HCT-7000 *BERT / Protocol Analyzer*

X.25, Frame Relay, HDLC, PPP, ISDN-D

The ***HCT-7000*** is a portable, battery powered communication tester, designed for a wide range of protocol analysis and BERT (Bit Error Rate Test) at full E1 speeds (2.048Mbps) and is fully suitable for equipment installations, on-line or off-line diagnostics, debugging, and interface development.



The ***HCT-7000*** features a backlit Liquid Crystal Display (LCD), push-button switch keyboard, interface lead indicator LEDs, PCMCIA card slot, user replaceable data port interface modules and internal rechargeable Li-Ion battery. The unit includes the Basic Interfaces, basic operational firmware, comprehensive User Guide, universal AC power adapter (100~240 VAC) and a sturdy hard shell carry case.

General Specifications

- **Interface Modules (Dual Port)**
  - Datacom Interface Module: RS-232C/D (V.24), RS-449 (V.36), RS-530, X.21, V.35.
  - E1 Interface Module: G.703 E1 (2048K).
  - *T1 Interface Module: G.703 T1 (1544K).
  - *G.703 64K Co-directional Module
  - others to be announced
- **Basic Interfaces**: Centronics Printer port, Craft control Serial port.
- **Protocols**: Async, Sync (BSC), HDLC, SDLC, X.25, Frame Relay, SS#7, PPP (Sync.), V5.1, V5.2, ISDN-D, *DDCMP, *SNA, *SLIP.
- **Data Rate**: ASYNC/SYNC:150-2.048Mbps
- **Data Code**: ASCII, EBCDIC, HEX, IPARS, TRANSCODE, EBCD
- **Data Length**: ASYNC Mode: 5,6,7, or 8 bits; SYNC Mode: 8 bits
- **Parity Bit**: ASYNC Mode: None, Odd, Even, Mark, Space.
- **Stop Bits**: ASYNC Mode: 1, 2
- **Display Modes**: Data only: Full Duplex; Data only: Half Duplex; Data and Lead Status; Frame and Packet.
- **Error Check**: None, Parity, LRC, CRC-16, CRC-CCITT.
- **Status LEDs**: System: External power, I/F 1 Error, I/F 2 Error, Paused. Datacom Interface Module: TD, RD, RTS, CTS, DSR, DTR, DCD, RI, XTC, TC, RC, RL, LL, TM. E1 Interface Module: Signal Present, HDB3, Signal Loss, FAS Loss, MFAS Loss, CAS Loss, Pattern Loss, Excess Zero, AIS, RAI, MRAI, Error. *T1 Interface Module: Signal Present/ Loss, B8ZS, Frame Loss, Pattern Loss, Excess Zero, One Density, AIS, Yellow, Loop UP, Loop Down, Error.
- **LCD Display**: 320x240 dots graphic (30 lines, 40 characters per line), with CCFL backlight, contrast controls.
- **Capture Buffer**: SDRAM
- **Storage**: *PCMCIA FLASH Card, up to 64MB.
- **Line Monitor**: DTE; DCE; DTE & DCE
- **Emulation**: DTE; DCE; MONITOR only
- **Counters&Timers**: 5 each internal counters and timers.
- **Power Source**: AC100~240V adapter to DC 19V/2.9A
- **Physical Dim.**: 220 (W) x 275 (H) x 65 (D) mm
- **Weight**: ~1.6 Kg
- **Temperature**: 0-50 C (32-125 F)
- **Humidity**: up to 90% RH non-condensing

denotes item is still under development, please check with the sales representative for the latest information

Specifications For G.703 E1/T1 BERT

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)
- ITUG.821
- ITUG.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 Errored Frame Count

Features

- **Frame Relay Analysis:**
  Analysis s/w package
  2M frame monitor and emulation based on ITU Q.933, ANSI T1.618/T1.617 and RFC1490 (RFC2427) packets.
  **Application s/w package*
  LMI analysis, automatic DLCI detection, FOX and user defined test messages over active DLCIs, Pings for end-to-end routing tests, DLCI statistics, Performance Statistics, Load Testing, Filtering.
- **Menu driven setup**
- **Auto Configuration**
- **Histogram Analysis**
- **ASYNC terminal emulation**
- **File Management**
- ***Remote Control**
- **Self Tests and Diagnostics**

Specifications For DATACOM BERT

Mode A: DTE or DCE Synchronous BERT

1. Interface:

RS-232, V.35, X.21,
RS-449, RS-530

2. Data rates for 56Kbps multiples; Nx56Kbp (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; Nx64Kbps(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.

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HCT-7000 BERT / Protocol Analyzer

Master Set

HCT7000

- A Master unit includes a backlight LCD, push-button switch keyboard, internal rechargeable battery, AC power adapter (100~240VAC), hard shell carry case.
- There are two slots for modularized hardware interfaces, one PCMCIA (PC Card) card slot for optional expandable Memory RAM, one remote control port (RS-232 async) and one printer port (Centronics).
- The standard cable accessories include one remote control cable DB9M to DB9F+DB25F and one printer cable DB15M to C36M.
- Hardware interface modules and software packages must be ordered separately as options.

Hardware Options

1. Datacom Interface Module

- Datacom 2M (2.048Mbps) BERT with the following protocol analysis; Frame Monitor and Emulation Package:
- Async, Sync, SDLC, HDLC, X.25, Frame Relay, PPP (Sync.) and *DDCMP.
  Two HD26 ports supporting RS-232,V.35, RS-530/RS-449, X.21. programmable interface.
- The standard accessory cable is HD26M to DB25M (RS-530 Standard) plus a gender changer. Other interface cables must be ordered separately.

Optional Adapter cables

CAB-HD26DB25M(F)-232-1	HD26/M to DB25(F/M) cable, 1 meter
CAB-HD26DB25M(F)-V35-1	HD26/M to MB34(F/M) cable, 1 meter
CAB-HD26DB37M(F)-449-1	HD26/M to DB37(F/M) cable, 1 meter
CAB-HD26DB25M(F)-530-1	HD26/M to DB25(F/M) cable, 1 meter
CAB-HD26DB25M(F)-X21-1	HD26/M to DB15(F/M) cable, 1 meter

2. E1 Interface Module

- E1 Logic, Frame, CRC, BPV, E-bit BERT, G.821/826 BERT, M.2100 BERT.
- Optional sofware for the E1 Frame Relay protocol analysis and CCS analysis for SS#7, ISDN,V5 .
- Two BNC ports, one DB15 for Balanced and one Bantam for receiving external clock.
- The standard accessories are two BNC to BNC, 75Ohm, cables and one Bantam to Bantam, 120 Ohm, cables.
  Other optional cables as follows:

Optional Adapter cables

DB15/RJ-45 adapter	DB15 to RJ-45 adapter
CAB-DB15BANF2-E1	DB15M to 2 X Female Bantam cables.
CAB-DB15BANM2-E1	DB15M to 2 X Male Bantam cables.
CAB-BANMIPM-E1	E1 Bantam to MIPS 120ohm cable.
CAB-BAN3PSM-E1	E1 Bantam to 3-Pole Siemems cable.

***3. T1 Interface Module**

- T1 Logic, Frame, CRC, BPV, G.821/826 BERT, M.2100 BERT
- Two Bantam ports, one DB15 for Balanced and one Bantam for receiving external clock.
- Other optional software scheduled for future release.
- The standard accessories are a pair of Bantam to Bantam 100 Ohm cables.
  The other optional cables as follows:

Optional Adapter cables

DB15/RJ-45 adapter	DB15 to RJ-45 adapter

***4. G.703 64K Interface Module**

- Two BNC ports and one RJ-45 port for G.703 64K Codirectional/Contradirectional/Centradirectional interface module.

Software Options

All software options apply to Datacom, E1, or T1 at speeds up to 2.048Mbps.

1. Frame Relay Protocol Analysis software package

Analysis s/w package - (A) package

2M frame monitor and emulation based on ITU Q.933, ANSI T1.618/T1.617 and RFC1490 (RFC2427) packets.

**Application s/w package - (B) package*

LMI analysis, automatic DLCI detection, FOX and user defined test messages over active DLCIs, Pings for end-to-end routing tests, DLCI statistics, Performance Statistics, Load Testing, Filtering.

***2. PPP/SLIP Protocols Analysis software package**

PPP (Sync.) Frame Monitor and Emulation Pack.
SLIP, PPP (Async.) Frame Monitor and Emulation Pack.

***3. SNA Protocols Analysis software package**

SNA Frame Monitor and Emulation Pack.

4. SS#7 F/W

E1/T1 CCS SS#7 Protocol Analysis Firmware Pack.

5. ISDN F/W

E1/T1 CCS ISDN-D Channel Protocol Analysis Firmware.

6. V5 F/W

E1 CCS V5.1/V5.2 Protocol Analysis.

PCMCIA Option

PCMCIA Memory Card

Optional Expandable PCMCIA Flash Card, capacity up to 64MB.

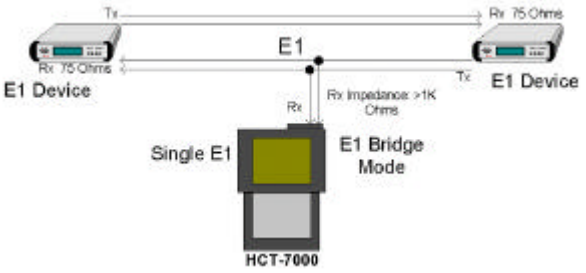
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Applications

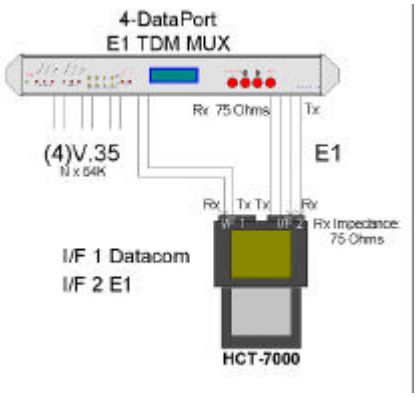
E1 Terminal Mode



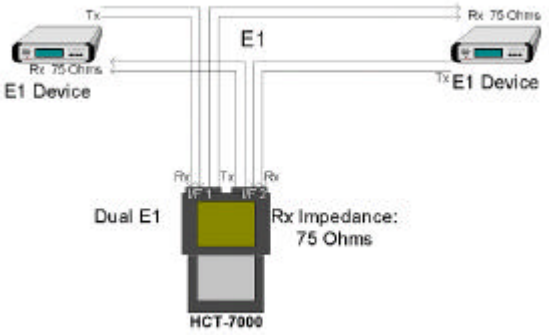
E1 Bridge Mode



MUX feature - E1 BERT & Datacom BERT



E1 Dual Port - Drop and Insert BERT Test



Ordering Information (only currently available items listed)

HCT 7000 A Master unit include a backlight LCD,tactile switch keyboard, interface lead indicator LEDs, internal rechargeable battery, AC power adapter (90~260VAC), sturdy carry case

Hardware Options

E1 I/F Two BNC ports, the standard accessories are two BNC to BNC 75 ohm cables.

Optional Adaptor Cables for E1 I/F

1)DB15/RF-45 adapter 2)CAB-DB15BANF2-E1 3)CAB-DB15BANM2-E1
4)CAB-BANMIPM-E1 5)CAB-BAN3PSM-E1

Datacom I/F Two HD26 ports supporting RS-232, V.35, RS-530/RS-449, X.21interface. The standard accessory cable is HD26M to DB25M (RS-530 Standard) plus a gender changer.

Optional Adaptor Cables for Datacom I/F

1)CAB-HD26DB25M(F)-232-1 2)CAB-HD26DB25M(F)-530-1 3)CAB-HD26DB25M(F)-449-1
4)CAB-HD26DB25M(F)-X21-1 5)CAB-HD26DB25M(F)-V35-1

Software Options

Frame Relay (A) Package	Frame Relay Analysis s/w package
SS#7 F/W	E1/T1 CCS SS#7 Protocol Analysis Firmware Pack.
ISDN F/W	E1/T1 CCS ISDN-D Channel Protocol Analysis Firmware.
V5 F/W	E1 CCS V5.1/V5.2 Protocol Analysis.