Acterna HST-3000

Option for the T-BERD DS3

Continued explosive growth in demand for bandwidth hungry applications and services is driving increased deployment of DS3 in today's network – both as a transport technology and as a service offering. This growth has led to an increased need for test solutions that ensure the proper installation and maintenance of DS3 service. Technicians who formerly were only responsible for T1 and lower speed service installation and maintenance are now being tasked to take on DS3 testing responsibilities. This, coupled with today's smaller workforces and reduced budgets for equipment and training, presents a real challenge to service providers who must ensure that the service provisioning and trouble correction is done right the first time out.

The combo DS1/DS3 Services Interface Module (SIM) Option adds DS3 testing capability to the wide array of test applications supported by the HST-3000 and provides a powerful and versatile solution for testing DS3. Hand-held, rugged and easy-to-use, the HST-3000 is ideal for field use. Its modular design provides a scalable, all-in-one solution for testing multiple technologies.

The HST-3000 ensures optimal DS3 network performance by performing end-to-end BER testing and measuring frequency and signal levels on the circuit under test. Technicians can quickly qualify networks for accurate multiplexed operation by performing BER testing on one or all DS1 channels transmitted by a DS3 multiplexer.

The HST-3000 DS3 option comes standard with dual DS3 receivers for bi-directional monitoring. Additionally, the option includes dual transmit and receive DS1 interfaces to provide an all-in-one application based approach to testing both the DS3 interface as well as the T1 tributary.

The HST-3000 boasts automated setups and advanced features that ensure consistent adherence to service provider methods and procedures. Each HST-3000 is built to order and can easily be field-upgraded with new modules and software as application and technology needs change.

Highlights

- **Reduce DS3 circuit testing time by using dual receivers for bi-directional monitoring, allowing for timely trouble isolation and correction.**
- **Seamlessly transition from testing the DS3 interface to testing at the T1 tributary without swapping modules or test sets via the standard dual transmit and receive DS1 interface.**
- **Verify multiplexed operation by performing BER testing on one or all 28 DS1 channels within the DS3.**
- **Accurately measure frequency and signal level to ensure optimal DS3 circuit performance.**
- **Compact, lightweight and scalable tool ideal for the needs of the field technician today**

ACTERNA™
Communications Test and Management Solutions

Service Installation

The HST-3000 provides comprehensive DS3 testing capability to ensure the circuit is functioning properly before hand-off to the customer. Evaluation of BER test results, frequency and signal level helps identify potential sources of problems such as faulty or loose cable crimps, improper line build out, excessive coaxial cable length and mis-optioned or faulty network equipment.

The HST-3000 enables simplified testing with the full range of T-BERD test patterns and capabilities for both multiplexed and unchannelized DS3 circuits with M13 or C-Bit framing. Testing can be performed to a loop at the far-end cross-connect panel or straightaway with another test set located at the far-end to sectionalize potential problems. For circuits with C-Bit framing, the HST-3000 can send DS3 FEAC loop commands and report FEAC alarms. For multiplexed DS3 testing, BERT patterns can be inserted on a single channel or all 28 DS1 channels within the DS3. Other standard features include error insertion, to verify continuity, and alarm generation, to verify proper network provisioning.

Easy-to-read results menus allow technicians to view physical layer measurements, BERT results, parity errors, FEBEs and alarm conditions. Additionally, the summary screen provides a rapid assessment of overall test performance.

T1 Testing

During DS3 installation or maintenance, it is often necessary to test at the T1 tributary level. The HST-3000 DS3 Option comes standard with dual transmit and receive DS1 interfaces. This enables the user to switch from DS3 to DS1 physical layer testing without changing instruments or swapping modules – enabling timely and thorough testing of the T1 circuit to verify proper multiplexed operation.

Service Maintenance

It is often necessary to perform in-service monitoring of a DS3 circuit during routine maintenance or troubleshooting operations. The HST-3000 DS3 Option comes standard with dual DS3 receivers for bi-directional monitoring. This allows the user quick and non-intrusive identification and sectionalization of potential problems. Results from both receivers (primary and secondary) are easily viewable on the same screen.

The HST-3000 also provides the capability to drop out a single DS1 from the DS3 for analysis. If it becomes necessary to conduct intrusive testing to isolate and correct a problem, the full range of out-of-service testing, described earlier, is available.

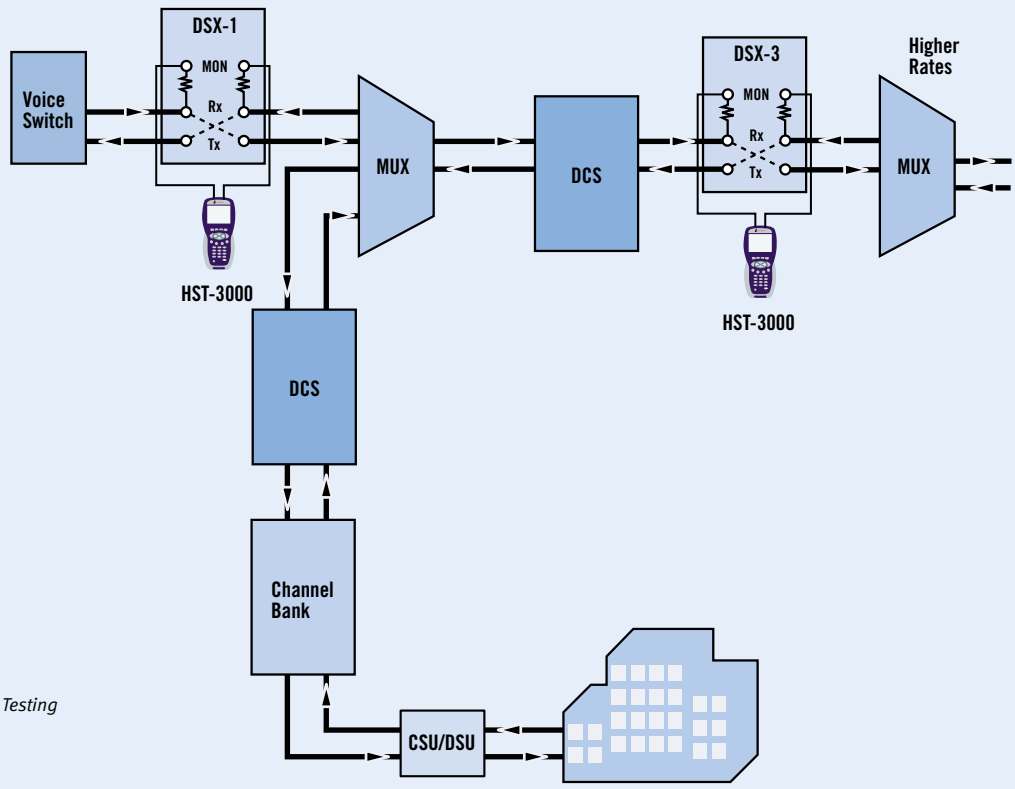


Figure 1: DS1/DS3 Testing

Test the Copper, Test the Service, Improve the Process

As an optional capability, the HST-3000 can be configured to include a robust suite of testing features for verification and troubleshooting of the copper facilities. Equipped with this option, the HST-3000 can quickly troubleshoot the local loop for line impairments that degrade or impair DS1 performance. The user can quickly identify and correct cable impairments including: shorts, grounds, opens, crosses, bridged taps, wet sections and other high resistive faults. These impairments are easy to locate with the HST-3000's advanced time domain reflectometer (TDR), precision digital volt/ohm meter (DVOM) and an accurate resistive fault locator (RFL) to pinpoint troubles prior to circuit installation. The HST-3000 can also transmit the full range wideband tones to confirm that noise and loss meet acceptable criteria. Copper test features are optimized for use anywhere on the local loop – at the NID, crossbox, pedestal, main distribution frame or anywhere a technician might gain access to the local loop to locate the source of trouble.

As previously mentioned, the HST-3000 DS3 Option provides the complete range of both DS1 and DS3 physical layer circuit testing. Building on these capabilities, the HST-3000 can also be equipped with options that support ISDN Primary Rate (PRI) testing as well as PCM Signaling and TIMS testing for verification of digital voice service on a T1 line. With all these features, the HST-3000 can easily scale to address the full breadth and depth of testing requirements from qualification of the copper pair through voice and data service verification.

The HST-3000 offers pre-programmed tests and customized scripts that simplify testing and ensure consistent adherence to standard test procedures. These customizations help eliminate mistakes caused by improper test configurations or incorrect methodologies.

Acterna's TechComplete™ software (optional customized) allows the HST-3000 to improve turn-up and maintenance processes. This is done by operating with service provider's dispatch and closeout report systems to offload stored test results for later trend analysis and coaching reports. With these features, the HST-3000 can reduce repeat rates and failures and improve overall process efficiency.

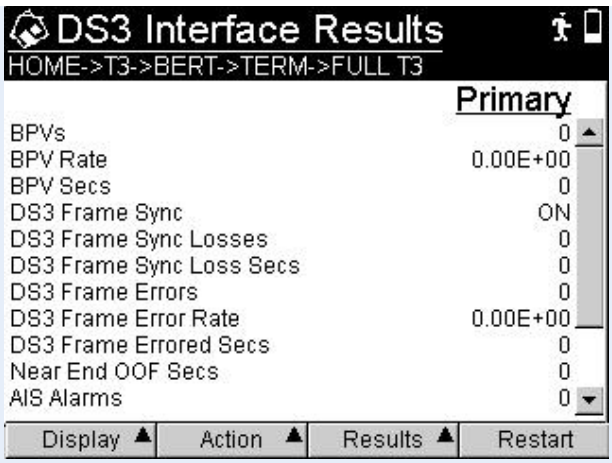


Figure 2. DS3 Interface Results

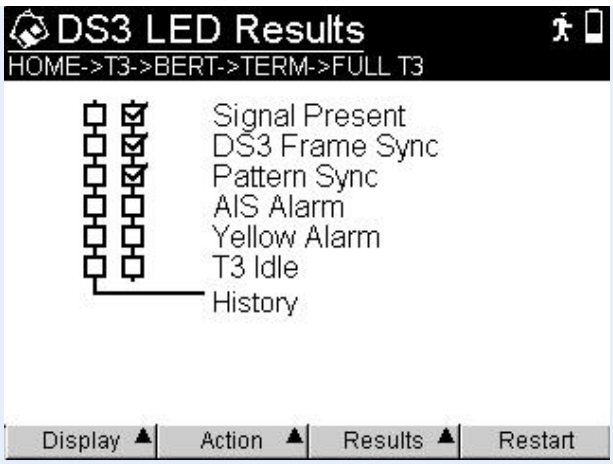
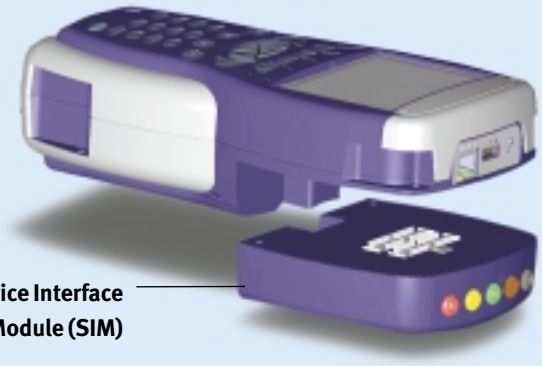


Figure 3. DS3 LED results

Flexible and Rugged Design

The HST's rugged, weather resistant design and long battery life are ideally suited for use in the field. Its modularity allows for field upgrades to support new testing requirements. Standard Ethernet, USB and serial connections offer flexibility to easily download software and offload captured test data.

Easily configurable, the HST-3000 can be used by different technicians with different responsibilities to perform a wide number of tests. The HST-3000 is easily upgradeable with technologies and advanced options that support the changing needs of service installers.



Service Interface Module (SIM)

Flexible, modular platform makes technology upgrades or hardware changes easy

HST-3000 Handheld Services Tester
Actual Size: 9.5 x 4.5 x 2.75 in
Weight: 2.7 lb with battery

Technical Specifications

Interfaces

DS3 (Single Tx/Dual Rx)	BNC
DS1 (Dual Tx/Rx)	Bantam Jacks
10/100 BT Ethernet jack	8-pin modular
Serial port	DB9 female via cable (DCE)
USB Host	
USB Device	

DS3 Specifications

Operating Modes	Terminate and Monitor
Receiver (Input) Specifications	
Frequency	44,736Mbps + 300 ppm
Impedance	Nominal 75 Ohms at 22MHz (unbalanced to ground)
Range	TERM: 0 to 12 dB cable loss at 22 MHz DSXMON: -20dB loss plus 0 to 9 dB of cable loss from high signal of 22 MHz
Jitter Tolerance	
Transmitter (Output) Specifications	
Frequency	44,736 Mbps + 50 ppm
Impedance	Nominal 75 Ohms unbalanced to ground
Timing	Internal Clock Recovered (from network) Clock
Pulse (High)	Nominal 1.2Vp
Pulse (DSX)	Nominal 0.6 Vp
Pulse (Low)	Nominal 0.3 Vp with 75 Ohms
Pulse Shape	Per T1.102 (1993) & ITU-T G.703
Output Jitter	Per T1.102 (1993)
Tests	BERT, Monitor
Framing	Auto, Unframed, M13, C-bit
Line Coding	B3ZS
Error/Alarm Types	Logic, BPV, Parity, Frame, AIS, RAI
Loopback Codes	NIU, CSU, HDSL, MSS, user defined and repeater
FEAC Loop Codes	NIU, DS3 line, DS1 line

Frequency & Level Measurements

Frequency	Range: 44,736 + 350 ppm Accuracy: + 3ppm, + 1ppm/year Resolution: 4 Hz
Level Vp	Range: 0.0 V to 1.99 V Accuracy: (+ .02V/+ 10%) Resolution: 0.01 V

DS1 Specifications

Operating Modes	Terminate, Monitor, Drop & Insert, Loopback, (Full T1 and Fractional)
Framing	Unframed, D4/SF, ESF
Line Coding	AMI, B8ZS
Input Impedance	BRIDGE > 1000 Ohms TERM 100 Ohms + 5% DSX-MON 100 Ohms + 5%
Receive Level	BRIDGE 0 to -20.0 dBdsx TERM + 6 to -35.0 dBdsx DSX-MON +6 to -24.0 dBdsx
Timing Sources	Internal Clock Recovered (from network) Clock
Line Build Out Level	0, 7.5, 15.0, and 22.5 dB of cable loss at 722 kHz
Error Insertion	Logic, BPV, Frame
Physical specifications	
Size (H x W x D)	9.5 x 4.5 x 2.75 in
Weight	2.7 lb with battery
Operating temperature	22°F to 122°F
Storage temperature	–40°F to 150°F
Battery life	10 hrs. typical usage
Charging time	7 hours from full discharge to full charge
Operating humidity	10% to 80% relative humidity
Storage humidity	10% to 95% relative humidity
Display	1/4 VGA monochrome transflective, 3.8-in diagonal (readable in direct sunlight)
General	
Ruggedness	Survives 3-ft drop to concrete on all sides
Water-resistance	Splashproof: may be used in heavy rain
Language	English
Keypad	Typical 12-button keyboard

Ordering information

Base units

HST-3000C	HST-3000C base with copper testing Requires the purchase of a SIM – see separate listing for HST3000-CAR or HST3000-CU (Ethernet and serial ports included)
HST-3000	HST-3000 base without copper testing Requires the purchase of a SIM – see separate listing for HST-3000-CAR or HST-3000-AR (Ethernet and serial ports included)

SIMS (Modules)

DDS SIM	
HST-3000-4WLL	Dual T/R/G interface for copper testing and 4 wire local loop interface and T1 DDS software option
HST-3000-T1	Dual Tx/Rx bantam T1 interface and T1 software option
HST-3000-CT1	Dual T/R/G interface for copper Testing and Dual Tx/Rx bantam T1 Interface and T1 software option
HST-3000-T3	Dual Tx/Rx bantam T1 interface, and dual Rx, single Tx BNC DS3 interface and DS3 software option
HST-3000-BRI	U-MON and U Interface with To LT and To NT and ISDN BRI software option

Software options

HST3000-TDR	TDR software option
HST3000-RFA	RFA/RFL software option
HST3000-WBTones	WB tones/TIMS software option
HST3000-VT100	VT100 option (Includes cable and software option)
HST3000-Script	Scripted testing software option
HST3000S-Web	Web browser software option
HST3000-PCMSIG	VF (PCM) signaling software option
HST3000-PCMTIMS	VF (PCM) TIMS software option
HST3000-T1DDS	T1 DDS software option
HST3000-PRI	ISDN PRI software option

Accessories

Test leads	POTS - 5 ft. banana plugs to alligator clips, T1 - bantam to bantam, bantam to 310 Weco
Charger Adapter	AC/DC battery charger/adapter 120 VAC (50/60 Hz) input;12 VDC (1 A) output
Soft Cover	Form fitting nylon glove for test set and leads
Carrying Case	Heavy duty, nylon case for test set, extra SIMs, accessories and cables
Battery	Lithium ion
41084	T1 repeater power supply
43141	repeater power supply multiplexer
44116	HDSL doubler power supply
44527	HDSL remote access shelf Repeater extender

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Acterna is the world's largest provider of communications test solutions for telecommunications and cable network operators. A trusted communications test partner for more than eight decades, Acterna offers an unmatched portfolio of award-winning instruments, systems, software and services that help its customers reduce network costs while improving performance and reliability. Headquartered in Germantown, Maryland, USA – with European and Asia-Pacific operations based in Eningen, Germany and Hong Kong – Acterna serves nearly every major communications service provider and equipment manufacturer around the world through a skilled sales and support organization in 31 countries.

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