HiGain

QUICK INSTALLATION

H2TU-C-202 LIST 1F
LINE UNIT

H2TU-C-202 LIST 1F

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 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 AWG wire 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
- Dual loopback commands
- 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
- Remote provisioning through TL1, FSL, or 11-bit payload 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	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, align the H2TU-C with the enclosure slot guides and slide the unit in. When the unit 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 unit 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 HLU 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.

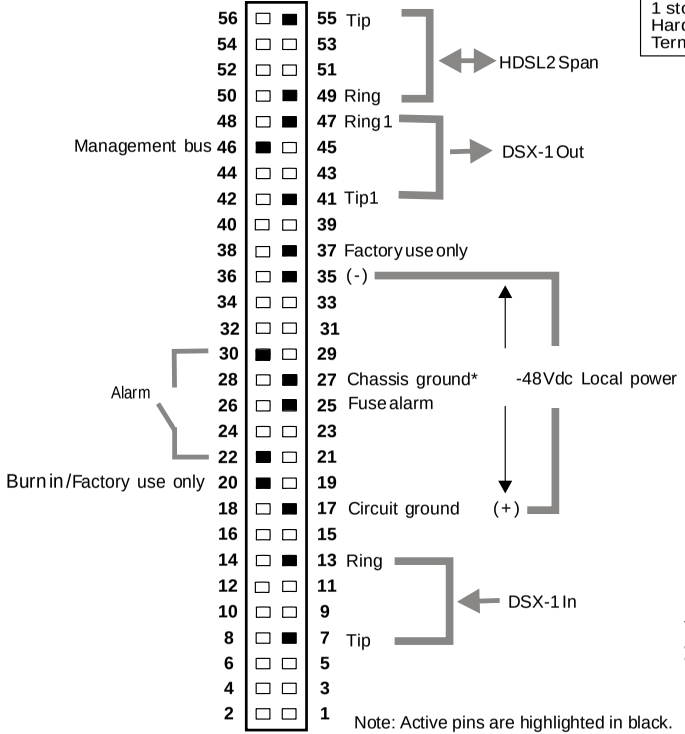
1. Connect a maintenance terminal to the craft port (see front-panel illustration inside), then press CTRL + R to refresh the logon screen, if necessary.
2. Select the Config menu, **Date and Time**, then type the date and time.
3. Select the Inventory menu, then type in the unit ID numbers.
4. Change 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

Maintenance Terminal Modem Settings

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

Card-edge Connector



Note: Active pins are highlighted in black.

* Chassis ground may be connected to Earth ground per local practice.

Front-panel display

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

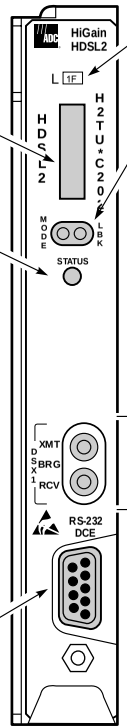
Status LED

Reports the following conditions:

- Green LED:
  Normal operation
- Red LED:
  Fuse alarm
- Flashing Red LED:
  HDSL2 acquisition or system alarm
- Yellow LED:
  Customer remote (CREM) or network local (NLOC) loopback is in effect
- Off:
  Line power is off

RS-232 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.



List number
Mode and LBK system option buttons

Use the 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 MODE and LBK buttons for at least 5 seconds. The following message appears:
   MAN LBK NLO?
2. Press LBK to activate the NLOC loopback or press MODE to advance to the next loopback selection.

To initiate a manual loopback: Press both MODE and LBK buttons for 3 or more seconds.

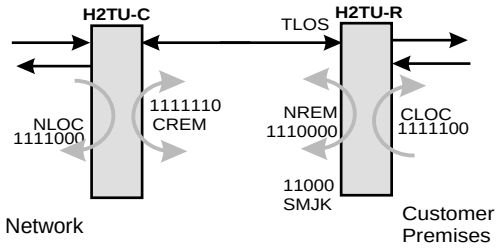
DSX-1 access jacks

Connect standard test equipment.

- BRG
  Provides non-intrusive bridging jack access to (XMT) and from (RCV) the HDSL2 span at the DSX-1 interface. Allows monitoring of the DS1 payloads.

4 LOOPBACK TESTING

Initiate loopback testing from the HiGain maintenance terminal screen or use the MODE and LBK buttons. The inband codes below (except COLB, 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.
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 [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.
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 button.

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-202 List 1F DSX-1 output ports to the cross-connect panel must be grounded at both ends.

For more information about the HiGain HDSL2 maintenance screens, refer to the H2TU-C-202 List 1F technical practice, document number 152-202-116-xx. Contact Customer Service to obtain a copy of the practice.

Front Panel Alarm Messages [a]

Message	Description (listed in priority order)
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 synchronization. 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 [c]	Local Alarm Indication Signal.
RAIS [c]	Remote Alarm Indication Signal.
TRCI	An RAI alarm (yellow LED) from the CPE with an error-free signal from the line unit or network.
RRAI	An RAI alarm (yellow LED) 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.
(c) Does not activate the alarm relay access pins 20 and 21.

Front Panel Diagnostic Messages

Message	Description
A=*xx*	The loop attenuation of the longest (maximum loss) span, measured in dB.
ACQ	The multiplexers of the HLU and H2TU-R are trying to establish synchronization.
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 (or the H2TU-C and first regenerator) are trying to establish contact with each other on Span 1 of the HDSL2 loop.

Front-Panel Read-Only Settings Using MODE

Message	Description (Default selections in bold. To scroll, press the MODE button for 3 seconds.)
VER *x.xx*	Software version number *x.xx*.
LIST *xx*	List number of the H2TU-C-231.
FRM *xxxx*	Frame (SF, ESF, UNFR).
CODE *xxxx*	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: **EXT** (replaces internal equalizer with external equalizer), 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 **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 = 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; **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 DS1 payload from the network with an embedded RAI pattern to an SF-RAI pattern toward 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 toward the network.
PBON	Configures the power output levels of the HLU network unit toward the network.
PBOC	Configures the power output levels of the H2TU-R customer unit toward the customer.

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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