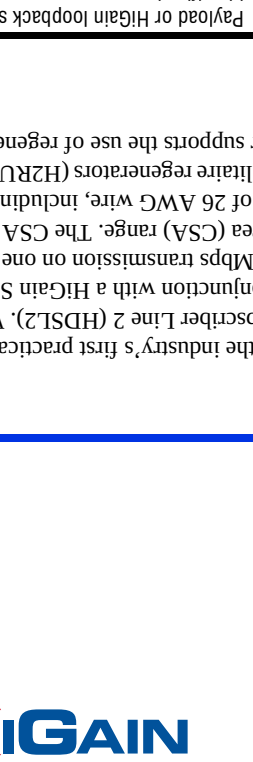
Quick Installation Guide



H2TU-C-388 List 1E Line Unit

The H2TU-C-388 List 1E

The HiGain® Solitaire™ product family is the industry's first practical implementation of High bit-rate Digital Subscriber Line 2 (HDSL2). When an H2TU-C-388 List 1E line unit is used in conjunction with a HiGain Solitaire 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. These line units can be used with HiGain Solitaire regenerators (H2RUs) to extend the CSA range. Firmware version 3.0 or higher supports the use of regenerators.

Features

- Front-panel status LED, craft port, and four-character status display
- Ultra-low wander
- Three-span range with two regenerators (36 kft, 24 AWG)
- Grounded loop detection
- Loss of Signal (LOS)/Alarm Indication Signal (AIS) payload alarm option
- HiGain Solitaire maintenance screens for inventory, provisioning, troubleshooting, and performance monitoring
- Payload or HiGain loopback source identification
- Bit Error Rate (BER) alarm options
- Bipolar Violation Transparency (BPVT) options
- Flash download of firmware updates
- Performance Report Messaging (SPRM and NPRM)
- Digital Data Service (DDS) latching loopback option

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

To ensure proper installation of the H2TU-C-388, align the H2TU-C with the enclosure slot guides, and slide the unit in. Push down on the front panel to properly seat it.

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 green while acquiring each device in the system, and turns a steady green when the entire system is operating without any alarms. (The T1 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 If any alarm conditions exist after the system powers up, these are reported on the display. (The H2TU-C reports alarms if no T1 signal is applied.)

3 Provisioning

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

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

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

3 Select the Inventory menu and type in the unit ID numbers.

4 Change the settings of any system parameters, if necessary, by selecting the Config menu, **Standard Options** or **PairGain Options**. (Configuration options can also be set from the front panel using the MODE and SEL buttons. See the "Front-Panel Configuration Options" table inside).

5 Once the H2TU-C is successfully installed and provisioned, access the Monitor or Performance menus to clear the Performance and Alarm History screens to ensure useful data.

Continued

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's warranty statement can be downloaded from the Service and Support portion of the ADC Web site at *http://www.pairgain.com.*

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

The H2TU-C-388 List 1E 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

Trademark Information

HiGain is a registered trademark, and HiGain Solitaire is a trademark of PairGain Technologies, Inc. All 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

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 H2TU-C-388 List 1E DSX-1 output ports to the cross-connect panel must be grounded at both ends.

Wireline Systems Division – Loop Transport
14402 Franklin Avenue
Tustin, CA 92780-7013
Tel: 714.832.9922
Fax: 714.832.9924

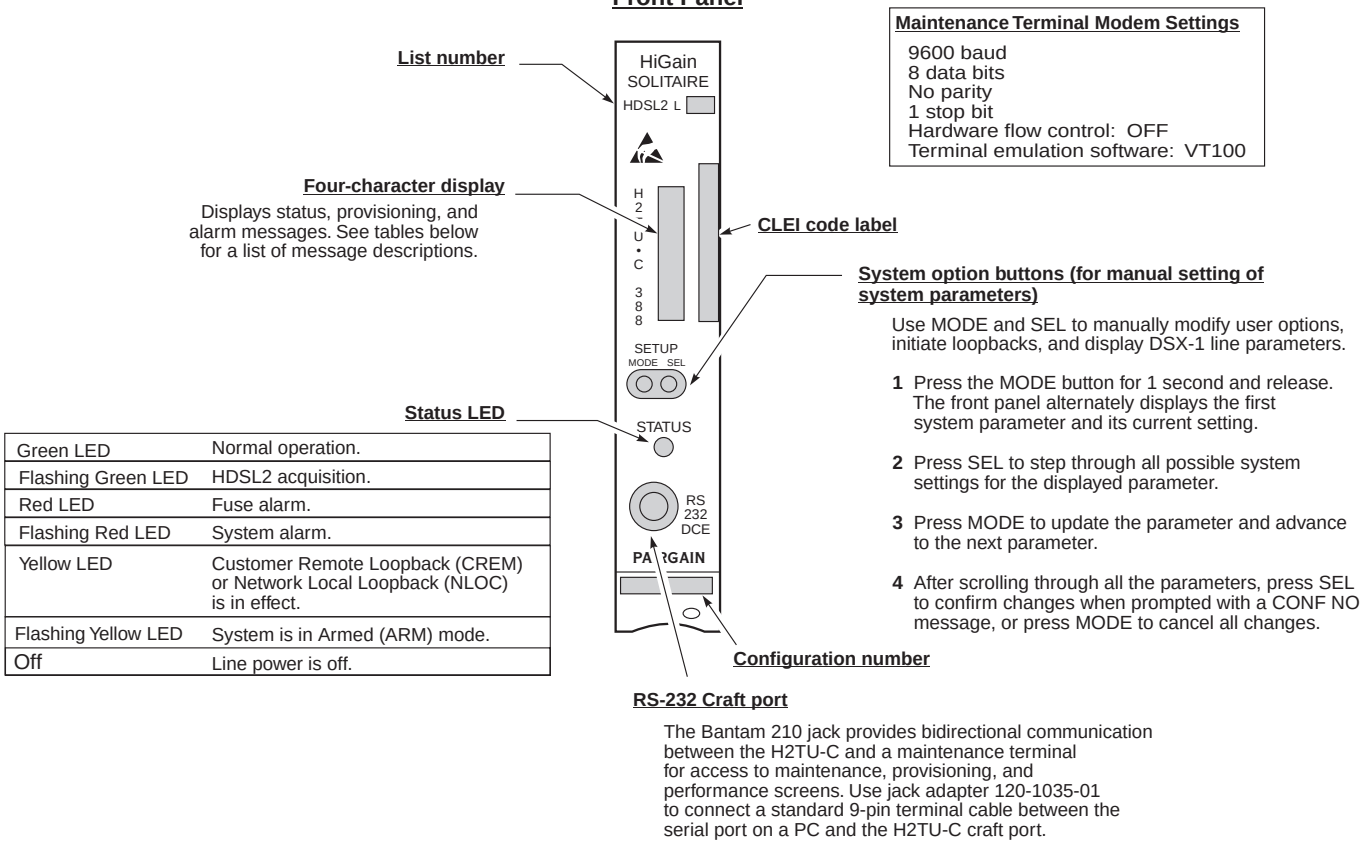
Technical Assistance
800.638.0031
714.730.3222

ISO 9001 DNV Certification, Inc. Certificated Firm

Product Number: 150-2406-15
Product Catalog: H2TU-C-388-L1E
CLEI: VACH4WYC
Document: 352-388-115-02

1203524
July 14, 1999

Front Panel



Green LED	Normal operation.
Flashing Green LED	HDSL2 acquisition.
Red LED	Fuse alarm.
Flashing Red LED	System alarm.
Yellow LED	Customer Remote Loopback (CREM) or Network Local Loopback (NLOC) is in effect.
Flashing Yellow LED	System is in Armed (ARM) mode.
Off	Line power is off.

Maintenance Terminal Modem Settings

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

System option buttons (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 button 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 system settings for the displayed parameter.

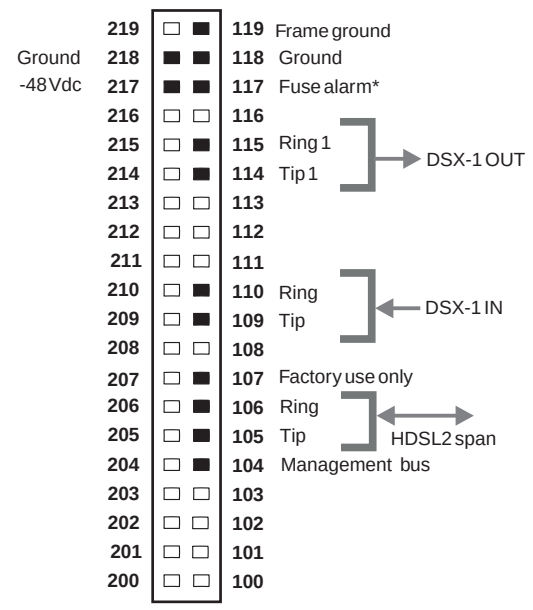
3 Press MODE to update the parameter and advance to the next parameter.

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.

RS-232 Craft port

The Bantam 210 jack provides bidirectional communication between the H2TU-C and a maintenance terminal for access to maintenance, provisioning, and performance screens. Use jack adapter 120-1035-01 to connect a standard 9-pin terminal cable between the serial port on a PC and the H2TU-C craft port.

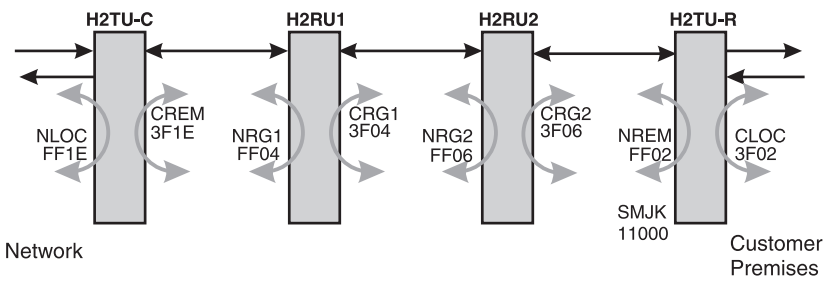
Card-edge Connector



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

4 Loopback Testing

Initiate loopback testing from the HiGain Solitaire Monitor screen or use the MODE and SEL buttons. The inband codes below can also be sent by a test set.



A3LB Loopback Commands

Loopback	Inband Code	Description
NLOC	1111-1111-0001-1110 (FF1E)	DSX-1 signal is looped back to the network at the H2TU-C.
NRG1 (a)	1111-1111-0000-0100 (FF04)	DSX-1 signal is looped back to the network at H2RU1.
NRG2 (a)	1111-1111-0000-0110 (FF06)	DSX-1 signal is looped back to the network at H2RU2.
NREM	1111-1111-0000-0010 (FF02)	DSX-1 signal is looped back to the network at the H2TU-R.
SMJK	1111-1111-0100-1000 (FF48) 100000 11000	DSX-1 signal is looped back to the network at the H2TU-R SmartJack module. (Choose any one of the three commands.)
CREM	0011-1111-0001-1110 (3F1E)	Signal from customer is looped back to the customer at the H2TU-C.
CRG1 (a)	0011-1111-0000-0100 (3F04)	Signal from customer is looped back to the customer at H2RU1.
CRG2 (a)	0011-1111-0000-0110 (3F06)	Signal from customer is looped back to the customer at H2RU2.
CLOC	0011-1111-0000-0010 (3F02)	Signal from customer is looped back to the customer at the H2TU-R.
Loopdown	1111-1111-0010-0100 (FF24) 11100 100	Deactivates any of the above loopbacks. (Choose any one of the three commands.)

(a) Regenerators (doublers) are supported in firmware version 3.0 and higher.

For more information about the HiGain Solitaire HDSL2 maintenance screens, refer to the H2TU-C-388 List 1E technical practice, section number 152-388-115-xx. This practice can be downloaded from the Customer Site portion of the ADC Web page at *www.pairgain.com*. A password is required for access to the Customer Site Web pages. If you do not have a password, contact your ADC sales representative.

Front-Panel Alarm Messages (a)

Message	Description
LOSW	The HDSL2 loop has lost sync.
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.
MAL	The margin on HDSL2 loop has dropped below the threshold setting.
LAIS	Local Alarm Indication Signal.
RAIS (a)	Remote Alarm Indication Signal.
RRAI (a)	An RAI alarm from the Customer Premises Equipment (CPE) with a failure from the network.
TRCI (a)	An RAI alarm from the CPE with no failure from the network. Sends RAI-CI to the network.
LA	The attenuation on the HDSL2 loop has exceeded the maximum threshold value.
DBER (a)	A system DS1 Bit Error Rate (BER) alarm.
HBER	A system HDSL2 Block Error Rate (BER) alarm.
SHRT	A short between the Tip and Ring of the HDSL2 pair.
GND	The HDSL2 loop is grounded.
OPEN	A line power open condition.
PRMF (a)	H2TU-R Performance Report Messaging BER threshold exceeded at far end.
PRMN (a)	H2TU-R Performance Report Messaging BER threshold exceeded at near end.

(a) Alarm messages are listed in order of priority. ALRM displays prior to any alarm message. Pressing the SEL button initiates an Alarm Cutoff (ACO) message.

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-388 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.
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 HMU-319 network management unit.
PWR FEED ON	Indicates that the HDSL2 loop is not grounded or shorted.
PWR FEED OFF	HDSL2 span power is turned off.
SIG	The tranceivers 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 tranceivers 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 Configuration Options Using MODE and SEL

Display Code	Description (default values in bold)
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 H2TU-R line buildout to 0 dB, **-7.5 dB**, or -15 dB.
LPBK	Enables (**ENA**) or disables (DIS) SmartJack loopback commands.
FT1	Enables (ENA) or disables (**DIS**) system response to DDS latching loopback commands for fractional T1 applications.
SPLB *xxxx*	Configures the system for generic (GNLB) or special inband loopback commands (A2LB, **A3LB**, A4LB).
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.
DS1	DSX-1 line code = **B8ZS** or AMI.
CONV	H2TU-R frame format conversion = OFF (framing determined by the DS1 frame formatting 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).
ALMP	Enables system to output an alarm pattern: **AIS** or LOS.
BPVT	Enables (ENA) or disables (**DIS**) Bipolar Violation Transparency.
NLBP	Enables the H2TU-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 H2TU-R when an LOS occurs at its DS1 input.
RTPV	Enables (**ENA**) or disables (DIS) remote provisioning.
PRM	OFF = no enhanced Performance Report Messaging; SPRM = Supplemental PRM; NPRM = Network PRM; **S + N** = 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 T1 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.

Front-Panel System Information Messages (Scroll Mode) (a)

Code	Description
CODE *xxxx*	The line code setting (AMI or B8ZS).
FRM *xxxx*	Indicates the type of frame pattern being received from the DSX-1 (SF, ESF, UNFR).
LATT xx	Loop attenuation threshold (0 to 35 dB). Default is 0.
LIST *xx*	The list number of the product.
MARG xx	Margin threshold (0 to 15 dB). Default is 4.
VER *x.xx*	The firmware version.

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