

SDH/SONET Analyzer

New ST103A



Features

ST103A

- VI Channel Scan
- Multiple SONET Alarm Generation
- J1 Trace Byte Programming
- Quick Setups
- User defined Configurations
- Non-SONET Testing
- Payload Mappings
- Multiple Outputs
- DCC and Orderwire Access
- Payload Frame Formats
- Switch Time and Payload Delays
- SONET Loop Timing
- LabVIEW*¹ for Windows Compatibility
- Receiver Frame Capture
- RS-232, GPIB, and Parallel Printer Interfaces
- Both Bit- and Byte-synchronous VT 1.5 Payload Mappings with ST-C-9G and LSF Frame Formats
- SONET Data Communications Channel Access
- Multiple Simultaneous SONET Alarms
- 8/7/3 and Burst-of-7 Pointer Stress Sequences
- SONET Line Loop Timing on an OC-n Signal
- APS Switching Time and SPE Transport Delay Measurements
- VT 1.5 Payload Analysis, 7X4 and 1X28 Mapping

*¹ LabVIEW is a registered trademark of National Instrument Corporation.



Applications

- Network Pointer and Payload Stress Tests
- Conformance and Compliance Testing
- Pass/Fail Testing
- Tributary Mapping and Demapping

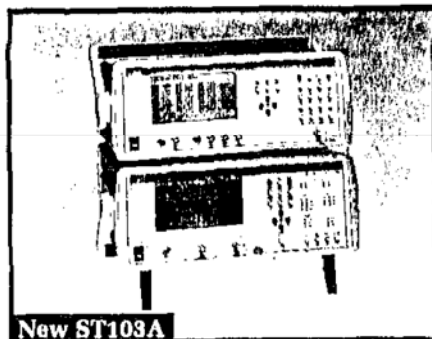
For your local Tektronix representative see the list in the back of this catalog or outside the U.S. call: 1-503-427-1933, inside the U.S. call: 1-800-426-2200.



Product(s) complies with IEEE Standard 488.2-1987.



See Tektronix on the World Wide Web:
<http://www.tek.com>



ST103A SONET Transmitter and Receiver

Today's rapidly expanding SONET marketplace has created the demand for versatile test instruments that provide SONET signal generation and analysis in accordance with Bellcore and CCITT optical transport specifications. The ST103A SONET Transmitter and Receiver respond to this need for test applications from DS1 through OC-12. Separate transmit and receive units allow the ultimate flexibility in lab and manufacturing applications where targeting test resources is desired.

The ST103A also provides seamless integration into manufacturing test and remote monitoring systems with optional LabVIEW*¹ for Windows instrument drivers and remote access software packages.

Characteristics

TRANSMITTER

Timing Synchronization Interfaces –

Internal:

SONET: 51.84 MHz \pm 10 ppm.

External:

SONET: 51.84 MHz, 155 MHz, 622 MHz

(Option 04) at \pm 1% ppm, ECL level;

DS1 – Signal: 1.544 MHz \pm 5 ppm, bipolar

input, 100 Ω balanced, 6 V_{p-p} nominal;

DS1 – Clock: 1.544 MHz \pm 5 ppm, TTL level signal terminated DC, 50 Ω to ground, rear-panel BNC.

STS-1 Interfaces –

Data – Bipolar: Three STS-1 outputs, B3ZS encoded, front-panel 75 Ω BNC.

Data – ECL: One STS-1 output, rear-panel 50 Ω BNC.

Clock – ECL: One STS-1 output, rear-panel 50 Ω BNC.

Sync – ECL: One STS-1 Frame Sync output, rear-panel 50 Ω BNC.

Programmable sync – TTL: One output, rear-panel 50 Ω BNC.

STS-1 Interfaces –

Data – ECL: One NRZ output, rear-panel 50 Ω BNC.

Clock – ECL: One output, rear-panel 50 Ω BNC.

Auxiliary Interfaces –

External DS3 signal: 44.736 MHz \pm 20 ppm, B3ZS-encoded bipolar input, front-panel 75 Ω balanced.

Event sync: One output, TTL level, rear-panel 50 Ω BNC.

Pointer trigger: One output, TTL level, rear-panel, 50 Ω BNC.

Frame Structure–

STS-1: Composition per GR-253-CORE, VT1.5, asynchronous DS3 mapping.

STS-3: Repeats the internal STS-1 frame three times.

STS-12: Repeats the internal STS-3 frame four times.

Overhead Bit Options –

Byte modification: Via Edit menu. All Overhead bytes except for B1, B2, B3, C1, H1, H2, H3, and H4 can be modified.

Error injection: Modify bytes to specified number of frames in Overhead menu. 1 to 255 bytes continuously.

SPS New Data Flag – Defined by user, range is 0 to 782.

VT Payload –

Internal DS1 – Active channel pattern: PRBS 2⁹ – 1, 2¹⁵ – 1, 2²⁰ – 1, 2²³ – 1, QRW, 24-Bit programmable.

Internal framing: Unframed or D4 framed.

External: Pattern and framing.

Modes supported: Locked bit synchronous, floating bit asynchronous, locked byte synchronous, floating byte synchronous.

VT New Data Flag – Defined by user.

STS-1 Level Mapping –

Internal DS3 – Frame patterns: M13, C-bit, unframed.

Internal DS3 – Payload patterns: PRBS (inverted 2¹⁵ – 1), 8-bit fixed word.

External DS3: B3ZS encoded DSX-3, front-panel 75 Ω BNC.

SDH/SONET Analyzer

New ST103A

Alarm and Error Generation – Loss of Signal (LOS), Loss of Frame (LOF), Section Bit Error Rate, Single Error Inject, Channel Error Inject.

Line Layer – Line Alarm Indication Signal (AIS), Line Far End Receive Failure (FERF), user-set Line Bit Error Rate from 10^{-3} to 10^{-9} , Single Error Inject.

APS Byte Failure – Specified number of frames (1 to 255) or continuously.

Path Layer – STS Yellow Alarm, STS Path Bit Error Rate, Single Error Inject, Pointer Errors.

VT Layer –

VT path yellow: Continuous or on selected number of frames (1 to 255).

VT bit error rate: Defined by user within the range of 10^{-4} to 10^{-9} .

Pointer errors: Pointer Justification (PJ) occurs if three or more bits are inverted.

RECEIVER

STS-1 Interfaces –

STS-1: 51.84 MHz \pm 10 ppm.

STSX-1: Monitor or terminate levels.

STS-3 Interfaces –

STS-3: 155.52 MHz \pm 20 ppm.

NRZ: ECL, 50 Ω BNC.

Clock: ECL, 50 Ω BNC.

DS1 Interfaces –

DS1: 1.544 MHz \pm 130 ppm.

DSX-1: B3ZS or AMI, monitor or terminate levels.

DS3 Interfaces –

DS3: 44.736 MHz \pm 20 ppm.

DSX-3: Bridge or terminate levels.

Auxiliary Interfaces –

Frame capture trigger: TTL level input, 1 k Ω BNC.

Bit error: TTL level output, 50 Ω .

B3 error: TTL level output, 50 Ω BNC.

TOH/POH Monitor – TTL level output, 50-Pin port.

Section Measurements –

B1 coding errors: Total, rate, ESs, %EFSS.

SEFS: Total.

SESS: Total for x or more CVs or OOF (x = 9 for STS-1 rate, x = 16 for OC3 rate, x = 63 for OC12 rate).

SONET frame: A1, A2, Pattern errors, OOF.

Line Measurements –

B2 coding errors: Total, rate, ESs, %EFSS.

SESS: Total for x or more CVs or OOF (x = 12 for STS-1 rate, x = 32 for OC3 rate, x = 124 for OC12 rate).

Alarm and error: LOP, FERG, Pointer out-of-range, APS byte failure, invalid K1.

STS Path Measurements –

B3 – Total, Rate, ESs, %LSFs.

SESS: Total for nine or more CVs or OOF.

VT Path (Floating VT) Measurements –

BIR-2: Total, rate, ESs, %EFSS.

STSS: Total for nine or more CVs or OOF.

DS3 (Payload or Input) Measurements –

M13 or C-bit parity: Rate, total ESs, %EFSS.

Bit errors (PRBS or fixed word): Rate, total ESs, %EFSS.

Alarms: BPV, AIS, Idle, FERF, X-Bit, and all 1s.

DS1 (Payload or Input) Measurements –

Bit errors (PRBS or fixed word): Rate, total ESs, %EFSS.

Alarms: BPV, AIS, Yellow, CRC-6, OOF, Frame errors.

Pointer Measurements – Detects and stores PJ or NDI on a selected VT.

APS Measurements – Protection Switching Counts (PSCs), Protection Switching Duration (PSD).

Frame Measurements – RAM captures last 40 STS-1 frames before/after user defined trigger.

Time Control – Single or repeat test set from one second to nine days in one second intervals, Untimed test control.

Test Storage –

Time: Current test and previous test.

Initialization: Local or remote.

Local Test Retrieval – Front-panel call-up and display, Send to GPIB or RS-232C ports, Output report to local printer.

Remote Test Retrieval – Selectable report format/content, Front-panel call-up and display, Send to GPIB or RS-232C ports, Output report to local printer.

OPTICAL OUTPUT

OC-1/3 Tx Power Out – -9 dBm.

OC-12 Tx Standard Power Out – -8 dBm.

OC-1/3/12 Rx Sensitivity – -25 dBm.

NOTE: CLASS I LASER PRODUCT. This product conforms to the applicable requirements of 21 CFR 1040 at the date of manufacture.

DISPLAY

14 line x 30 column Double Supertwist LCD.

INTERFACES

GPIB, RS-232C, and Centronics Printer Port.

POWER

AC Line – 115 V.

PHYSICAL CHARACTERISTICS

Dimensions	mm	in.
Height	152	6.0
Width	366	14.4
Depth	419	16.5
Weight	kg	lb.
Net	10	22

ORDERING INFORMATION

For price information: Outside the U.S. contact your local Tektronix representative, inside the U.S. see the price list in the back of this catalog.

ST103A

SONET Transmitter and Receiver.

Includes: Power Cord, Manual, OC-1/3, STS-1/3, DS1/3.

Opt. 04 – OC-1/3/12, STS-1/3/12, DS1/3 Pair.

Opt. 06 – LabVIEW[®] Drivers for Remote Test.

Opt. 1C – Replace BNC Connectors with WLC0 560.

Opt. 1R – Rack Mount for Receiver.

Opt. 1T – Rack Mount for Transmitter.

Opt. 3C – Replace FC Connectors with SC.

Opt. 4C – Replace FC Connectors with ST.

Opt. 3R – Delete OC-3 Transmitter Unit.

Opt. 3T – Delete OC-3 Receiver Unit.

Opt. 4R – Delete OC-12 Transmitter Unit.

Opt. 4T – Delete OC-12 Receiver Unit.

SERVICE ASSURANCE OPTIONS

Opt. R2 – Adds two years of post-warranty Repair Protection.

Opt. C5 – Adds five years of Calibration Services.

RECOMMENDED ACCESSORIES

Soft Carrying Case for Transmitter or Receiver – Order 016-1442-00.

Transit Case for Transmitter or

Receiver – Order 016-1443-00.

10-ft. 25-Pin Male-to-Male RS-232 Cable – Order 012-1384-00.

10-ft. 25-Pin Male to 9-Pin Female RS-232 Cable – Order 012-1298-00.

[®] LabVIEW is a registered trademark of National Instrument Corporation.

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