

SPECIFICATIONS

Connectors

DS3 Receive/Transmit: BNC
 DS3 External Clock Input: Coax SMC, TTL
 DS1/E1 Receive/Transmit: Bantam
 DS1/E1 External Clock Input: Bantam, AMI, 0 to -30 dB
 Serial Port: 8-pin Mini DIN RS232C (V.24), DTE
 DC power

Status/Alarm Indicators

DS3: Pulses, Idle, Errors, M13 Frm, C-Bit Frm, AIS, Yel Alm (X-bit), FEBE
 DS2: Frame
 DS1: Pulses, B8ZS, Errors, SF, ESF, SLC-96, Yel Alm, AIS
 E1: Pulses, HDB3, Errors, PCM-30, PCM-31, CRC det, Alarm, AIS
 General: Pat Sync, Power, Battery

DS3 General

Framing: Unframed, M13, C-bit parity. Conforms to ANSI T1.102, 107, 107A, 403, and 404. Also Telcordia TR-TSY-000009 and TR-TSY-000191.
 Line Coding: B3ZS
 Clock Source: 44.736 MHz, External (± 300 ppm, TTL, 50% $\pm 1\%$ duty cycle), Internal (± 5 ppm), Loop (± 300 ppm)
 Standard Test Patterns: 1111, 1100, 1010, 2¹⁵-1, 2²⁰-1, 2²³-1
 User Programmed Patterns: 10 programmable 24-bit patterns with alphanumeric names
 Test Pattern Inversion
 Error Injection: Logic, BPV, Logic+BPV, C-bit, P-bit parity, FEBE, Frame, Burst or Rate
 Alarm Generation: AIS, Yellow, Idle
 Loopbacks: FEAC loopbacks per ANSI T1.401, M13 C-bit loopback per TR-TSY-000009 (requires SW361)
 FEAC transmit/receive per ANSI (requires SW301)

DS3 Transmitter

Transmit Signal Source: DS3 Test pattern, DS1 Test pattern broadcast, DS1 AIS broadcast, loop received DS3 signal
 Pulse Shape: Conforms to ITU-T G.703, Telcordia TR-TSY-000499. High, DSX, Low
 DS1 Insert: Insert DS1 on desired channel. Other channels have DS1 test pattern copies or AIS. DS1 generated internally or from DS1 RX connector
 E1 Insert: Insert E1 on desired channel. Other channels have AIS. E1 generated internally.

DS3 Receiver

Input Impedance: 75 Ω
 Input Sensitivity
 DSX: Up to 26 dB resistive or 6 dB cable loss from DSX
 High/Low: +6 dB to -26 dB resistive loss
 Jitter tolerance: Conforms to Telcordia TR-TSY-000009
 Auto Configure to received signal, line coding, & test pattern
 T1/E1 Drop: Drop to internal receiver or drop to DS1 TX connector

DS1 General (Requires SW310)

Signal Directions: Multiplexed to DS3 jacks or to DS1 jacks
 Clock Source: Internal (± 5 ppm), Loop (recovered, ± 300 ppm), External (± 300 ppm, 0 to -30 dB resistive)
 Framing: Unframed, Superframe (SF-D4), ESF, SLC-96*.
 Conforms to ANSI T1.102, 107, 107A, 403, and 404.
 Also Telcordia TR-TSY-000009 and TR-TSY-000191.
 *SLC is a registered trademark of AT&T.
 Line Coding: AMI, B8ZS
 Standard Test Patterns: All 1s, All 0s, Alt 10, 1100, 1-in-8 (1:7), 1-in-16, 3-in-24, Quasi-Random Signal (QRS), 2⁶-1, 2⁷-1, 2⁹-1, 2¹¹-1, 2¹⁵-1, 2²⁰-1, 2²³-1, 55 Daly, T1-1 through T1-6, DDS-1, DDS-2, DDS-3, DDS-4, DDS-6 (Idle, Yellow, 2-8, FOX)
 User Programmed Patterns: 10 programmable 2048-bit patterns with alphanumeric names
 Test Pattern Inversion: All Standard Test Patterns and User Programmed Patterns
 Error Injection: Logic, BPV, Logic+BPV, Frame, Burst or Rate
 Alarm Generation: AIS, Yellow, Idle
 Fractional T1: Any arbitrary combination of 1 to 24 channels. Nx56k or Nx64k format. Autoconfigure to active channels. Requires SW311.
 Loopbacks: CSU/NIU loop up/down, Inband, ESF datalink, programmable 32-bit control. M13 C-bit loopbacks per Telcordia TR-TSY-000009.
 DS3/DS1 based FEAC loopbacks per ANSI T1.404

DS1 Transmitter

Pulse Shape: Conforms to ITU-T G.703, Telcordia TR-TSY-000499
 Output Levels: 0, -7.5, -15, -20 dB



SunSet™ T3

DS1 Receiver

Input Frequency: 1.544 Mbps, ± 300 ppm
Input Impedance: 100 Ω , +6 dB to -36 dB
External Clock Input: 1.544 Mbps, ± 300 ppm, 0 to -30 dB resistive with ALBO
Auto Configure to received signal, Line Coding, Test Pattern

E1 2.048 Mbps (Requires SW324)

Drop and insert one E1 channel to/from a DS3
Transmit and receive at E1 interface
Transmit
Pulse Shape: Conforms to ITU-T G.703, 3.0V $\pm 10\%$
Clock: De-jittered from DS3, Internal 2.048 Mbps ± 5 ppm
Line coding: AMI, HDB3
Receive
Impedance: 120 Ω , +6 to -20 dB
Line coding: AMI, HDB3
Framing: PCM-30 and PCM-31 with or without CRC, unframed
Test Patterns
Standard Patterns: All 1s, All 0s, Alt 10, 1-in-8 (1:7), 3-in-24, QRS, 2⁶-1, 2⁷-1, 2⁹-1, 2¹¹-1, 2¹⁵-1, 2²⁰-1, 2²³-1, 1100 (FOX, 2-in-8, Yellow, Idle, User Patterns)
User Programmed Patterns: 10 ea patterns up to 2048 bits long, alphanumeric name up to 10 characters for each pattern
Test Pattern Inversion
Auto Configure to received signal, line coding, test pattern
Fractional E1: Any arbitrary combination of 1 to 31 channels. Nx64k format. Autoconfigure to active channels. Requires SW311.

Measurements

G.821 and general errors: Bit error, bit err rate, errored seconds, %errored seconds, severely errored seconds, %severely errored seconds, error-free seconds, %error-free seconds, available seconds, unavailable seconds, synch loss seconds, degraded minutes
DS3: Frame loss seconds, loss of signal seconds, BPV, BPV rate, Frame-bit error, Frame-bit error rate, P-bit error, C-bit error, FEBE, available seconds, errored seconds, %errored seconds, severely errored seconds, %severely errored seconds, error-free seconds, %error-free seconds, unavailable seconds, degraded minutes, AIS seconds, yellow alarm seconds, frequency, max frequency, min frequency, peak voltage (V), power (dBm)
DS2: F-bit error, frame loss seconds, AIS seconds, Yellow Alarm seconds
DS1: BPV, BPV rate, Frame-bit error, Frame-bit error rate, CRC-6 block error, CRC-6 block error rate, out of frame count, change of frame alignment count, errored seconds, %errored seconds, severely errored seconds, %severely errored seconds, error-free seconds, available seconds, degraded minutes, unavailable seconds, frequency, AIS seconds, loss of frame seconds, loss of signal seconds, yellow alarm seconds, low density seconds, excess zeroes seconds, max frequency, min frequency, +1-peak voltage frame slip, +1-wander peak level
E1: Code violation (BPV), code violation rate, FAS error, FAS error rate, MFAS error, MFAS error rate, CRC error, CRC error rate, errored seconds, %errored seconds, severely errored seconds, %severely errored seconds, error-free seconds, available seconds, degraded minutes, unavailable seconds, AIS seconds, loss of frame seconds, loss of signal seconds, FAS alarm seconds, MFAS alarm seconds, peak voltage (V), frequency, max frequency, min frequency, + wander, - wander, peak level (dB), clockslip

Other Measurements

View Received Data

View T1 data in binary, hex, ASCII formats
Displays data in bytes by timeslot
Displays 8 timeslots per display page
Capture & store 256 consecutive timeslots as test pattern, 10 patterns

Propagation Delay

Measure round trip propagation delay in unit intervals ± 1 UI, with translation to microseconds and one way distance over cable

Bridge Tap

Automated transmission and measurement of 21 different patterns to identify possible bridge taps at some point on a T1 line

Quick Test I and II

2 programmable automated loopback tests that save time when performing standardized acceptance tests
10 character alphanumeric ticket name
Automatically loopback a CSU or NIU device; automatically drop the loopback at conclusion of test
Automatically print results at conclusion of test
Specify 5 independent test patterns, run each pattern for 1 to 999 min
Operate in single-run or continuous-run mode

Protection Switch Timing

Measure the duration a switch or multiplexer takes to perform the protective switching function

Loopbacks

Loopback Control, In-band
CSU, NIU, 100000
Loopback Control, ESF-Facility Datalink
10 programmable user codes, 1 to 32 bits each

Remote Control (SW302)

To VT100 terminal or PC running terminal emulation
Status table provides current & historical information on test sets' LEDs
Uses test set's serial port, 8-pin MINI DIN connector, RS232C
Serial port cannot be connected to printer during remote control operation

Westell PM NIU and MSS (SW303)

Supports Westell performance monitoring network interface unit and maintenance switch system with ramp
Set/query NIU time and date
Query performance data by hour or for all accumulated data
Reset performance registers
Read data over ramp line
Perform maintenance switch function for Westell and Teltrend
Automated looping of Westell and Teltrend line and central office repeaters: SF and ESF modes supported
Arm, loop up/down, loopback query, sequential loopback, power loop query, span power up/down, unblocking
Requires SW310

Fractional T1 (SW311)

Error measurements, channel configuration verification
Nx64 kbps, Nx56 kbps, N=1 to 24
Sequential, alternating, or random channels
Set Tx and Rx channels independently
Auto scan and auto configure to any FT1 order for active channels
Selectable idle channel code, 7F or FF hex
Requires SW310

ESF and SLC-96 Datalink send and Receive (SW312)

ESF Datalink
Read and Send T1.403 message on FDL (PRM and BOM)
Automatic HDLC protocol handling
YEL ALM, LLB ACT, LLB DEA, PLB ACT, PLB DEA
T1.403 24 hour PRM collection per 15 min interval
SLC-96 Datalink
Send and receive message
WP1, WP1B, NOTE formats
Alarms, switch-to-protect, far end loop
To Telcordia TR-TSY-000008 specifications, modes I and III
SLC-96 FEND loop
Requires SW310

CSU/NI Emulation (SW313)

Graphical indication of signal status
Simultaneous display of T1 line measurements
Automatic generation of AIS
Loopbacks
 Responds to remote loopback commands, in-band and out-of-band (ESF datalink T1.403)
 Establish Line and payload loopback from keypad
Requires SW310

Voice Frequency Capability (SW320)

General: Talk/listen with volume control, 24 channel signaling bit display, control signaling bits, view channel data, μ A law to DS3 or DS1/E1 ports
Specify trunk type: E&M, ground/loop start, FXO, FXS, user defined
Specify supervision on idle channels
Basic Transmission Impairment Measurements: Level, frequency, C-message noise, C-notched noise, 3 kHz flat filter noise, signal to noise with 1004 Hz tone. Generate 50 to 3950 Hz \pm 1 Hz, 1 Hz steps, +3 to -60 dBm, 1 dB steps. Requires SW321.
Addressing
 DTMF/MF/DP dialing, programmable dial number up to 32 digits, 10 stored numbers, programmable transmit level -5 to -25 dBm
 MF/DTMF dialing: Specify dial period, silent period from 50 ms to 999 ms
 DP dialing: Specify %break from 40 to 60, interdigit period from 200 ms to 900 ms
 Measure MF/DTMF high/low frequency, level, twist, digital time, interdigital time
 Measure DP pulses per second, %break
Requires SW322

ISDN PRI Call Setup and Analysis (SW323)

D-channel message monitor
Filter type: Call reference, caller number, called number
Voice and data call setup and receive
Talk/listen for voice calls
56k, 64k data rates
Data patterns: 2047, 511, 127, 63, All 1s, All 0s, or 8-bit user pattern
Programmable called and caller numbers, B-channel number, NSF code, NSF type
NT, TE emulation
Programmable D-channel number
AT&T 5ESS and Northern Telecom DMS-100 compatible
On-screen table for optional call feature programming
Requires SW310

GENERAL

SW options upgradeable via software in-field cartridge replacement
Printer: Print every 2 to 99 minutes, print at end of measurement, print on error/alarm events, print screen alphanumerics
Size: 4 x 2.4 x 10.5" [10.5 x 6 x 27 cm]
Weight: 2.8 lb [1.3 kg]
SS300e chassis only
 Built-in NiMH rechargeable battery pack
 Battery operating time: 90 min nominal. AC operation with 100 to 240 VAC, 50/60 Hz universal charger.
Operating temperature: 32°F to 122°F [0°C to 50°C]
Storage temperature: -4°F to 158°F [-20°C to 70°C]
Humidity: 5% to 90% noncondensing

ORDERING INFORMATION

Test Set

SS300e SunSet T3 Chassis
Includes SunSet T3 Chassis, 100 VAC to 240 VAC Universal Battery Charger, 6-cell NiMH battery, SunSet T3 User's Manual, SunSet T3 Field Manual, Software Cartridge, Instrument Stand. Software Cartridge includes basic T3 testing operations.

Software Options

SW301 DS3 FEAC
Provides control and analysis of the DS3 FEAC data link in C-bit parity framing format.
SW302 Remote Control
Allows menu-driven remote control of basic test functions using a dumb terminal or personal computer equipped with VT100 terminal emulation software. Includes printer cable and null modem adapter.
SW303 Maintenance Switch, Performance Monitoring NIU, RAMP, Looping Repeaters. Provides menu-driven support for the Westell & Teltrend looping repeaters, Maintenance Switch, and Performance Monitoring NIU, including the RAMP feature. Requires SW310.

SW310 DS1 Testing
Provides DS1 test capability through the bantam jacks on the set. Also provides DS1 drop & insert test capability through the WECO 560-style jacks on the set. DS1 capabilities include a broad variety of test patterns, DS1 NIU & CSU loopback operations, basic DS1 measurements, view received data, quick test, bridge tap test.

SW311 Fractional T1
Requires SW310

SW312 ESF and SLC-96 Datalink Send and Receive
Requires SW310

SW313 CSU/NIU Emulation
Requires SW310

SW320 DS0 Drop/Insert
Provides voice frequency talk/listen/tone.
Requires SW310.

SW321 VF Level, Freq, & Noise Measurement
Requires SW310 and SW320

SW322 MF/DTMF/DP Dialing, Decoding, and Analysis
Requires SW310 and SW320

SW323 ISDN PRI Call Setup & Analysis
Requires SW310

SW324 E1 Test Capability
From a DS3, drop and insert an E1 signal through the test sets' DS1 bantam jacks, or test an E1 signal directly through the DS1 bantam jacks. Requires the SS300e chassis. Includes Fractional E1.

SW2501 1 Mb Software Replacement Cartridge
Specify model and serial number.

Accessories

SS101 Carrying Case

SS104 Cigarette Lighter Battery Charger

SS105 Repeater Extender

SS106 Single Bantam to Single Bantam Cable, 6'

SS108 Single Bantam to Single 310 Cable, 6'

SS109 Single Bantam to Probe Clip Cable, 6'

SS110 Dual Bantam to 15-pin D Connector Cable (m), 6'

SS111 Dual Bantam to 15-pin D Connector Cable (f), 6'

SS112 Dual Bantam to 8-position Modular Plug Cable
Fits RJ-48 jacks per ANSI T1.403, 6'. Used for NIUs (smart jacks).

SS115 DIN-8 to RS232C Printer Cable
Replacement printer cable for earlier serial printers such as SS118.

SS115D DIN-8 to DB-9 Printer Cable
Included when SW302 or SS118B/C is ordered.

SS116 Instrument Stand

SS117A Printer Paper, 5 rolls, for SS118B/C

SS118B High Capacity Thermal Printer. With internal rechargeable battery. Includes cable (SS115B) for connection to SunSet & 110 VAC charger.

SS118C High Capacity Thermal Printer. With internal rechargeable battery. Includes cable (SS115B) for connection to SunSet & 220 VAC charger.

SS121B SunSet AC Charger, 220 VAC, 50/60 Cycle.
Provides continuous operation from 220 VAC source. Provides 0.6A output at 12 VDC. Charges battery. 2-stage operation for fast recharge then slow trickle charge. 3-prong IEC connector. For SS300 chassis only.

SS122 Null Modem Adapter
Replacement null modem adapter for earlier serial printers such as SS118.

SS122B Null Modem Adapter
DTE to DCE conversion, DB-9 to DB-9.
Included with SW302

SS123A SunSet Jacket
Provides additional weather protection for SunSets. Rugged padded synthetic fabric.

SS123C SunSet Jacket, Large - Provides additional weather protection for SunSets. Only for use with SS143B (SS123B included)

SS128A 120V/12V 1.2A SunSet Charger
For USA and Canada. Provides continuous operation from 120 VAC source. Provides 1.2A output at 12 VDC. Charges battery. 2-stage operation for fast recharge then slow trickle charge. For SS300 chassis only.

SS128B 110V/12V 1.2A SunSet Charger
For Taiwan and Korea. Provides continuous operation from 110 VAC source. Provides 1.2A output at 12 VDC. Charges battery. 2-stage operation for fast recharge then slow trickle charge. For SS300 chassis only.

SS132 Two Single Bantams to 4-position Modular Plug Cable. Used for downloading performance monitoring information from a Westell NIU at the front panel jack without disrupting service.

SS138D SunSet AC Charger, 100 to 240 VAC, 50/60 Hz input, 15 VDC @ 2A output. For SS300e chassis only.

SS139 6-cell NiMH Battery Pack
7.2 VDC, 1.8 Ahr. For SS300e chassis only.
Requires factory installation.

SS143B SunSet Rubber Holster

SS1212 Conversion cable, BNC (m) 75Ω to bantam 120Ω, 6'

SS300W SunSet T3 Extended Warranty. Extends standard 1 yr warranty period to 3 yr. Excludes battery and accessories, which are warranted for 1 yr

SS302 WECO 440A to WECO 440A (miniature style) Coaxial Cable, 6', fits in 560A jack

SS303 WECO 440A to BNC Coaxial Cable, 6'

SS304 WECO 440A (mini) to 358A (large) Coaxial Cable, 6'

SS305 SunSet T3 User's Manual

SS309 SunSet T3 Training Tape, English (specify SS309K for Korean)

SS315 BNC to WECO 358A Cable, 6'



Note: Specifications subject to change without notice.
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