Acterna SDH Access Tester ANT-5

- STM-4, STM-1, E4, DS3, E3 and E1 interfaces
- Dual wavelength 1310nm and 1550nm
- Large colour display with graphical user interface
- The unique "Big OK" results summary page

Applications

- Installation and commissioning of PDH and SDH links and systems

- Quality of service verification

- 'In-' and 'out-of-service' maintenance testing.

- Automatic Protection Switch (APS) verification

- Fault finding and isolation

STM-1 and STM-4 transmission rates have matured into the commodity phase of their market life. SDH is now prevalent in the Metropolitan and Access networks. With increased pressure to commission and maintain these services more quickly, and at lower cost, technicians now need a smaller, more portable, battery powered tool able to test SDH and PDH technologies.

The Acterna SDH Access Tester ANT-5 provides all this in a single, easy to use instrument. All the required interfaces, mappings and measurement functions are built into the unit. The large colour display and graphical user interface make for faster operation – reducing the time and cost spent in installing and maintaining the network.

Functions

- Bit error rate testing including anomaly/defect analysis and generation

- G.821, G.826, M.2100 and M.2101 performance analysis

- Overhead testing including path tracing and generation

- Tandem Connection Monitoring (TCM) and SDH Pointer analysis

- APS and RTD time measurements

- Repetitive BER testing for SDH radio links

Installation checks can be made quickly and easily with the "Big OK" results summary. For commissioning the SDH Access Tester ANT-5 provides PASS/FAIL evaluation to ITU-T limits together with event log and histogram results display. APS enables verification of protection switch systems. For maintenance and troubleshooting, anomalies and defects can be inserted and monitored. Path labels can be generated and traced. Section and path overheads can be generated and decoded. TCM allows performance monitoring of tandem networks. Pointer analysis easily identifies synchronisation problems. Test results may be printed or transferred to a PC.

ACTERNA
The Keepers of Communications

Technical Specifications

G.703 Transmitters

BNC 75Ω unbalanced outputs

Bit rates and line codes:

2048, 34368kbit/s	HDB3
44736kbit/s*	B3ZS
139264, 155520kbit/s	CMI

RJ48 120Ω balanced output

Bit rate and line codes:

2048kbit/s	HDB3

G.703 Receivers

BNC 75Ω unbalanced inputs

Bit rates and line codes:

2048, 34368kbit/s	HDB3
44736kbit/s*	B3ZS
139264, 155520kbit/s	CMI

* ANSI T1.102 compliant

RJ48 120Ω balanced input

Bit rate and line codes:

2048kbit/s	HDB3
Clock recovery pulling range:	as G.703

Selectable input gain:

155520kbit/s	20dB
2048, 34368, 44736, 139264kbit/s	26dB

G.957 Optical Transmitter and Receiver (option)

Class 1 laser product

FC-PC Connectors

Transmitter wavelengths:
- 1310nm short haul
- 1550nm long haul
- 1310nm and 1550nm

Line bit rates:
- 155.52Mbit/s
- 622.080Mbit/s

Line code:	scrambled NRZ

Output level:

1310nm	-8 to -15dBm
1550nm	0 to –5dBm
Optical Overload:	–1 to -2dBm
Receiver Wavelength range:	1100 to 1580nm
Input sensitivity, STM-1/-4:	-28dBm

Transmit Clock synchronisation

Internal, stability:	±3.6ppm

External Clock (SDH Transmitter):

Connector	BNC 75Ω
	(120Ω via external adapter)
Reference clock	2048kHz
Reference signal	2048kbit/s (HDB3)

Mappings (to ITU G.707)

The following mappings are provided as standard with the instrument:

C12 mapping (2Mbit/s in STM-1, AU-4, asynchronous mode)

C3 mapping (34Mbit/s in STM-1, AU-4)

C3 mapping (45Mbit/s in STM-1, AU-4)

C4 mapping (140Mbit/s in STM-1)

SDH output signals

STM-1 signal consists of:
- Framed or unframed PDH test pattern

Test pattern without stuffing bits (bulk signal to O.181)

Content of non-selected containers:

STM-1   PRBS $2^{11}-1$
(framed/unframed as per selected container)

STM-4 signal consists of:

1 STM-1 signal containing:

Framed or unframed PDH test pattern or

Test pattern without stuffing bits (bulk signal to O.181)

3 STM-1 signals containing VC4 containers each filled with a fixed pattern of 11100110.

SOH and POH Generation

The content of all bytes, with the exception of A1/A2, B1/B2/B3 and H1 to H4, is programmable with any byte.

Selectable Synchronisation messages (S byte).

Selectable Signal labels (C byte).

Trace identifier.

J0 programmable 1 byte hexadecimal or 16 byte ASCII sequence with CRC.

J1, J2 programmable 16 byte ASCII sequence with CRC or 64 byte ASCII sequence.

PDH output signals

Signal structures for all bit rates:

Unframed test pattern

Framed test pattern (to ITU-T O.150)

Frame types:

2048kbit/s Unframed, PCM31, PCM31CRC, PCM30, PCM 30 CRC (to ITU G.704)

34368 kbit/s Unframed, Framed G.751

44736 kbit/s Unframed, Framed C-parity, Framed M13

139264 kbit/s Unframed, Framed G.751

Test patterns

Test patterns may be generated and measured for any of the provided bit rates either directly at the SDH/PDH interface or within the STM-4/STM-1 substructure.

PRBS:
$2^{15}-1$, $2^{20}-1$, $2^{23}-1$, $2^{31}-1$, $2^{15}-1$ inv., $2^{20}-1$ inv., $2^{23}-1$ inv, $2^{31}-1$ inv.

Programmable word   16bits

Anomaly and Defect Insertion

Defect Generation is static, i.e. ON/OFF

Anomaly generation is Single or at a continuous error ratio of 1×10^{-n} where the range of n is as indicated below:

Payload   Bit errors (TSEs): n=2 – 9

SDH Structure:

Anomalies   B1, B3: n=4 – 9

MS-REI, LP-BIP (except C4), LP-REI (except C4): n=3 – 10

B2: n= 3 – 9

HP-REI: n=4 – 10

Defects   LOS, LOF, RS-TIM, MS-AIS,MS-RDI, AU-LOP, AU-AIS, HP-UNEQ,HP-RDI, HP-TIM, HP-PLM, TU-LOP, TU-AIS, TU-LOM, LP-UNEQ,LP-RDI, LP-TIM,LP-PLM, LP-RFI

PDH Structure:

Anomalies   FAS, EBIT (Framed 2Mbit/s only): n=3 – 10

CRC (Framed 2Mbit/s only): n=3 – 9

P-BIT (Framed 45Mbit/s only): n=4 – 8

Defects   AIS, LOF, RDI

Yellow, Idle (45Mbit/s only)

SDH and PDH receive signals

Signal structures as for generator unit

Error measurements

Error types: B1, B2, B3, MS-REI, HP-REI, LP–REI, TSE, LP-BIP, PDH, FAS-45, FAS-34, FAS-2, REI-45, CP-BIT, EBIT-2, CRC-2, HP-IEC, LP-IEC, HP-OEI, HP-TC-DIFF, HP-TC-REI

Alarm detection

All alarms are monitored and detected simultaneously.

Alarm types: LOS, OOF, LOF, AU-LOF, MS-AIS, MS-RDI, RS-TIM, AU-AIS, AU-LOP, AU-NDF,HP-RDI, HP-UNEQ, HP-TIM, HP-PLM, TU-AIS, TU-LOP,TU-LOM, LP-RDI, LP-PLM, LP-UNEQ, LP-TIM, LSS, LP-RFI, PDH-AIS

IDLE, YELLOW (45 Mbit/s only)

OK Summary display

Display of large OK for error free circuits for fast and simple installation checks. Upon detection of any anomaly or defect the OK is removed and replaced with a hierarchical list of events – allowing easy diagnosis of problems. Display of signal structure with BER or BLER displayed simultaneously.
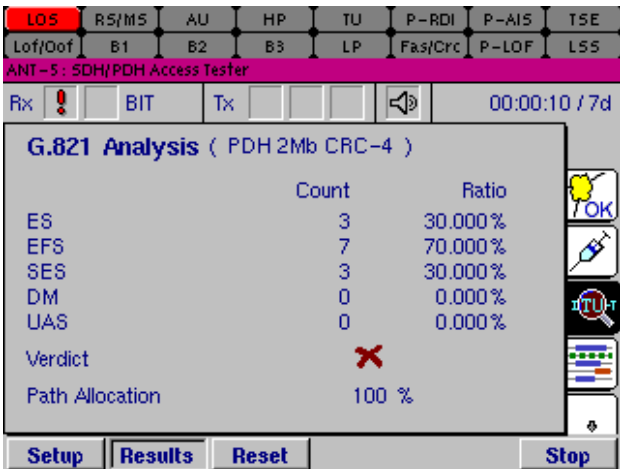
Performance Analysis

ITU–T Recommendation G.821

ES, EFS, SES, DM and UAS are evaluated.

Pass/fail assessment based on line length allocation of 1 to 100%.

Evaluation for higher bit rates (up to 140Mbit/s) is obtained using a multiplex factor as per G.821, Annex D.

Measurements can be made using the following events: bit errors (TSEs), FAS-2, CRC-4 and E bit (2Mbit/s), FAS-34, FAS-140.

ITU–T Recommendation G.826

EB, BBE, ES, EFS, SES and UAS are evaluated.

Pass/fail assessment based on line length allocation of 1 to 100%.

The SES and UAS thresholds are user-settable.

In-service measurement (ISM)

Simultaneous in-service measurement of near end and far end of a selected path:

Measurements can be made using the following events: RSOH B1, MSOH B2, HP B3, FAS-140, FAS-34, FAS-2, CRC (2Mbit/s), LP-BIP.

Out of service measurement (OOS)

Out of service measurement using bit errors in the test pattern (for PDH and SDH).

ITU–T Recommendation M.2100

ES, EFS, SES and UAS are evaluated.

Pass/fail assessment based on line length allocation of 1 to 100%.

The UAS and BISO (bringing into service objectives) thresholds are user-settable.

Measurements can be made using the following events: TSEs, FAS-2, FAS-34, FAS-140, CRC (2Mbit/s)

ITU–T Recommendation M.2101

ES, EFS, SES, BBE, SEP and UAS are evaluated.

Pass/fail assessment based on line length allocation of 1 to 100%.

The UAS and BISO (bringing into service objectives) thresholds are user-settable.

ISM simultaneously for near end and far end of a selected path:

PDH systems

Measurements can be made using the following events: TSE, LP-BIP, HP-B3, MSOH-B2, RSOH-B1.

Defect Panel

On screen hierarchical LED indication of defects.

Event Log

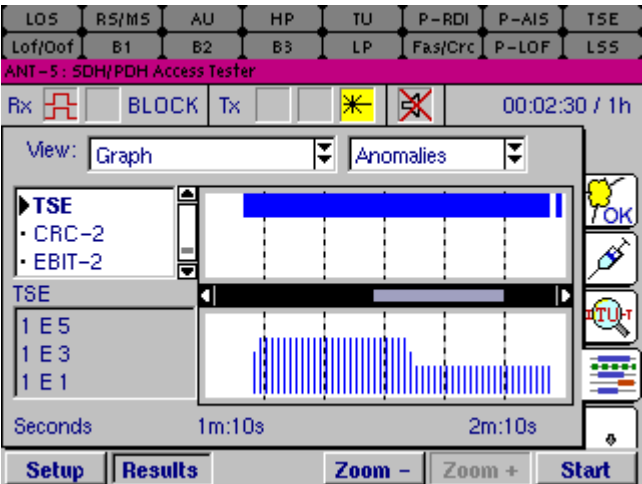Tabular display of timestamped events.

Anomaly Count

Table of all Anomalies with measured count and ratio.

Graphical display (histogram)

Display of errors, and alarms as bargraphs vs. time.

Zoom function allows display resolution of seconds, minutes, hours, days.

SOH and POH evaluation

Display of complete SOH and POH in Hex, Binary and ASCII formats.

Text Decode of S and C bytes.

For the Trace Identifier.

J0 display of 16 byte ASCII sequence.

J1, J2 display of 16 or 64 byte ASCII sequence.

Tandem Connection Monitoring (TCM)

Analysis of N1 and N2 bytes

Monitoring/display of: TC-IEC, TC-AIS, TC-REI, TC-OEI, TC-UNEQ, LTC, TC-AIS , TC-RDI, TC-ODI, TC-REI

On-line display of TCM Access Point Identifier

TCM error measurement
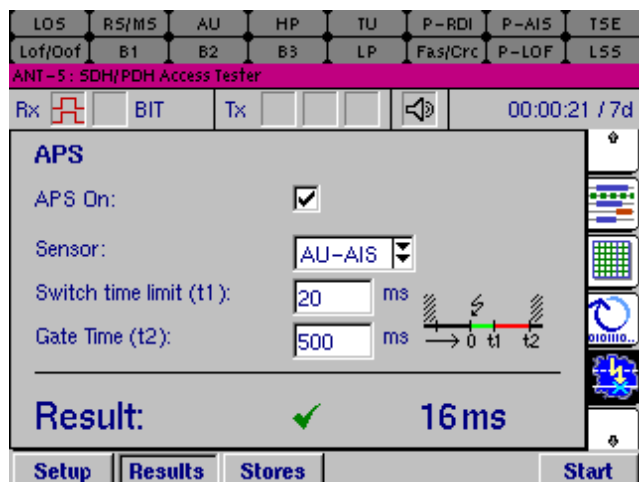
Incoming B3/computed BIP comparison

Auto Protection Switching (APS)

Operates at SDH and PDH interfaces

Measurement triggers: MS-AIS, AU-AIS, TU-AIS or bit error

Pass/fail user specified time limit: 10 to 2000ms

1mS resolution and accuracy

Round Trip Delay (RTD)

1 µS resolution

Measurement range 10 seconds

Pointer Analysis

Pointers analysed:	AU, TU

Current pointer values displayed

Displays counts of:	Pointer increments
	Pointer decrements
	New data flags (NDFs)
	Inc./Dec. sum and difference

Average deviation (in ppm) of AU & TU

User selectable recording of pointer events into the event log.

Repetitive BER test

BER evaluation over user definable period: 1-99 seconds

Automatically repeating feature

Progress bar displays the current test period

Large character display of BER result

Measurement Timers

Variable	1 second to 99 days
Measurement start	manual or delayed start timer
Measurement stop	manual or automatic timer
Display of elapsed time	hh:mm:ss

Results Memory

Resolution of error events	1 second
Alarm resolution	100ms
Memory capacity	up to 10,000 entries
	(approx. 7 days at 1 entry per minute)

Alarm notification

Anomalies and defects are indicated via LEDs, on-screen graphic icons and via an audio beeper.

Printing

Setups and measurement results can be printed using printers compatible with DeskJet, Thinkjet and Epson9 print drivers.

Printer/remote interface:
  Serial V.24/RS 232
  Parallel using adapter cable K1589

Result export

Results can be exported to PC in .CSV format using V.24 or PC Card.

These can be processed using standard PC software.

Display

Color TFT LCD screen

Resolution   320 x 240 pixels

Languages

The user interface can be displayed in the following languages:
   English, German, French, Spanish, Portuguese and Chinese

PCMCIA interface

Type PCMCIA 2.1 types I, II

Using RAM cards the PCMCIA interface provides results and setups stoarge and results export.

Power outage function

In the event of an AC line power failure during a measurement, continues to perform measurements using its internal batteries.

General specifications

Power supply

AC line voltage using PPS-1 adapter   100 to 240V

AC line frequency   50/60Hz

Typical operating time on Batteries:
                         3 hours (for STM-1 optical test)

Safety class to IEC 1010-1 Part 1

Pollution environment Degree 2

Installation category II (indoor use)

Ambient temperature:
   Nominal range of use   +5°C to +45°C
   Storage and transport range   -20°C to +60°C

Dimensions (in millimetres)   approx. 199 x 258 x 95

Weight   approx. 2.35kg

Ordering information

Acterna SDH Access Tester ANT-5   BN4565/10

Options:

STM-1 Optical FC/PC 1310nm	BN 4565/00.01
STM-1 Optical FC/PC 1550nm	BN 4565/00.02
STM-1 Optical FC/PC 1310 and 1550nm	BN 4565/00.03
STM-1/4 Optical FC/PC 1310 and 1550nm	BN 4565/00.14

Accessories

RAM Card (1 Mbyte)	BN4548/00.11
Printer Cable	K1524
Modem cable	K1550
Serial to Parallel interface converter cable (for printing)	K1589
Shoulder bag	BN4548/00.09
Neck Strap	BN4548/00.08
Hard carrying case (small)	BN4548/00.07
Hard carrying case (large)	BN4548/00.06
Soft Carrying case	BN4518/00.08

Single mode optical cables:

FC-PC/FC-PC	K1605
FC-PC/SC-PC	K1606
DIN47256/FC-PC	K1607
FC-PC/E-2000	K1608
FC-PC/E-2000 APC	K1609
FC-PC/ST-PC	K1610
FC-PC/RADIALL VFO	K1611
FC-PC/FC-APC	K1612
FC-APC/FC-APC	K1613
Electrical Cables:	
BNC/BNC (2m)	K169(4)
RJ-48/2 x cf	K1597
RJ-48/RJ-48	K1598
RJ-48/RJ-48 (M)/RJ-48 (F)	K1599

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