NETWORK TESTING EQUIPMENT
BTM10 Series

BTM10 Series
BTM10-E1/T1

E1/T1 TRANSMISSION ANALYZER

BTM10-E1/T1: E1/T1 PCM Multi-Tester with Full Features
BTM10A-E1/T1: E1/T1 PCM Multi-Tester without Pulse Shape Feature
BTM10B-E1/T1: E1/T1 PCM Multi-Tester without Datacom Feature
BTM10C-E1/T1: E1/T1 PCM Multi-Tester without Pulse Shape, and Datacom Features

The ***BTM10–E1/T1*** series analyzer is a compact, notebook sized E1/T1 PCM measuring instrument designed for field use in analysis and maintenance of E1 (2.048Mbps) or T1 (1.544Mbps) lines. The ***BTM10*** performs framed, unframed, signaling analysis, drop and insert 8K voice, Nx64Kbps, or Nx56Kbps data into any time slot. The ***BTM10*** series analyzer also provides a variety of E1 or T1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 or T1 line, the ***BTM10*** series product may be used as a generator or receiver.

Functions

- **E1 BERT Analysis:** E1/T1frame, code, CRC, and BPV performance analysis and generator.
- **Alarm Setting:** Manual or automatic alarm setting.
- **VF Access:** Drop and Insert 8K voice; Low frequency generator (transmit VF Frequency from 60 to 3950 Hz, transmit VF level from 0dBm to -55dBm) and measurement(A-law and μ-law). Voice access by using telephone handset.
- **Pulse Shape:** E1/T1 pulse shape analysis.
- **Signal Result:** E1/T1 PCM level meter and frequency analysis.
- **Signaling Setting:** ABCD bit setting.
- **Singaling Display:** Display all channels of ABCD bits.
- **BERT on Data Port:** Data port BERTperformance analysis.
- **Remote Control:** Remote controlled by PC terminal or modem.
- **SS7 Analysis:** Decode and performance analysis of levels 2, 3, 4.
- **Examine Analysis:** Off-line analysis of BERT performance.
- **External Drop and Insert:** Acts as a Fractional E1 or T1 converter.
- **User Programmable Pattern Setting:** There are three 32 bit Programmable patterns,which can be inserted onto the E1/T1 line and drop for analysis.
- **Timeslot Setting:** Available,bypassed, or idle timeslot, Drop and Insert Nx64k data onto E1/T1 line.
- **Timeslot Mapping Data:** Analyze any channel data of two frames.
- **SLIP Measure:** Uncontrolled,Controlled, Frame, and Timing SLIP measure.
- **Sa Bits Setup and Monitor:** Multiframe Sa bits setup and monitor.(E1 only)
- **File Management:** Ten configuration and result memory locations can be stored and recalled by user.
- **Datacom Clock Measurement**
- **Round Trip Delay Measurement**
- **ISDN Analysis:** Digital Subscriber Signaling System No.1(DSS 1)-Monitoring ISDN D-Channel Signaling information (ITU Q.921,Q.931).
- **V5.1/V5.2 Analysis:** Monitoring V5 Signaling information

E1 Specifications

1.Receiver Interface of E1/CEPT

Line Code: HDB3/AMI

Pulse characteristics: meets ITU-T G.703

Jitter Tolerance: meets ITU-T G.823

Input Port Type: Coaxial pair:
Symmetrical pair:

Input mode (with AGC):
Termination:
Coaxial Pair Impedance:
75ohm resistive (unbalanced)
Symmetrical Pair Impedance:
120ohm resistive (balanced)
Return Loss:
>18dB
Receive Sensitivity:
+3dB to -40dB

Bridge Mode:
Impedance:
>1000ohm
Receive Sensitivity:
+3dB to -30dB

DSX-MONitor Mode:
Coaxial Pair Impedance
75ohm resistive (unbalanced)
Symmetrical Pair Impedance:
120 ohm resistive (balanced)
Receive Sensitivity:
+6dBdsx to -30dBdsx

Recevice Timing Range: 2.048MHz ±4000Hz

2.Transmitter Interface of E1/CEPT:

Bit Rate: 2048K bit/s ±3ppm.

Line Code: HDB3/AMI

Pulse characteristics: meets ITU-T G.703

Pluse Amplitude: Nominal 2.37V for Coaxial Pair 75 ohm
Nominal 3.00V for Symmetrical Pair 120 ohm

Zero Amplitude: +0.1 V max.

Jitter Tolerance: meets ITU-T G.823

Output Port Type:
Coaxial pair:
BNC (unbalance)
Symmetrical pair:
Bantam or DB15 (balanced)

TX Clock Source:
1.Internal Timing:
2.048MHz ±3ppm.
2.Internal Timing plus 50ppm offset (30ppm factory option)
3.Internal Timing minus 50ppm offset (30ppm factory option)
4.Recovery from RX Timing (Loop Timing)
5.External Timing
6.Data Port Timing

3.E1/CEPT Frame Structure:

FAS	(PCM31)
FAS+CRC4	(PCM31 with CRC)
FAS+CAS	(PCM30)
FAS+CRC4+CAS	(PCM30 with CRC)
Unframed	

4.Line Build Out:

0dB
-7.5dB
-15dB
-22.5dB
(Accuracy ±1dB)

Analyzer Mode

1.Channel Map
2.Line Attenuation
3.Slip Measure
4.Signaling
5.General Status:
- Signal Present
- HDB3
- Pattern Sync
- Frame Sync
- Looping

6.Results:
- Bit Errors
- BPV Errors
- Frame Errors
- CRC Errors
- G.821 Analysis
- G.826 Analysis

7.Alarm/Warning:
- Signal Loss (Pulses)
- Frame Loss
- Pattern Loss
- Excess Zero Error
- One Density
- AIS
- SLIP
- RAI
- MRAI

8.Print out of test results

T1 Specifications

1.Receiver Interface of T1/DS1

Line Code: B8ZS/AMI

Pulse characteristics: meets ITU-T G.703

Jitter Tolerance: meets ITU-T G.824

Input Port Type: Symmetrical pair:
Bantam or DB15 (balanced), andBNC

Input mode (with AGC):
Termination:
Symmetrical Pair Impedance:
100 ohm ±5% resistive (unbalanced)
Return Loss:
>18dB
Receive Sensitivity:
+6dB to -36dB

Bridge Mode:
Impedance:
>1000 ohm
Receive Sensitivity:
+6dB to -30dB

DSX-MONitor Mode:
Symmetrical Pair Impedance:
100 ohm ±5% resistive (balanced)
Receive Sensitivity:
up to -30dBdsx

Recevice Timing Range: 1.544MHz ±4000Hz

2.Transmitter Interface of T1/DS1:

Bit Rate: 1544K bit/s ±3ppm.
Line Code: B8ZS/AMI
Pulse characteristics: meets ITU-T G.703
Pluse Amplitude: Nominal 3.00V for Symmetrical Pair 100 ohm
Zero Amplitude: ±0.1V max.
Jitter Tolerance: meets ITU-T G.824
Output Port Type: Symmetrical pair:
Bantam or DB15(balanced), or BNC

BTM10-E1/T1

TX Clock Source:

1.Internal Timing:
1.544MHz ±3ppm.
2.Internal Timing plus 50ppm offset (30ppm factory option)
3.Internal Timing minus 50ppm offset (30ppm factory option)
4.Recovery from RX Timing (Loop Timing)
5.External Timing
6.Data Port Timing

3.T1/DS1 Frame Structure:

ESF
ESF+CRC6
D4(SF)
SLC-96
T1DM
Unframed

4.Line Build Out:

0dB
-7.5dB
-15dB
-22.5dB
(Accuracy: ±1dB)

Analyzer Mode

1.Channel Map
2.Line Attenuation
3.Slip Measure
4.Signaling:ABCD
5.General Status:
- Signal Present
- B8ZS
- Pattern Sync
- Frame Sync
- Looping

6.Results:
- Bit Errors
- BPV Errors
- Frame Errors
- CRC Errors
- G.821 Analysis
- G.826 Analysis

7.Alarm/Warning:
- Signal Loss (Pulses)
- Frame Loss
- Pattern Loss
- Excess Zero Error
- One Density
- AIS
- SLIP
- Yellow Alarm
- Loop Up
- Loop Down

8.Print out of test results

Interface Port Description

DB15(Male): E1/T1 TX and RX Port
BNC x 2: E1/T1 TX and RX Ports
Bantam x 2: E1/T1 TX and RX Ports
Bantam x 1: External Clock In

HD26(Female): Data Port (RS-449/530,V.35 X.21, RS-232 interface)

DB15(Fmale): Printer Port

DB9(Male): Remote Control Port/Serial RS-232 Print Port(option)

RJ-45/RJ-11: Voice handset In/Out

Slide Switch: External(Reference)Clock Setting: TTL/PCM

Power Switch: Power ON/OFF

Mini-Phone Jack: DC9V~12VIN

G.703 E1/T1 BERT Test

1. BERT Patterns

63, 127, 2^9-1 (511), 2^{11}-1 (2047), 2^{15}-1 ITU standard, 2^{15}-1 non- standard(inverted), 2^{20}-1 ITU standard, 2^{20}-1 non-standard(inverted), QRSS, 2^{23}-1 ITU standard, 2^{23}-1 non-standard(inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

2. BERT Display Format

- Normal
- ITU M.2100 (option)
- ITU G.821
- ITU G.826

3. BERT Transmit Error Rate

- Force Single Error: Logic (Bit), Frame, CRC, and BPV (Bipolar Violation)
- Force 10^{-3} to 10^{-7} Error Rate: Logic (Bit), Frame, CRC, and BPV

4. Performance Analysis:

Logic, Frame, CRC, BPV, E-bit Errors
Receive Counter
Error Seconds
Error Free Seconds
Error Rate
G.821 Available Seconds
G.821 Degraded Minutes
G.821 Severely Error Seconds
G.821 Error Seconds
G.821 Unavailable Seconds
G.826 Blocks
G.826 Available Seconds
G.826 errored block (EB)
G.826 background block error (BBE)
G.826 errored second (ES)
G.826 severely errored second (SES)
G.826 errored second ratio (ESR)
G.826 severely errored second ratio (SESR)
G.826 background block error ratio (BBER)
LOF (Loss of Frame) Events
COFA (Change of Frame Alignment)Events
Severely Error Frame Count

DATACOM BERT Test

Mode A: DTE or DCE Synchronous BERT

1. Interface:

RS-232 (max. speed up to 128Kbps), V.35, X.21, RS-232, RS-449

2. Data rates for 56Kbps multiples; N x 56Kbps (N=1~24):

56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k, 560k, 616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k, 1064k, 1120k, 1176k, 1232k, 1288k, 1344k, 1400k, 1456k, 1512k, 1568k, 1624k, 1680k, 1736k, and 1792k bps.

3. Data rates for 64Kbps multiples; N x 64Kbps (N=1~32):

64k, 128k, 192k, 256k, 320k, 384k, 448k, 512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k, 1024k, 1088k, 1152k, 1216k, 1280k, 1344k, 1408k, 1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k, 1856k, 1920k, 1984k, and 2048k bps.

4. BERT Patterns:

63, 127, 2^9-1 (511), 2^{11}-1 (2047), 2^{15}-1 ITU standard, 2^{15}-1 non- standard(inverted), 2^{20}-1 ITU standard, 2^{20}-1 non-standard(inverted), QRSS, 2^{23}-1 ITU standard, 2^{23}-1 non-standard(inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

5. Tx Clock Source:

The Tx Clock may be set to internal or external. The polarity may also be inverted.

6. Rx Clock Source:

The Rx Clock is set to external. The polarity of the external clock may also be inverted.

7. BERT Transmit Error Rate:

single, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7.

8. Flow Control:

DCE permitted to transmit on RTS signal or not, DTE permitted to transmit on CTS signal or not.

Mode B: DTE or DCE low speed BERT

1. Data Rate:

Asynchronous: from 50 to 115.2K bps.
Synchronous: from 150 to 72K bps.

2. BERT Patterns:

63, 511, 2047, FOX, SPACE, MARK, and ALT

3. Tx Clock Source:

DTE or DCE.

4. Flow Control:

Xon/Xoff, RTS/CTS, or disable.

Special Features

1. **Pulse Wave Analyzer (optional)**
   ITU G.703(E1), ANSI T1.403(T1) & ITU G.703(E1,T1)
2. **Loop Back Code Setting and Detection:**
   IN Band, Out Band and ITU-T V.54
3. **DS0 Control Loop Codes (optional)**
   TIP, LSC, LBE, FEV
4. **VF Noise Measurement (optional)**
   C-Message Weighting, P-Weighting
5. **Large LCD display**
   32 Characters x 8 Lines
   Text / Graphic mode
6. **Results Report**
   Internal Memory storage of test result.
   Direct display on LCD screen
   Print out via Parallel Printer port
   Print out via RS-232 Series Port (option)
7. **Portable for field use**
8. **Upgradeable for advanced features**
9. **Rechargeable Battery with battery low indicator**
10. **Temp. Range**
    0° C to 50° C (operating)
    -20° C to 60° C (storage)
11. **Humidity: up to 95%**
12. **Power Source**
    AC 100-240V / DC12V/1A Switching adapter
13. **Dimensions**
    173 mm (L) x 235 mm (W) x 54 mm (H)
14. **Weight**
    1.6 kg net

Transmission Analyzer Series Comparison Chart

FUNCTIONS / MODEL NAME			BTM10-E1					BTM10-T1					BTM10-E1/T1				
				A	B	C			A	B	C			A	B	C	
Interfaces	RS-232, V.35		▲	▲				▲	▲				▲	▲			
	RS-449/RS-530/X.21		▲	▲				▲	▲				▲	▲			
	E1		▲	▲	▲	▲							▲	▲	▲	▲	
	T1							▲	▲	▲	▲		▲	▲	▲	▲	
	G.703 64K Codirectional		●	●				●	●				●	●			
CCS Analysis	SS#7, ISDN-D, V5.1/V5.2		●	●	●	●		●	●	●	●		●	●	●	●	
BERT Analysis	**Datacom**	128K Basic Analysis	▲	▲				▲	▲				▲	▲			
		2M Basic Analysis	▲	▲				▲	▲				▲	▲			
		2M G.821 Analysis	▲	▲				▲	▲				▲	▲			
	E1/T1	Basic Analysis	▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
		G.821/G826 Analysis	▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
		M.2100 Analysis	●	●	●	●		●	●	●	●		●	●	●	●	
		Histogram	▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
Control type	Remote Control		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	Auto Configuration		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
Data Save type	Printer Feature		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	File Management		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
Features	Datacom Clock Measurement		▲	▲				▲	▲				▲	▲			
	External Drop and Insert (DSU/CSU)		▲	▲				▲	▲				▲	▲			
	Pulse Shape		▲		▲			▲		▲			▲		▲		
	VF Access		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	Signal Result Level Measurement		▲		▲			▲		▲			▲		▲		
	Signal Result Frequency Measure		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	Alarm Setting and Monitor		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	Looping Setting and Monitor							▲	▲	▲	▲		▲	▲	▲	▲	
	Signaling Setting and Display		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	Timeslot Setting and Display		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	SLIP Measurement		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	User Program Patterns Setting		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	Sa Bit Setting and Display		▲	▲	▲	▲							▲	▲	▲	▲	
	Round Trip Delay Measurement		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	
	Self Test and Diagnostics		▲	▲	▲	▲		▲	▲	▲	▲		▲	▲	▲	▲	

Note: The ▲ denotes available, the ● denotes optional.

Application