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 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 PairGain Technologies, 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

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Product Number: 150-2400-25
CLEI Code: VACH4XYC
Catalog: LTPH-QI-1027-02, Issue 2

1203509
January 9, 2001

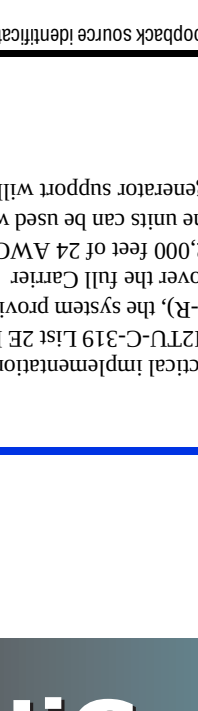
FCC Certification

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.

HiGain



H2TU-C-319 LIST 2E LINE UNIT

ADC

THE H2TU-C-319 LIST 2E

The ADC® HiGain® product family is the industry's first practical implementation of High bit-rate Digital Subscriber Line 2 (HDSL2). When an H2TU-C-319 List 2E 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. These line units can be used with HiGain regenerators (H2RUs) to extend the CSA range. Regenerator support will be available in future product enhancements.

FEATURES

- Ultra-low wander
- Grounded loop detection
- Three-span range with two regenerators (36 kft, 24 AWG)
- Metallic test access option
- Flash download of firmware updates
- Bit Error Rate (BER) alarm options
- Dual DSX-1 outputs
- HiGain maintenance screens for inventory, provisioning, troubleshooting, and performance monitoring
- Performance Report Messaging (SPRM and NPRM)
- Digital Data Service (DDS) latching loopback option
- Front-panel status LED, craft port, and four-character status display
- Payload or HiGain loopback source identification

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	3192 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
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 install the H2TU-C-319, align the H2TU-C with the slot guides, then slide the line unit into the enclosure. You should hear a snap when the H2TU-C-319 is properly seated.

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 While as devices in the system are being acquired the Status LED flashes red. Once the entire system is operating without any alarms (the T1 signal must be present), the Status LED illuminates steady green.

2 The four-character display reports margin (SNR) readings (should be ≥ 6 dB) and loop attenuation (should be <35 dB @196 KHz).

3 If an alarm condition exists after the system powers up, it is reported on the display. (The H2TU-C reports alarms if no T1 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.

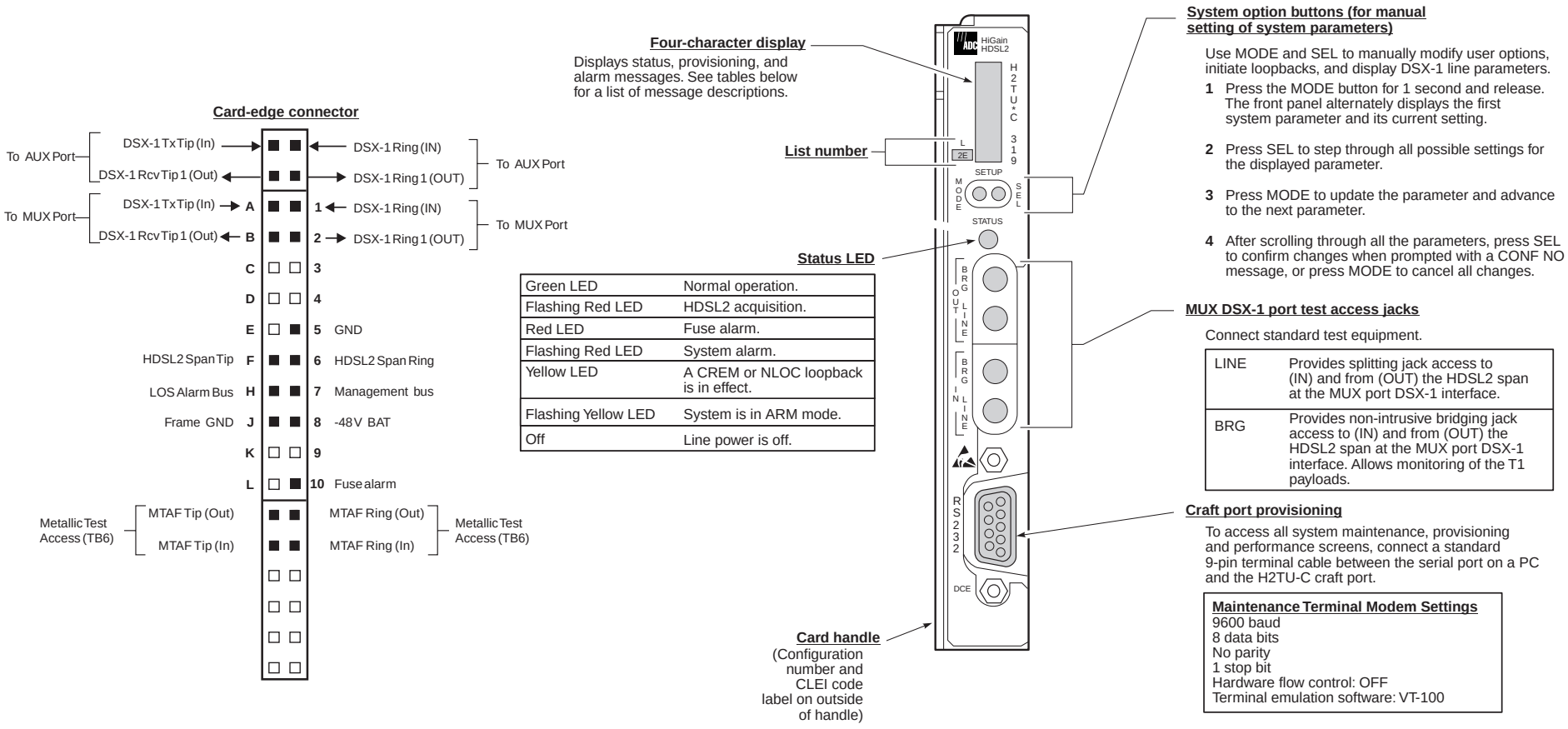
2 Select the Config menu, **Date and Time**, and type the date and time.

3 Select the Inventory menu and 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.)

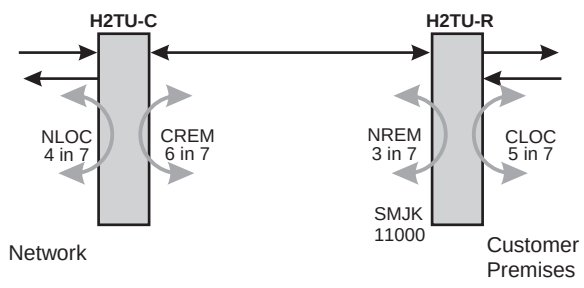
5 Once the H2TU-C is successfully installed and provisioned, access the Monitor or Performance menus to clear the Performance and Alarm History screens to ensure useful data.

Continued



4 Loopback Testing

Initiate loopback testing from the Monitor screen or use the MODE and SEL buttons. The inband codes below can also be sent by a test set.



GNLB Loopback Commands

Loopback	Inband Code	Out of Band Code	Description
NLOC	1111000 (4 in 7)		DSX-1 signal is looped back to the network at the H2TU-C.
NREM	1110000 (3 in 7)		DSX-1 signal is looped back to the network at the H2TU-R.
SMJK	100000 11000	1111-1111-0100-1000 (FF48)	DSX-1 signal is looped back to the network at the H2TU-R SmartJack module. (Choose any one of the three commands.)
CREM	1111110 (6 in 7)		Signal from customer is looped back to the customer at the H2TU-C.
CLOC	1111100 (5 in 7)		Signal from customer is looped back to the customer at the H2TU-R.
Loopdown	11100 100	1111-1111-0010-0100 (FF24)	Deactivates any of the above loopbacks. (Choose any one of the three commands.)

For more information about the HDSL2 screens, provisioning, and loopback testing, refer to the H2TU-C-319 List 2E technical practice, document number 152-319-125-xx.

Front-Panel Alarm Messages

Message	Description
SYSTEM ALARM MESSAGES [a]	
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 [b]	Local AIS Input Signal detected.
RAIS [b]	Remote AIS Input Signal detected.
LRAI [b]	An RAI condition is detected at the remote and the signal from the line unit is error-free.
RRAI [b]	An RAI (yellow) alarm from the Customer Premises Equipment (CPE) with a failure from the network.
DBER [b]	A system DS1 Bit Error Rate (BER) alarm.
PRMF [b]	H2TU-R Performance Report Messaging BER threshold exceeded at far end.
PRMN [b]	H2TU-R Performance Report Messaging BER threshold exceeded at near end.
HBER	A system HDSL2 Block Error Rate (BER) alarm.
MAL	The margin on the HDSL2 loop has dropped below the threshold setting.
LA	The attenuation on the HDSL2 loop has exceeded the maximum threshold value.
LINE-POWER ALARM MESSAGES [c]	
PWR FEED SHRT	A short between the Tip and Ring of the HDSL2 pair.
PWR FEED GND	The HDSL2 loop is grounded.
PWR FEED OPEN	A line-power open condition.

(a) System 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) Does not activate the alarm relay access pin H.
(c) Line-power alarm messages display repeatedly as long as the alarm condition exists and are not included in the priority order of the system alarm messages.

Front-Panel Diagnostic Messages

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-319 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 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.
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

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.
FT1	Enables (ENA) or disables (**DIS**) system response to DDS latching loopback commands for fractional T1 applications.
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 pin H.
DS1	DSX-1 line code = **B8ZS** or AMI.
CONV	H2TU-R frame format conversion = **OFF** (framing determined by the DS1 frame formatting option), ACON (auto detection of framing and potential frame conversion at the H2TU-R), or FCON (auto detection 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 the CI for any network loopback.
TLOS	Enables (ENA) or disables (**DIS**) logic loopback at the H2TU-R when LOS occurs at DS1 input.
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, 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.
CONF	Updates all operating mode selections (YES or **NO**).
ROVR	Enables (**ENA**) conversion of a network ESF-RAI or ESF-RAI-CI to SF-RAI or SF-RAI-CI pattern. Disables (DIS) conversion of the RAI-CI.
RACI	Enables (**ENA**) DS1 SF-RAI-CI (yellow alarm) signal received by the H2TU-R to be converted to an SF-RAI-CI signal towards the network. Disables (DIS) conversion of the DS1 SF-RAI.
ADS1	**MUX** = activates the DSX-1 MUX port. AUX = Activates the auxiliary DSX-1 Port #2. CTHR = Activates the CUt-through mode.
LATT	Loop Attenuation Threshold (0 - 40 dB). Default = **35** dB.
MARG	Determines the minimum allowable margin below which a system alarm can occur (**4 dB**) 0 dB to -15 dB.
SPLB *xxxx*	Configures system for generic (**GNLB**) or special inband loopback commands (A2LB, A3LB, A4LB).