HiGain

QUICK INSTALLATION

H2TU-C-388 LIST 1
LINE UNIT

ADC

THE H2TU-C-388 LIST 1

The HiGain HDSL2 product family is the industry's first practical implementation of High-bit-rate Digital Subscriber Line 2 (HDSL2). When an H2TU-C-388 List 1 line unit is used in conjunction with a HiGain HDSL2 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 American Wire Gauge (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
- HiGain maintenance screens for inventory, provisioning, troubleshooting, and performance monitoring
- Payload (PL) or HiGain (HG) loopback source identification
- Bit Error Rate (BER) alarm option
- Bipolar Violation Transparency (BPVT) option
- Grounded loop detection

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 shelf
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 at CO side +16.5 dBm ±0.5 dB, 135 Ω at remote side
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 List 1, align the H2TU-C with the slot guides and slide the unit in until it touches the backplane card-edge connector. Push down on the front panel to seat the unit in the card-edge connector.

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 lights a steady green when the entire system is operating without any 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 Connect a maintenance terminal to the craft port (see front-panel illustration inside), then press CTRL + R to refresh the logon screen, if necessary.

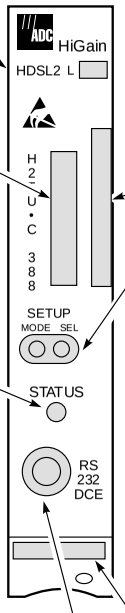
2 Select the Config menu, **Date and Time**, then type the date and time.

3 Select the Inventory screen, 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 **PairGain Options**. (Configuration options can also be set from the front panel using the MODE and SEL buttons. See the "Front-Panel Configuration Options Using MODE and SEL" table inside.)

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 select Master Clear in the Config menu.

Continued



List number

Four-character display

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

CLEI code label

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 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.

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.

Configuration number

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.

Maintenance Terminal Modem Settings

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

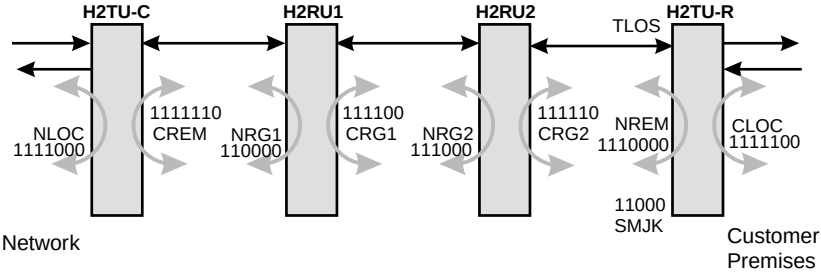
Card-edge Connector

	219	119	Frame ground	
Ground	218	118	Ground	
-48 Vdc	217	117	Fuse alarm*	
	216	116		
	215	115	Ring 1	DSX-1 OUT
	214	114	Tip 1	DSX-1 OUT
	213	113		
	212	112		
	211	111		
	210	110	Ring	DSX-1 IN
	209	109	Tip	DSX-1 IN
	208	108		
	207	107	Factory use only	
	206	106	Ring	HDSL2 span
	205	105	Tip	HDSL2 span
	204	104	Management bus	
	203	103		
	202	102		
	201	101		
	200	100		

* Fuse alarm is normally floating and at -48 Vdc when activated.

4 LOOPBACK TESTING

Initiate loopback testing from the HiGain maintenance terminal screen or use the MODE and SEL buttons. The inband codes below (except COLB, D*x*LB, and RULB) can also be sent by a test set.



GNLB Loopback Commands

Loopback	Inband Code	Description
NLOC	1111000	DSX-1 signal is looped back to the network at the H2TU-C.
NRG1 [a]	110000	DSX-1 signal is looped back to the network at H2RU1.
NRG2 [a]	111000	DSX-1 signal is looped back to the network at H2RU2.
NREM	1110000	DSX-1 signal is looped back to the network at the H2TU-R.
COLB [b]		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.
D*x*LB [b]		DSX-1 signal is looped back to the network at regenerator *x* and signal from the customer is looped back to the customer at regenerator *x*, if present.
RULB [b]		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.
CREM	1111110	Signal from customer is looped back to the customer at the H2TU-C.
CRG1 [a]	111100	Signal from customer is looped back to the customer at H2RU1.
CRG2 [a]	111110	Signal from customer is looped back to the customer at H2RU2.
CLOC	1111100	Signal from customer is looped back to the customer at the H2TU-R.
Loopdown	11100	Deactivates any of the above loopbacks.

(a) Regenerators (doublers) will be supported by future product enhancements.
(b) Dual loopbacks are only initiated from a maintenance terminal or the MODE and SEL buttons.

For more detailed information about the HiGain HDSL2 screens, provisioning, and loopback testing, refer to the H2TU-C-388 List 1 user manual, catalog number 152-388-105-xx. It can be downloaded from the ADC Web site at www.adc.com.

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.
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 AIS Signal.
RAIS	Remote AIS Signal.
LRAI	An RAI condition is detected at the remote and the signal from the line unit is error-free.
RRAI	An RAI (yellow) alarm from the Customer Premises Equipment (CPE) with a failure from the network.
xxxx-DBER	A system DS1 Bit Error Rate (BER) alarm.
PRMF	H2TU-R Performance Report Messaging BER threshold exceeded at far end.
PRMN	H2TU-R Performance Report Messaging BER threshold exceeded at near end.
xxxx-HBER	A system HDSL2 Block Error Rate (BER) alarm.
xxxx-MAL	The margin on the HDSL2 loop has dropped below the threshold setting.
xxxx-LA	The attenuation on the HDSL2 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 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.

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 List 1 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-388 List 1 is not receiving a response from the H2TU-R.
FERR	A framing bit error occurred at H2TU-C-388 List 1 DSX-1 input.
FLDL	Flash download of firmware updates. (Contact Customer Service for update procedures.)
HES	H2TU-C-388 List 1 HDSL2 loop cyclical redundancy check (CRC) error.
LBPV	A local bipolar violation has been received at the DSX-1 input to the H2TU-C-388 List 1.
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-388 List 1 is under control of the HMU-319 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 Configuration Options Using MODE and SEL [(a)]

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.
SPLB *xxxx*	Configures the 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.
DS1	DSX-1 line code = **AUTO**, B8ZS, AMI**.**
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 the H2TU-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 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.

(a) Front-panel configuration options display in the order listed.

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

Code	Description	Code	Description
CODE *xxxx*	Line code setting (AMI, B8ZS).	LIST *xx*	Product list number.
FRM *xxxx*	Frame pattern received from the DSX-1 (SF, ESF, UNFR).	MARG *xx*	Margin threshold (0 to 15 dB). Default is 4.
LATT *xx*	Loop attenuation threshold (0 to 40 dB). Default is 35.	VER *x.xx*	Firmware version.

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

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

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

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