in the view window.

**NOTE.** When the Channel view window is displayed, the view type indicated in the title bar is First Level View. Also, the view type is not listed in the title bar if the audio stream is opened using the Deferred-Time Analyzer.

- File name. The file name indicates the name of the audio stream file or the transport stream from which the audio stream was extracted.

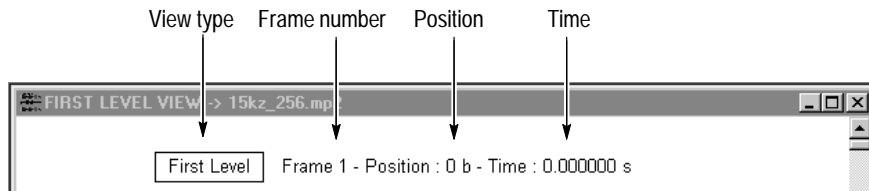
---

**NOTE.** *If the view window is maximized, the view type and file name are displayed in the title bar of the application window.*

---

The top line of the First Level, Channel, and Interpreted view windows provide the following information (refer to the illustration below):

- View type. The view type indicator will be the same as the view type indicated in the title bar with the following exception: In the Channel view the view type on the first line is *Channel* and the title bar reads *First Level View*.
- Frame number. The frame number of the displayed element is relative to the first synchronized frame. The number of the first synchronized frame is one.
- Position. The position of the displayed element is indicated in bytes (b) and is relative to the first byte of the first synchronized frame. The position of the first synchronized frame is zero.
- Time. The time stamp of the displayed element is indicated in seconds (s) and is relative to the first byte of the first synchronized frame. The time of the first synchronized frame is zero.



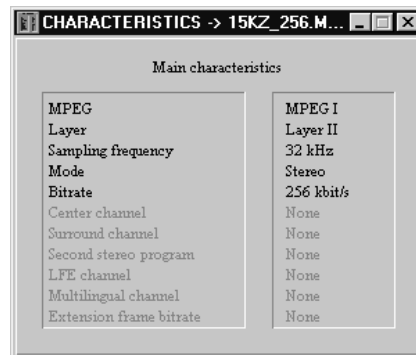
The areas of the view windows below the top line are described briefly in the next section, *MPEG Audio Stream Analyzer Views*, and more thoroughly in the *Reference* section of this manual.

## MPEG Audio Stream Analyzer Views

You can use the MPEG Audio Stream Analyzer to view audio elementary streams at different levels of detail. This section describes the views used by the analyzer to display MPEG data and how to access them. See *Interpreted Views* beginning on page 3–1, and see *Additional Views* beginning on page 3–12 for more detailed information about the various view types used in the MPEG Audio Stream Analyzer.

### Main Characteristics View

The Main Characteristics view window is displayed when you first open an audio stream file.



This view provides quick access to the following information about the audio stream:

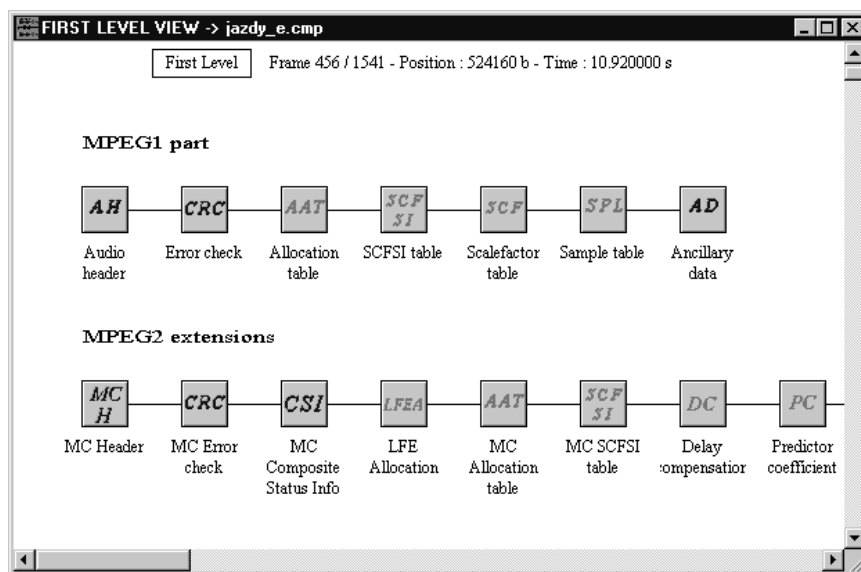
- MPEG standard
- Layer
- Sampling frequency
- Mode
- Bitrate
- Center channel
- Surround channel
- Second stereo program
- Low frequency enhancement channel
- Multilingual channel
- Extension frame bitrate

You can access the Main Characteristics view from other views by selecting the Main characteristics view button from the Upper toolbar, or by selecting **Main characteristics view** from the Selection menu.

You cannot access the Main Characteristics view from the Binary, Hexadecimal, or Wave Editor view windows.

### First Level View

When you open an audio stream file, the First Level view is displayed. The First Level view provides you with a graphic representation of the elements associated with the audio stream.



The lower portion of the window depicts the elements of the audio stream. Each element is represented by an icon. Double-click an icon to access the interpreted view of the audio stream element. If the audio data has been encoded using MPEG-2 extensions, the icons for the extensions are shown on a separate line.

Add a new First Level view window to your display from a First Level or Channel view window using one of the following techniques:

- Select **Add View** from the Window menu, and then select **First Level** from the submenu.
- Select the Add View button from the Upper toolbar and select **First Level** from the submenu.
























Add a new First Level view to your display from an interpreted view by selecting the First Level view icon from the Upper toolbar (see Table 2-1 on page 2-3). If the active audio stream file uses MPEG-2 extensions, you will be asked to select the associated extension file.



## Interpreted Views

Access interpreted views of MPEG elements by double-clicking the element icons shown in Table 2–3. These icons are displayed in the First Level view window. Page references indicate where you can find more information about the interpreted view.

**Table 2–3: Interpreted view icons**

MPEG-1 icon	Interpreted view displayed	MPEG-2 icon	Interpreted view displayed
	Audio Header (page 3–6)		Multichannel Audio Header (page 3–8)
	Error Check (Cyclic Redundancy Check) (page 3–6)		Multichannel Error Check (Cyclic Redundancy Check) (page 3–8)
	Audio Allocation Table (page 3–5)		Multichannel Composite Status Information (page 3–7)
	Scalefactor Selection Information (page 3–11)		Low Frequency Enhancement Allocation Table (page 3–6)
	Scalefactor Table (page 3–11)		Multichannel Allocation Table (page 3–7)
	Sample Table (page 3–11)		Multichannel Scalefactor Selection Information (page 3–9)
	Ancillary Data (page 3–5)		Delay Compensation (page 3–6)
			Predictor Coefficient (page 3–10)
			Low Frequency Scalefactor Table (page 3–7)
			Multichannel Scalefactor Table (page 3–9)
			Low Frequency Enhancement Sample Table (page 3–7)
			Multichannel Sample Table (page 3–9)
			Multilingual Allocation Table (page 3–10)
			Multilingual Scalefactor Selection Information (page 3–10)
			Multilingual Scalefactor Table (page 3–10)
			Multilingual Sample Table (page 3–10)

From the interpreted views, you can access two other views: **Binary** and **Hexadecimal**.

### Binary and Hexadecimal Views

The Binary and Hexadecimal views show the bit representation, in either binary or hexadecimal format, of the interpreted view from which it was accessed.





You can display the Binary or Hexadecimal view windows using one of the following techniques:

- Navigate to an interpreted view window for the syntax you want displayed, and then select the **Add view** button on the Upper toolbar. When the submenu is displayed, select **Binary** or **Hexadecimal**.
- Navigate to an interpreted view window for the syntax you want displayed, and then select **Add view** from the Window menu. When the submenu is displayed, select **Binary** or **Hexadecimal**.

### Channel View

The Channel view displays the number and type of channels used to encode the audio information. The icons shown in Table 2-4 are used to depict the channel types indicated.

**Table 2-4: Channel view icons**

Icon	Type	Icon	Type
	Left, right, or dual channel		Single, center, or LFE channel
	Left, right, or mono surround channel		Multilingual channel

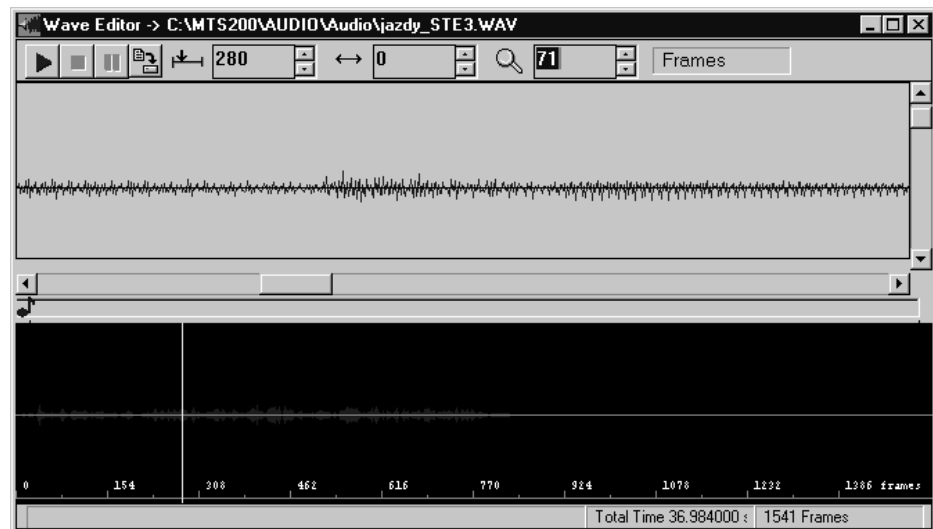
Access the Channel view using the following procedure:

1. Navigate to the First Level view for the audio file.
2. Select **Add View** from the Window menu (or click the Add View icon from the upper toolbar).
3. Select **Channel View** from the submenu and the Channel view window is displayed.

You can decode an audio stream from this view by right-clicking the Left or Right channel icons, which displays a submenu from which you select either **Decode** (as a single channel), or **Stereo**. An overview of the decoding function is described in *Decoding Audio Stream Files* on page 2-18.

## Wave Editor View

Immediately after you decode an audio stream file, the Wave Editor view window is displayed. From this window you can view the decoded audio stream waveform, play the decoded audio file, and save the audio file (or a portion of it) as a .wav file. To listen to the decoded audio stream, you must have a sound card installed on your computer.



To display the Wave Editor window, you must perform one of the decoding procedures described in *Decoding Audio Stream Files* on page 2–18 or in *Decoding Audio Streams* on page 3–13.

---

**NOTE.** *The Wave Editor view window is displayed only after the analyzer has finished decoding an audio stream file. The editing capabilities of the Wave Editor are limited to selecting a portion of the decoded audio stream to save or playback.*

---

You can add another Wave Editor view window using the following procedure:

1. Ensure that the Wave Editor view window is the active view window.
2. Click the Add View command button from the Upper toolbar.

Alternatively, select **Add view** from the Window menu.

### Adding Views

You can add multiple view windows to the application window using one of the following techniques:

- Select the Add View button from the Upper toolbar, and then select the type of view window you want displayed from the submenu.
- Select **Add View** from the Window menu, and then select the type of view window you want displayed from the submenu.

The views available from the submenus in both cases depend on the active view window as described in Table 2–5.

**Table 2–5: Add view options**

From this view window	Select Add View to display
First Level view	<ul style="list-style-type: none"> <li>■ An additional First Level view or</li> <li>■ A Channel view</li> </ul>
Interpreted view	<ul style="list-style-type: none"> <li>■ An additional interpreted view or</li> <li>■ A Binary or Hexadecimal view</li> </ul>
Binary or Hexadecimal view	<ul style="list-style-type: none"> <li>■ An interpreted view of the syntax or</li> <li>■ A Binary or Hexadecimal view</li> </ul>
Channel view	<ul style="list-style-type: none"> <li>■ A First Level view or</li> <li>■ An additional Channel view</li> </ul>
Wave Editor	<ul style="list-style-type: none"> <li>■ Another Wave Editor view window</li> </ul>

## Basic Operations

This section describes how to open, save, print, analyze, and decode MPEG audio stream files and how to exit the application.

### Opening Audio Stream Files

The MPEG Audio Stream Analyzer can display audio elementary streams of the following file formats:

- MPEG encoded audio stream files
- Audio elementary streams extracted from transport stream files, such as those captured and saved with the Tektronix MPEG Test System Data Store System

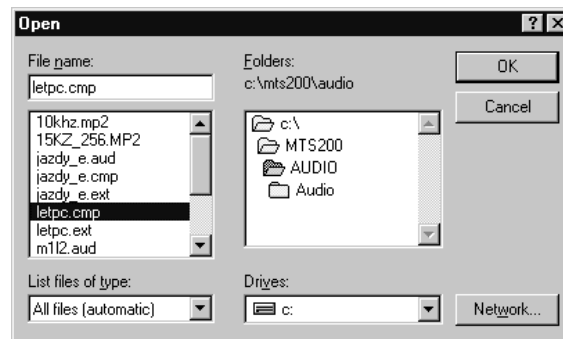
---

**NOTE.** The analyzer may take a few minutes to load extremely large audio elementary stream files when the List file of type option is **All files (automatic)**.

---

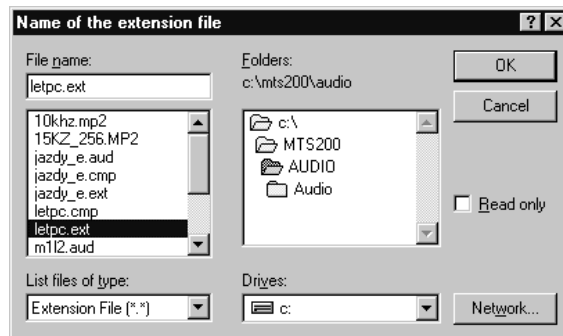
**Opening an Audio Stream File.** To open and analyze an audio stream file, use the following procedure:

1. Select **Open** from the File menu. The Open dialog box is displayed.



2. From the List files of type drop down selection box, select one of the following options:
  - **All files (automatic).** If you select this option (the default option), the analyzer automatically scans the entire file and then opens the audio stream regardless of whether the file uses the multichannel extensions.
  - **All files (no multichannel).** If you select this option, you can open MPEG-1 as well as MPEG-2 low sampling frequency audio files without the MPEG-2 extension information.
  - **All files (multichannel).** If you select this option, you can open only multichannel encoded files.

3. Select the appropriate file from the File name selection box and select **OK**.
4. If you have selected a file that was encoded using MPEG-2 extensions (for example, LFE or multilingual extensions) and have selected either the automatic or multichannel option in step 2, the following dialog box is displayed.



5. Select the appropriate extension file, and then select **OK**. The First Level and Main Characteristics view windows will be displayed.

**Opening an Audio Elementary Stream from a Transport Stream.** To extract and analyze an elementary stream that is encoded in a transport stream file, use the following procedure:

1. Confirm that you know the PID of the packets that contain the audio stream of interest. If necessary, examine the transport stream first with the Tektronix Deferred-Time Analyzer application.
2. Select **Open** from the File menu.
3. Use standard Windows NT techniques to select the appropriate file from the Open dialog box.
4. Enter the PID of the packets that contain the audio stream.

---

**NOTE.** *If you have the Tektronix MPEG Deferred-Time Analyzer, you can open the MPEG Audio Stream Analyzer to analyze an audio elementary stream directly from the Deferred-Time Analyzer. From the Hierarchic View, right-click the audio icon and select **Audio Stream Analyzer** from the submenu.*

---

## Saving Audio Stream Files

You can save complete audio stream files or specific parts of the audio stream. You can also save decoded audio streams. (See *Decoding Audio Stream Files* on page 2–18.)

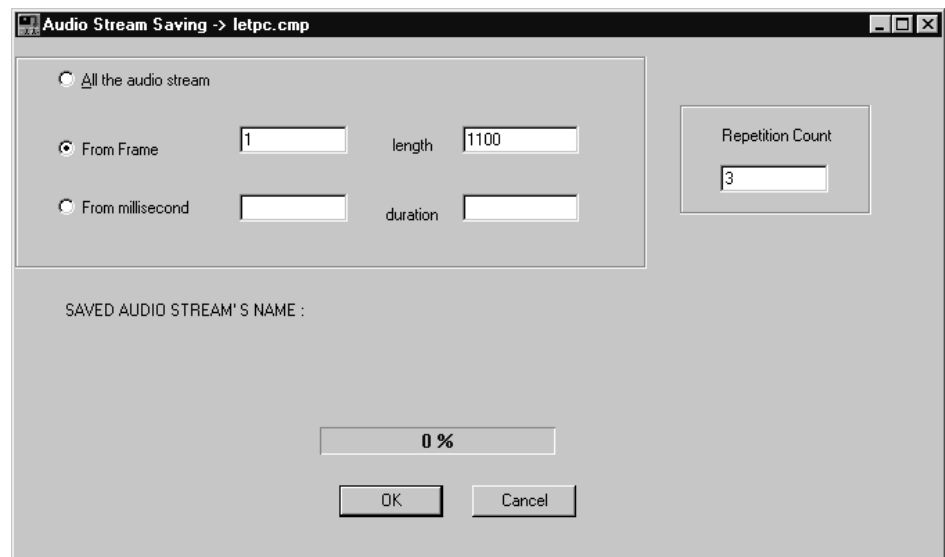
---

**NOTE.** You can save audio stream files only when the First Level view is the active view.

---

To save all or part of an audio stream file, use the following procedure:

1. Navigate to the First Level view window of the stream you want to save.
2. Select **Save as** from the File menu (or select the Save As button from the Upper toolbar). The following dialog box is displayed.



3. Using this dialog box, specify whether or not you want to save the complete audio stream or just a specific part of the stream, by selecting one of the following options:
  - **All the audio stream.** This option is the default for storing encoded streams and will save the complete audio stream. (If you select this option, proceed to step 5.)
  - **From frame/length.** This option allows you to save the specific portion of the audio stream you indicate in the **From frame** and **length** text boxes.
  - **From millisecond/duration.** This option allows you to save the specific portion of the audio stream you indicate in the **From millisecond** and **duration** text boxes.

4. If you chose to save a specific portion of the stream in step 3, perform one of the following steps:
  - If you chose **From frame**, indicate the starting frame in the **From frame** text box and the number of frames you want to save in the **length** text box.
  - If you chose **From milliseconds**, indicate the starting millisecond in the **From millisecond** text box and the number of milliseconds you want to save in the **duration** text box.

---

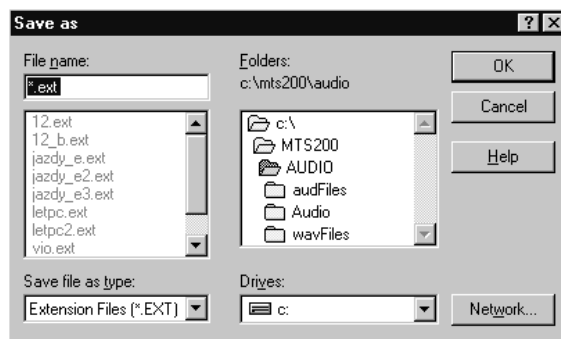
**NOTE.** When the analyzer saves audio streams, it does so frame by frame.

---

5. Select the number of times you want to save the audio data in the **Repetitions** text box, and then select **OK**. For each repetition greater than one, the audio stream or the selected portion will be appended to the first repetition.

If the stream you are saving uses MPEG-2 extensions (for example LFE or multilingual extensions), proceed to step 6. Otherwise, proceed to step 8.

6. You are prompted to save the extension file first with the following dialog box.



7. Select or type the name and extension for the MPEG-2 extension file in the File name text box and select **OK**.

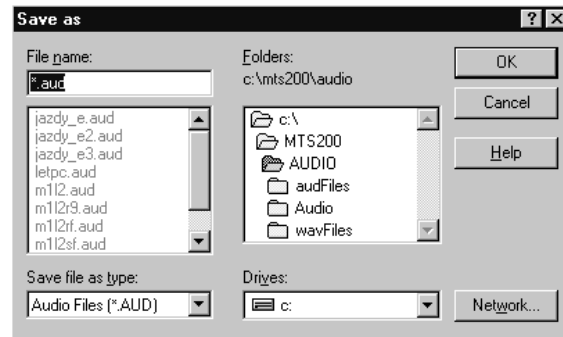
---

**NOTE.** It is easier to keep track of standard and extension files if you save both files using a common file name and different file extensions (for instance, testfile.ext and testfile.aud).

---



8. You are prompted for the audio stream file name with the following dialog box.



9. Select or type the file name and extension, and then select **OK**.

## Analyzing Audio Stream Files

You can check the audio elementary streams for three separate types of errors:

- **Syntactic.** Syntactic errors indicate errors in the value(s) of a structure.
- **Semantic.** Semantic errors indicate errors in the MPEG structure.
- **CRC.** CRC errors indicate errors in transmission or decoding.

**Syntactic Analysis.** To perform a syntactic analysis, use the following procedure:

1. Navigate to the interpreted view of the element in the elementary stream that you want to check.
2. Select **Syntactic** from the Analysis menu.
3. The analyzer performs a syntactic analysis of the element you have selected and reports any errors in an error message window.
4. Double-click an error message and the interpreted view window containing the syntax in error is displayed. The value of the field in error is displayed in red.

You can perform syntactic analyses on all of the structures in the stream by navigating to the First Level view window, and then selecting **Syntactic** from the Analysis menu. See *Syntactic Analysis* on page 3–19 for more information.

**Semantic Analysis.** To perform a semantic analysis, use the following procedure:

1. Navigate to the First Level view.
2. Select **Semantic** from the Analysis menu.
3. The analyzer performs a semantic analysis of the entire stream and reports any errors in an error message window.
4. Double-click an error message and the interpreted view of the element in error is displayed.

You can perform semantic analyses only from the First Level view. See *Semantic Analysis* on page 3–19 for more information.

**CRC Error Check.** To display the CRC errors, select the CRC icon from the First Level view, and then select the Next error icon from the Edit toolbar. If CRC errors are present, the next frame with an error is displayed with the CRC value in red.

## Decoding Audio Stream Files

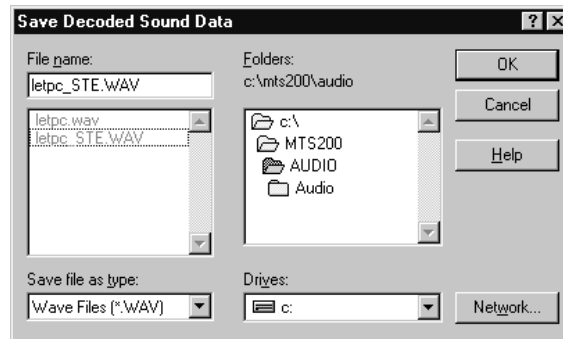
You can decode and save an audio stream and view the audio waveform using the Wave Editor window (see *Decoded View*, beginning on page 2–11). As part of the decoding process, the analyzer saves decoded streams as \*.wav files.

The following list describes the options available for decoding and saving audio stream data:

- All frames in the audio stream in stereo (if the stream contains stereo information)
- Specific frames in stereo (if the stream contains stereo information)
- Only left or only right channels for all frames or for specific frames

See *Decoding Audio Streams* beginning on page 3–13 for complete procedures on how to decode audio stream data. Use the following procedure to decode all of the frames in the displayed audio stream:

1. Navigate to either the First Level or the Channel view window.
2. Select **Complete** from the Decoding menu.
3. The MPEG Audio Stream Analyzer will begin decoding the stream and will display the Save Decoded Sound Data dialog box.



4. A default file name is displayed in the File name text box. If you want to use that file name, select **OK**. Otherwise, type a file name and extension in the File name text box and select **OK**.
5. After the analyzer finishes decoding the audio stream, the Wave Editor view window is displayed. See *Using the Wave Editor* beginning on page 3–16 for a discussion of the Wave Editor capabilities.

### Printing Audio Stream Data

You can print any of the view windows displayed with the exception of the Main Characteristics and Wave Editor view windows. To print the information displayed in a view window, use the following procedure:

1. Set up the page layout by selecting **Printer setup** from the File menu. Make appropriate selections for paper size and source, orientation, and margins from the Page Setup dialog box.
2. Set up the printer connections by selecting the **Printer** command button, and then making the appropriate printer and printer properties selections (see your Windows documentation).
3. Return to the view window you want to print and select **Print** from the File menu.
4. The Print dialog box is displayed. Make standard Windows Print selections and print the contents of the active view window.

---

**NOTE.** You may need to change the font and page margins to print all of the information displayed in some of the interpreted view windows.

---

### Quitting the MPEG Audio Stream Analyzer

To quit the MPEG Audio Stream Analyzer, select **Exit** from the File menu.

To close a window without exiting the analyzer application, use one of the following techniques:

- To close an active view window, select the close button on the active view window. Alternatively, select **Close view** from the Window menu.
- To close all windows, select **Close all** from the Window menu.

## Menu Selections

Table 2–6 describes each of the menu selections for the MPEG Audio Stream Analyzer. The page references in parentheses indicate where you can find more information about the selections for the menu.

**Table 2–6: Menu selections**

Menu	Selection	Description
File	<b>Open</b>	Displays the Open dialog box from which you identify the existing audio stream file you want to view. Same as the Open button on the Upper toolbar.
	<b>Save as</b>	Displays the Audio Stream Save dialog box from which you indicate how much of the stream you want to save. After you select OK, a standard Save As dialog box is displayed. Same as the Save as button on the Upper toolbar.
	<b>Print</b>	Displays a standard Print dialog box from which you can print the active view window.
	<b>Printer setup</b>	Displays the Page Setup dialog box from which you specify the paper size, orientation, and page margins. The dialog box also provides access to printer options.
	<b>Exit</b>	Quits the MPEG Audio Stream Analyzer.
Edit	<b>Next</b>	Displays the next item in the active view.
	<b>Previous</b>	Displays the previous item in the active view.
	<b>First</b>	Displays the first item in the active view.
	<b>Las</b>	Displays the last item in the active view.
	<b>Go to</b>	Displays the specified item in the active view.
	<b>Number of Items</b>	Calculates the number of items in the active view, and then displays the number in the upper portion of the active view window.
	<b>Next error</b>	Displays the next item in the active view with either a CRC, syntax, or a semantic error.
Selection	<b>First level view</b>	Displays the First Level view for the audio stream indicated in the title bar of the view window.
	<b>Main characteristics</b>	Displays the Main Characteristics view for the audio stream indicated in the title bar of the view window.

**Table 2–6: Menu selections (cont.)**

<b>Menu</b>	<b>Selection</b>	<b>Description</b>
Analysis	<b>Syntactic</b>	Performs a Syntactic analysis on the audio stream indicated in the title bar of the secondary window.
	<b>Semantic</b>	Performs a Semantic analysis on the audio stream indicated in the title bar of the secondary window.
	<b>Automatic</b>	Performs both Syntactic and Semantic analyses on the audio stream indicated in the title bar of the secondary window.
Decoding	<b>Complete</b>	Displays the Save Decoded Data dialog box from which you specify a file name for the decoded audio stream. This selection is used to decode the entire audio stream.
	<b>Partial</b>	Displays the Decoding dialog box from which you select the start and stop frames of the audio stream that you want to decode. After you select OK, the Save as Decoded Data dialog box is displayed.
Options	<b>Base</b> (see page 3–21)	Displays the Base dialog box from which you set the numeric base (decimal or hexadecimal) used for various views.
	<b>Font</b> (see page 3–21)	Displays the Font dialog box from which you set the font used for most of the views windows. (The Binary and Hexadecimal view windows are not affected by the font selection.)
	<b>Interpretation</b> (see page 3–22)	Displays the Interpreted view option dialog box from which you can choose to display either the length or the position of the structures in the interpreted views.
	<b>Read configuration</b> (see page 3–22)	Displays the Read Configuration dialog box from which you can load an existing configuration file into the Audio Stream Analyzer.
	<b>Save configuration</b> (see page 3–22)	Displays the Save Configuration dialog box from which you can save the current configuration into a specified configuration file.
	<b>Set default configuration</b> (see page 3–22)	Loads the default configuration file into the Audio Stream Analyzer.
	<b>Display in frames</b> (see page 3–22)	Changes the display unit of the Wave Editor to frames.
	<b>Display in milliseconds</b> (see page 3–22)	Changes the display unit of the Wave Editor to milliseconds.

Table 2-6: Menu selections (cont.)

Menu	Selection	Description
Window	Cascade	Displays the open view windows on top of one another.
	Tile	Fits the open view windows to the application window.
	Arrange icons	Arranges all minimized windows to the bottom of the application window.
	Close view	Closes the selected view window.
	Close all	Closes all of the view windows.
	Add view	Displays a submenu from which you can choose to add an identical view of the selected view or a different view of the displayed information (for instance, from an interpreted view you can choose to display a binary or hexadecimal view of the frame selected). Same as the Add View button on the upper toolbar.
	List of open view windows	Selects the active view from the listed view windows and brings the selected view to the front of the display. All open views are listed, including any minimized windows. A checkmark indicates the current active view.
Help	Contents	Displays the MPEG 2 Audio Stream Analyzer Help contents from which you can choose or search for a specific help topic.
	Using help	Displays the Windows Help contents.
	About MPEG Audio Stream Analyzer	Displays version number and copyright information about the MPEG Audio Stream Analyzer.







# Reference



# Reference

*Reference* provides detailed information about the MPEG Audio Stream Analyzer. This chapter is organized into the following sections:

- *Interpreted Views* describes each of the interpreted views accessible by double-clicking the First Level view icons.
- *Additional Views* describes other views used by the analyzer to display and interpret audio elementary stream data.
- *Analyzing Audio Elementary Streams* describes the types of audio elementary stream analyses available using the MPEG Audio Stream Analyzer. This section also describes how to decode audio streams and how to use the Wave Editor view window.
- *Options Menu Reference* provides a reference for the Options menu selections that allow you to configure the MPEG Audio Stream Analyzer.

## Interpreted Views

Interpreted views provide a graphical user interface for examining MPEG audio stream elements. The following section, *Interpreted View Displays*, describes the types of displays used to interpret the audio stream elements and lists some common interface features for each view type. It is followed by descriptions of the interpreted views used by the analyzer (organized alphabetically).

### Interpreted View Displays

The MPEG Audio Stream Analyzer uses graphical displays to help you interpret the values of different MPEG-1 and MPEG-2 parameters. The types of displays are differentiated in the way information is presented: one type of display is tabular and the other is linear. Both types of displays are interactive, making it easy for you to determine what you are looking at when you examine the syntax. These interactive characteristics are described in the following pages.

From all of the interpreted views, use the Edit toolbar to quickly navigate through the frames of the audio stream file. (See *Edit Toolbar* on page 2–4.) When you select the Next error button from the Edit toolbar (or **Next error** from the Edit menu) the analyzer looks for syntactic errors and not semantic errors. (To check an audio file for semantic errors, the First Level view must be the active view window; the Edit toolbar is inactive from the First Level view.) Select the Next Error command button while the CRC interpreted view is displayed to automatically search for and display the next detected CRC error.

**Tabular displays.** Tabular displays are those interpreted views that present the extracted information in tabular format, like the Predictor Coefficient View shown below:

Pred coef Frame 456 / 1541 - Position : 524913 b - Time : 10.920000 s

Group : 1

Ch \ Sb	Subband 0	Subband 1	Subband 2	Subband 3	Subband 4	Subband 5
Channel 0	0	0	118	178	0	107
Channel 1	0	180	0	223	210	0
Channel 2	0	0	195			
Channel 3	0	0	0			
Channel 4	0	0	0			
Channel 5	0	0	0	0	0	0

pred\_coef[sbgr][px][pci]  
Actual coefficient of predictor with up to second order in subband group sbgr and predictor index px

In addition to the information common to all interpreted views, tabular views have common features of their own, as indicated in the following list:

- Information is presented in table format, with row and column headings and cells for the actual information.
- Row and column headings provide access to descriptions of the displayed syntax. To read the descriptions, double-click a row or column heading.
- Data displayed in the cells are one of two types: Actual values for the various MPEG parameters or indices for a set of values from the standard. To read the interpretation of the data in a specific cell, double-click the cell. Red values indicate syntax errors.

The displayed parameter values can be shown in decimal or hexadecimal format. To switch between the two, press the **F2** function key. (You can choose **Base** from the Options menu, and then make the selection from the dialog box.)

When you double-click a cell or heading in the tabular view the message box, shown in the preceding illustration is displayed. The title bar of the message box indicates the specific syntax displayed. You can position the box anywhere within the view window by clicking and dragging the title bar of the box. Click anywhere outside of the box to dismiss it.

Some of the tabular displays also provide an additional tool bar, called the Group toolbar, to help you navigate through groups of items in the syntax.

Ch	Sb	Subband 0	Subband 1	Subband 2	Subband 3	Subband 4	Subband 5
Channel 0		0	0	118	178	0	107

The Group toolbar is similar to the Edit toolbar, except the Go to next error and Number of items buttons are not provided. The Edit toolbar is still available from views that have a Group toolbar.

**Linear displays.** Linear displays are those interpreted views that present the extracted information in a series of rectangles, like the Audio Header View shown below.

In addition to the information common to all interpreted views, linear views have common features of their own, as indicated in the following list:

- Large rectangles display parameter names. Shaded rectangles indicate more critical MPEG parameters. Access descriptions of parameter by double-clicking on the large rectangle representing the parameter.

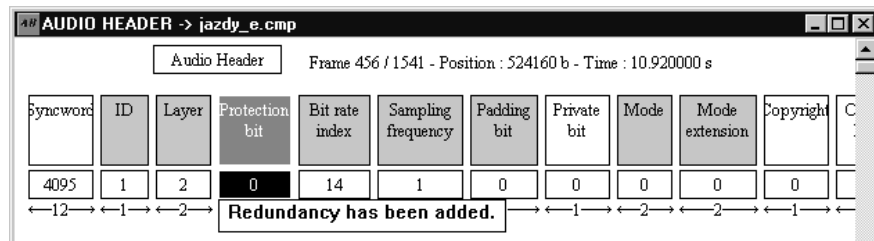
The message box displayed can be moved anywhere within the view window. To move the box, click and drag the title bar of the box. Click anywhere outside of the box to dismiss it.

Syncword	ID	Layer	Protection bit	Bit rate index	Sampling frequency	Padding bit	Private bit	Mode	Mode extension	Copyright	C
4095	1	2	0				0	0	0	0	

**Protection bit**  
One bit to indicate whether redundancy has been added in the audio bitstream to facilitate error detection and concealment.

- Small rectangles display the parameter value. Access the interpretation of the displayed value by double-clicking on the small rectangle, as shown in the following illustration. Click anywhere outside of the displayed message box to dismiss it. Values displayed in red indicate an error in the parameter.

You can display parameter values in decimal or hexadecimal format. To switch between the two, press the **F2** function key. (Alternatively, select **Base** from the Options menu, and then make the selection from the dialog box that is displayed.)



Linear displays can also indicate of the position or the length of the parameter in the bitstream. When enabled, this information is displayed below the small rectangles. You determine which type of information, if any, is displayed using the following procedure:

1. Select **Interpretation** from the Options menu.
2. Select **Position** or **Length** from the resulting dialog box. Only one option can be chosen at a time, or you can deselect both options.
  - **Position** indicates the position in the bitstream of the first bit of the parameter. Position is relative to the to the first bit in the displayed syntax.
  - **Length** is the length in bits of the parameter. For instance, the Layer parameter is a 2-bit indicator, as shown in the preceding illustration.

When you start a new MPEG Audio Stream Analyzer session, the analyzer will use the option selected the last time the analyzer was exited. The default Interpretation option is to display neither length nor position information.

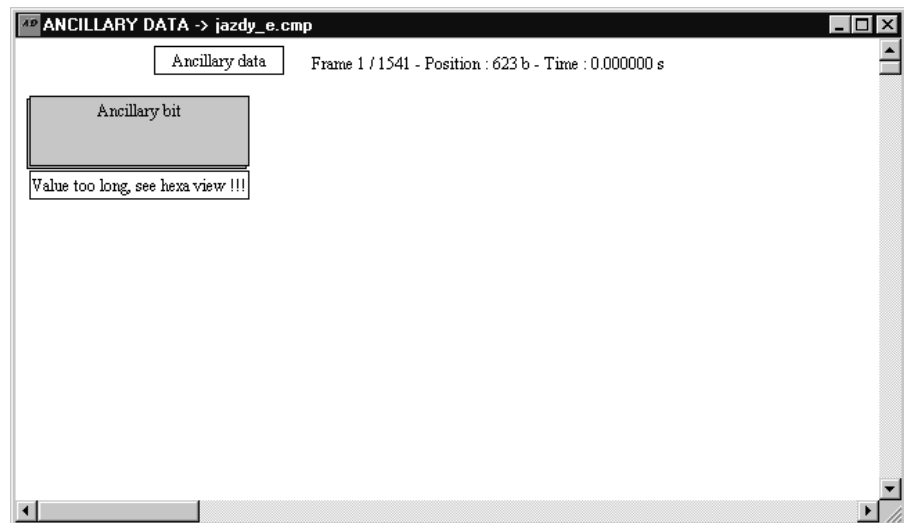
**Allocation Table (AAT)**

Double-click the AAT icon from the First Level view to display a graphical representation of the allocation table syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)

Double-click a row or column header to read a description of the syntax.  
Double-click a cell to read an interpretation of the data for that cell.

**Ancillary Data (AD)**

Double-click the AD icon from the First Level view to display a graphical representation of the ancillary data syntax as shown in the following illustration. This view uses a modified linear display. (See page 3–3 for information about linear displays.)



In the Ancillary Data interpreted view, the large rectangle looks three dimensional and represents the data for the syntax.

Double-clicking the large rectangle displays either a hexadecimal or a binary view of the data. (The format displayed depends on the frame from which you accessed the Ancillary Data interpreted view.)

Double-clicking the small rectangle displays the message **Bit value**.

In order to use the **Next error** button on the Edit toolbar, display the bitstream first by double-clicking on the large rectangle.

**Audio Header (AH)**

Double-click the AH icon from the First Level view to display a graphical representation of the audio header syntax for the indicated frame. This view uses a linear display. (See page 3–3 for information about linear displays.)

Information about the following parameters is displayed in the audio header interpreted view:

- Syncword
- ID
- Layer
- Protection bit
- Bit rate index
- Sampling frequency
- Padding bit
- Private bit
- Mode
- Mode extension
- Copyright
- Original home
- Emphasis

To read a description of a parameter, double-click the large rectangle with that parameter name. To read an interpretation of a parameter value, double-click the small rectangle below the parameter name.

**Cyclic Redundancy Check (CRC)**

Double-click the CRC icon from the First Level view to display a graphical representation of the CRC error syntax. This view uses a linear display. (See page 3–3 for information about linear displays.)

The small rectangle in the CRC error interpreted view displays the CRC value. Red values indicate errors. Display other CRC errors by selecting the **Next error** button on the Edit toolbar.

**Delay Compensation (DC)**

Double-click the DC icon from the First Level view to display a graphical representation of the delay compensation syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)

Double-click a row or column header to read a description of the syntax. Double-click a cell to read an interpretation of the data for that cell.

**Low Frequency Enhancement Allocation (LFEA)**

Double-click the LFEA icon from the First Level view to display a graphical representation of the low frequency enhancement allocation syntax. This view uses a linear display. (See page 3–3 for information about linear displays.)

Double-click the large rectangle to read a description of the syntax. Double-click the small rectangle for an interpretation of the value.





The features for this interpreted view that are not standard are described in the following list:

- Double-clicking the large Tc Allocation rectangle displays the transmission channel allocation table, which is described on page 3–11.
- Double-clicking one of the other large three dimensional rectangles displays a hexadecimal view of the bitstream for the parameter indicated.
- Double-clicking the small three dimensional rectangles displays the message **Number of data bits**.

The rest of the elements are standard. Double-click a large rectangle to read a description of the syntax. Double-click the small rectangles to display an interpretation of the value for that parameter.

### Multichannel Cyclic Redundancy Check (CRC)

Double-click the CRC icon (with the MC error check title underneath) from the First Level view to display a graphical representation of the multichannel CRC error syntax. This view uses a linear display. (See page 3–3 for information about linear displays.)

The small rectangle in the Multichannel CRC error interpreted view displays the multichannel CRC value. Red values indicate errors. From this view you can find other multichannel CRC errors by selecting the **Next error** button on the Edit toolbar.

### Multichannel Header (MCH)

Double-click the MCH icon from the First Level view to display a graphical representation of the multichannel header syntax. This view uses a linear display. (See page 3–3 for information about linear displays.)

Information about the following parameters is displayed in the multichannel header interpreted view:

- |   |   |
|---|---|
| ■ Extension bit stream present                                  | ■ De-matrix procedure                       |
| ■ Number of MPEG-1 compatible ancillary data bytes (if present) | ■ Low frequency enhancement channel present |
| ■ Center channel present  | ■ Multilingual sampling frequencies         |
| ■ Surround channel present                                      | ■ Multilingual layer                        |
| ■ Number of multilingual channels                               | ■ Copyright identification                  |
| ■ Audio mix   | ■ Copyright identification start            |

To read a description of a multichannel header parameter, double-click the large rectangle with that parameter name. To read an interpretation of a parameter value, double-click the small rectangle below the parameter name.

### Multichannel Sample Table (SPL)

Double-click the SPL icon (with the MC sample table title underneath) from the First Level view to display a graphical representation of the multichannel sample table syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)

Double-click a row or column header to read a description of the syntax. The cells represent the value of the coded sample. Use the Group toolbar to step through the groups of the multichannel sample table syntax.

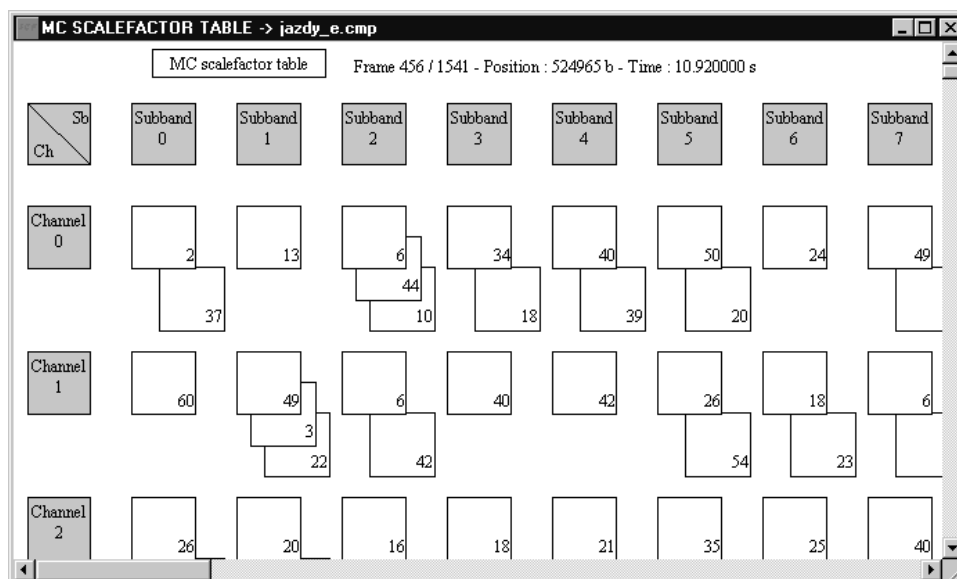
### Multichannel Scalefactor Selection Information (SCFSI)

Double-click the SCFSI icon (with the MC SCFSI table title underneath) from the First Level view to display a graphical representation of the multichannel scalefactor selection information syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)

Double-click a row or column header to read a description of the syntax. Double-click a cell to read an interpretation of the data for that cell.

### Multichannel Scalefactor Table (SCF)

Double-click the SCF icon (with the MC scalefactor title underneath) from the First Level view to display a graphical representation of the multichannel scalefactor syntax. This view uses a modified tabular display. (See page 3–2 for information about tabular displays.)



Double-click a row or column header to read a description of the syntax. The cell data is multi-layered so that you can easily access the scalefactor values of the different parts of the frame.

**Multilingual Allocation Table (AAT)**

Double-click the AAT icon (with the ML Allocation table title underneath) from the First Level view to display a graphical representation of the multilingual allocation table syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)

Double-click a row or column header to read a description of the syntax.  
Double-click a cell to read an interpretation of the data for that cell.

**Multilingual Sample Table (SPL)**

Double-click the SPL icon (with the ML sample table title underneath) from the First Level view to display a graphical representation of the multilingual sample table syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)

Double-click a row or column header to read a description of the syntax. The cells represent the value of the coded sample. Use the Group toolbar to step through the groups of the multilingual sample table syntax.

**Multilingual Scalefactor Selection Information (SCFSI)**

Double-click the SCFSI icon (with the ML SCFSI table title underneath) from the First Level view to display a representation of the multilingual SCFSI syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)

Double-click a row or column header to read a description of the syntax.  
Double-click a cell to read an interpretation of the data for that cell.

**Multilingual Scalefactor Table (SCF)**

Double-click the SCF icon (with the ML scalefactor title underneath) from the First Level view to display a graphical representation of the multilingual scalefactor syntax. This view uses a modified tabular display. (See page 3–2 for information about tabular displays.) See the multichannel scalefactor table display figure on page 3–9.

Double-click a row or column header to read a description of the syntax. The cell data is multi-layered so that you can easily access the scalefactor values of the different parts of the frame.

**Predictor Coefficient (PC)**

Double-click the PC icon from the First Level view to display a graphical representation of the predictor coefficient syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)

Double-click a row or column header to read a description of the syntax. The cell data represent the actual predictor coefficients. Use the Group toolbar to step through the groups of the predictor coefficient syntax.

- 
- Sample Table (SPL)** Double-click the SPL icon from the First Level view to display a graphical representation of the sample table syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)
- Double-click a row or column header to read a description of the syntax. The cells represent the value of the coded sample. Use the Group toolbar to step through the groups of the multilingual sample table syntax.
- Scalefactor Selection Information (SCFSI)** Double-click the SCFSI icon from the First Level view to display a graphical representation of the scalefactor selection information syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)
- Double-click a row or column header to read a description of the syntax. Double-click a cell to read an interpretation of the data for that cell.
- Scalefactor Table (SCF)** Double-click the SCF icon from the First Level view to display a graphical representation of the scalefactor syntax. This view uses a modified tabular display. (See page 3–2 for information about tabular displays.) See the figure showing the multichannel scalefactor table display on page 3–9 to see a representation of the Scalefactor Table interpreted view window.
- Double-click a row or column header to read a description of the syntax. The cell data is multi-layered so that you can easily access the scalefactor values of the different parts of the frame.
- Transmission Channel Allocation (TC)** Double-click the TC Allocation rectangle from the Multichannel Composite Status Information interpreted view to display a graphical representation of the transmission channel syntax. This view uses a tabular display. (See page 3–2 for information about tabular displays.)
- Double-click a row or column header to read a description of the syntax. Double-click a cell to read an interpretation of the data for that cell.

## Additional Views

Interpreted view windows display different syntax of MPEG audio bitstreams. The view windows described in this section offer alternative ways of viewing the bitstream.

- The Binary and Hexadecimal view windows display low-level views of the bitstream.
- The Channel view window displays the channel distribution for an audio elementary stream.
- The Wave Editor view window displays the analog waveform of a decoded audio stream.

### Binary and Hexadecimal Views

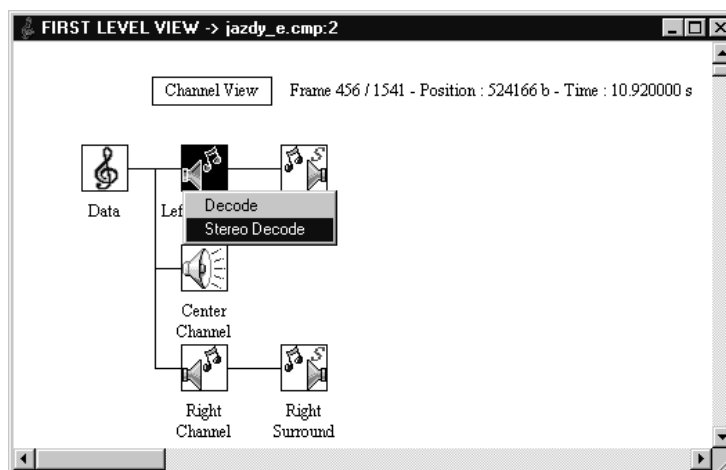
The Binary and Hexadecimal view windows display the audio bitstream for the MPEG syntax indicated in the top line of the view window (the interpreted view from which you accessed the binary or hexadecimal view).

Display the Binary or Hexadecimal views using one of the following techniques:

- From an interpreted view, click the Add view button, and then select either **Binary** or **Hexadecimal** from the submenu.
- From an interpreted view, select **Add view** from the Window menu, and then select either **Binary** or **Hexadecimal** from the submenu.

The Edit toolbar is available from either of these views, so you can step through the binary or hexadecimal views for the other frames of the syntax you are viewing. (See *Edit Toolbar* on page 2–4.) When you select the Next error button (or **Next error** from the Edit menu), the analyzer looks for syntactic errors and not semantic errors.

**Channel View** The Channel view window displays the channel distribution for the audio stream as shown in the following illustration. The Channel view provides the common view window elements as described in *Common View Window Elements* beginning on page 2–5.



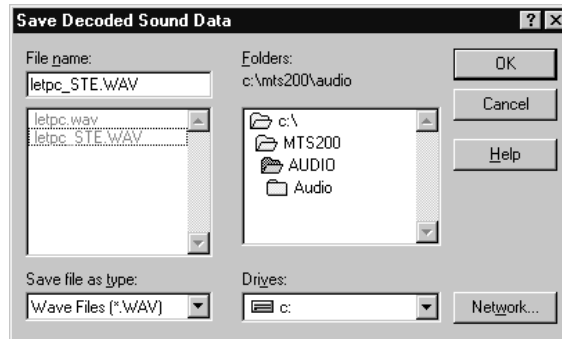
The icons are interactive. Right-click a left or right channel icon to display a submenu from which you can choose to decode the audio stream. You can decode the audio stream in stereo if the audio stream contains stereo information. If not, the analyzer will decode the audio stream as a single channel. To decode audio stream files, use the procedure described in the next section, *Decoding Audio Streams*.

Immediately after the audio stream has been decoded and saved as a \*.wav file, the Wave Editor view window is displayed. See *Wave Editor* beginning on page 3–16 for information about the Wave Editor view window.

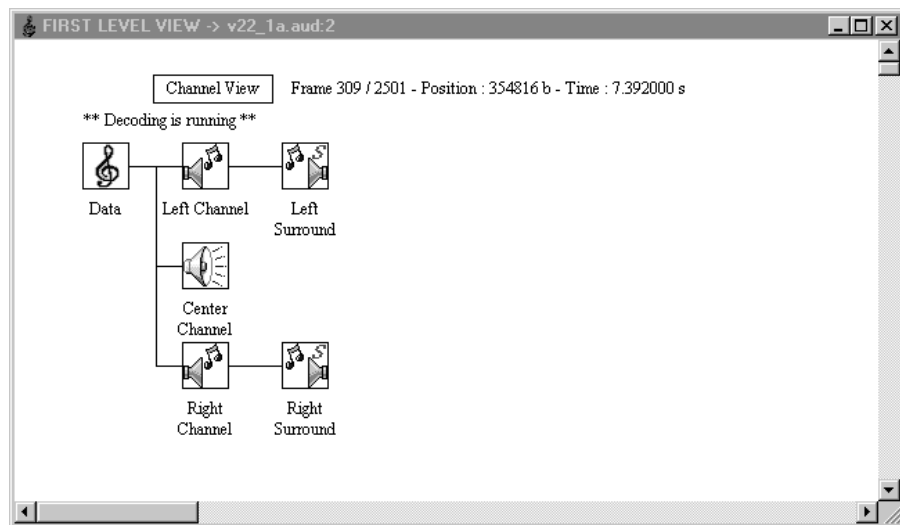
**Decoding Audio Streams.** Decode all or part of an audio stream using the following procedure:

1. Navigate to the First Level or Channel view window.
2. Select one of the following options from the Decoding menu:
  - **Complete.** Use this option to decode all of the audio frames in the audio stream. (If stereo information is present, the \*.wav file is decoded in stereo.)
  - **Partial.** Use this option to decode the specific frames of the audio stream. (If stereo information is present, the \*.wav file is decoded in stereo.)

3. If you selected **Partial** in step 2, specify a start and stop frame from the displayed dialog box, and then select **OK**. The frames you specify will make up the new \*.wav file.
4. Select or type the name and extension for the decoded file in the Save Decoded Sound Data dialog box, and then click **OK**. The analyzer saves decoded audio data as \*.wav files.



5. While the audio stream is being decoded, the view window displays a message below the first line, indicating that the decoding process is running.

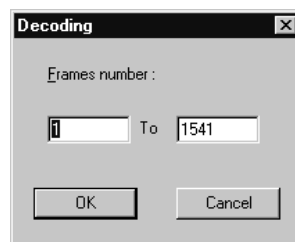


After the audio stream is decoded and written to the file name you have chosen, the Wave Editor window is displayed (see page 3–16).



To decode specific channels of an audio stream, use the following procedure:

1. Navigate to the Channel view window.
  - a. Navigate to the First Level view for the audio stream you want to decode.
  - b. Select **Add View** from the Window menu, and then select **Channel View** from the submenu.
2. Right-click the Left or Right Channel icon and select **Decode** from the submenu (if you select **Stereo** that you will save both the right and the left channel information to the \*.wav file).
3. The dialog box shown below is displayed. Indicate which frames you want to decode in the text boxes provided, and then select **OK**. (The default option is the complete audio stream.)



4. Select or type the name for the decoded file in the Save Decoded Sound Data dialog box.

After you select **OK**, the audio stream is decoded and written to the file name you chose in step 4. After the file has been decoded, the Wave Editor window is displayed (see page 3–16).

---

**NOTE.** *The MPEG Audio Stream Analyzer decodes only to MPEG-1 standards: single channel and stereo. Multichannel decoding is not supported.*

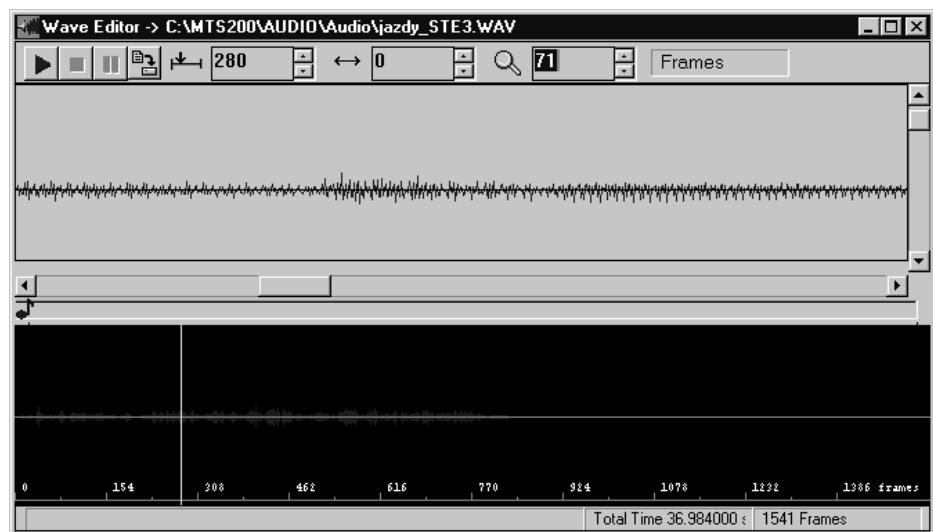
---

**Wave Editor View**

You can display analog waveforms of decoded audio streams, play decoded audio files, and save decoded audio files as \*.wav files, using the Wave Editor view window. To listen to audio files, you must have a sound card installed on your computer.

The Wave Editor view window is displayed immediately after an audio stream is decoded. Procedures for decoding audio streams are provided in *Decoding Audio Streams* beginning on page 3–13. The following section, *Using the Wave Editor*, describes how to use the Wave Editor view window.

**Using the Wave Editor.** The Wave Editor view window graphically displays the analog waveform for the decoded audio stream.



**NOTE.** The Wave Editor view window displays only one waveform at a time. If the audio stream you have decoded is a stereo or multichannel stream, the analyzer defaults to displaying only the left channel waveform.

The following list describes the elements of the Wave Editor view window. Table 3–1 on page 3–17 describes the Wave Editor toolbar elements.

- The title bar displays the decoded file name and location.
- The Wave Editor toolbar displays the controls you use to play, save, and select portions of the waveform.
- The middle and bottom sections display the analog waveform.

The bottom section displays the waveform compressed to fit the width of the view window. If **Display in frames** is checked in the Options menu, the horizontal unit of measurement is audio stream frames. If **Display in milliseconds** is checked, the unit of measurement is milliseconds.

- The eighth note indicates the position in the sound file as the decoded audio stream is played.
- The total time (in seconds) and length (in frames) of the decoded audio file is indicated in the lower right of the view window.

**Table 3-1: Wave Editor toolbar elements**








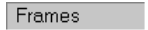
Element	Name	Description
	<b>Play</b>	Starts playing the decoded audio file.  Unless you have selected a portion of the waveform, the complete waveform is played when you select this command button. If a portion of the waveform is selected, only the selected portion of the sound file is played.
	<b>Stop</b>	Stops playing the decoded audio file.
	<b>Pause/Resume</b>	Pauses and resumes playing the decoded audio file.
	<b>Save As</b>	Saves the decoded audio file.  Unless you have selected a portion of the waveform, the complete waveform is saved when you select this command button. If a portion of the waveform is selected, only the selected portion of the sound file is saved.
	<b>Position</b>	Sets the position of the cursor in the bottom part of the Wave Editor view window.  Change the position of the cursor by selecting the up and down buttons, or by clicking in the bottom waveform display.

Table 3-1: Wave Editor toolbar elements (cont.)

Element	Name	Description
	<b>Selection</b>	<p>Selects a portion of the audio file. The selected portion of the audio file starts at the cursor position.</p> <p>Change the selected portion of the waveform by selecting the up and down buttons, or by clicking and dragging in the bottom waveform display.</p> <p>The selected portion of the waveform determines which part of the audio file will be played and saved.</p>
	<b>Zoom</b>	<p>Sets a horizontal zoom factor for the upper waveform display.</p> <p>Change the zoom factor by selecting the up and down buttons, or by moving the scroll bar.</p> <p>Initially, the waveform is displayed at the highest zoom factor.</p>
	<b>Display</b>	<p>Sets the unit of measurement used in the Wave Editor view window.</p> <p>Set the unit used for the Wave Editor by selecting either <b>Display in frames</b> or <b>Display in milliseconds</b> from the Options menu. The current unit of increment has a check mark next to it in the Options menu.</p>

## Analyzing Audio Elementary Streams

The MPEG Audio Stream Analyzer can check for the following types of errors:

- Syntax errors, which indicate errors in the values of the MPEG structures.
- Semantic errors, which indicate errors in the structure of the audio stream.
- CRC errors, which indicate errors in transmitting or decoding the audio stream.

Procedures for performing the analyses that check for these types of errors are described in this section.

---

**NOTE.** *The MPEG Audio Stream Analyzer does not analyze all MPEG audio elementary stream structures. Only those structures displayed in one the interpreted view windows are checked for syntax, semantic, and/or CRC errors.*

---

## Syntactic Analysis

You can perform syntactic analyses on a specific MPEG structure, or on the entire audio stream, using the following procedure:

1. Display the interpreted view window of the structure you want to check. (If you want to check all of the structures at once, perform the syntax analyses from the First Level view.)
2. Select **Syntactic** from the Analysis menu. The frame number in the top line of the interpreted view cycles through the frames of the audio stream to indicate that the analysis is being performed.
3. If the analysis finds errors in the audio stream syntax, the following message box is displayed. Each line represents an error at the stream location indicated.



4. To view the error, double-click a message line. The syntax in error is displayed, and value in error is usually shown in red.

## Semantic Analysis

Semantic analyses can be performed only when the First Level view is the active view window. Use the following procedure to perform a semantic analysis of the audio stream.

1. Ensure that the First Level view is the active view window.
2. Select **Semantic** from the Analysis menu. The frame number in the top line of the interpreted view cycles through the frames of the audio stream to indicate that the analysis is being performed.
3. If the analysis finds semantic errors in the audio stream, the following error message box is displayed. Each line represents an error at the stream location indicated.
4. To view the error, double-click a message line. For semantic analyses, the errors are not indicated in red.

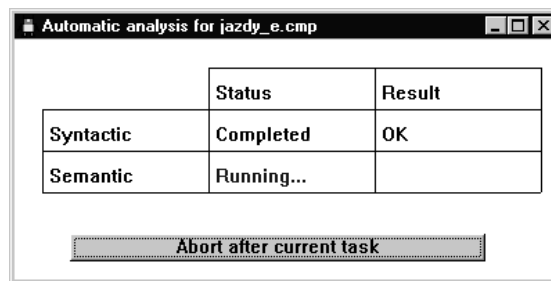


## Automatic Analysis

The **Automatic analysis** selection from the Analysis menu allows you to perform both syntactic and semantic analyses without having to select both individually. The error reporting display mechanisms are similar to those described for syntactic and semantic analyses except that the dialog box shown below is displayed as the file is being analyzed for errors.

To perform both a syntactic and semantic analysis on the active audio stream, use the following procedure:

1. Ensure that the First Level view for the audio stream that you want to analyze is the active view window.
2. Select **Automatic** from the Analysis menu.
3. A syntactic analysis is carried out first followed the semantic analysis. To stop the analysis, press the button at the bottom of the message window.



The Result column indicates the results of the analyses. If an error is found the word *Errors* is displayed in red in either the Syntactic or Semantic row.

4. Double-click the word *Errors*, and message windows identical to the syntactic and semantic analyses error message windows are displayed.

## CRC Error Check

The CRC value is automatically checked as the audio stream is displayed in the MPEG Audio Stream Analyzer. For information about how to find CRC errors, see *Cyclic Redundancy Check (CRC)* on page 3–6.

---

## Options Menu Reference

Use the selections from the Options menu to configure how the current MPEG Audio Stream Analyzer session displays information. You can also save and load configuration files using the Option menu selections.

---

***NOTE.** The Options menu selections apply to the analyzer and not the audio streams displayed. Consequently, when an audio stream is opened, the information displayed reflects the current analyzer configuration. Furthermore, when beginning a new session, the analyzer loads the configuration options selected the last time it was exited*

---

**Base** Use this menu selection to determine how the interpreted views display the audio elementary stream data. The MPEG Audio Stream Analyzer can display the data in either decimal or hexadecimal base. The default is decimal base.

1. Select **Base** from the Options menu.
2. From the displayed Base dialog box, select **Decimal** or **Hexadecimal**.

When you start a new MPEG Audio Stream Analyzer session, the analyzer uses the base displayed the last time the application was exited.

To switch between decimal and hexadecimal base, press the **F2** function key.

---

***NOTE.** Even though you can display information in either decimal or hexadecimal, you can enter values only in decimal base.*

---

**Font** Use this menu selection to determine which font is used to display information in some of the analyzer view windows. (The Wave Editor, Main Characteristics, and the Binary and Hexadecimal view windows use a fixed font and are not affected by the font selection.)

When you start a new MPEG Audio Stream Analyzer session, the analyzer uses the font displayed the last time the application was exited.

**Interpretation** This menu selection allows you to display the length or the position of a field in the bitstream. This information is only available in the linear display view windows.

1. Select **Interpretation** from the Options menu.
2. Select **Position** or **Length** from the Interpretation dialog box. You can either deselect both options, or select one of the options.
  - **Position** indicates the position in the bitstream of the first bit of the field. Position is relative to the to the first bit in the displayed structure.
  - **Length** is the length of the field in bits.

The default setting is to display no position or length information.

**Configuration Files** The following Options menu selections allow you to save and load configuration files.

**Read configuration.** Use this menu selection to load a previously saved configuration file (an .acf file) into the current analyzer session.

**Save configuration.** Use this menu selection to save the current analyzer settings to a configuration file (an .acf file) that you can transfer to another system or load at a later time.

**Set default configuration.** Use this menu selection to revert the current Base, Font, and Interpretation selections to the default settings.

**Wave Editor Configuration** The following Options menu selections allow you to determine the unit of measurement used in the Wave Editor view. The current option is indicated by a checkmark next to the name of the option.

**Display in frames.** Use this menu selection to enable the audio frame unit of measurement for the Wave Editor. When this option is selected, the Wave Editor toolbar elements and displays use audio frames as a unit of measurement, and the item has a checkmark next to it in the Options menu.

**Display in milliseconds.** Use this menu selection to enable the millisecond/second unit of measurement for the Wave Editor. When this option is selected, the Wave Editor toolbar elements and displays use millisecond as a unit of measurement, and the item has a checkmark next to it in the Options menu. Total time, in the lower right-corner of the view window, is displayed in seconds.





# Index



# Index

## A

- Add view
  - binary or hexadecimal, 3–12
  - channel view, 3–15
  - first level, 2–8
  - main characteristics, 2–8
  - menu selection, 2–23
  - options, 2–12
  - upper toolbar command button, 2–3
- Allocation table, 3–5
- Analyzing audio streams
  - audio layers, 1–1
  - overview, 2–17
  - procedures for, 3–18
  - types of analyses, 1–2
- Ancillary data, 3–5
- Application window, 2–2
- Audio header, 3–6
- Audio Sound Saving, dialog box, 2–15
- Audio streams
  - analyzing, 2–17
  - decoding, 2–18, 3–13
  - opening, 2–13
  - saving, 2–15
  - viewing, 2–7
- Automatic
  - analyses procedure, 3–20
  - menu selection, 2–22

## B

- Base
  - menu selection, 2–22
  - procedure for changing, 3–21
- Basic Operations, 2–13
- Binary view, 2–10, 3–12
- Buttons
  - Edit toolbar, 2–4
  - Group toolbar, 3–3
  - Upper toolbar, 2–3
  - Wave Editor toolbar, 3–17

## C

- Cell data, tabular display windows, 3–2
- Channel view, 3–13
  - overview, 2–10
- Closing windows, 2–20

- Column headings, tabular display windows, 3–2
- Common view window elements, 2–5
- Complete
  - decoding stream procedure, 3–13
  - menu selection, 2–22
- Configuration, read, save, and set default, 3–22
- Contacting Tektronix, vi
- CRC error check, 2–18
  - procedure, 3–20
  - view window, 3–6

## D

- Decimal and Hexadecimal base, 3–21
- Decoded view of audio streams, Wave Editor, 2–11
- Decoding an audio stream, 2–18, 3–13
- Delay compensation, 3–6
- Display in frames, menu selection, 2–22
- Display in milliseconds, menu selection, 2–22
- Displays
  - linear, 3–3
  - tabular, 3–2

## E

- Edit toolbar, 2–4
- Elementary stream files, opening, 2–14
- Error message window
  - semantic analysis, 3–20
  - syntactic analysis, 3–19
- Exit, menu selection, 2–21
- Exiting the application, 2–20
- Extension file
  - Open dialog box, 2–14
  - Save as dialog box, 2–16

## F

- Fields, interpreting position or length, 3–22
- First, edit toolbar command button, 2–4
- First level view
  - overview, 2–8
  - upper toolbar command button, 2–3
- First time operation, 1–2
- Font
  - menu selection, 2–22
  - setting, 3–21
- Frame number indicator, 2–6

Functional overview, 2–2

## G

Go to

edit toolbar command button, 2–4

menu selection quick reference, 2–21

Group toolbar, 3–3

## H

Hexadecimal view, 2–10

## I

Icons

Audio Stream Analyzer, 2–1

Channel view, 2–10

Edit toolbar, 2–4

First level view, 2–9

Group toolbar, 3–3

Upper toolbar, 2–3

Wave Editor toolbar, 3–17

Interface description, 2–5

Interpretation

menu selection, 2–22

position or length, 3–22

Interpreted Views

Allocation table (AAT), 3–5

Ancillary data, 3–5

Audio header, 3–6

common elements for linear displays, 3–3

common elements for tabular displays, 3–2

Cyclic Redundancy Check (CRC), 3–6

Delay compensation, 3–6

icons, 2–9

Low frequency enhancement allocation, 3–6

Low frequency enhancement SPL, 3–7

Low frequency SCF, 3–7

MCH, 3–8

Multichannel AAT, 3–7

Multichannel Composite Status Information, 3–7

Multichannel CRC, 3–8

Multichannel SCF, 3–9

Multichannel SCFSI, 3–9

Multichannel SPL, 3–9

Multilingual AAT, 3–10

Multilingual SCF, 3–10

Multilingual SCFSI, 3–10

Multilingual SPL, 3–10

Predictor coefficient, 3–10

Sample table (SPL), 3–11

Scalefactor selection information (SCFSI), 3–11

Scalefactor table (SCF), 3–11

Transmission channel allocation (TC), 3–11

types of displays used for, 3–1

## L

Last, edit toolbar command button, 2–4

Length, interpreting field, 3–22

List files of type, Open dialog box selection, 2–13

List of open view windows, 2–23

Low frequency, scalefactor, 3–7

Low frequency enhancement

allocation, 3–6

scalefactor, 3–7

Lower toolbar, 2–4

## M

Main characteristics view

overview, 2–7

upper toolbar command button, 2–3

Menu bar, 2–3

Menu Selections, quick reference to, 2–21

MPEG fields

described in linear display types, 3–3

described in tabular displays, 3–2

MPEG parameters

displayed in tabular view windows, 3–2

displayed in the audio header view window, 3–6

displayed in the multichannel header view window,  
3–8

MPEG structures, displayed as interpreted views, 1–1

Multichannel

allocation table, 3–7

composite status information, 3–7

CRC error check, 3–8

header, 3–8

sample table, 3–9

scalefactor selection information, 3–9

scalefactor table, 3–9

Multichannel audio streams

opening, 2–14

saving, 2–15

Multilingual

allocation, 3–10

sample table, 3–10

scalefactor selection information, 3–10

scalefactor table, 3–10

**N**

Next, edit toolbar command button, 2–4  
 Next error, edit toolbar command button, 2–4  
 Number of items, edit toolbar command button, 2–4

**O**

Online help, Contents menu selection, 2–23  
 Open, upper toolbar command button, 2–3  
 Opening an audio stream file, 2–13

**P**

Parameter values, displayed in linear view windows,  
 3–3  
 Partial  
   decoding stream procedure, 3–13  
   menu selection, 2–22  
 Position, interpreting field, 3–22  
 Position indicator, 2–6  
 Predictor coefficient, 3–10  
   group toolbar, 3–3  
 Previous, edit toolbar command button, 2–4  
 Print, 2–19  
 Product limitations, 1–2  
 Product support, contact numbers, vi

**Q**

Quitting the application, 2–20

**R**

Read configuration, menu selection, 2–22  
 Red parameter values  
   in CRC field, 3–6  
   in linear displays, 3–4  
   in tabular displays, 3–2  
 Row headings, tabular display windows, 3–2

**S**

Sample table, 3–11  
   group toolbar, 3–3  
 Save as  
   extension file dialog box, 2–16  
   saving audio streams, 2–15  
   upper toolbar command button, 2–3  
 Save configuration, menu selection, 2–22  
 Save Decoded Sound Data, dialog box, 2–19  
 Scalefactor, low frequency, 3–7  
 Scalefactor selection information, 3–11  
 Scalefactor table, 3–11  
 Semantic Analysis  
   basic procedure, 2–18  
   error message window, 3–20  
   procedure, 3–19  
 Service Support, contact numbers, vi  
 Set default configuration, menu selection, 2–22  
 Shaded rectangles, in linear displays, 3–3  
 Start application, 2–1  
 Status bar, 2–3  
 Streams  
   analyzing, 2–17  
   decoding, 2–18  
   opening, 2–13  
   saving, 2–15  
   viewing, 2–7  
 Syntactic Analysis  
   basic procedure, 2–17  
   error message window, 3–19  
   procedure, 3–19

**T**

Tektronix MPEG Test System, v, 1–2  
 Time indicator, 2–6  
 Title bar, 2–2  
 Toolbar, edit, 2–4  
 Transmission channel allocation, 3–11  
 Transport streams, opening an audio stream from, 2–14

## U

Upper toolbar, 2-3

## V

View window, common elements, 2-5

Viewing audio files, overview, 2-7

### Views

adding, 2-12

Channel view, 3-13

Interpreted views, 3-1

overview of linear displays, 3-3

overview of tabular displays, 3-2

Wave Editor view, 3-16

## W

Wave Editor, 2-11

toolbar, 3-17

using, 3-16

view window, 3-16

Window, application, 2-2

### Windows

automatic analyses, 3-20

Binary and Hexadecimal view, 3-12

Channel view, 3-13

common elements, 2-5

error message, 3-19

First level view, 2-8

Interpreted view, 3-1

linear display type, 3-3

Main characteristics view, 2-7

tabular display type, 3-2

Wave Editor view, 3-16



