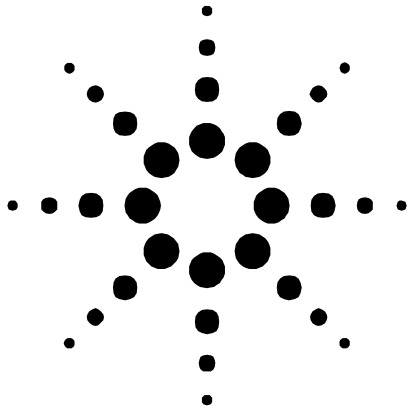




MPEGscope Test Systems

Agilent Technologies MPEGscope Test Systems
Overview

***Powerful MPEG test solutions that
provide in-depth analysis and traffic
generation tools***



Agilent Technologies
Innovating the HP Way

Applications

- Digital television product development and quality assurance
- System integration for satellite, cable and terrestrial broadcast networks
- Troubleshooting operational digital television systems
- Trials of new technologies

Introduction

Agilent Technologies MPEGscope test systems provide engineers with a complete solution to quickly and efficiently test ATSC, ISDB and DVB systems. MPEGscope offers an unparalleled spectrum of stream capture, generation and in-depth analysis tools to get your products and services to market faster.

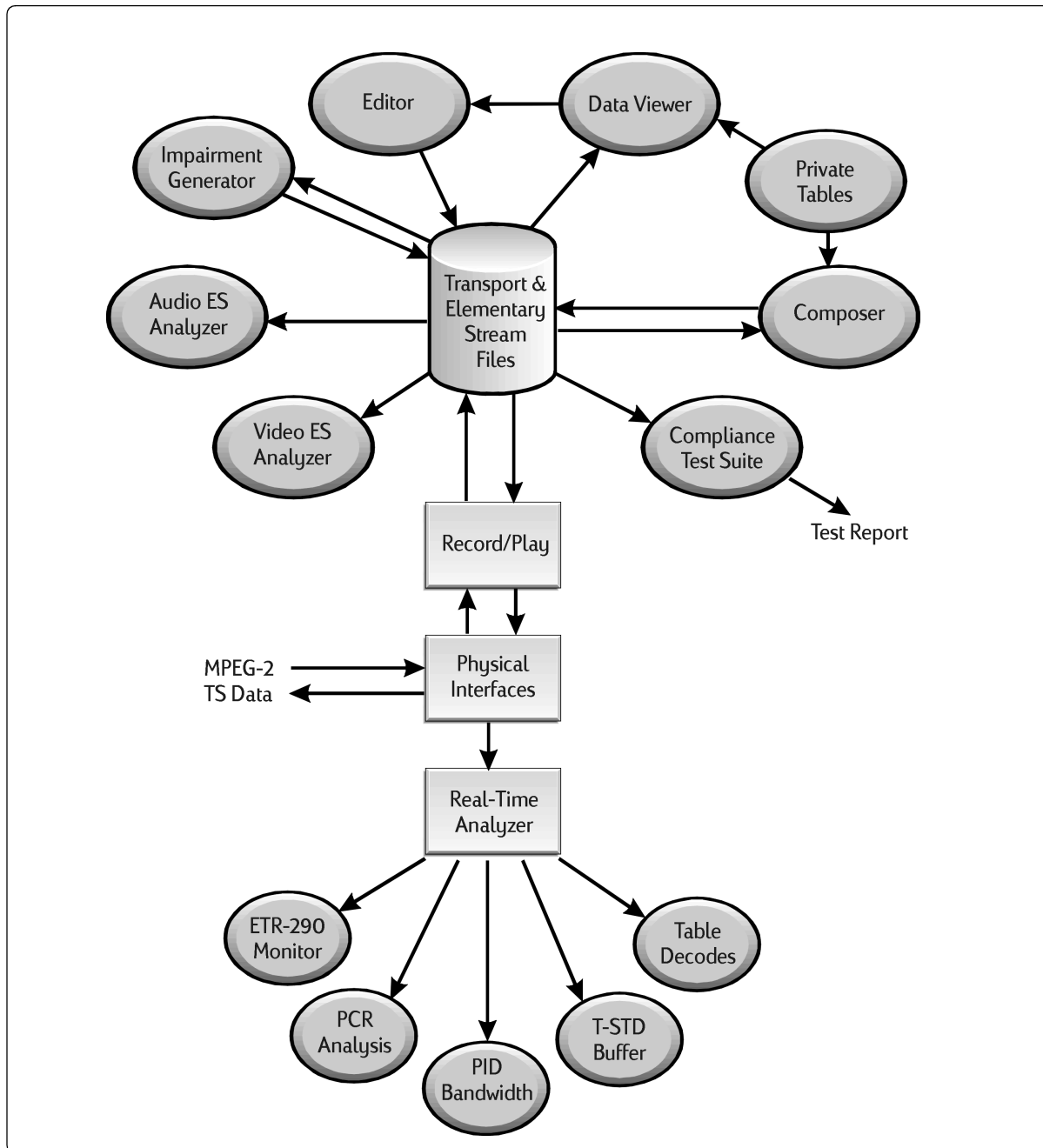
Whether you are optimizing an HDTV encoder, perfecting a statistical multiplexer, bulletproofing an interactive set-top box or integrating them all together, the MPEGscope offers you a comprehensive test solution.

Agilent MPEGscope test systems are available in either a desktop or a ruggedized portable PC-based platform. The Agilent MPEGscope Lite and Portable Lite models are available for applications not requiring real-time analysis.

Key Features and Benefits

- MPEG-2, DVB, ATSC, ISDB, PerfecTV and private table protocol support
- Real-time transport stream tests and measurements with external triggers
- 90 Mb/s maximum record/play rate with packet level timestamping, PID filtering and error-based triggering
- SyntaxSmart stream creation tools including stream composer, editor and impairment generator
- Comprehensive off-line analysis tools including protocol syntax test and timing analysis
- Intuitive GUI with extensive on-line help and step-by-step tutorials
- Modular interface architecture with support for a wide array interface types including DVB/ATSC-SPI, DVB-ASI, DHEI, ARIB and SMPTE-310M
- Modular software applications for specific testing needs such as video and audio elementary stream analysis

System Overview

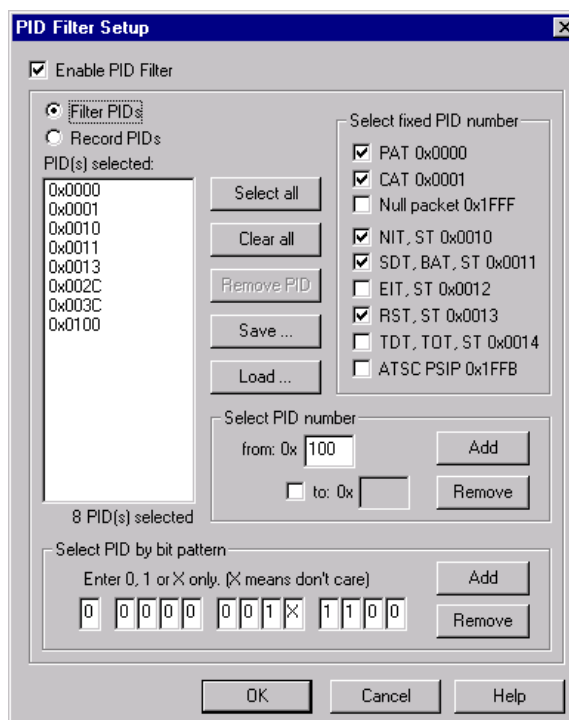
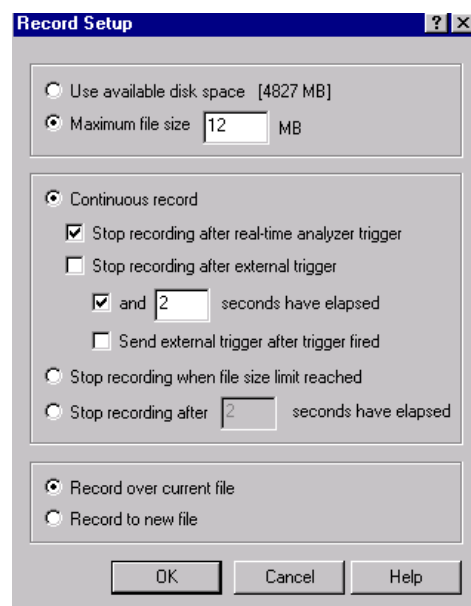
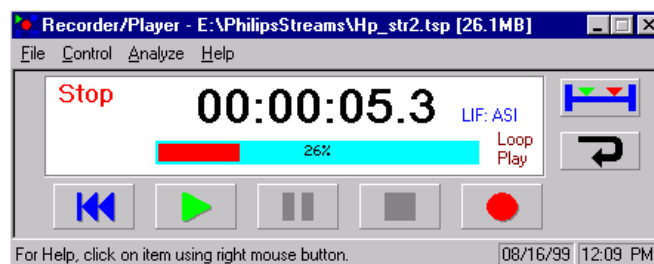


An overview of the MPEGscope test system.

Playback and Record

MPEGscope's Record/Play application uses an intuitive VCR-like graphical interface to record or play out transport streams (TS) with advanced features including PID filtering, packet timestamping and real-time error triggers.

- Performance
 - Max TS Packet Rate: 85 Mb/s
 - Max Data Rate: 94 Mb/s
 - Min Data Rate: 250 Kb/s
- Packet-level timestamp
 - Resolution: 10 ns
 - Accuracy: +/- 2.5 ppm
- Packet I/O format
 - Length (bytes): 188, 204, 208
 - Packet size detection: Automatic
 - I/O rate detection: Automatic
- Packet "Save" format
 - *.tsp format 204 byte TS packets
 - *.ts format 188 byte TS packets
 - *.es format Elementary stream
- Data stream storage
 - File format: Windows NTFS
 - Capacity: 36 GB
 - Expansion option: 72 GB
- Record PID filter
 - Pre-defined PIDs PSI/SI/PSIP, Null
 - PDI range Hex entry
 - Bit pattern match 0, 1, X (don't care)
- Record timer
 - Record timer events: 12
- Transmit clock
 - Resolution: 0.023 Hz
 - Accuracy: +/- 2.5 ppm
 - Manual adj. range: +/- 50 ppm
 - Manual adj. resolution: +/- 1 ppm
- External Tx clock input
 - Connector type: SMB
 - Impedance: 50 Ohms
 - Signal level: 1 Vp-p
 - Range: 31.25 KHz-95 MHz/s



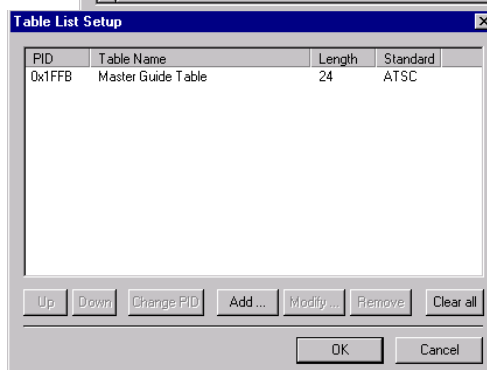
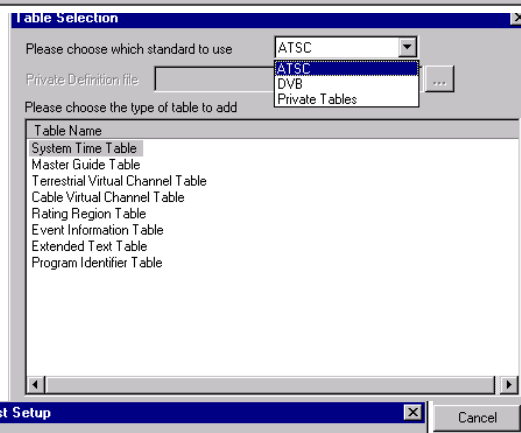
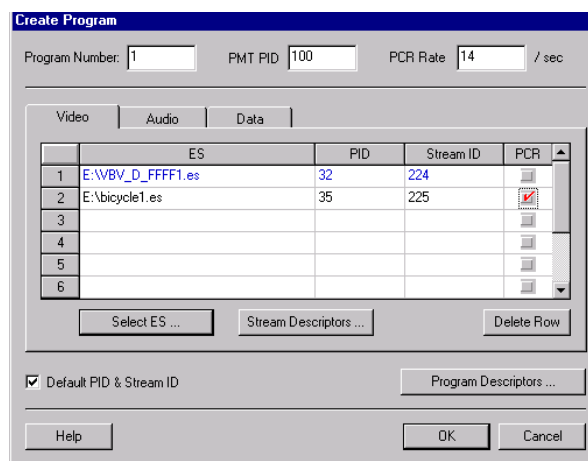
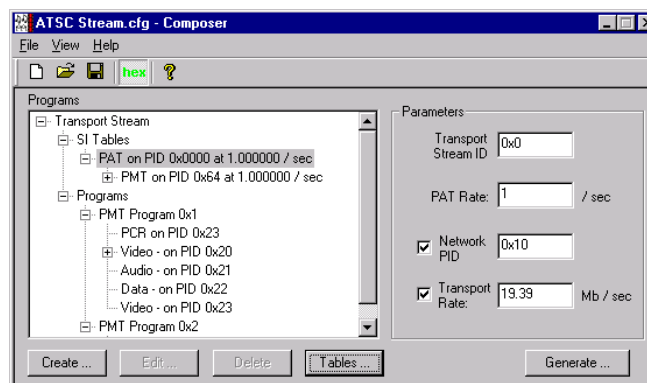
Composer

MPEGscope's Composer application is a flexible tool for building MPEG-2 compliant multi-program transport streams from elementary streams. The Composer supports both DVB and ATSC standards.

In addition to standard-definition video formats and DVB SI tables, the Composer supports high-definition video formats, Dolby™ AC-3 audio streams and ATSC PSIP tables and descriptors to build ATSC streams. The Composer even supports multiplexing of data and private tables.

The Composer uses Agilent's SyntaxSmart technology to facilitate easy data entry.

- Table and descriptor support
 - MPEG-2 PSI
 - ATSC PSIP
 - DVB SI
 - Private Tables
- Transport stream parameters
 - Maximum rate 90 Mb/s
 - PSI Table rate 0-30/second
- Program parameters
 - PMT PID number
 - PCR PID number
 - PCR rate 5-30/second
 - Program number
 - Program descriptors
- Program element formats
 - Video: Up to MP@HL
 - Audio: MPEG Layer II
 - Dolby™ AC-3
 - MPEG AAC
 - Data: Adapt. Field Private Data
- Performance
 - Number of programs: 51 programs per TS
 - Maximum file size: 2 GB



*Dolby is a trademark of Dolby Laboratories

Protocol Data Viewer

The Protocol Data Viewer (PDV) is an off-line protocol tool for analyzing MPEG streams. The PDV offers extensive systems layer analysis to quickly isolate errors in a captured stream or streams from other sources.

The layered display allows you to drill down and isolate problems whether they are in SI tables, sections, PES packets or TS packets.

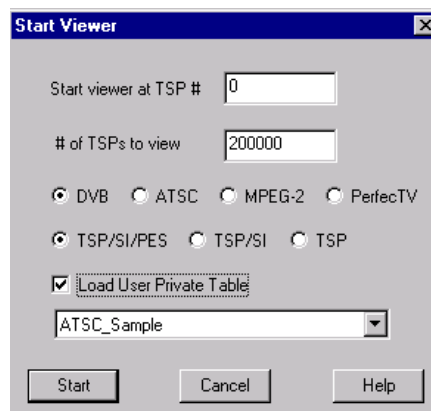
The timestamp timing analyzer and stream editing tools are conveniently started from the PDV.

The PDV can decode according to different standards and even private table formats using the powerful private table template builder.

- Protocol Support
 - MPEG-2
 - ATSC
 - DVB
 - ISDB
 - PerfecTV! (option)
 - Private Table Decode
- Protocol Decode and Analysis Levels
 - Transport Stream Packet (TSP)
 - Packetized Elementary Stream (PES)
 - PSI/SI/PSIP Table Sections
 - PSI/SI/PSIP Tables
- Views

Hierarchical:	Program structure
Component:	PDU occurrence
Summary:	Series of PDU's
Details:	Detailed PDU decode
Graphical:	Timing graphs
- File formats

Packet size:	188, 204 bytes
Maximum file size:	2 GB



PDV Protocol Analysis Support

MPEG-2 Systems

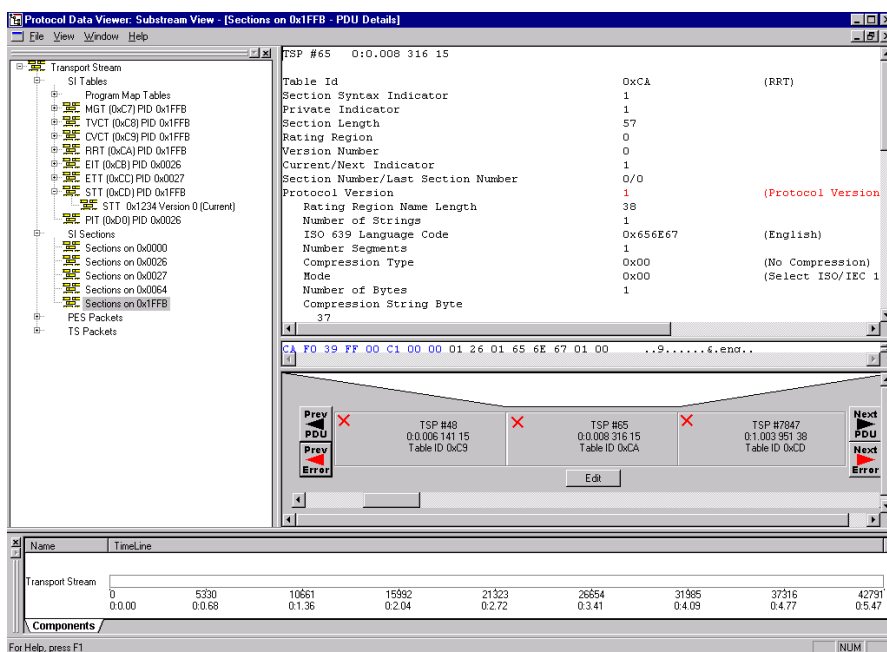
- Decode, display, interpret and test
- ISO/IEC 13818-1 specification support
- ISO/IEC 13818-4 conformance standard test support
- MPEG-2 protocol layer support:
 - Transport Stream Packets
 - Packetized Elementary Stream Packets
 - PSI Sections and Tables

- MPEG PSI tables support:
 - Program Association Table
 - Program Map Table
 - Conditional Access Table
 - Transport Stream Description table

- MPEG PSI descriptor support:
 - Audio Stream Descriptor
 - Conditional Access Descriptor
 - Copyright Descriptor
 - Data Stream Alignment Descriptor
 - Hierarchy Descriptor
 - IBP Descriptor
 - ISO Language Descriptor
 - Maximum Bitrate Descriptor
 - Multiplex Buffer Utilization Descriptor
 - Private Data Indicator Descriptor
 - Registration Descriptor
 - STD Descriptor
 - System Clock Descriptor
 - Target Background Grid Descriptor
 - Video Stream Descriptor
 - Video Window Descriptor

ATSC PSIP Tables

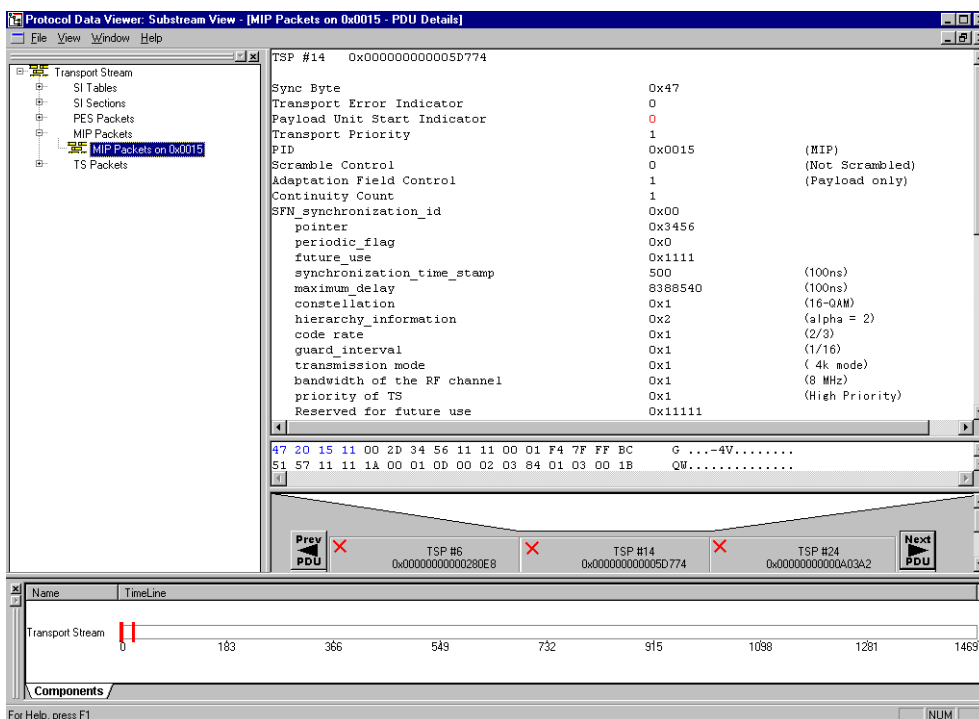
- Decode, display, interpret and test
- ATSC A/57 and A/65 specification support
- Implemented using MPEGscope private table decodes for easy changes/additions as ATSC standards change
- PSIP table support:
 - Cable Virtual Channel Table
 - Extended Text Table
 - Event Information Table
 - Master Guide Table
 - Program Identifier Table
 - Rating Region Table
 - System Time Table
 - Terrestrial Virtual Channel Table
- PSIP descriptor support:
 - AC-3 Audio Descriptor
 - Caption Service Descriptor
 - Component Name Descriptor
 - Content Advisory Descriptor
 - Program Identifier Descriptor
 - Registration Descriptor
 - Service Location Descriptor
 - Stuffing Descriptor
 - Time Shifted Service Descriptor



PDV Protocol Analysis Support**DVB System Information**

- Decode, display, interpret and test
- ETS 300-468 specification support
- Test according to ETR-211 guidelines
- Megaframe Initialization Packet (MIP)
 - Analyze DVB-T single frequency networks
 - Supports DVB standard ETSI TS 101 191
- DVB-SI table support:
 - Bouquet Allocation Table (BAT)
 - Discontinuity Information Table (DIT)
 - Event Information Table (EIT)
 - Network Information Table (NIT)
 - Running Status Table (RST)
 - Selection Information Table (SIT)
 - Service Descriptor Table (SDT)
 - Time and Date Table (TDT)
 - Time Offset Table (TOT)
- DVB descriptor support:
 - Bouquet Name Descriptor
 - CA Identifier Descriptor
 - Component Descriptor
 - Content Descriptor
 - Country Availability Descriptor
 - Cable Delivery System Descriptor
 - Extended Event Descriptor

Frequency List Descriptor
 Linkage Descriptor
 Local Time Offset Descriptor
 Mosaic Descriptor
 Multilingual Bouquet Name Descriptor
 Multilingual Network Name Descriptor
 Multilingual Component Descriptor
 Multilingual Service Name Descriptor
 Network Name Descriptor
 NVOD Reference Descriptor
 Parental Rating Descriptor
 Private Data Specifier Descriptor
 Satellite Delivery System Descriptor
 Service Descriptor
 Service List Descriptor
 Service Move Descriptor
 Short Event Descriptor
 Short Smoothing Buffer Descriptor
 Stream Identifier Descriptor
 Stuffing Descriptor
 Subtitling Descriptor
 Telephone descriptor
 Teletext Descriptor
 Terrestrial Delivery System Descriptor
 Time Shifted Event Descriptor
 Time Shifted Service Descriptor



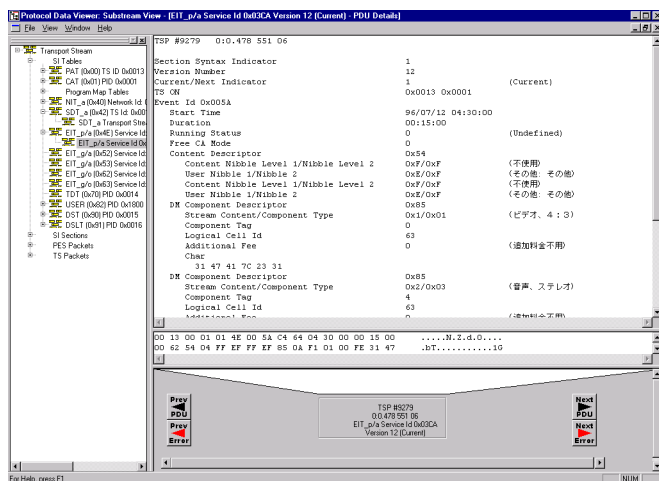
PDV Protocol Analysis Support

ISDB System Information

- Decode, display, interpret and test
- ARIB STD-B10 Ver. 1.2 support
- Implemented using MPEGscope private table decodes for easy changes/additions as standards change
- ISDB table support:
 - Download Control Table (DCT)
 - Download Table (DLT)
 - Event Relation Table (ERT)
 - Index Transmission Table (ITT)
 - Partial Content Announcement Table (PCAT)
 - Local Event Information Table (LIT)
 - Software Download Trigger Table (SDIT)
- ISDB descriptor support:
 - Audio Component Descriptor
 - Basic Local Event Descriptor
 - CA Descriptor
 - CA EMM TS Descriptor
 - CA Service Descriptor
 - Data Content Descriptor
 - Download Content Descriptor
 - Hyperlink Descriptor
 - Local Time Offset Descriptor
 - Network Identifier Descriptor
 - Node Relation Descriptor
 - Reference Descriptor
 - Short Node Descriptor
 - STC Reference Descriptor
 - Target Area Descriptor
 - Video Decode Control Descriptor

PerfectTV! Service Information Tables (Option)

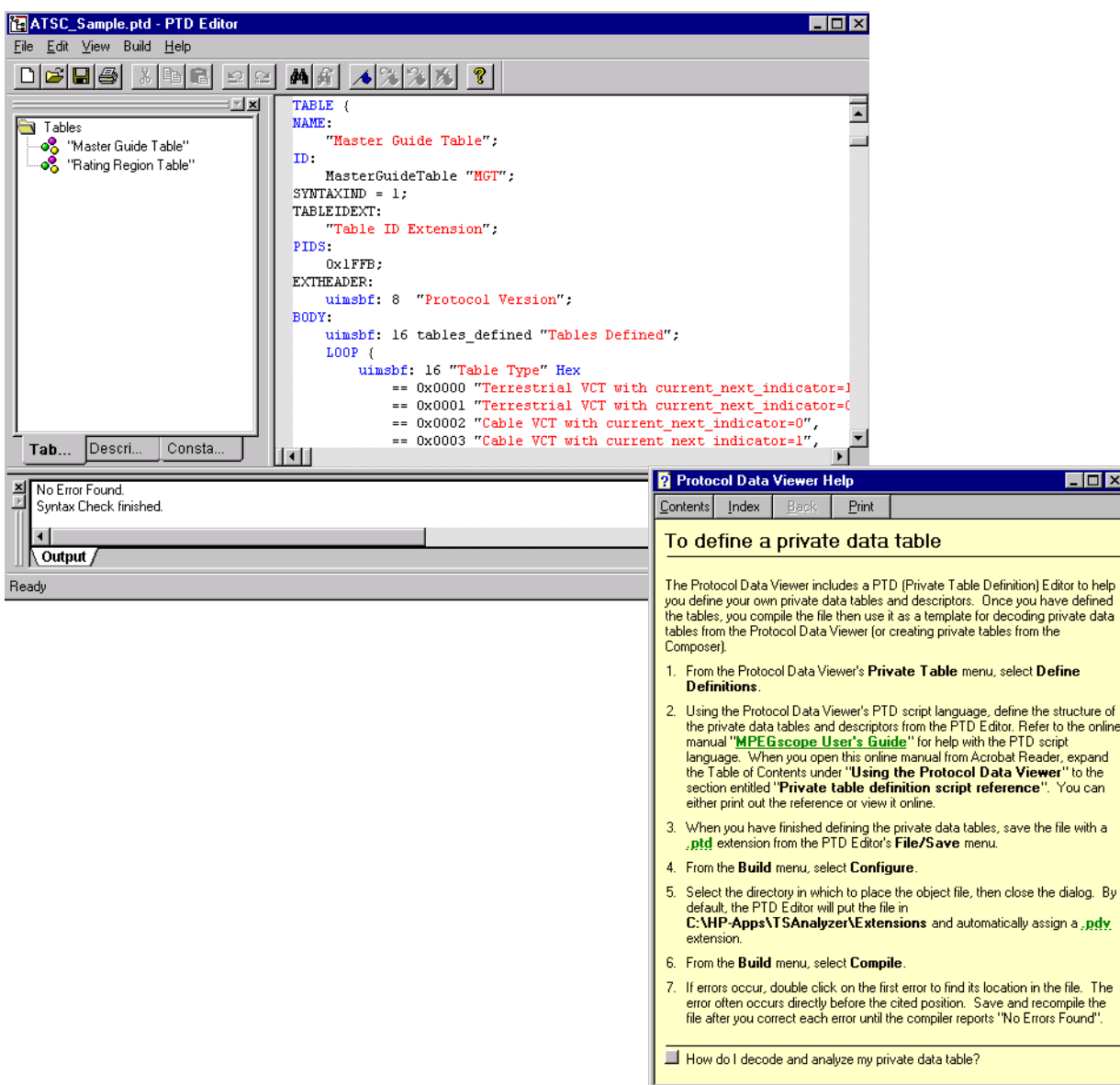
- Decode, display, interpret and test
- Japanese language interpretation and display
- Supports PerfectTV! DM_SI specification
- PerfectTV-SI table support:
 - DM Series Table
 - DM Series List Table
 - Event Information Table
 - Network Information Table
 - Service Descriptor Table
 - Stuffing Table
 - Time and Date Table
- PerfectTV! descriptor support:
 - content_descriptor
 - data_component_descriptor
 - DM_component_descriptor
 - DM_content_descriptor
 - DM_copy_control_descriptor
 - DM_copy_management_descriptor
 - DM_event_range_descriptor
 - DM_fee_descriptor
 - DM_function_descriptor
 - DM_logo_descriptor
 - DM_message_descriptor
 - DM_name_descriptor
 - DM_offset_time_descriptor
 - DM_series_descriptor
 - DM_service_type_descriptor
 - DM_voting_descriptor
 - mosaic_descriptor
 - parental_rating_descriptor
 - satellite_delivery_system_descriptor
 - service_list_descriptor
 - stream_identifier_descriptor
 - stuffing_descriptor
 - system_management_descriptor



Private Table Environment

MPEGscope has a private table environment which allows you to create private table definitions you can then use the Composer to create streams with your private tables, or use the Protocol Data Viewer to decode, interpret and edit streams containing private tables.

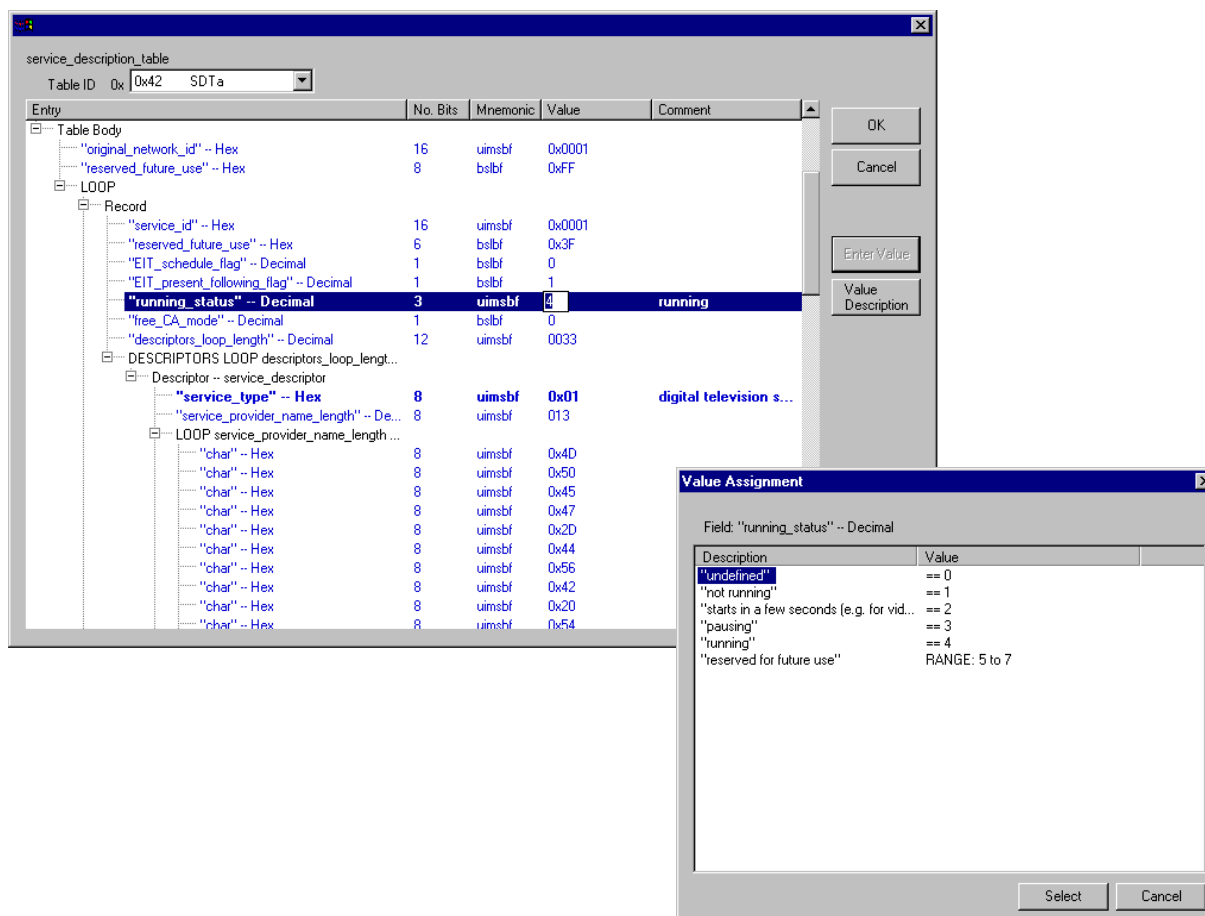
Using a simple “C” like language, you can define the protocol of your private table to create a template. The syntax is completely documented in the online help.



Editor

MPEGscope's built-in SyntaxSmart editor provides a quick and easy way to change the contents in a stream. Using the editor you can modify any MPEG, DVB, ATSC or Private table and descriptor.

- Syntax guided editing
- Edit PSI, SI, PSIP or private sections
- Edit descriptors
- CRC auto recalculation



Timing Analysis

MPEGscope's integrated off-line timing analysis tool is a flexible application to assist in debugging timing problems such as timestamp clock drift and lipsync.

Using the spreadsheet-like format and graphing capabilities, you can methodically analyze the timing trends and the relationships between various timestamps.

- Displayed Parameters:
 - Decode Timestamp (DTS)
 - Presentation Timestamp (PTS)
 - Program Clock Reference (PCR)
 - Received timestamp
 - Difference (between any two columns)
 - Delta (between any two samples in a column)
- Graphing
 - Number of graphs: 2
 - Graph Formats: Line graph
Bar graph
 - Graph timebase: Received timestamp
PCR values

Timing Analysis - Spreadsheet View (Program Number 1)

Calculation for the "Difference" column: PCR 0x00A0 - Received Timestamp

Calculation for the "Delta" column: Value: PCR 0x00A0, Delta: sample i - sample (i - 1)

	DTS 0x00A0 (Video) nsec	PTS 0x00A0 (Video) nsec	Received Timestamp (nsec)	Received Timestamp	Difference (nsec)	Delta (nsec)
1			34965380266667	13222680	34965367043987	
2			34965413539799	46498730	34965367041069	33273133
3	34965677877778	34965677877778	34965438917604	71878760	34965367038844	25377805
4			34965447188889	80150770	34965367038119	8271285
5	34965717877778	34965797877778	34965464675299	97634800	34965367040499	17486410
6			34965480466667	113426820	34965367039847	15791368
7	34965757877778	34965757877778	34965506226249	139182850	34965367043399	25759582
8			34965514122222	147078860	34965367043362	7895973
9	34965797877778	34965877877778	34965531045470	163998890	34965367046580	16923248
10			34965547777778	180730910	34965367046868	16732308
11			34965581046850	214006950	34965367039900	33269072
12	34965837877778	34965837877778	34965601162470	234122980	34965367039490	20115621
13			34965614322222	247283000	34965367039222	13159752
14	34965877877778	34965957877778	34965626357849	259315020	34965367042829	12035627
15			34965647977778	280935050	34965367042728	21619928
16	34965917877778	34965917877778	34965664898659	292855070	34965367043599	16920891

Graph Options

Plot:

- ☐ DTS 0x00A0 (Video)
- ☒ PTS 0x00A0 (Video)
- ☒ PCR 0x00A0
- ☐ Difference (PCR 0x00A0 - Received Timestamp)
- ☐ Delta PCR 0x00A0 (time (i) - sample (i - 1))

Graph Type:

☒ Line ☐ Bar

Horizontal Axis:

☒ Timestamp ☐ PCR

Axis Range:

☒ Use Default ☐ User Define

Horizontal: Min 0, Max 10000000000

Vertical: Min 34964000000, Max 349760000000

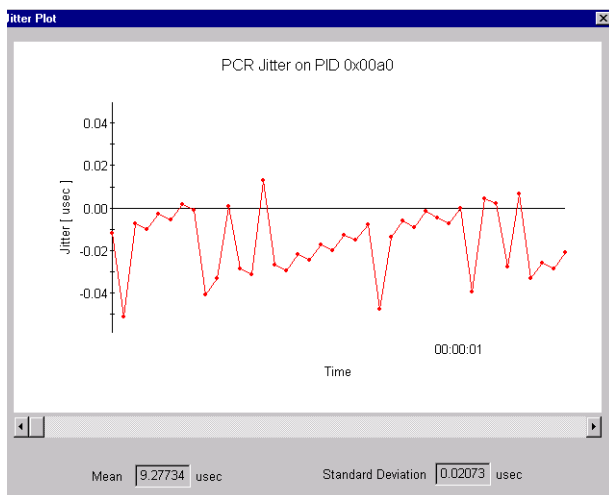
OK Cancel



Impairments

The Impairments Application statistically inserts timing and data errors in a recorded stream. This application provides a controlled method to test the robustness of a decoder under adverse conditions.

- PCR Jitter
 - Distributions: Gaussian, sinusoidal
 - Display graph: PCR Jitter vs. Time
- Bit Errors
 - Distributions: Gaussian, uniform



Real-time Analysis

(Available on E6277C and E6300A)

Monitor/Logging/Triggering

- Monitor 8192 PID's simultaneously
- Log error events to text file
- Trigger with pre/post capture and output
- Error alarm indicators
 - Graphical LED indicator
 - Error count
 - Error time, PID and description

- ETR-290 Priority 1 Errors

TS Sync Loss
Sync Byte
PAT
Continuity Count
PMT
PID

- ETR-290 Priority 2 Errors

Transport
CRC
PCR
PCR Accuracy
CAT

- ETR-290 Priority 3 Errors

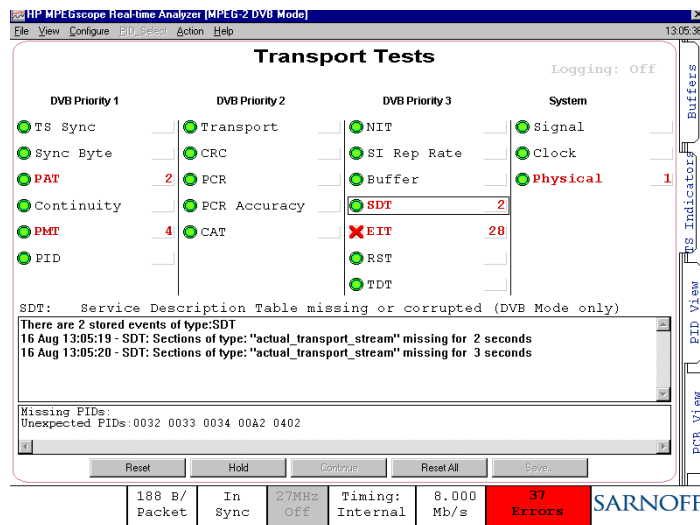
NIT
SI Table Repetition
T-STD TBsys Buffer
SDT
EIT
RST
TDT

- Physical Errors

No input signal
No clock signal
Physical sync error

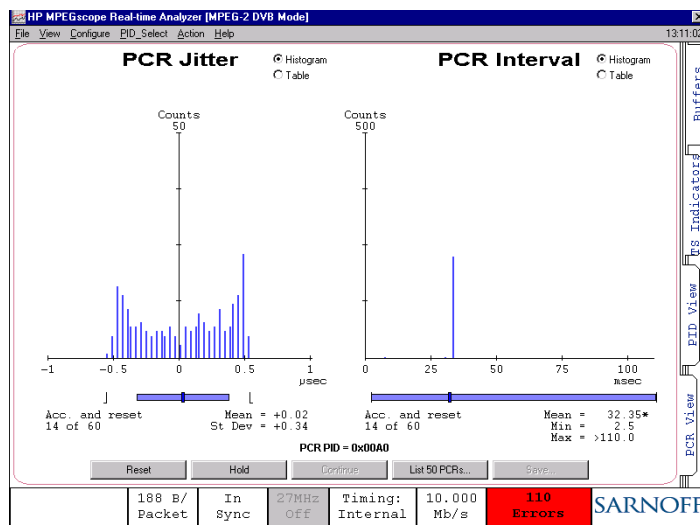
- Missing/Unexpected PID Errors

Missing PIDs referenced in PSI
Un-referenced PID occurrence



Real-time PCR Analysis

- Measurements:
 - Jitter & Interval
- Data integration modes:
 - 1-second average
 - 2-second average
 - Accumulate and stop (max 65,535 seconds)
 - Accumulate and reset (max 65,535 seconds)
 - Accumulate until reset
- Presentation and “save to file” formats:
 - Histogram graph
 - Table
 - List of last 50 PCR values
- Performance
 - Total PCR rate max:1000 PCRs/s
 - Granularity (typical):1% of range



Real-time PID Bandwidth Analysis

- Presentation and “save to file” formats:
Bar graph
Inchworm graph
Table
- Data integration modes:
1 second average
10 second average
- Performance
Resolution: 1 TS packet
Accuracy: 4 TS packets

Real-time PID Utilization Analysis

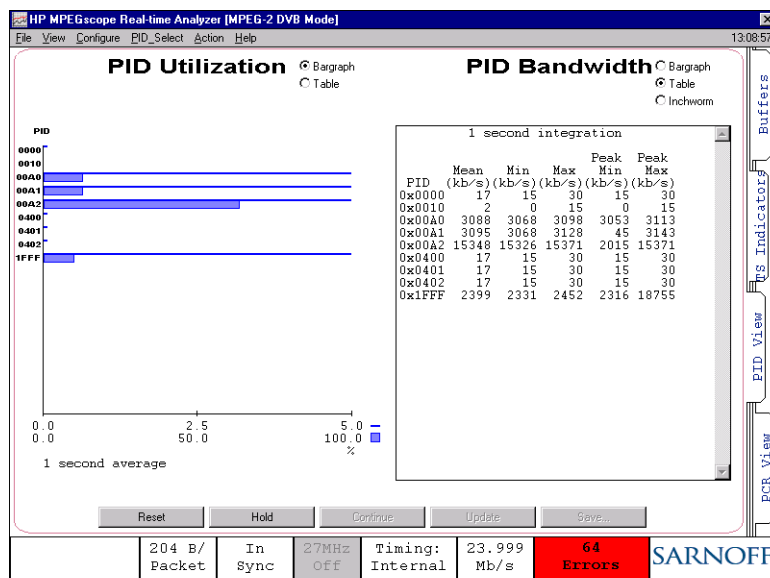
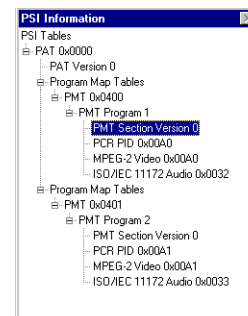
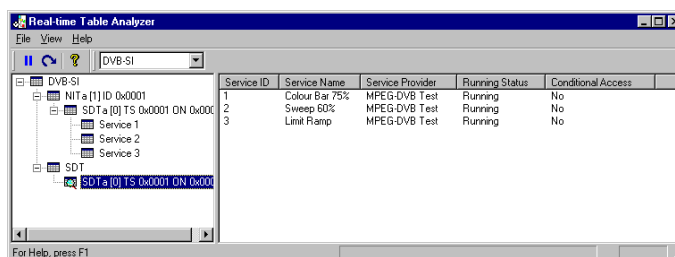
- Presentation and “save to file” formats:
Bar graph
Inchworm graph
Table
- Data integration modes:
1 second average
2 second average
Accumulate and reset
Accumulate until reset
- Performance
Resolution: 0.01%
Accuracy: 4 TS packets

TSTD Transport Buffer Level Monitor

- Presentation:
Bar graph
Buffer fullness vs. time
Numeric value
- Performance
Resolution: 1 byte
Maximum TS Buffers: 10 TBsys buffers
35 TBn buffers

Real-time PSI/PSIP/SI Table Decodes

The real-time table decodes allow you to view live table information of an incoming stream.

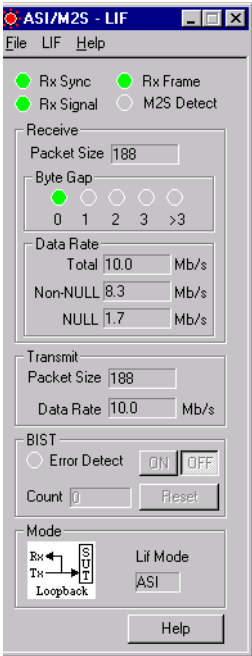
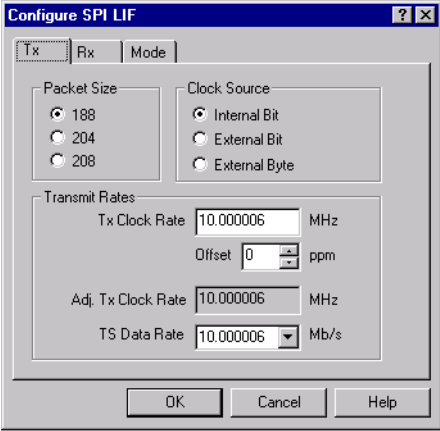


Transport Stream Interfaces

MPEGscope accommodates multiple interfaces simultaneously, depending on the specific configuration.

MPEGscope is equipped with the DVB/ATSC-SPI Synchronous Parallel Interface (LVDS). Additional interfaces may be installed to match your specific requirements.

- DVB/ATSC Synchronous Parallel Interface (SPI)
Specification: EN 50083-9
I/O Connectors: DB-25
Signal Level: EIA/TIA-644 LVDS
Input Impedance: 100 Ohms
Output Impedance: 100 Ohms
Packet Sizes: 188, 204, 208
- Interface Modes
Normal
Monitor
Loopback
- Optional Interface Cards
SMPTE-310M Synchronous Serial Interface
DVB-ASI/M2S/DHEI Serial ECL Interface
ARIB Parallel TTL Interface



Configuration

Model	Record/Play	Real-Time Analysis	Off-line Analysis	Platform	Maximum Additional I/F Cards
E6277C MPEGscope Plus	Yes	Yes	Yes	Desktop	2
E6301A MPEGscope Lite	Yes	No	Yes	Desktop	2
E6300A MPEGscope Portable	Yes	Yes	Yes	Portable	1
E6302A MPEGscope Portable Lite	Yes	No	Yes	Portable	1

Ordering Information

Base System Product Numbers

- **E6277C** MPEGscope Plus
- **E6300A** MPEGscope Portable
- **E6301A** MPEGscope Lite
- **E6302A** MPEGscope Portable Lite

Physical Interface Product Numbers

- **E6291A** ASI/M2S & Serial ECL (DHEI) Interface
- **E6292A** SMPTE310M Interface
- **E6289A** ARIB Interface Adapter

Software Option Product Numbers

- **E6309A** Audio Elementary Stream Analyzer
- **E6310A** Video Elementary Stream Analyzer
- **E6311A** Basic Compliance Verifier
- **E6312A** Advanced Compliance Verifier
- **E6290A** PerfecTV! Protocol Decode
- **E6288A** Video Decoder Compliance Bitstreams

Accessory Part Numbers

- **E6295A** Transit Case for Desktop Monitor
- **E6296A** Transit Case for Desktop Chassis
- **E6297A** Hard Transit Case for Portable
- **E6305A** 24GB External DAT Drive
- **E6306A** Upgrade to 72GB Hard Drive
- **E6307A** Internal CD-RW Drive

Warranty and Support

Warranty

3 year return to Agilent service center for repair

Software Updates

1 year software updates included

Renewable software subscription after 1 year

Telephone Support

1 year on-line telephone product support

Renewable on-line support after 1 year

Systems

MPEGscope Plus and Lite

- CPU

Processor:	Intel Pentium II
Clock speed:	450 MHz
Memory:	128 MB
System hard disk:	3.2 GB
- Media, external ports, accessories

CD-ROM	32x speed
Floppy drive	3.5"
External I/O:	Ultra-wide SCSI
	Parallel, 2 serial
	USB
LAN interface:	10/100 BaseT
Audio I/O	
- Operating System

Windows NT 4.0

MPEGscope Portable and Portable Lite

- CPU

Processor:	Intel Pentium II
Clock speed:	300 MHz
Memory:	128 MB
System hard disk:	4.0 GB
- Built-in Display

Display type:	Active Matrix TFT
Display size:	12.1 inches
Resolution:	1024 x 768 (XGA)
Colors:	16.7 million
Contrast ratio:	100:1
Viewing angle:	90 degrees
- Media, external ports, accessories

CD-ROM:	32x speed
Floppy drive:	3.5"
External I/O:	Ultra-wide SCSI
	Parallel, 2 serial
LAN Interface:	10/100 BaseT
Padded nylon case	
- Operating System

Windows NT 4.0

Physical, Electrical and Environmental

MPEGscope Plus and Lite

- Dimensions WxHxD (cm)

CPU:	21.0 x 41.5 x 40.5
Monitor:	42.8 x 43.9 x 42.0
- Weight (kg)

CPU:	15
Monitor:	18
- Electrical

Voltage:	100-240 VAC
Frequency:	47-63 Hz
Power:	200 Watts
- Environmental

Operating temp:	5°C to 40°C
Operating humidity:	15%-80% @40°C
Operating altitude:	3,100 m
Non-operating temp:	-40°C to 70°C
Non-operating altitude:	4,575 m

MPEGscope Portable and Portable Lite

- Dimensions WxHxD (cm)

CPU + display	40.0 x 26.2 x 20.9
---------------	--------------------
- Weight (kg)

CPU + display:	9.07
----------------	------
- Electrical

Voltage:	110V/240VAC
Frequency:	50/60 Hz
Power:	200 Watts
- Environmental

Operating temp:	5°C to 40°C
Operating humidity:	15%-80% @ 40°C
Operating altitude:	3,100 m
Non-operating temp:	-40°C to 70°C
Non-operating altitude:	4,575 m





Agilent MPEGscope Family

The MPEGscope family of digital TV test products provide a complete spectrum of stream-capture, generation and in-depth analysis tools for MPEG-2, DVB, ISDB and ATSC standards. Agilent's tools cover the entire MPEG-2 protocol stack - from deep macroblock analysis to display, error-checking and editing of the DVB, ATSC and ISDB tables.

www.Agilent.com/comms/MPEGscope

United States:

Agilent Technologies
Test and Measurement Call Center
P.O. Box 4026
Englewood, CO 80155-4026
1-800-452-4844

Canada:

Agilent Technologies Canada Inc.
5150 Spectrum Way
Mississauga, Ontario
L4W 5G1
1-877-894-4414

Europe:

Agilent Technologies
European Marketing Organisation
P.O. Box 999
1180 AZ Amstelveen
The Netherlands
(31 20) 547-9999

Japan:

Agilent Technologies Japan Ltd.
Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
Tokyo 192-8510, Japan
Tel: (81) 426-56-7832
Fax: (81) 426-56-7840

Latin America:

Agilent Technologies
Latin American Region Headquarters
5200 Blue Lagoon Drive, Suite #950
Miami, Florida 33126
U.S.A.
Tel: (305) 267-4245
Fax: (305) 267-4286

Asia Pacific:

Agilent Technologies
19/F, Cityplaza One, 1111 King's Road,
Taikoo Shing, Hong Kong, SAR
Tel: (852) 2599-7889
Fax: (852) 2506-9233

Australia/New Zealand:

Agilent Technologies Australia Pty Ltd
347 Burwood Highway
Forest Hill, Victoria 3131
Tel: 1-800-629-485 (Australia)
Fax: (61-3) 9272-0749
Tel: 0-800-738-378 (New Zealand)
Fax: (64-4) 802-6881

