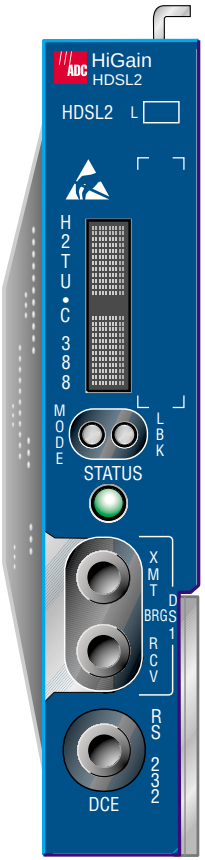
HIGAIN HDSL2

Quick Installation Guide



H2TU-C-388 List 1F
Line Unit

THE H2TU-C-388 LIST 1F

The HiGain ® product family is the industry's first practical implementation of High bit-rate Digital Subscriber Line 2 (HDSL2). When an H2TU-C-388 List 1F line unit is used in conjunction with a HiGain remote unit (H2TU-R), the system provides 1.552 Mbps transmission on one unconditioned copper pair over the full Carrier Service Area (CSA) range. The CSA includes loops up to 12,000 feet of 24 AWG or 9,000 feet of 26 AWG wire, including bridged taps.

FEATURES

- Front-panel status LED, craft port, and four-character status display
- Ultra-low wander
- Loss of Signal (LOS)/Alarm Indication Signal (AIS) payload alarm option
- Grounded loop detection
- Remote provisioning through TL1 FDL or 11-bit payload commands
- HiGain maintenance screens for inventory, provisioning, troubleshooting, and performance monitoring
- Payload (PL) or HiGain (HG) loopback source identification
- Bipolar Violation Transparency (BPVT) option
- Performance Report Messaging (SPRM and NPRM)
- Bit Error Rate (BER) alarm option
- Power Back Off (PBON and PBOC) for configuring power output levels
- Dual loopback commands

SPECIFICATIONS

Operating Temperature	-40 °F to +149 °F (-40 °C to +65 °C)
Operating Humidity	5% to 95% non-condensing
HDSL2 Span Voltage	0, -185 Vdc
Mounting	Double Dual Module Plus (DDM+) high-density
HDSL2 Line Rate	1.552 Mbps Overlapped Pulse Amplitude Modulation Transmission with Interlocking Spectra (OPTIS)
HDSL2 Output	+16.8 dBm ±0.5 dB, 135 Ω
Maximum Loop Attenuation	35 dB at 196 KHz, 135 Ω
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	6 $V^{pk\text{-}pk}$, pre-equalized for 0 to 655 feet of ABAM cable
DSX-1 Input Level	+1.5 to -7.5 dB DSX

1 INSTALLATION

Raise the H2TU-C front panel and slide the unit into the CO shelf card slot. Lower and push on the H2TU-C 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 reports status messages.

If the H2TU-C is unable to communicate with the next span device, it displays various alarm and status messages.

If the H2TU-C is able to communicate with the next span device, the following occurs:

1 The Status LED flashes red while acquiring each device in the system, and turns steady green when the entire system is operating with no alarms. (The DS1 signal must be present.)

2 The four-character display reports margin (SNR) readings (should be ≥ 6 dB) and loop attenuation (should be <35 dB @196 KHz).

3 Any alarm conditions that exist after the system powers up are reported on the display. (The H2TU-C reports alarms if no DS1 signal is applied.)

3 PROVISIONING

After installing the H2TU-C perform these basic provisioning tasks by accessing the HiGain HDSL2 logon screen. Refer to the onscreen Help menu for navigational aids.

1 Using the furnished 210-to-DB9 cable adapter, connect a maintenance terminal to the H2TU-C craft port. The HiGain HDSL2 logon screen will appear. Press CTRL + R to refresh the logon screen.

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

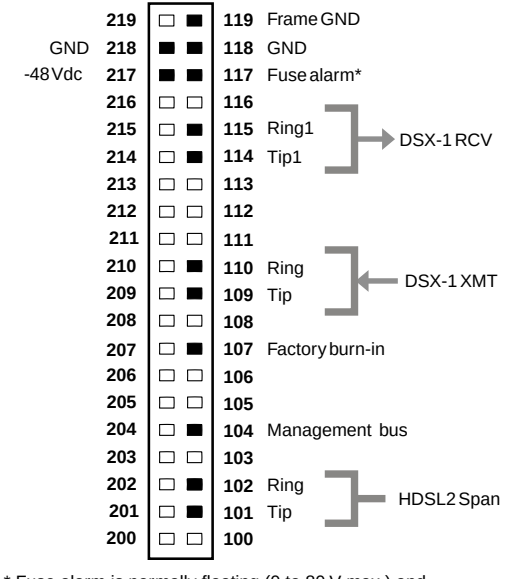
3 Select the Inventory menu, then type in the unit ID numbers.

4 Change the settings of any system parameters, if necessary, by selecting the Config menu, **Standard Options** or **ADC Options**.

5 Once the H2TU-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.

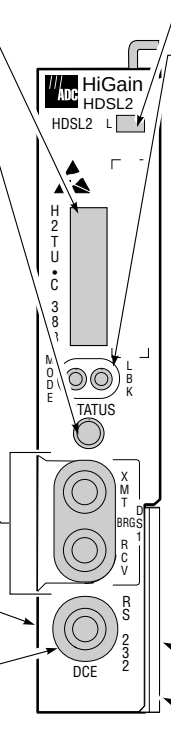
Continued

Card-edge Connector



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

Front Panel



List number

System option buttons

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

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

To initiate a manual loopback:

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

   MAN LPBK NLO?

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

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

Four-character display

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

StatusLED

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 bridging 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.

Configuration number
(on PC board)

Craft port

210 Bantam jack allows communication between the H2TU-C and a maintenance terminal for access to the unit's provisioning and performance monitoring screens. Use the furnished 210-to-DB9 connector adapter to connect your 9-pin serial cable.

CLEI/ECI bar code label
(inside handle)

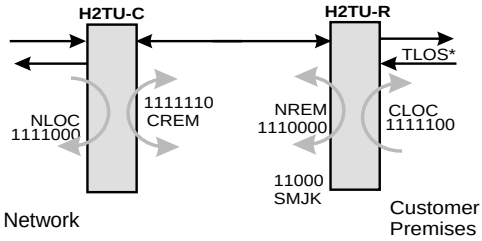
Extraction handle

Use to remove the H2TU-C-388 from its slot.

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 HiGain maintenance terminal screen or use the MODE and LBK buttons. The inband codes below can also be sent by a test set.



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

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.
CLOC	1111100	Signal from customer is looped back to the customer at the H2TU-R.
CREM	1111110	Signal from customer is looped back to the customer at the H2TU-C.
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.
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 buttons.

For more information about the HiGain HDSL2 maintenance screens, refer to the H2TU-C technical practice, document number 152-388-116-*xx*.

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.
SPN*n*-LOSW	The HDSL2 loop has lost sync. The span closest to the network has higher priority.
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	Local Alarm Indication Signal.
RAIS	Remote Alarm Indication Signal.
TRCI	An RAI alarm (yellow) from the CPE with an error-free signal from the line unit or network.
RRAI	An RAI alarm (yellow) from the Customer Premises Equipment (CPE) with errors from the line unit or network.
xxx-DBER	A system DS1 Bit Error Rate (BER) alarm. (*xxx* denotes either TUC or 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 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.

Front-Panel Diagnostic Messages

Display Code	Description (normal operating messages in bold)
A=*xx*	The loop attenuation of the longest (maximum loss) span, measured in dB.
ACQ	The multiplexers of the H2TU-C and H2TU-R are trying to establish synchronization.
A*n*L	The multiplexers of the two devices on Span *n* are trying to establish synchronization with each other, where *n* is the number of the span.
ARM	Armed to respond to Intelligent Repeater Loop (ILR) codes.
BAD RT?	The H2TU-C is not receiving a response from the H2TU-R.
DSL2	Displays HDSL2 Subscriber Line 2 (DSL2) at initial power-up.
FERR	A framing bit error occurred at H2TU-C DSX-1 input.
FLDL	Flash download of firmware updates. (Contact Customer Service for update procedures.)
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*	Indicates the power of the received HDSL2 signal relative to noise (S/N with respect to 21.5 dB). Any value of 6 dB or greater is adequate for reliable system operation.
MNGD	The H2TU-C is under control of the network management unit.
PWR FEED OFF	HDSL2 span power is turned off.
PWR FEED ON	Indicates that the HDSL2 loop is not grounded or shorted.
SIG	The transceivers of the H2TU-C and H2TU-R (or the H2TU-C and first regenerator) are trying to establish contact with each other on Span 1 of the HDSL2 loop.
S*n*L	The transceivers of the two devices on Span *n* are trying to establish contact with each other, where *n* is the number of the span.

Front-Panel Read-Only Settings Using MODE [(a)]

Code	Description (default values in bold)
VER *x.xx*	Software version number *x.xx*.
LIST *xx*	List number of the H2TU-C.
FRM *xxx*	Frame (SF, ESF, **UNFR**).
CODE *xxx*	Line code setting (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.), 533 (533 to 655 ft.).
RLBO	Sets the H2TU-R line buildout to DSX, **0 dB**, -7.5 dB, -15 dB, or DSX.
LPBK	Enables (**ENA**) or disables (DIS) SmartJack loopback commands.
SPLB *xxx*	Configures system for generic (**GNLB**) or special inband loopback commands (A1LB, A2LB, A3LB, A4LB, A5LB).
PWRF	OFF = disables HDSL2 powering; **ON** = HDSL2 line voltage is -185 Vdc maximum.
HBER	1E-6 or 1E-7 = alarm activates when the HDSL2 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 hours, 24 hours.
DS1	DSX-1 line code = AUTO, Bipolar with 8-Zero Substitution (**B8ZS**), Alternate Mark Inversion (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 (auto framing mode) or **UNFR** (unframed mode),
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 (BPVT).
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 RAI (yellow alarm) signal received by the H2TU-R to be converted to an 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-C 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.

FCC Certification

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

ADC DSL Systems, Incorporated ("ADC") warrants this product to be free of defects and to be fully functional for a period of sixty (60) months from the date of original shipment, given correct customer installation and regular maintenance. ADC will repair or replace at ADC's option any unit without cost during this 60-month period if the unit is found to be defective for any reason other than abuse or incorrect use or installation.

Do not try to repair the unit. If it fails, replace it with another unit and return the faulty unit to ADC for repair. Any modifications of the unit by anyone other than an authorized ADC representative voids the warranty.

If a unit needs repair, call ADC for a Return Material Authorization (RMA) number and return the defective unit, freight prepaid, along with a brief description of the problem.

ADC continues to repair faulty modules beyond the warranty program at a nominal charge. Contact your ADC sales representative for details and pricing.

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 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

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