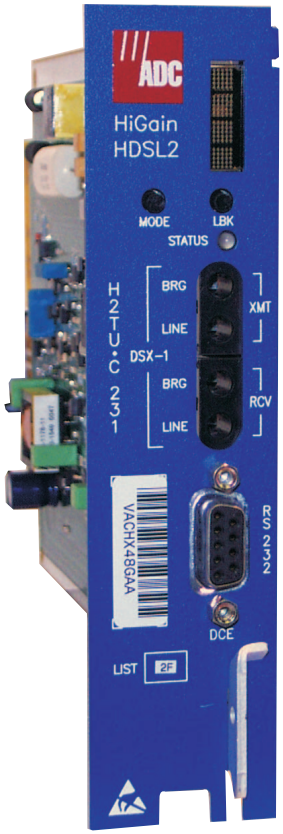
QUICK INSTALLATION



H2TU-C-231 LIST 2F
LINE UNIT

H2TU-C-231 LIST 2F

The H2TU-C-231 List 2F functions as the central office end (H2TU-C) of a repeaterless T1 transmission system when connected to a HiGain HDSL2 remote unit (H2TU-R). Setting new standards for interoperability and efficiency, HiGain HDSL2 modules transmit a 1.554 Mbps T1 payload on one unconditioned copper pair over the full Carrier Service Area (CSA) range.

FEATURES

- Front-panel status LED, craft port, and four-character status display
- Maintenance screens for inventory, provisioning, troubleshooting, and performance monitoring
- Loss of Signal/Alarm Indication Signal (LOS/AIS) payload alarm option
- Grounded loop detection
- Report menu option for downloading status and performance monitoring data to a file
- Ultra-low wander
- Remote provisioning through TL1 FDL or 11-bit payload commands
- Payload (PL) or HiGain (HG) loopback source identification
- Bipolar Violation Transparency (BPVT) option
- Performance Report Messaging (SPRM, NPRM, and AUTO)
- BER alarm option
- Power Back Off (PBON and PBOC) for configuring HDSL2 transmit power levels
- Dual loopback commands
- 16-bit HDSL2 status retrieval command (DBDB)

SPECIFICATIONS

Operating Temperature	-40°F to +149°F (-40°C to +65°C)
Operating Humidity	5% to 95% non-condensing
HDSL2 Span Voltage	0 or -180 Vdc ± 5 Vdc
Mounting	220 mechanics, high-density shelf
HDSL2 Line Rate	1.542 Mbps Overlapped Pulse Amplitude Modulation Transmission with Interlocking Spectra (OPTIS)
HDSL2 Output	+16.8 dBm ±0.5 dBm, 135Ω at CO side +16.5 dBm ±0.5 dBm, 135Ω at remote side
Maximum Insertion Loss	35 dB at 196 kHz
Maximum Loop Attenuation	28 dB
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-231 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 not communicating with the H2TU-R, it displays various alarm and status messages. If the H2TU-C is communicating with the H2TU-R, the following occurs:

1. The Status LED flashes red while acquiring the H2TU-R and turns a steady green when the entire system is operating with no alarms. (The DS1 signal must be present.)
2. The front-panel display reports signal-to-noise ratio (SNR) margin readings (should be ≥ 6 dB) and loop attenuation (should be ≤28 dB).
3. After the system powers up, alarm conditions that exist are reported on the display. (The H2TU-C reports alarms if no DS1 signal is applied.)

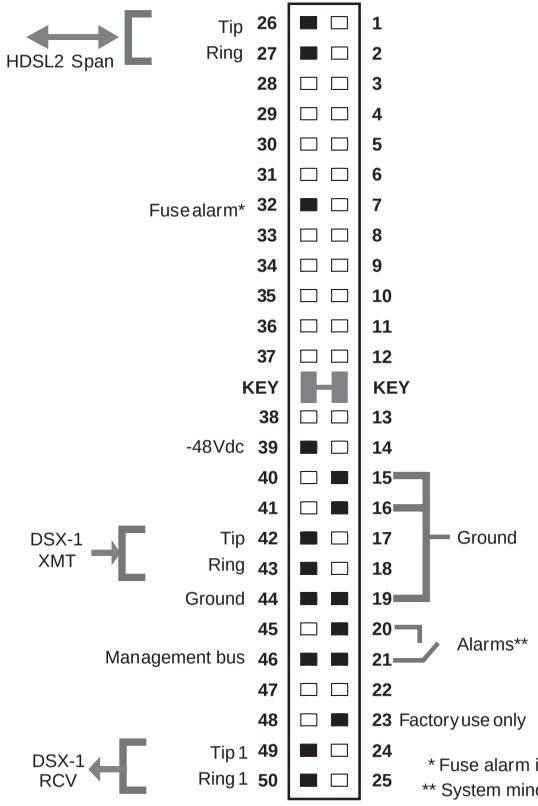
3 PROVISIONING

After installing the H2TU-C-231, perform these basic provisioning tasks by accessing the logon screen. Refer to the onscreen Help menu for navigational aids or use the SPACEBAR (to cycle through selections), ENTER (to activate the current setting, choice, or to display a menu), ESC or F11 (to return to the parent menu), or directional arrow keys (to navigate to a menu or item).

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-231 is successfully installed and provisioned, access the Performance or Event Log menu to clear the Performance, Alarm History, or Event Log screens, or use Master Clear in the Config menu. This ensures useful data.

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, but close upon alarm.

Four-character display

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

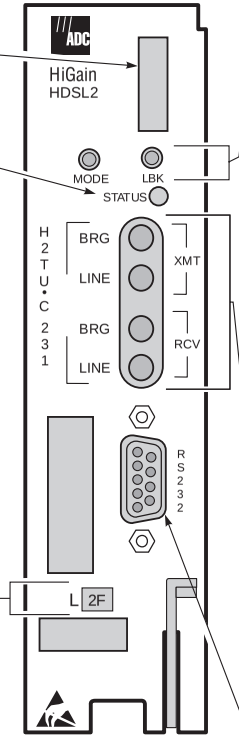
Status LED

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.

Maintenance Terminal Modem Settings

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



List number

Mode and LBK pushbutton options

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

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

To initiate a manual loopback:

1 Press both MODE and LBK pushbuttons 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 manually terminate a loopback: Press both MODE and LBK for 3 or more seconds.

DSX-1 test access jacks

Connect standard test equipment.

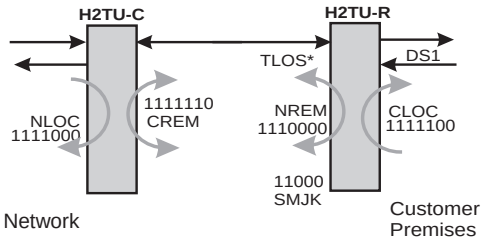
BRG	Provides non-intrusive bridging jack access to (XMT) and from (RCV) the HDSL2 span at the DSX-1 interface. Allows monitoring of the DS1 payloads.
LINE	Provides splitting jack access to (XMT) and from (RCV) the HDSL2 span at the DSX-1 interface.

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.

4 LOOPBACK TESTING

Initiate loopback testing from the HiGain HDSL2 maintenance terminal screen or use the MODE and LBK buttons. The inband codes below (exceptions are COLB and RULB) 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.
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.
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 buttons.

Copies of this publication or the technical practice (LTPH-TP-1093-xx) can be downloaded from the ADC website at www.adc.com. To order a hard copy, please contact your sales representative.

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*1*-LOSW	The HDSL2 loop has lost synchronization. The span closest to the network has highest 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)	Line Alarm Indication Signal.
RAIS (c)	Remote Alarm Indication Signal.
TRCI (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.
xxx-DBER (c)	A system DS1 Bit Error Rate (BER) alarm. (*xxx* 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.
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.

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 2F DSX-1 output ports to the cross-connect panel must be grounded at both ends.

Front-Panel Diagnostic Messages

Message	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.
ARM	Armed to respond to Intelligent Repeater Loop (ILR) codes.
BAD RT?	The H2TU-C-231 is not receiving a response from the H2TU-R.
FERR	A framing bit error occurred at H2TU-C-231 DSX-1 input.
HES	H2TU-C-231 HDSL2 loop cyclical redundancy check (CRC) error.
LBPV	A local bipolar violation has been received at the DSX-1 input to the H2TU-C-231.
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-231 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[(a)]

Message	Description (default selections in bold)
VER *x.xx*	Software version number of the H2TU-C-231.
LIST *xx*	List number of the H2TU-C-231.
FRM *xxxx*	Frame pattern received from the DSX-1 (SF, ESF, UNFR).
CODE *xxxx*	Line code (AMI or **B8ZS**).
LATT *xx*	Loop Attenuation threshold setting (**38 dB**).
MARG *xx*	Margin threshold setting (**4 dB**).
EQL	Indicates DSX-1 Equalizer setting: **EXT** (disables internal equalizer, allows connection to external equalizer), 0 (0 to 132 ft.), 133 (133 to 265 ft.), 266 (266 to 398 ft.), 399 (399 to 532 ft.), or 533 (533 to 655 ft.).
RLBO	Indicates H2TU-R line buildout setting: **0 dB**, -7.5 dB, or -15 dB.
LPBK	SmartJack loopback commands enabled (**ENA**) or disabled (DIS).
SPLB *xxxx*	System configured for generic (**GNLB**) or special inband loopback commands (A1LB, A2LB, A3LB, A4LB, A5LB).
PWRF	HDSL2 line power disabled (OFF) or -180 Vdc (**ON**).
HBER	1E-6 or 1E-7 = indicates HDSL2 BER alarm threshold setting. **NONE** = no generation of a system alarm due to BER.
DBER	24-hour DSX-1 BER alarm threshold enabled (ENA) or disabled (**DIS**).
LBTO	Loopback timeout = NONE, 20, **60**, 120 minutes, 8-hour, 24-hour.
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	Alarm indications due to remote DS1 LOS at H2TU-R input are enabled (**ENA**) or disabled (DIS).
ALMP	Alarm pattern = Alarm Indication Signal (**AIS**) or Loss of Signal (LOS).
BPVT	Bipolar Violation Transparency (BPVT) enabled (ENA) or disabled (**DIS**).
NLBP	H2TU-R transmits either **AIS** or LOS towards CI for any network loopback.
TLOS	Logic loopback at the H2TU-R is either enabled (ENA) or disabled (**DIS**) when an LOS occurs at its DS1 input.
PRM	Performance Report Messaging = OFF (no enhanced Performance Report Messaging), SPRM (Supplemental PRM), NPRM (Network PRM), **AUTO** (H2TU-R generates both SPRMs and NPRMs whenever possible).
NAIS	If ALMP is set to AIS, indicates 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	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 is enabled (ENA) or disabled (**DIS**). CONV option must be set to FCON or ACON.
RACI	Conversion of a DS1 RAI signal (yellow alarm) received by the H2TU-R to an RAI-CI signal toward the network is enabled (ENA) or disabled (**DIS**).
PBOC	Indicates the power output levels of the H2TU-R customer unit toward the network. Default (**DEF**) or enhanced (ENH).
PBON	Indicates the power output levels of the H2TU-C network unit toward the customer. Default (**DEF**) or enhanced (ENH).

(a) Front-panel codes scroll in the order listed. The configured selections follow each code.

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.

Safety 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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