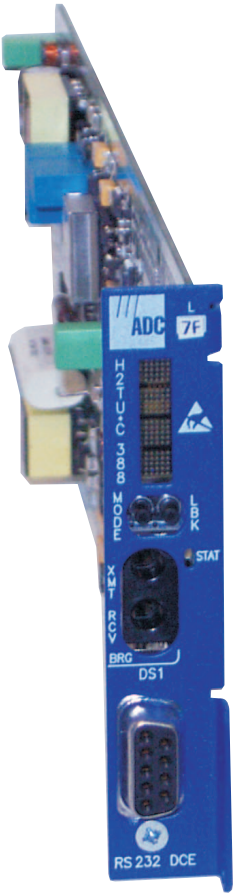
QUICK INSTALLATION



HIGAIN® H2TU-C-388 LIST 7F LINE UNIT

THE H2TU-C-388 LIST 7F

The H2TU-C-388 List 7F line unit is the Central Office (CO) side of a T1 transmission system. The H2TU-C, when used with an H2TU-R remote unit, transmits a 1.544 Mbps payload on one unconditioned copper pair over the full Carrier Service Area (CSA) range. The H2TU-C-388 List 7F is designed to mount in Double Dual Module Plus (DDM+) high-density mechanics shelves.

FEATURES

Front-panel features: status LED, craft port for maintenance screen access, MODE and LBK pushbuttons for displaying system parameters and activating loopback commands (including dual loopbacks), DSX-1 access jacks, and a four-character status display

HDSL2 transmission features:

- Enhanced lightning protection
- Full-duplex transmission on one copper pair
- Grounded loop detection on HDSL2 span

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

- Loop attenuation and insertion loss reporting
- Remote provisioning and PM data retrieval through TL1 FDL or 11-bit inband commands
- Power Back Off (PBON and PBOC) for configuring HDSL2 transmit power levels to reduce crosstalk
- Report menu option for downloading status and performance data
- Non-volatile storage of performance monitoring parameters
- Customer disconnect indication alarms (AIS-CI and RAI-CI alarm patterns)
- Payload retrieval of margin and pulse attenuation parameters (DBDB)
- Performance Report Messaging (SPRM, NPRM, AUTO, and OFF)

SPECIFICATIONS

Operating Temperature	-40°F to +149°F (-40°C to +65°C)
Operating Humidity	5% to 95% non-condensing
HDSL2 Span Voltage	0 or -180 Vdc ±5 Vdc
CO Supply	-48 Vdc nominal (-42.5 Vdc to -56.5 Vdc)
Mounting	DDM+ high-density shelf
HDSL2 Line Rate	1.552 Mbps Overlapped Pulse Amplitude Modulation Transmission with Interlocking Spectra (OPTIS)
HDSL2 Output	+16.8 dBm ±0.5 dBm, 135Ω at CO side +16.5 dBm ±0.5 dBm, 135Ω at remote side
Maximum Insertion Loss	35 dB @ 196 kHz
Maximum Loop Attenuation	28 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), Unframed (UNFR), or AUTO
DSX-1 Pulse Output	6 $V^{pk\text{-}pk}$, pre-equalized for 0 to 655 feet of ABAM cable
DSX-1 Input Level	+1.5 dB to -7.5 dB DSX

1 INSTALLATION

Align the H2TU-C with the shelf card-slot guides and slide the unit in. Push on the front panel to secure the unit in the shelf.

2 POWER-UP SEQUENCE

When the H2TU-C powers up, the four-character display illuminates and displays status messages.

If the H2TU-C is unable to communicate with the H2TU-R, it displays various alarm and status messages. If the H2TU-C is able to communicate with the H2TU-R, the following occurs:

- The Status LED flashes red while acquiring the H2TU-R and then turns a 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 ≤ 28 dB).
- After the system powers up, alarm conditions that exist are reported on the display. (The H2TU-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 or 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 **Config**, **Date and Time**, then type the date and time.

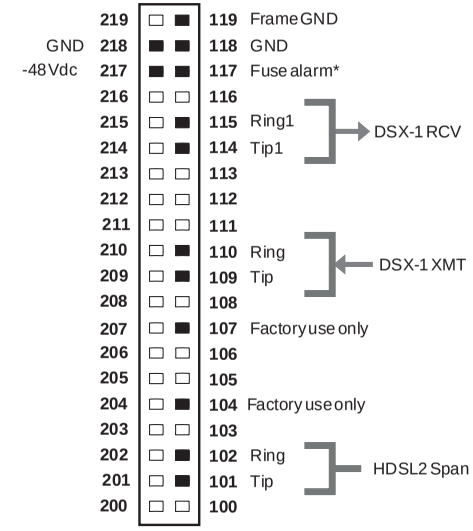
3 Select **Inventory**, then type the unit ID numbers.

4 Change the settings of any system parameters, if necessary, by selecting **Config**, then **Standard Options** or **ADC Options** (see Table 3 and Table 4 inside). (Configuration options and their current settings can be read from the front panel using the MODE pushbutton. See Table 2 inside.)

5 Once the H2TU-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

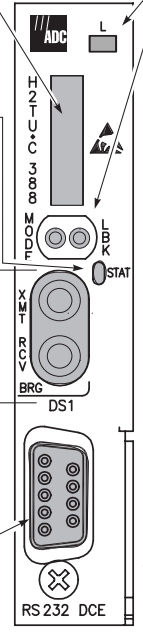
Card-Edge Connector



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

H0523-C

Front Panel



Four-character display

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

Status LED

Green LED	Normal operation.
Red LED	Fuse alarm.
Flashing Red LED	HDSL2 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 access jacks

Provides non-intrusive bridging jack access to (XMT) and from (RCV) the HDSL2 span at the DSX-1 interface. Allows monitoring of the T1 payloads.

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 H2TU-C craft port.

List number

MODE and LBK pushbutton options

Use the MODE and LBK pushbuttons to review all system parameters, including user-configured settings, and to activate loopbacks.

To display system parameters: Press MODE for at least 3 seconds to place the front-panel display in scroll mode. When it has finished scrolling through all the system parameters, the display returns to its normal mode.

To initiate a dual loopback: Press LBK for more than 3 seconds to activate the NLOC and CREM loopbacks. If a loopback condition already exists, this will loopdown all existing loopbacks. Press LBK again for more than 3 seconds to reactivate the dual loopback.

To initiate a manual loopback:

1 Simultaneously press MODE and LBK for at least 3 seconds. The following message appears:

MAN LPBK NLO?

2 Press LBK to activate the NLOC loopback or press MODE to advance to the next loopback (NREM, CLOC, CREM, COLB or RULB).

To manually terminate a loopback, simultaneously press MODE and LBK for 3 or more seconds.

Extraction Handle

(CLEI/ECI bar code label inside handle)

Maintenance Terminal Modem Settings

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

Table 1. *Front-Panel Alarm Messages* [a]

Message	Description
PWR FEED SHRT [b]	A short between the Tip and Ring of the HDSL2 pair.
PWR FEED GND [b]	The HDSL2 loop is grounded.
PWR FEED OPEN [b]	A line-power open condition.
LOSW	The HDSL2 loop has lost synchronization.
LLOS	No signal is detected at the DSX-1 input to the H2TU-C.
RLOS	No signal is detected at the DS1 input to the H2TU-R.
LAIS	Line Alarm Indication Signal.
RAIS	Remote Alarm Indication Signal.
TRCI	An RAI alarm (yellow) from the Customer Premises Equipment (CPE) with an error-free signal from the line unit or network.
RRAI	An RAI alarm (yellow) from the CPE with errors from the line unit or network.
xxx-LOF	The DS1 input does not contain the ESF or SF frame pattern setting of the FRMG option (*xxx* denotes either TUC or TUR).
xxx-DBER	A system DS1 Bit Error Rate (BER) alarm. (*xxx* denotes either Transmission Unit Central Office [TUC] or Transmission Unit Remote End [TUR].)
PRMF	H2TU-R Performance Report Messaging BER threshold exceeded at far end.
PRMN	H2TU-R Performance Report Messaging BER threshold exceeded at near end.
xxx-HBER	A system HDSL2 Block Error Rate (BER) alarm. (*xxx* denotes either TUC or TUR.)
xxx-MAL	The margin on the HDSL2 loop has dropped below the threshold setting. (*xxx* denotes either TUC or TUR.)
xxx-LA	The attenuation on the HDSL2 loop has exceeded the maximum threshold value. (*xxx* denotes either TUC or TUR.)

(a) Front-panel alarm messages are listed in order of priority. ALRM displays prior to any alarm message. Pressing the LBK 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.

Table 2. *Front-Panel Read-Only Settings Using MODE* [a]

Message	Function [b]
VER *x.xx*	Software version number of the H2TU-C.
LIST *xx*	List number of the H2TU-C.
FRM *xxxx*	Frame pattern received from the DSX-1 (SF, ESF, or UNFR).
CODE *xxxx*	Line code (AMI or **B8ZS**).
LATT *xx*	Loop attenuation threshold setting (**38**).
MARG *xx*	Margin threshold setting (**4**).
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.), or 533 (533 to 655 ft.).
RLBO	H2TU-R line buildout to DS1 is set to **0 dB**, -7.5 dB, or -15 dB.
LPBK	Enables (**ENA**) or disables (DIS) SmartJack loopback commands.
SPLB *xxxx*	Configures system for generic (**GNLB**) or special inband loopback commands (A1LB, A2LB, A3LB, A4LB, or A5LB).
PWRF	OFF = disables line power; **ON** = -180 Vdc.
HBER	1E-6 or 1E-7 = indicates HDSL2 BER alarm threshold setting. **NONE** = no 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-hour, or 24-hour.
DS1	DSX-1 line code = **B8ZS** or AMI**.**
CONV	H2TU-R frame format conversion = OFF (framing determined by the DS1 FRMG option), **ACON** (autodetection of framing and potential frame conversion at the H2TU-R), or FCON (autodetection of framing and forced frame format conversion at the H2TU-R).
FRMG	DS1 frame formatting = 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 H2TU-R input.
ALMP	Enables system to output an alarm pattern: Alarm Indication Signal (**AIS)** or Loss of Signal (LOS).
BPVT	Enables (ENA) or disables (**DIS**) Bipolar Violation Transparency.
NLBP	Enables the H2TU-R to transmit either **AIS** or LOS towards CI for any network loopback.
TLOS	Enables (ENA) or disables (**DIS**) a logic loopback at the H2TU-R when an LOS occurs at its DS1 input.
PRM	OFF = no enhanced Performance Report Messaging; SPRM = Supplemental PRM; NPRM = Network PRM; **AUTO** = SPRM + NPRM.
NAIS	If ALMP is set to AIS, this option specifies which pattern is sent to the network when a remote LOS or AIS occurs. CI = AIS-CI sent to the network; **AIS** = AIS sent to the network.
ROVR	Enables (ENA) or disables (**DIS**) conversion of an ESF DS1 payload from the network with an embedded RAI pattern to an SF-RAI pattern towards the CI at the H2TU-R. CONV option must be set to FCON or ACON.
RACI	Enables (ENA) or disables (**DIS**) conversion of a DS1 SF-RAI signal received by the H2TU-R to an SF-RAI-CI signal towards the network.
PBON	Configures the power output levels of the H2TU-C network unit toward the customer to comply with Default (**DEF**) or Enhanced (ENH) templates.
PBOC	Configures the power output levels of the H2TU-R customer unit toward the network to comply with Default (**DEF**) or Enhanced (ENH) templates.

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

Table 3. *Front-Panel Diagnostic Messages*

Message [(a)]	Description
A=*xx*	The highest loop attenuation (loss of signal power) measured in dB.
ACQ	The H2TU-C and H2TU-R are trying to establish synchronization.
ARM	The H2TU-C is armed to respond to Intelligent Repeater Loop (ILR) codes.
BAD RT?	The H2TU-C is not receiving a response from the H2TU-R.
FERR	A framing bit error has occurred at H2TU-C DSX-1 input.
HES	H2TU-C HDSL2 loop cyclical redundancy check (CRC) error.
LBPV	A local bipolar violation has been received at the DSX-1 input to the H2TU-C.
M=*xx*	The power of the received HDSL2 signal relative to noise (S/N with respect to 21.5 dB).
PWR FEED OFF	HDSL2 span power is turned off.
PWR FEED ON	HDSL2 loop is not grounded or shorted.
SIG	The transceivers of the H2TU-C and H2TU-R are trying to establish contact with each other over the HDSL2 loop.

(a) Normal operating messages are in bold.

4 LOOPBACK TESTING

Initiate loopback testing from the maintenance menus. The inband codes shown below can be sent by a test set.

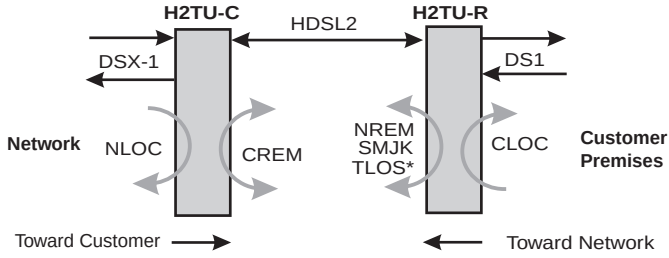


Table 4. *GNLB Loopback Commands*

Loopback	Inband Code	Description
NLOC	1111000	DSX-1 signal is looped back to the network at the H2TU-C.
NREM	1110000	DSX-1 signal is looped back to the network at the H2TU-R.
COLB [a]		DSX-1 signal is looped back to the network at the H2TU-C and signal from the customer is looped back to the customer at the H2TU-C.
RULB [a]		DSX-1 signal is looped back to the network at the H2TU-R and signal from the customer is looped back to the customer at the H2TU-R.
CREM	1111110	DS1 signal from customer is looped back to the customer at the H2TU-C.
CLOC	1111100	DS1 signal from customer is looped back to the customer at the H2TU-R.
SMJK	11000	DSX-1 signal is looped back to the network at the H2TU-R SmartJack module.
Loopdown	11100	Deactivates any of the above loopbacks.

(a) Dual loopbacks are only initiated from the MODE and LBK pushbuttons.

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 line unit DSX-1 output ports to the cross-connect panel must be grounded at both ends.

Copies of this publication or the user manual (LTPH-UM-1214-xx) can be downloaded from the ADC website at www.adc.com. To order a hard copy, please 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 Third Edition: Safety of Information Technology Equipment.

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