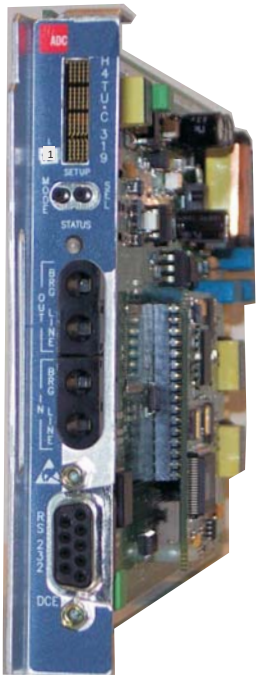
HDSL4

QUICK INSTALLATION



H4TU-C-319 LIST 1
LINE UNIT

H4TU-C-319 LIST 1

The H4TU-C-319 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 is designed to mount in 3192 mechanics 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 wire: 12 kft. (span 1), 11 kft. (span 2), 11 kft. (span 3)
HDSL4 Span Voltage	0, -185 Vdc, ±123 Vdc (Voltage is applied across Loop 1 and Loop 2.)
CO Supply	-48 Vdc nominal (-42.5 to -56.5 Vdc)
Mounting	3192 high-density shelf
HDSL4 Line Rate	784 kbps Overlapped Pulse Amplitude Modulation (OPAM) transmission per pair
HDSL4 Output	+14.1 dBm ±0.5 dBm, 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)
Operating Temperature	-40°F to +149°F (-40°C to +65°C)
Operating Humidity	5% to 95% non-condensing

1 INSTALLATION

To ensure proper installation, align the H4TU-C with the enclosure slot guides and slide the unit in. The unit should snap into place, indicating that the unit is properly seated.

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 various alarm and status messages.

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

- The Status LED flashes red while each device in the system and lights a steady green when the entire system is operating with no alarms. (The DS1 signal must be present.)
- The four-character display reports signal-to-noise ratio (SNR) margin readings (should be ≥ 6 dB) and loop attenuation (should be ≤ 34 dB @196 kHz).
- After the system powers up, alarm conditions that exist are reported on the display. (The H4TU-C reports alarms if no DS1 signal is applied.)

3 PROVISIONING

Perform these basic provisioning tasks:

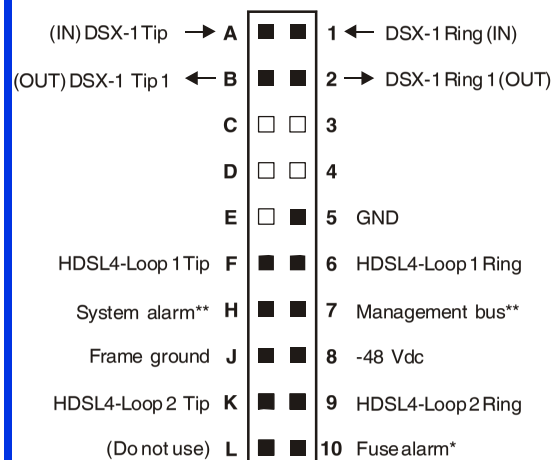
1. Connect a maintenance terminal to the craft port (see front-panel illustration inside) and log on. (When logging on through the management unit, the default password is **public**.) Press CTRL + R to refresh the logon screen, if necessary.

   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. Access the Config menu, select **Date and Time**, then type the date and time.
3. Select the Inventory menu, then type in the unit ID numbers.
4. Change the settings of any system parameters, if necessary, by selecting **Config**, then **Standard Options** or **ADC Options**. (Configuration options can also be set from the front panel using the MODE and SEL pushbuttons. See Table 4 inside.)
5. Once the H4TU-C is successfully installed and provisioned, access the Monitor, Performance, or Event Log menus 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 and at -48 Vdc when activated.
** System alarm and management bus (reserved).

The H4TU-C-319 List 1 complies with the protection switching features of the PSC-606 List 1 protection switching card. See the PSC-606 List 1 technical practice, document number LTPH-TP-1006-xx, for detailed information.

Four-character display

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

List number

Status LED

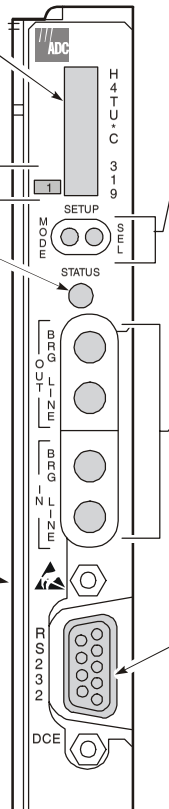
Green LED	Normal operation.
Red LED	Fuse alarm.
Flashing Red LED	HDSL4 acquisition or system alarm.
Yellow LED	A Customer Remote (CREM) loopback or a Network Local (NLOC) loopback is in effect.
Flashing Yellow LED	System is in Armed (ARM) mode.
Off	Line power is off.

Card handle

(CLEI and ECI bar code label on outside of handle)

Maintenance Terminal Modem Settings

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



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.

DSX-1 test access jacks

Connect standard test equipment.

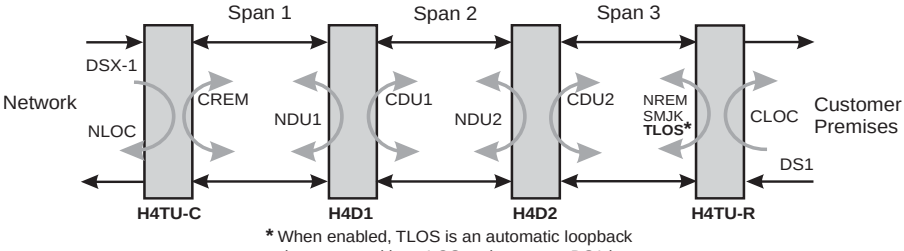
BRG	Provides non-intrusive bridging jack access to (IN) and from (OUT) the HDSL4 span at the DSX-1 interface. Allows monitoring of the DS1 payloads.
LINE	Provides splitting jack access to (IN) and from (OUT) the HDSL4 span at the DSX-1 interface.

DB-9 craft port

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 craft port.

4 LOOPBACK TESTING

Initiate loopback testing from the maintenance menus or use the MODE and SEL pushbuttons. The inband codes shown below can be sent by a test set. For more information, refer to the H4TU-C-319 List 1 User Manual, document number LTPH-UM-1031-xx.



* When enabled, TLOS is an automatic loopback that occurs with an LOS at the remote DS1 input.

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.
NDU1	110000	Signal is looped back to the network at H4D1.
CDU1	111100	DS1 signal from customer is looped back to the customer at H4D1.
NDU2	111000	Signal is looped back to the network at H4D2.
CDU2	111110	DS1 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.
CREM	1111110	DS1 signal from customer is looped back to the customer at the H4TU-C.
CLOC	1111100	DS1 signal from customer is looped back to the customer at the H4TU-R.
Loopdown	11100	Deactivates any of the above loopbacks.

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

Message	Description (listed in priority order)
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.
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 [c]	Line Alarm Indication Signal.
RAIS [c]	Remote Alarm Indication Signal.
LRAI [c]	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 [c]	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 [c]	A system DS1 Bit Error Rate (BER) alarm. (*xxx* denotes either TUC or TUR.)
PRMF [c]	H4TU-R Performance Report Messaging BER threshold exceeded at far end.
PRMN [c]	H4TU-R Performance Report Messaging BER threshold exceeded at near end.
xxxx-HBR*x* [d]	A system HDSL4 Block Error Rate (BER) alarm.
xxxx-MAL*x* [d]	The margin on the HDSL4 loop has dropped below the threshold setting.
xxxx-LA*x* [d]	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 SEL pushbutton 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) Does not activate the alarm relay access pin H.
(d) *xxxx* denotes TUC, TUR, or first or second doubler HDSL4 upstream or downstream interface. The single *x* 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-319 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 is not receiving a response from the H4TU-R.
FERR	A framing bit error occurred at H4TU-C DSX-1 input.
H*x*ES	H4TU-C 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*	The 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.)
MNGD	The H4TU-C is under control of the HMU-319 network management unit.
PWR FEED OFF	HDSL4 span power is turned 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)]*

Display Code	Description (default values in bold).
EQL	Sets the DSX-1 Equalizer to: **0 (0 to 132 ft.)**, 133 (133 to 265 ft.), 266 (266 to 398 ft.), 399 (399 to 532 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 HDSL4 powering; **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, **60**, 120 minutes, 8 hr, and 24 hr.
ALM	Enables (ENA) or disables (**DIS**) alarm indications on pin H.
DS1	DSX-1 line code = **AUTO**, B8ZS, AMI**.**
FRMG	DS1 frame formatting = **AUTO** (auto framing mode)**,** SF (SuperFrame), ESF (Extended SuperFrame), or UNFR (unframed mode).
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 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.
PBOC	Configures the power output levels of the H4TU-R customer unit toward the network. Default (**DEF**) or enhanced (ENH).
PBON	Configures the power output levels of the H4TU-C network unit toward the customer. Default (**DEF**) or enhanced (ENH).

(a) Front-panel codes scroll in the order listed. The configured selections follow each code
(b) Default values are in **bold**..

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

Code	Description	Code	Description
VER *x.xx*	Software version number of the H4TU-C.	CODE *xxxx*	Line code (AUTO, AMI, or B8ZS). Default is AUTO.
LIST *xx*	List number of the H4TU-C-319.	LATT *xx*	Loop attenuation (0 to 50 dB). Default is 38.
FRM *xxxx*	Frame pattern received from the DSX-1 (SF, ESF, UNFR).	MARG *xx*	Margin threshold (0 to 15 dB). Default is 4.

(a) To scroll through system information messages, press the MODE pushbutton for 3 or more seconds. Messages display in the order listed.

Copies of this publication or the user manual (LTPH-UM-1031-*xx*) can be downloaded from the ADC website 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-1950/CSA-C22.2 No. 950-95: Safety of Information Technology Equipment

Trademark Information

ADC is a registered trademark of ADC Telecommunications, Inc. Other product names mentioned in this installation guide are used for identification purposes only and may be trademarks or registered trademarks of their respective companies.

Copyright Information

World Headquarters

ADC Telecommunications, Inc.
PO Box 1101
Minneapolis, MN 55440-1101

Technical Assistance

Tel: 800.366.3891

Product Catalog: H4TU-C-319-L1
CLEI: VACJNUNE
Document: LTPH-QI-1032-04, Issue 4

1274236
September 12, 2003