HiGain

HiGain
HDSL2

L 4E

HDSL2

○ ALM

○ LOOP

H2TU*C202

○ LBK

○ DSX

DSX1

IN
|
BRG
|
OUT

RS-232
DCE

**H2TU-C-202 LIST 4E
LINE UNIT**

ADC

H2TU-C-202 LIST 4E

The HiGain H2TU-C-202 List 4E functions as the Central Office (CO) end 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 1.544 Mbps T1 payload on one unconditioned copper pair over the full Carrier Service Area (CSA) range.

FEATURES

- Front-panel status LEDs, craft port, and bridging jacks
- Ultra-low wander
- Grounded loop detection
- Loss of Signal (LOS)/Alarm Indication Signal (LOS/AIS) payload alarm option
- Report menu option for downloading status and performance monitoring data to a file
- Maintenance screens for inventory, provisioning, troubleshooting, and performance monitoring
- Sources sealing current when connected to an H2TU-R-402 List 5E or higher

- Payload (PL) or HiGain (HG) loopback source identification
- Bit Error Rate (BER) alarm option
- Bipolar Violation Transparency (BPVT) option
- Performance Report Messaging (SPRM and NPRM)
- Digital Data Service (DDS) latching loopback option
- Supports the inband 100 inband loopdown and 100000 loopup command when SmartJack loopback (LPBK) option is enabled

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	200 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 dBm, 135Ω (0-450 kHz) at Central Office (CO) side +16.5 dBm ±0.5 dBm, 135Ω (0-350 kHz) at remote side
Maximum Loop Attenuation	35 dB at 196 KHz, 135Ω
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	6V $^{pk-pk}$, 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 unit with the enclosure slot guides and slide it in until it touches the backplane card-edge connector.

> ⚠️ **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 4E DSX-1 output ports to the cross-connect panel must be grounded at both ends.**

2 POWER-UP SEQUENCE

When the H2TU-C powers up, the four status LEDs illuminate and report status messages.

If the H2TU-C is able to communicate with the H2TU-R, the following occurs:

1   The LOOP 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 DS1 signal must be present.)

2   If any alarm conditions exist after the system powers up, these are reported on the appropriate status LED (see the descriptions of the four status LEDs on the front-panel illustration inside).

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 menus to clear the Performance, Alarm History or Event Log screens, or use Master Clear in the Config menu.

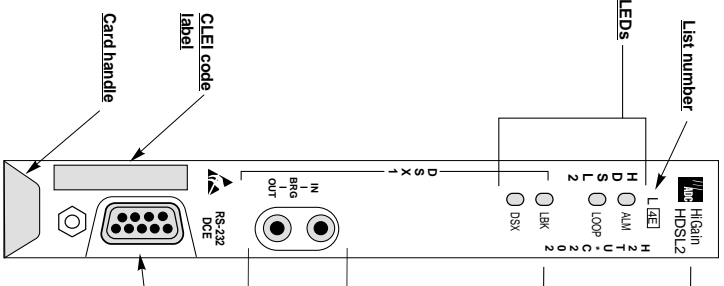**Status LEDs**

Report the following conditions:

ALM LED:
-Solid red when a fuse alarm is present.
-Flashes red once per second while a local alarm is present.
-Flashes red five times per second while a remote alarm is present.
-Off when no alarm is present.

LOOP LED:
-Solid green while all HDSL2 spans are up.
-Flashes green once per second during a loop acquisition on the span.
-Flashes green five times per second when a margin or loop attenuation threshold is exceeded.

LBK LED:
-Solid yellow when the system is in loopback, NLOC, or CREM mode.
-Flashes yellow five times per second when the system is armed.
-Off when the system is not armed and not in loopback mode.

DSX LED:
-Solid green when DSX-1 signal is present and no alarm is present.
-Flashes green once per second for BPV, FERR, UAS, or CRC DSX-1 error.
-Flashes green five times per second when network side framing or line code provisioning does not match the DSX-1 signal being received.
-Off when the DSX-1 signal is not present.

List number

CLEI code label

Card handle

HiGain HDSL2 — L 4EI H — H 2 / ALM — D T U — S L / LOOP — L 2 — C 0 / LBK — U - / 2 — DSX — D S X 1
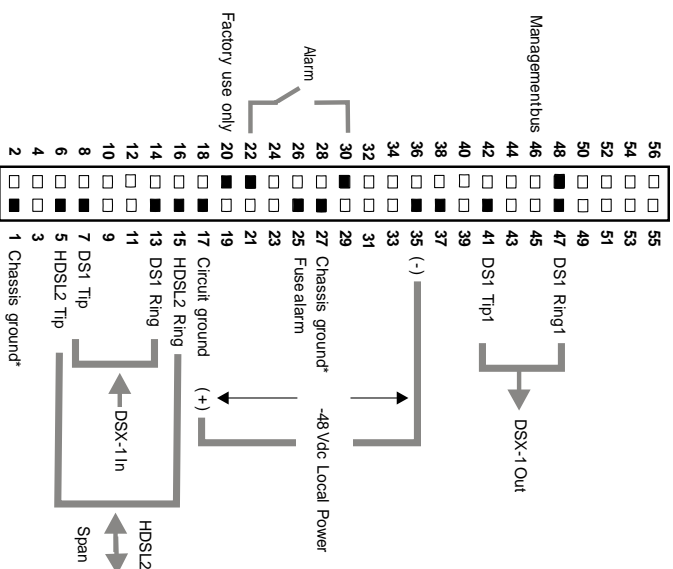
Craft port provisioning

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.

RS-232 DCE

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

**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.

IN BRG OUT

Configuration Switch Bank (located on the board)

DSX-1 EQL (switches 1-4)	Equalization
AMI/B8ZS (switch 5)	Line code
LBTO (switch 6)	Loopback timeout
FT1 (switch 7)	Fractional T1
LCL/SPAN (switch 8)	Local/Span Powering

Card-Edge Connector

56	55	
54	53	
52	51	
50	49	
48	47	DS1 Ring1
46	45	
44	43	
42	41	DS1 Tip1
40	39	
38	37	
36	35	(-)
34	33	
32	31	
30	29	
28	27	Chassis ground*
26	25	Fuse alarm
24	23	
22	21	
20	19	
18	17	Circuit ground
16	15	HDSL2 Ring
14	13	DS1 Ring
12	11	
10	9	
8	7	DS1 Tip
6	5	HDSL2 Tip
4	3	
2	1	Chassis ground*

Management bus

Alarm

Factory use only

DSX-1 Out

-48 Vdc Local Power

(+)

DSX-1 In

HDSL2

Span

*Chassis ground may be tied to earth ground per local practice.
Note: Active pins are highlighted in black.

4 LOOPBACK TESTING

Initiate loopback testing from the HiGain HDSL2 maintenance screen accessed through the craft port. The inband codes can also be sent by a test set.
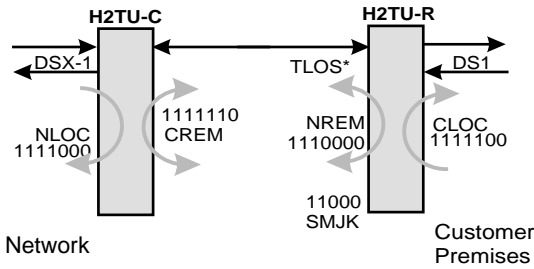
* When enabled, TLOS is an automatic loopback
that occurs with an LOS at the remote DS1 input.

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.
SMJK	11000	DSX-1 signal is looped back to the network at the H2TU-R SmartJack module.
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.
Loopdown	11100	Deactivates any of the above loopbacks.

*Configuration Options Using Maintenance Terminal*

Option Code	Description (default values in bold)
EQL	Sets the DSX-1 Equalizer to: **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.
FT1	Enables (ENA) or disables (**DIS**) system response to DDS latching loopback commands for fractional T1 applications.
SPLB *xxxx*	Configures system for generic (**GNLB**) or special inband loopback commands (A2LB, A3LB, A4LB).
PWRF	OFF = disables HDSL2 powering; **ON** = HDSL2 line voltage is -180 Vdc.
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 22 and 30.
MARG	Determines the minimum allowable margin below which a system alarm can occur: (**5 dB**) 0 dB to -15 dB.
DS1	DSX-1 line code = **B8ZS**, 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).
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 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.
LATT	Loop Attenuation Threshold (0 - 40 dB). Default = **32** dB.
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, NAIS 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 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.
PBON	Configures the power output levels of the H2TU-C network unit toward the customer to comply with Default (**DEF**) or Enhanced (ENH) templates.
PBOC	Configures the power output levels of the H2TU-C customer unit toward the network to comply with Default (**DEF**) or Enhanced (ENH) templates.

5 CONFIGURATION

> **The H2TU-C-202 List 4E does not have a display or MODE and SEL pushbuttons. Set the switches on the on-board switch bank or access the maintenance terminal screens through the craft port to make configuration changes.**

The H2TU-C-202 List 4E has a configuration switch bank containing eight switches (located on the printed circuit card). The switches are shown in the figure below and are described in the Switch Descriptions table.
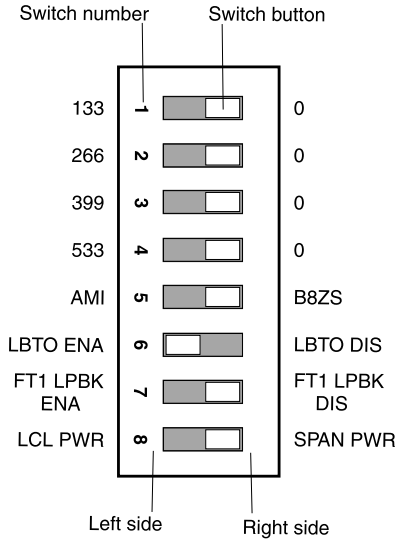
Switch Descriptions (default values in bold)

Leftmost Switch Position Options	Switch Number	Rightmost Switch Position Options
Sets the equalizer to 133 to 265 feet	1 (a)	**0**
Sets the equalizer to 266 to 398 feet	2 (a)	**0**
Sets the equalizer to 399 to 532 feet	3 (a)	**0**
Sets the equalizer to 533 to 655 feet	4 (a)	**0**
Selects the DSX-1 line code Alternate Mark Inversion (AMI)	5	Selects Bipolar with 8-Zero Substitution **(B8ZS)**
Enables the Loopback Timeout (LBTO) for **120 minutes**	6	Disables LBTO
Enables Fractional T1 (FT1) loopback capability	7	**Disables** FT1 loopback capability
Configures the system for Local powering	8	Configures the system for **Span powering**

(a) Only one of the DSX-1 line equalization switches (1 - 4) can be selected at a time. If more than one switch is enabled, the lowest value setting has priority.

Copies of this publication or the H2TU-C-202 List 4E technical practice (LTPH-TP-1099-xx) can be downloaded from the ADC website at *www.adc.com*. To order a hard copy, please contact your sales representative.

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

Trademark Information

ADC is a registered trademark of ADC Telecommunications, Inc. HiGain is a registered trademark of ADC DSL Systems, Inc. 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

© 2002 ADC DSL Systems, Inc. All rights reserved. Information contained in this document is company private to ADC DSL Systems, Inc., and shall not be modified, used, copied, reproduced or disclosed in whole or in part without the written consent of ADC.