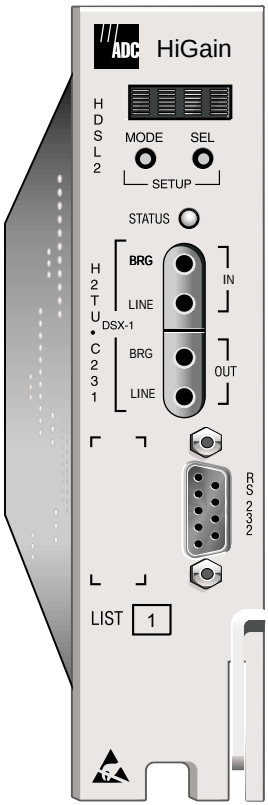
HiGain

QUICK INSTALLATION



H2TU-C-231 LIST 1
LINE UNIT

H2TU-C-231 LIST 1

The HiGain® H2TU-C-231 List 1 line unit is the Central Office (CO) side of a T1 transmission system. When an H2TU-C-319 List 1A 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.

Copies of this publication or the user manual (152-231-100-xx) can be downloaded from the ADC website at www.adc.com. To order a hard copy, please contact your sales representative.

FEATURES

- Front-panel status LED, craft port, and four-character status display
- Ultra-low wander
- Grounded loop detection
- Loss of Signal (LOS)/Alarm Indication Signal (AIS) payload alarm option
- Payload (PL) or HiGain Generic (HG) loopback source identification
- Bit Error Rate (BER) alarm option
- Bipolar Violation Transparency (BPVT) option
- HiGain HDSL2 maintenance screens for inventory, provisioning, troubleshooting, and performance monitoring

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	220 mechanics 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-231, align the H2TU-C with the enclosure slot guides and slide the unit in. When the H2TU-C is properly seated, the retaining latch snaps closed.

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.)

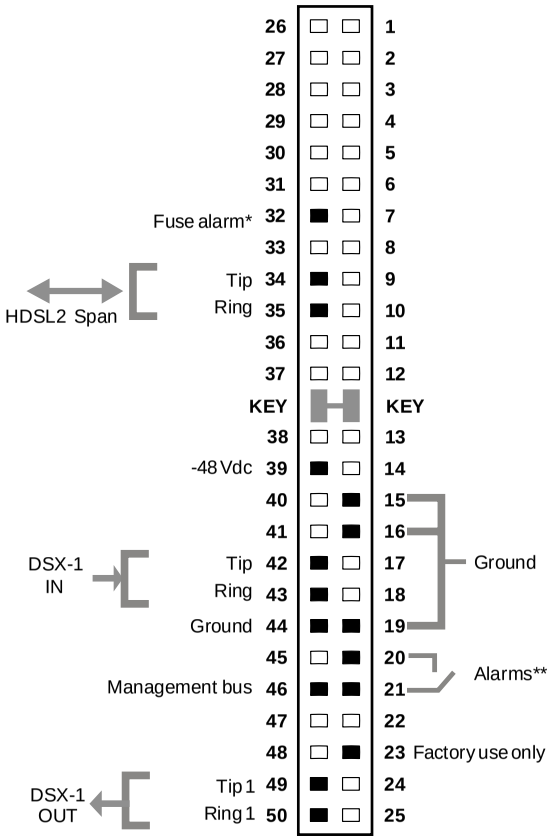
3 PROVISIONING

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. 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 **ADC 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

Card-edge connector



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

** System minor alarm contacts (pins 20 and 21) are normally open, and close upon alarm.

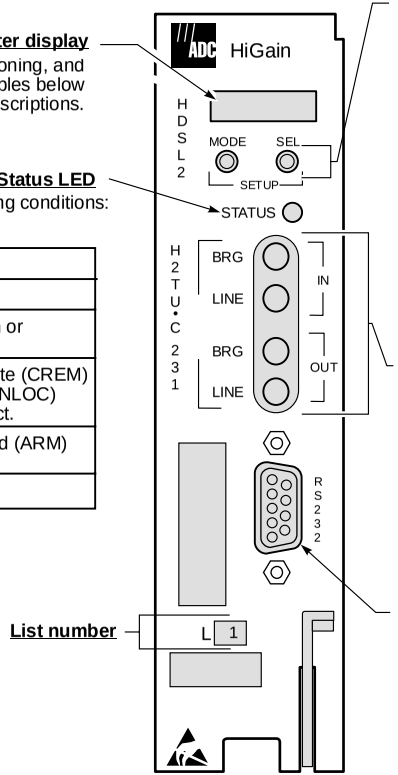
Four-character display

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

Status LED

Status LED reports the following conditions:

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



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.

DSX-1 test access jacks

Connect standard test equipment.

BRG	Provides non-intrusive bridging jack access to (IN) and from (OUT) the HDSL2 span at the DSX-1 interface. Allows monitoring of the T1 payloads.
LINE	Provides splitting jack access to (IN) and from (OUT) the HDSL2 span at the DSX-1 interface.

Craft port provisioning

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.

Maintenance Terminal Modem Settings

9600 baud
8 data bits
No parity
1 stop bit
Hardware flow control: OFF
Terminal emulation software: VT-100

4 LOOPBACK TESTING

Initiate loopback testing from the HiGain HDSL2 maintenance terminal screen or use the MODE and SEL buttons. The inband codes below (except COLB and RULB) can also be sent by a test set.

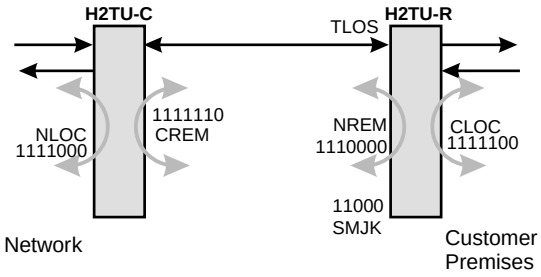


Table 1. *GNLB Loopback Commands*

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.
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.
CLOC	1111100	Signal from customer is looped back to the customer at the H2TU-R.
Loopdown	11100	Deactivates any of the above loopbacks.

(a) Dual loopbacks are only initiated from a maintenance terminal or the MODE and SEL buttons.

Table 2. *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 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 [c]	Local Alarm Indication Signal.
RAIS [c]	Remote Alarm Indication Signal.
LRAI [c]	An RAI alarm (yellow LED) from the CPE with an error-free signal from the line unit or network.
RRAI [c]	An RAI alarm (yellow LED) from the Customer Premises Equipment (CPE) with errors from the line unit or network.
xxxx-DBER [c]	A system DS1 Bit Error Rate (BER) alarm. (*xxxx* denotes either TUC or TUR.)
PRMF [c]	H2TU-R Performance Report Messaging BER threshold exceeded at far end.
PRMN [c]	H2TU-R Performance Report Messaging BER threshold exceeded at near end.
xxxx-HBER	A system HDSL2 Block Error Rate (BER) alarm. (*xxxx* denotes either TUC or TUR.)
xxxx-MAL	The margin on the HDSL2 loop has dropped below the threshold setting. (*xxxx* denotes either TUC or TUR.)
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.
(c) Does not activate the alarm relay access pins 20 and 21.

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-231 List 1 DSX-1 output ports to the cross-connect panel must be grounded at both ends.

Table 3. *Front-Panel Diagnostic Messages*

Display Code	Description (normal operating messages in bold)
A=*xx*	The loop attenuation of the span (maximum loss) , measured in dB.
ACQ	The multiplexers of the H2TU-C-231 and H2TU-R are trying to establish synchronization.
A*n*L	The multiplexers of the two devices on the span 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 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 are trying to establish contact with each other on the HDSL2 loop.
S*n*L	The transceivers of the two devices on the span are trying to establish contact with each other, where *n* is the number of the span.

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: **EXT** (replaces the internal equalizer with an external equalizer), 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 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.
ALM	Enables (ENA) or disables (**DIS**) alarm indications on pins 20 and 21.
DS1	DSX-1 line code = **AUTO**, Bipolar with 8-Zero Substitution (B8ZS), Alternate Mark Inversion (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 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.
RTPV	Enables (**ENA**) or disables (DIS) remote provisioning.

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

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

Code	Description	Code	Description
CODE *xxxx*	Line code setting (AUTO, 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 (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.

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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