HiGain

QUICK INSTALLATION

H2TU-C-202 LIST 1E
LINE UNIT

THE H2TU-C-202 LIST 1E

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-202 List 1E 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 or 9,000 feet of 26 AWG wire, including bridged taps. These line units can be used with HiGain HDSL2 regenerators (H2RUs) to extend the CSA range. Firmware version 3.0 or higher supports the use of regenerators.

FEATURES

- Front-panel status LEDs, craft port, and bridging jacks
- Ultra-low wander
- Three-span range with two regenerators (36 kft, 24 AWG)
- Grounded loop detection
- Loss of Signal (LOS)/Alarm Indication Signal (AIS) payload alarm option
- HiGain HDSL2 maintenance screens for inventory, provisioning, troubleshooting, and performance monitoring
- Payload or HiGain loopback source identification
- Bit Error Rate (BER) alarm option
- Bipolar Violation Transparency (BPVT) options
- Flash download of firmware updates
- Performance Report Messaging (SPRM and NPRM)
- Digital Data Service (DDS) latching loopback option

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	200 and 400 mechanics, high-density shelves
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
DS1 Line Rate	1.544 Mbps ±200 bps
DS1 Line Format	Alternate Mark Inversion (AMI), Bipolar with 8-Zero Substitution (B8ZS)
DS1 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-202, align the H2TU-C with the enclosure slot guides and slide the unit in until it touches the backplane card-edge connector. Push the H2TU-C into the card-edge connector until seated securely.

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 next span device, the following occurs:

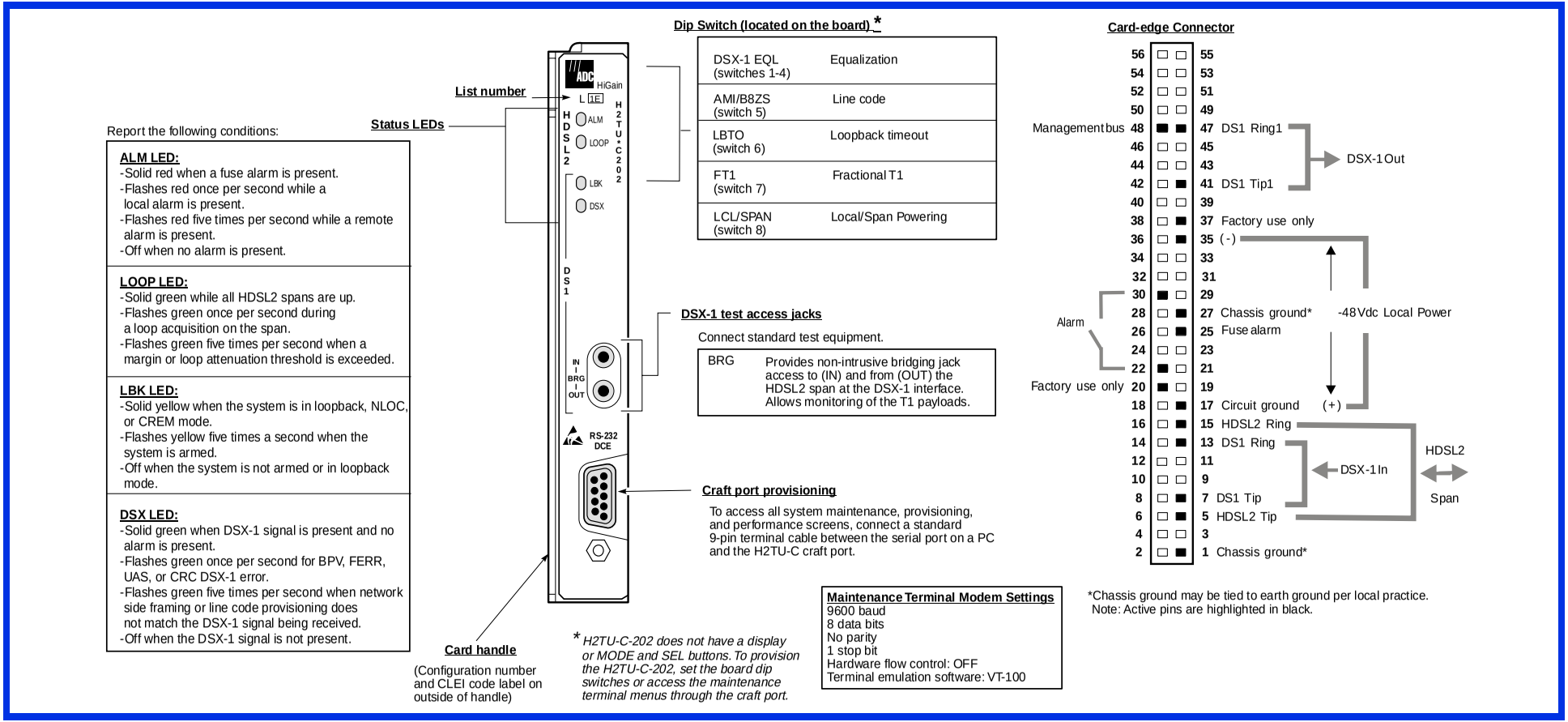
1. The LOOP Status LED flashes green while acquiring each device in the system, and turns a steady green when the entire system is operating without any alarms. (The T1 signal must be present.)
2. If any alarm conditions exist after the system powers up, these are reported on the appropriate status LED (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.

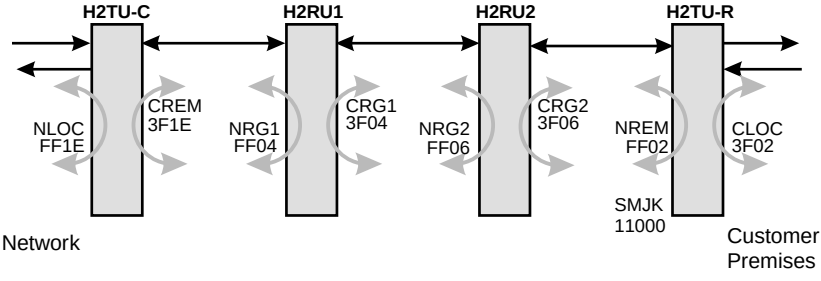
1. Connect a maintenance terminal to the craft port (see front-panel illustration inside) then press CTRL + R to refresh the logon screen, if necessary.
2. Select the Config menu, **Date and Time**, then type the date and time.
3. Select the Inventory menu then type in the unit ID numbers.
4. Change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


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 a second when the system is armed.
-Off when the system is not armed or 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
Status LEDs
ADC
HiGain
L
1E
ALM
LOOP
HDSL2
H2TU*C202
LBK
DSX
DS1
IN
BRG
OUT
RS-232 DCE
Card handle
(Configuration number and CLEI code label on outside of handle)
Dip Switch (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
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.
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.
* H2TU-C-202 does not have a display or MODE and SEL buttons. To provision the H2TU-C-202, set the board dip switches or access the maintenance terminal menus through the 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
Card-edge Connector
Management bus
DS1 Ring1
DSX-1 Out
DS1 Tip1
Factory use only
(-)
Alarm
Chassis ground*
-48 Vdc Local Power
Fuse alarm
Factory use only
Circuit ground
(+)
HDSL2 Ring
DS1 Ring
DSX-1 In
HDSL2 Span
DS1 Tip
HDSL2 Tip
Chassis ground*
*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 maintenance menus. The inband codes shown below can be sent by a test set.



A3LB Loopback Commands

Loopback	Inband Code	Description
NLOC	1111-1111-0001-1 110 (FF1E)	DSX-1 signal is looped back to the network at the H2TU-C.
NRG1 (a)	1111-1111-0000-0 100 (FF04)	DSX-1 signal is looped back to the network at H2RU1.
NRG2 (a)	1111-1111-0000-0 110 (FF06)	DSX-1 signal is looped back to the network at H2RU2.
NREM	1111-1111-0000-0 010 (FF02)	DSX-1 signal is looped back to the network at the H2TU-R.
SMJK	1111-1111-0100-1 000 (FF48) 100000 11000	DSX-1 signal is looped back to the network at the H2TU-R SmartJack module. (Choose any one of the three commands.)
CREM	0011-1111-0001-1 110 (3F1E)	Signal from customer is looped back to the customer at the H2TU-C.
CRG1 (a)	0011-1111-0000-0 100 (3F04)	Signal from customer is looped back to the customer at H2RU1.
CRG2 (a)	0011-1111-0000-0 110 (3F06)	Signal from customer is looped back to the customer at H2RU2.
CLOC	0011-1111-0000-0 010 (3F02)	Signal from customer is looped back to the customer at the H2TU-R.
Loopdown	1111-1111-0010-0 100 (FF24) 11100 100	Deactivates any of the above loopbacks. (Choose any one of the three commands.)
NLOC	1111-1111-0001-1 110 (FF1E)	DSX-1 signal is looped back to the network at the H2TU-C.

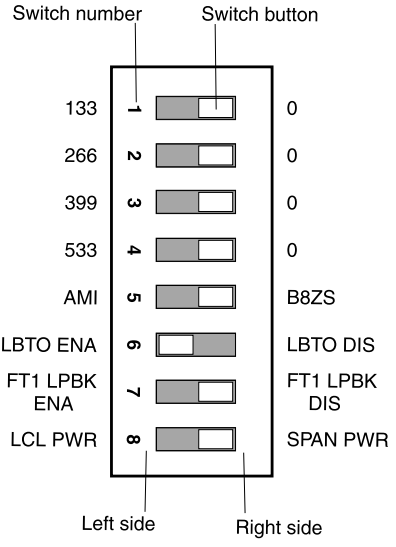
(a) Regenerators (doublers) are supported in firmware version 3.0 and higher.

Craft Port Configuration Options

Display Code	Description (default values in bold)
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).
SPLB *xxxx*	Configures system for generic (**GNLB**) or special inband loopback commands (A1LB, A2LB, A3LB, A4LB, A5LB).
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.
ALM	Enables (ENA) or disables (**DIS**) alarm indications on pin H.
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.
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.

CONFIGURATION SWITCH DESCRIPTION

The H2TU-C-202 has a dip switch bank containing eight switches (located on the board). The switches are shown in the figure below and are described in detail in the Switch Descriptions table below.



Switch Descriptions (default values in bold)

Left Side Options	Switch Number	Right Side Options
Set the equalizer to 133 to 265 feet	1 (a)	**0**
Set the equalizer to 266 to 398 feet	2 (a)	**0**
Set the equalizer to 399 to 532 feet	3 (a)	**0**
Set 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) to **120 minutes**	6	Disables LBTO to NONE
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.

For more detailed information about the HiGain HDSL2 screens, provisioning, and loopback testing, refer to the H2TU-C-202 List 1E user manual, catalog number 152-202-115-xx. It can be downloaded from the ADC Web site at www.adc.com.

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

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Copyright Information

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CLEI: VACH4W4C
Document: 352-202-115-03, Revision 3

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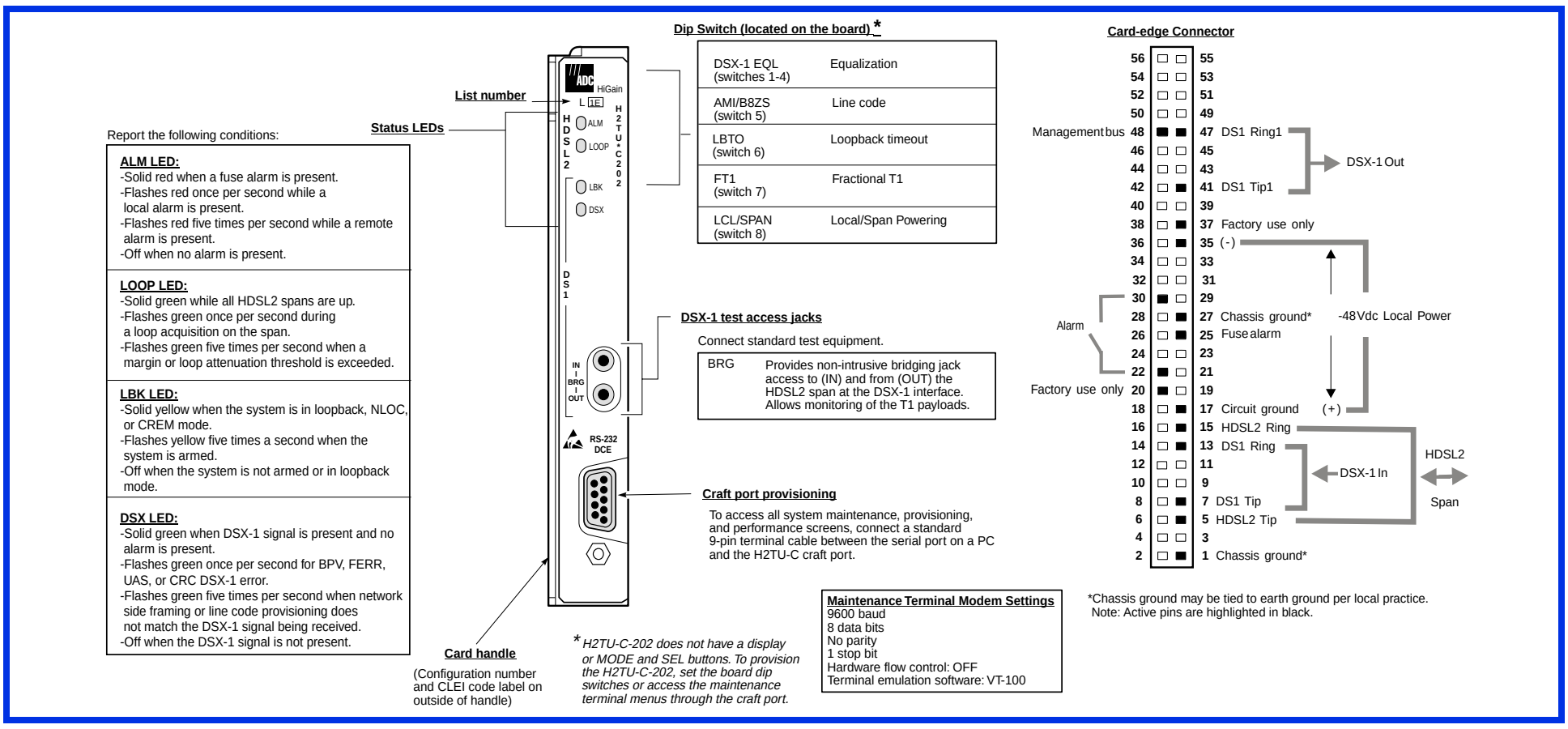
December 13, 1999



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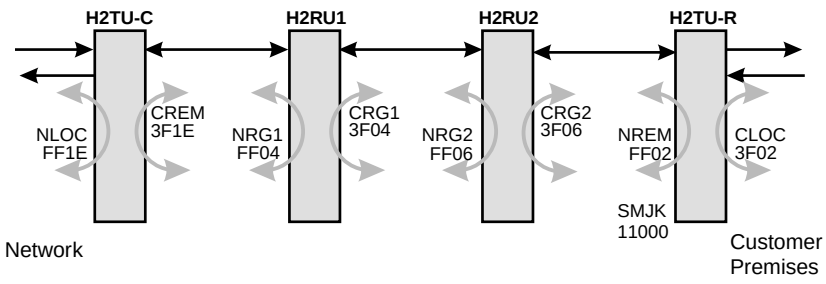

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NREM	1111-1111-0000-0010 (FF02)	DSX-1 signal is looped back to the network at the H2TU-R.
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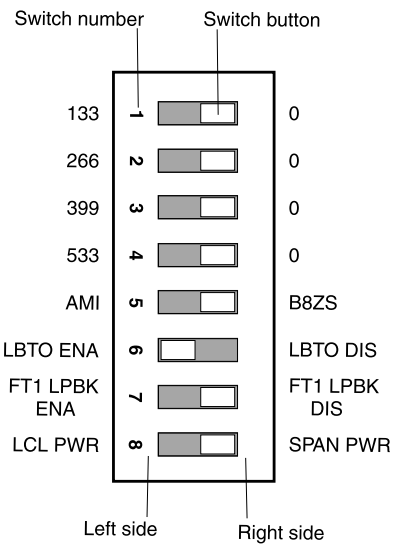

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