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 (±30 ppm, TTL, ±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, 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 loopback per Telcordia TR-TSY-000009.
DS3/DS1 based FEAC loopbacks per ANSI T1.404

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), 2^-1, 2^-2, 2^-3, 2^-4, 2^-5, 2^-6, 2^-7, 2^-8, 2^-9, 2^-10, 55 Daly, T1-1 through T1-6, DDS-1, DDS-2, DDS-3, DDS-4, DDS-5
(Idie, 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 loopback 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

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: 75Ω
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
**SunSet™ T3**

**DS1 Receiver**
- Input Frequency: 1.544 Mbps, ±300 ppm
- Input Impedance: 100Ω, +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
- Pulse Shape: Conforms to ITU-T G.703, 3.0V ±10%
- Clock: De-jittered from DS3, Internal 2.048 Mbps ±5 ppm
- Line coding: AMI, HDB3
- Receive Impedance: 120Ω, +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, 2^-1, 2^-1, 2^-1, 2^-1, 2^-1, 2^-1, 2^-1, 2^-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. Autocofigure to active channels. Requires SW311.

**Measurements**
- G.821 and general errors: Bit error, bit err rate, errored seconds, %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, peak voltage (V), frequency, 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
- CSU, NIU, 100000
- Loopbacks
- 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

**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
- Setting/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, µA 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 ±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 alphanumeric.
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 & Teltrnd 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 S60-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/TDMF/DLP 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

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<tr>
<th>Item</th>
<th>Description</th>
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<td>Carrying Case</td>
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<td>SS104</td>
<td>Cigarette Lighter Battery Charger</td>
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<td>SS105</td>
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<td>SS106</td>
<td>Single Bantam to Single Bantam Cable, 6'</td>
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<td>SS108</td>
<td>Single Bantam to Single 310 Cable, 6'</td>
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<td>SS109</td>
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<td>SS110</td>
<td>Dual Bantam to 15-pin D Connector Cable (m), 6'</td>
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<tr>
<td>SS111</td>
<td>Dual Bantam to 15-pin D Connector Cable (f), 6'</td>
</tr>
<tr>
<td>SS112</td>
<td>Dual Bantam to 8-position Modular Plug Cable</td>
</tr>
<tr>
<td>SS115</td>
<td>DIN-8 to RS232C Printer Cable</td>
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<tr>
<td>SS115D</td>
<td>DIN-8 to DB-9 Printer Cable</td>
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<tr>
<td>SS116</td>
<td>Printer Paper, 5 rolls, for SS118B/C</td>
</tr>
<tr>
<td>SS117A</td>
<td>High Capacity Thermal Printer. With internal rechargeable battery. Includes cable (SS115B) for connection to SunSet &amp; 110 VAC charger.</td>
</tr>
<tr>
<td>SS118B</td>
<td>High Capacity Thermal Printer. With internal rechargeable battery. Includes cable (SS115B) for connection to SunSet &amp; 220 VAC charger.</td>
</tr>
<tr>
<td>SS121B</td>
<td>SunSet AC Charger, 220 VAC, 50/60 Cycle.</td>
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<tr>
<td>SS123A</td>
<td>SunSet Jacket</td>
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<tr>
<td>SS124B</td>
<td>E1 Test Capability</td>
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