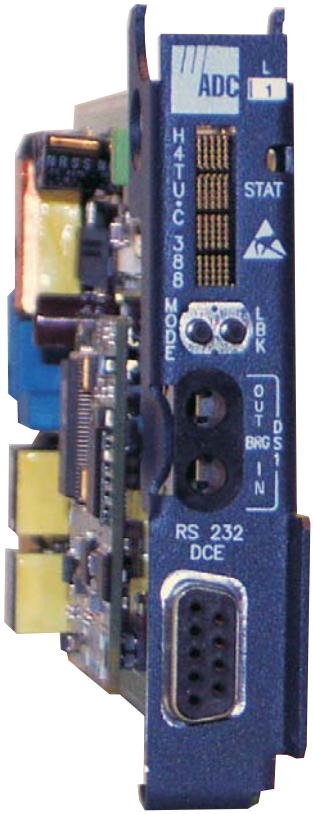
HDSL4

QUICK INSTALLATION



H4TU-C-388 LIST 1
LINE UNIT

ADC

H4TU-C-388 LIST 1

The H4TU-C-388 List 1 line unit is the Central Office (CO) side of a T1 transmission system. The H4TU-C, when used with an H4TU-R remote unit, transmits a 1.544 Mbps payload a maximum distance of 12 kft. over two unconditioned copper pairs. Using two doublers (H4Ds), the Carrier Service Area (CSA) reach can be extended to a maximum of 34 kft. (See Specifications below.)

The H4TU-C-388 List 1 is designed to mount in Double Dual Module Plus (DDM+) high-density shelves.

FEATURES

Front-panel features: status LED, craft port, MODE and SEL pushbuttons for setting system parameters and activating loopback commands (including dual loopbacks), DSX-1 test jacks, and a four-character status display

HDSL4 transmission features:

- Doubler (HD4) support for up to three spans
- Grounded loop detection on HDSL4 spans
- Bit Error Rate Tester (BERT)
- Spectrum compatibility with ADSL services

Maintenance screens for inventory, provisioning, performance monitoring, and troubleshooting, including:

- Remote provisioning
- Loop attenuation and insertion loss reporting
- Power Back Off (PBON and PBOC) for configuring HDSL4 transmit power levels to reduce crosstalk
- Report menu option for downloading status and performance data

Sources sealing current when connected to any locally powered H4TU-R-402

SPECIFICATIONS

Operating Temperature	-40°F to +149°F (-40°C to +65°C)
Operating Humidity	5% to 95% non-condensing
CSA Reach	34 kft. maximum using 26 AWG: 12 kft. (Span 1), 11 kft. each (Spans 2 and 3)
CO Supply	-48 Vdc nominal (-42.5 to -56.5 Vdc)
HDSL4 Span Voltage	0, -185 Vdc, ±123 Vdc (voltage is applied across Loop 1 and Loop 2)
Mounting	Double Dual Module Plus (DDM+) high-density
HDSL4 Line Rate	784 kbps Overlapped Pulse Amplitude Modulation (OPAM) transmission per pair
HDSL4 Output	+14.1 dBm ±0.5 dB, 135Ω
Maximum Insertion Loss	Span 1 = 47 dB at 196 kHz Span 2 and Span 3 = 43 dB at 196 kHz
Maximum Loop attenuation	Span 1 = 31 dB Span 2 and Span 3 = 29 dB
DSX-1 Line Rate	1.544 Mbps ±200 bps
DSX-1 Line Format	Alternate Mark Inversion (AMI) or Bipolar with 8-Zero Substitution (B8ZS)
DSX-1 Frame Format	Extended SuperFrame (ESF), SuperFrame (SF) or Unframed (UNFR)
DSX-1 Pulse Output	$6V^{pk\text{-}pk}$, pre-equalized for 0 to 655 feet of ABAM cable

1 INSTALLATION

Align the H4TU-C with the shelf card-slot guides and slide the unit in. Press down on the front panel to snap the H4TU-C into place.

2 POWER-UP SEQUENCE

When the H4TU-C powers up, the four-character display illuminates and displays status messages.

If the H4TU-C is unable to communicate with the next span device, it displays appropriate alarm and status messages.

If the H4TU-C is able to communicate with the next span device, the following events occur:

- The Status LED flashes red while the H4TU-C acquires each device in the system, and then turns steady green when the entire system is operating with no alarms (the DS1 signal must be present).
- The front panel display reports signal-to-noise ratio (SNR) margin readings (should be ≥ 6 dB) and loop attenuation (should be ≤ 34 dB).
- The front panel display reports any alarm conditions that exist after the system powers up (the H4TU-C reports alarms if no DS1 signal is applied).

3 PROVISIONING

Perform these basic provisioning tasks:

1 Connect a maintenance terminal to the craft port (see front-panel illustration inside) and log on. Press CTRL + R to refresh the logon screen, if necessary.

Refer to the onscreen Help menu for navigational aids or use the SPACEBAR (to cycle through selections), ENTER (to activate the current setting, choice, or to display a menu), ESC or F11 (to return to the parent menu), or directional arrow keys (to navigate to a menu or item)

2 Select the Config menu, **Date and Time**, then type the date and time.

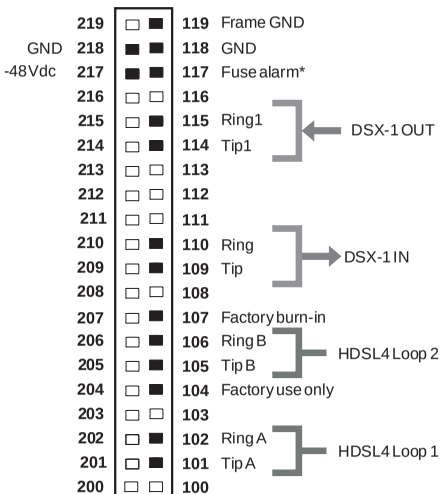
3 Select the Inventory screen, then type in the unit ID numbers.

4 Change system parameter settings, if necessary, by selecting the **Config** menu, then **Standard Options** or **ADC Options**. (Configuration options can also be set from the front panel using the MODE and SEL buttons. See the Table 4 inside.)

5 Once the H4TU-C is successfully installed and provisioned, access the Monitor, Performance, or Event Log menu to clear the Performance, Alarm History, or Event Log screens, or use Master Clear in the Config menu.

Continued

Card-edge Connector



* Fuse alarm is normally floating (0 to 80V max.) and at -48V (10 mA max.) when activated.

Front Panel

Four-character display

Displays status, provisioning, and alarm messages. See tables belowfor a list of message descriptions.

MODE and SEL pushbuttons (for manual setting of system parameters)

Use MODE and SEL to manually modify user options, initiate loopbacks, and display DSX-1 line parameters.

1 Press the MODE pushbutton for 1 second and release. The front panel alternately displays the first system parameter and its current setting.

2 Press SEL to step through all possible settings for the displayed parameter.

3 Press MODE to update the parameter and advance to the next parameter.

4 After scrolling through all the parameters, press SEL to confirm changes when prompted with a CONF NO message, or press MODE to cancel all changes.

To initiate a manual loopback:

1 Press both the MODE and SEL pushbuttons for at least 3 seconds. The following message appears:

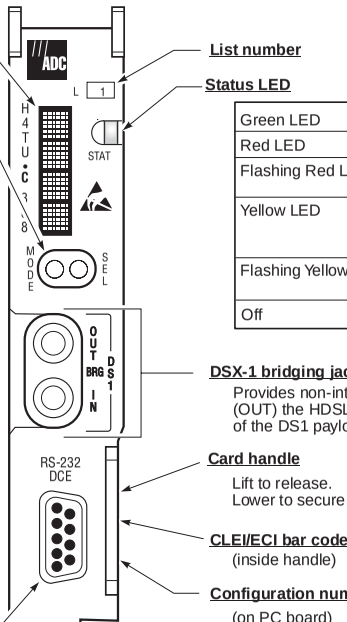
MAN LPBK NLO?

2 Press SEL to activate the NLOC loopback or press MODE to select the next available loopback.

To manually terminate a loopback, press both the MODE and SEL pushbuttons for 3 or more seconds

Craft port provisioning

To access all system maintenance, provisioning and performance screens, connect a standard 9-pin terminal cable between the serial port on a PC and the H4TU-C-388 craft port.



List number

Status LED

Green LED	Normal operation.
Red LED	Fuse alarm.
Flashing Red LED	HDSL4 acquisition or system alarm.
Yellow LED	A Customer Remote (CREM) loopback or a Network Local (NLOC) loopback is in effect.
Flashing Yellow LED	System is in Armed (ARM) mode.
Off	Line power is off.

DSX-1 bridging jacks

Provides non-intrusive bridging jack access to (IN) and from (OUT) the HDSL4 span at the DSX-1 interface. Allows monitoring of the DS1 payloads.

Card handle

Lift to release.
Lower to secure H4TU-C.

CLEI/ECI bar code label

(inside handle)

Configuration number

(on PC board)

Maintenance Terminal Modem Settings

9600 baud
8 data bits
No parity
1 stop bit
Hardware flow control: OFF
Terminal emulation software: VT100

4 LOOPBACK TESTING

Initiate loopback testing from the maintenance menus or use the MODE and SEL pushbuttons. Testing can also be initiated by using a test set to send inband codes (Table 1).

Refer to the user manual, document number LTPH-UM-1122-*xx*, for more information.

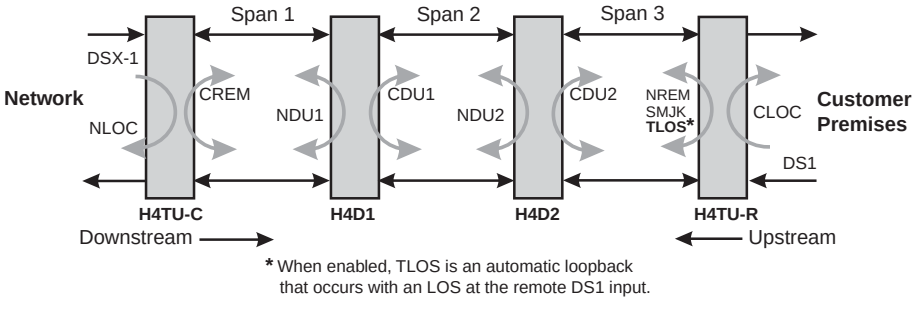


Table 1. *GNLB Loopback Commands*

Loopback	Inband Code	Description
NLOC	1111000	DSX-1 signal is looped back to the network at the H4TU-C.
NREM	1110000	DSX-1 signal is looped back to the network at the H4TU-R.
CLOC	1111100	DS1 signal from customer is looped back to the customer at the H4TU-R.
CREM	1111110	DS1 signal from customer is looped back to the customer at the H4TU-C.
NDU1	110000	Signal is looped back to the network at H4D1.
NDU2	111000	Signal is looped back to the network at H4D2.
CDU1	111100	Signal from customer is looped back to the customer at H4D1.
CDU2	111110	Signal from customer is looped back to the customer at H4D2.
SMJK	11000	DSX-1 signal is looped back to the network at the H4TU-R SmartJack module.
Loopdown	11100	Deactivates any of the above loopbacks.

Table 2. *Front-Panel Alarm Messages* [(a)]

Message	Description
PWR FEED SHRT [(b)]	A short between Loop 1 and Loop 2 of the HDSL4 pairs.
PWR FEED GND [(b)]	The HDSL4 loop is grounded.
PWR FEED OPEN [(b)]	A line-power open condition.
SPN*n*-LOSW	The HDSL4 loop has lost synchronization. The span closest to the network has highest priority. (*n* = span number)
LLOS	No signal is detected at the DSX-1 input to the H4TU-C.
RLOS	No signal is detected at the DS1 input to the H4TU-R.
LAIS	Line Alarm Indication Signal.
RAIS	Remote Alarm Indication Signal.
LRAI	An RAI alarm (yellow) from the Customer Premises Equipment (CPE) with an error-free signal from the line unit or network. RAI signal is transmitted towards the network.
RRAI	An RAI alarm (yellow) from the CPE with errors from the line unit or network.
xxx-LOF	DS1 input does not contain the ESF or SF frame pattern setting of the FRMG option. (*xxx* denotes either Transmission Unit Central Office [TUC] or Transmission Unit Remote End [TUR]).
xxx-DBER	A system DS1 Bit Error Rate (DBER) alarm (*xxx* denotes either TUC or TUR).
PRMF	H4TU-R Performance Report Messaging BER threshold exceeded at far end.
PRMN	H4TU-R Performance Report Messaging BER threshold exceeded at near end.
xxxx-HBR*x* [(c)]	A system HDSL4 Block Error Rate (HBER) alarm.
xxxx-MAL*x* [(c)]	The margin on the HDSL4 loop has dropped below the threshold setting.
xxxx-LA*x* [(c)]	The attenuation on the HDSL4 loop has exceeded the maximum threshold value.

(a) Front panel alarm messages are listed in order of priority. ALRM displays prior to any alarm message. Pressing the LBK button initiates an Alarm Cutoff (ACO) message.
(b) Message displays repeatedly as long as the alarm condition exists and is not included in the priority order.
(c) The *xxxx* prefix denotes TUC, TUR, or a first or second doubler interface, upstream or downstream (DU*x*U or DU*x*D, where *x* = Doubler 1 or 2). The single *x* suffix denotes Loop 1 or Loop 2.

To comply with the intrabuilding wiring requirements of GR-1089 CORE, Section 4.5.9, the shields of the ABAM-type cables that connect the H4TU-C-388 List 1 DSX-1 output ports to the cross-connect panel must be grounded at both ends.

Table 3. *Front Panel Diagnostic Messages*

Message [a]	Description
A=*xx*	The Attenuation (A) message appears followed by *xx*, where *xx* is the highest loop attenuation of all HDSL interfaces.
ACQ1 or ACQ2	The multiplexers of the H4TU-C and H4TU-R are trying to establish synchronization over HDSL4 Loop 1 or Loop 2.
ARM	Armed to respond to Intelligent Repeater Loop (ILR) codes.
BAD RT?	The H4TU-C has not received a response from the H4TU-R.
FERR	A framing bit error has occurred at H4TU-C DSX-1 input.
H*x*ES	H4TU-C HDSL4 Loop 1 or Loop 2 Cyclical Redundancy Check (CRC) error. (Loop 1 has display priority over Loop 2.)
LBPV	A local bipolar violation has been received at the DSX-1 input to the H4TU-C.
1=*xx* or 2=*xx*	Power of the received HDSL4 signal on each loop relative to noise (S/N with respect to 21.5 dB). (*xx* denotes lowest margin in dB for Loop 1 and Loop 2.)
PWR FEED OFF	HDSL4 span power is off.
PWR FEED ON	HDSL4 loop is not grounded or shorted.
SIG1 or SIG2	H4TU-C and H4TU-R transceivers are trying to establish contact with each other over HDSL4 Loop 1 or Loop 2.

(a) Normal operating messages are in bold.

Table 4. *Front-Panel Configuration Options Using MODE and SEL [a]*

Message [b]	Description
EQL	Sets the DSX-1 equalizer to: **0 (0 to 133 ft.)**, 133 (133 to 266 ft.), 266 (266 to 399 ft.), 399 (399 to 533 ft.), 533 (533 to 655 ft.).
RLBO	Sets the H4TU-R line buildout to **0 dB**, -7.5 dB, or -15 dB.
LPBK	Enables (**ENA**) or disables (DIS) SmartJack loopback commands.
PWRF	OFF = disables line power; **AUTO** = -185 Vdc or ±123 Vdc (depending on number of downstream units detected); LOW = -185 Vdc; and HIGH = ±123 Vdc.
HBER	1E-6 or 1E-7 = alarm activates when the HDSL4 BER alarm threshold exceeds 10^{-6} or 10^{-7}. **NONE** = prevents generation of a system alarm due to BER.
DBER	Enables (ENA) or disables (**DIS**) fixed 24-hour DSX-1 BER alarm threshold.
LBTO	Loopback timeout = NONE, 20 min, **60 min**, 120 min, 8 hr, and 24 hr.
DS1	DSX-1 line code = **AUTO**, B8ZS, or AMI**.**
FRMG	DS1 frame formatting mode = **AUTO** (automatic framing)**,** SF (SuperFrame), ESF (Extended SuperFrame), or UNFR (unframed).
RDA	Enables (**ENA**) or disables (DIS) alarm indications due to remote DS1 LOS at the H4TU-R input.
ALMP	Enables system to output an alarm pattern: **AIS** or LOS.
BPVT	Enables (ENA) or disables (**DIS**) Bipolar Violation Transparency.
NLBP	Enables the H4TU-R to transmit either **AIS** or LOS towards the CI for any network loopback.
TLOS	Enables (ENA) or disables (**DIS**) a logic loopback at the H4TU-R when an LOS occurs at its DS1 input.
RTPV	Enables (**ENA**) or disables (DIS) remote provisioning.
PBON	Configures the power output levels of the H4TU-C network unit toward the customer to comply with Default (**DEF**) or Enhanced (ENH) templates.
PBOC	Configures the power output levels of the H4TU-R customer unit toward the network to comply with Default (**DEF**) or Enhanced (ENH) templates.

(a) Front-panel configuration options display in the order listed.
(b) Normal operating messages are in bold.

Table 5. *Front-Panel System Information Messages (Scroll Mode) [a]*

Message	Description	Message	Description
VER *x.xx*	Firmware version.	CODE *xxxx*	Line code setting (AUTO, AMI, B8ZS). Default is AUTO.
LIST *xx*	Product list number.	LATT *xx*	Loop attenuation threshold (0 to 50 dB). Default is 38.
FRM *xxxx*	Frame pattern received from the DSX-1 (SF, ESF, or UNFR).	MARG *xx*	Margin threshold (0 to 15 dB). Default is 4.

(a) To scroll through system information messages, press the MODE button for 3 or more seconds.

Copies of this publication or the user manual (LTPH-UM-1122-*xx*) can be downloaded at *www.adc.com*. To order a hard copy, contact your sales representative.

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Limited Warranty

Product warranty is determined by your service agreement. Contact your sales representative or Customer Service for details.

Modifications

Any changes or modifications made to this device that are not expressly approved by ADC DSL Systems, Inc. voids the user's warranty.

All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

Standards Compliance

This equipment has been tested and verified to comply with the applicable sections of the following safety standards:

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- Binational standard, UL-60950/CSA-C22.2 No. 60950-00: Safety of Information Technology Equipment

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Product Catalog: H4TU-C-388-L1
CLEI: VACJSKPE
Document: LTPH-QI-1123-03

1274237
September 12, 2003