

## E220 RP 19" HDSL SYSTEM SHELF INSTALLATION/MAINTENANCE

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## 1. GENERAL

### Revision History

Revisions to this practice will be summarized in this paragraph.

This practice is an installation and maintenance guide for the ADTRAN E220 Redundant Power (RP) 19" HDSL System Shelf. Figure 1 is an illustration of the shelf. ADTRAN E220 RP HDSL 19" System Shelf features include:

- Wire-wrap terminations
- Modular connector terminations
- Offset connector arrangement to ensure correct plug-in of the HFAC
- Adjustable side brackets for mounting the shelf in a bay
- Redundant power supply capability
- Visual fuse failure indication

The ADTRAN E220 RP shelf is designed for use in applications where it is beneficial to replace a series of T1 repeaters with HDSL transceiver technology. While the shelf is designed primarily to accept ADTRAN HTU-C units, the shelf can also accommodate 231 type T1 repeater cards or a combination of HTU-C units and 231 repeaters. T1 repeater cards can be loaded into slots 1 through 11.

The E220 RP is functionally the same as the ADTRAN E220 shelf P/N 1240010L4, with the addition of a redundant power supply capability, front panel fuse access, and LED indication of fuse failure. The redundant power capability allows the shelf to use two separate power supplies together or separately with seamless switching from one to the other in the event of failure.

The ADTRAN E220 RP measures 19 inches wide (17.40 inches minus the mounting ears), 12.5 inches front-to-back, and 6.969 inches (standard 4U) high. The shelf weighs 10 pounds, 8 ounces.

Each shelf is wired and tested and contains provisions for power connection, fusing, and connections to office alarms.

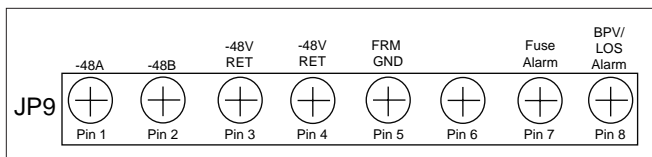


Figure 1. E220 RP 19" HDSL System Shelf

The shelf is equipped with adjustable side brackets that are used to mount the shelf in the bay. The brackets will permit flush, four-inch, and five-inch recessed mounting. Two sets of mounting holes have been drilled in the side plates to conform to standard rack mechanics. Choose the appropriate set of holes for the specific mounting requirement.

The E220 RP shelf uses an offset connector arrangement to ensure that only the correct card type can be plugged into a particular slot.

The shelf has a backplane containing thirteen 50-pin connectors. These connectors are interconnected with printed circuit copper traces for voltage and ground distribution. Power and ground connections, and certain office alarms are available on an 8-position barrier strip on the backplane (see Figure 2). Input/output signals and alarm dry contact terminations are made using wire-wrap connections to allow special purpose configurations to be wired.



**Figure 2. Backplane Barrier Strip Connections**

## 2. INSTALLATION

After unpacking the unit inspect it immediately for possible shipping damage. If damage is discovered, file a claim with the carrier, then contact ADTRAN Customer Service.

Before installing the E220 RP in a communications bay, remove all plug-in cards that may have been shipped in the shelf.

**NOTE** *These units are static-sensitive and should be handled only with appropriate ESD protective measures.*

To remove the cards, grasp the metal latch at the bottom of the card and pull the latch downward. This will force the unit to be unseated from its connector. Temporarily place these units in a protected area.

Prior to initial installation, ensure that the bay frame for the shelf is installed, the -48 VDC power source and alarm cabling to the bay is installed, and that any special backplane wiring is complete.

Make sure to install the 5-amp GMT-type fuses shipped with the unit in fuse holders F1 and F2 located at the top left corner on the front of the shelf.

The E220 RP shelf can now be mounted in a 19-inch wide equipment bay. The shelf mounting flanges have two sets of mounting holes that conform to standard 19" bay mechanics. Position the shelf in the desired position and align the mounting holes. Secure the shelf with appropriate size screws (not provided).

After securing the shelf in the bay, use a Phillips™-head screwdriver to temporarily remove the clear plastic cover that protects the wire-wrap pins.

In the initial installation, it is not necessary to equip all the slot locations with plug-in cards. The shelf can be equipped with from one to eleven ADTRAN HTU-C transceivers. These units should be loaded into slots 1-11. For these slot locations, the DSX-1 and HDSL loop wiring will be made on the corresponding backplane connector, or wire-wrap pins.

The far left slot in the shelf is reserved for the HFAC shelf controller, ADTRAN part number 1240.008LX. Slot 1 is reserved for either an HCOT systems controller (ADTRAN part number 1240.009LX) or an HTU-C unit. The shelf will support up to eleven HTU-C units in slots 1-11.

A shelf controller (HFAC) or system controller (HCOT-CTL) is not required for normal HTU-C operation unless performance monitoring and/or advanced alarm processing functions are desired.

### Backplane Connections

**Locations:** Power and ground connections are located on JP9, an 8-position barrier strip in the lower right corner of the backplane (Figure 2). Also located on the barrier strip are local alarm connection lugs for fuse and Bipolar Violation (BPV)/Loss of Signal (LOS) alarms. Controller-to-shelf communication ports (JP6 and JP7) are located at the upper left corner of the backplane along with a DB25 connector that serves as a DCE/DTE configurable communications port (see Figure 6). All other connections to the shelf can be made directly to each wire wrap connector (see Figure 3 and Figure 4) as required by the application.

**NOTE** *DSX-1 and HDSL loop signals are also available on connectors P1-P4. See Figures 5 and 6.*

**Frame Ground:** Attach frame ground to pin 5 of JP9.

**-48 Volt Supply:** The -48V office supply is connected to JP9 positions 1 or 2. The backplane power distribution is provided on two separately-fused circuits with F1 and F2 as the 5-amp supply fuses mounted on the front face of the shelf. F1 is connected to slots 1 through 7, and F2 is connected to slots 8 through 11. If one fuse fails, that half of the shelf will lose power. The shelf will operate with one or two -48 VDC supplies connected (-48A and -48B).

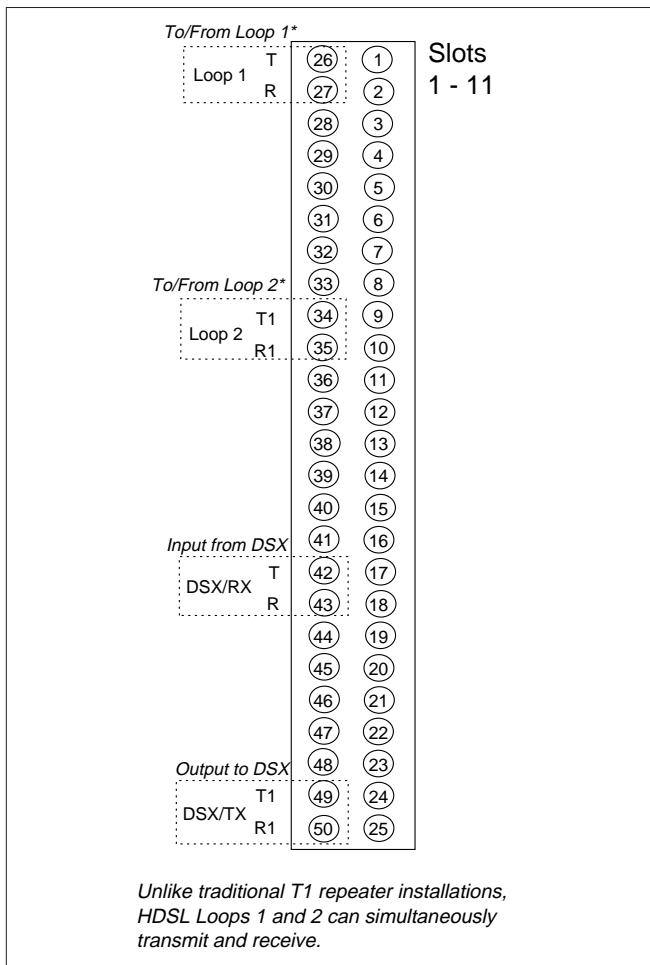


Figure 3. HTU-C Slot Wire Wrap Connections

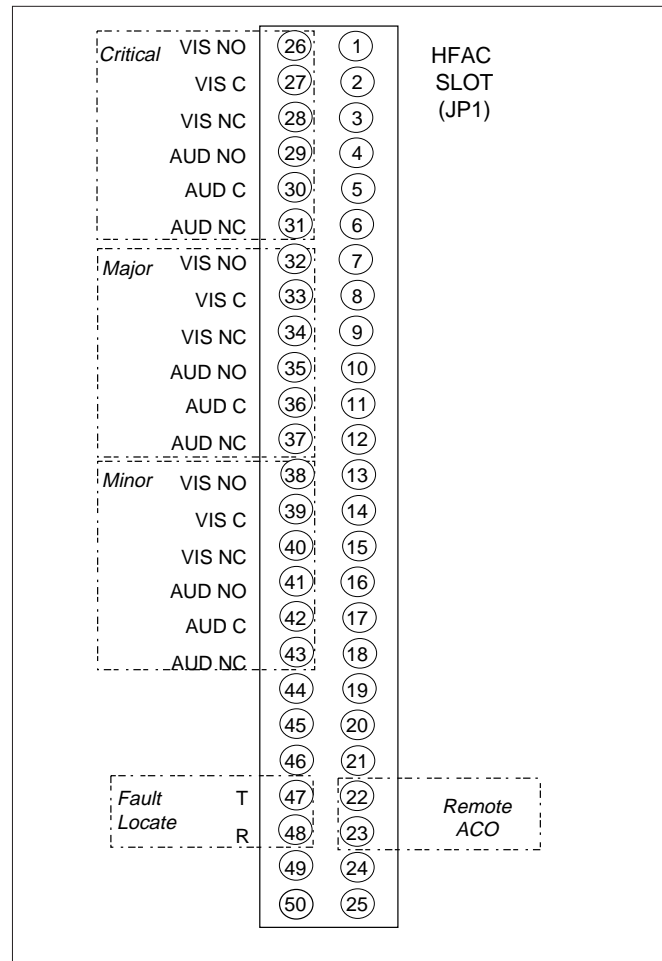


Figure 4. HFAC Controller Slot Wire Wrap Connections

An LED next to each fuse located on the top of the front panel of the shelf illuminates when the corresponding fuse fails and creates an open circuit. This redundant power capability allows power to be supplied by either A or B or both. In the event one supply fails, current will automatically be drawn from the other supply (if connected), to keep the shelf running normally without dropouts or errors. The HFAC controller slot has an independent power distribution and fuse circuit that is fed from either -48V connection. Spade lug terminations are recommended. The power return should be connected to pins 3 and 4 of JP9.

**CAUTION** *Ensure all power connections are firmly secured.*

### Alarms

The ADTRAN E220 RP shelf provides two modes of alarm reporting capability.

If the shelf is used for stand-alone HTU-C operation with no shelf controller, the alarm connections on the barrier strip can be utilized. The fuse alarm bus is available on JP9, pin 8.

The fuse alarm connection is normally floating, but provides -48 VDC output when a fuse is blown. The BPV/LOS connection provides a closure to -48V RET when a BPV/LOS alarm condition exists.

If the shelf is equipped with a shelf controller, a set of alarm relay contacts is provided through backplane wire wrap connections (see Figure 4). Wiring can be made to appropriate pins on JP1 for normally open or normally closed connections for an alarm condition.

Connection is made to the Common (C) pin and to either the Normally Open (NO) or the Normally Closed (NC) pin. Visible and audible contact connections are provided for critical, major, and minor alarm types. An audible alarm cutoff function is provided with the shelf controller. An audible alarm cutoff can be initiated by pressing the ACO push-button on the HFAC controller front panel or by providing closure between the REMOTE ACO pins on backplane connector JP1, pins 22 and 23. The backplane is labeled with appropriate markings for the alarm and alarm cutoff connections.

## Wire Wrap Terminations

After wiring for alarms, attach the signal wires as required. There are eleven connectors labeled 1-11 that are available for wire wrap connection to the signal wires. Use the appropriate wire size and wire wrap tool to connect the signal wires to the .031-inch square posts (see Figure 3 for DSX-1 and HDSL loop connection pin numbers). These correspond to the standard signal connections used in T1 office repeater applications.

Other wire wrap connections include the fault locate bus (JP1, pins 47 and 48; see *Fault Locate Option*), the alarm outputs (JP1, pins 26-43), and the remote alarm cutoff input (JP1, pins 22 and 23).

## Signal I/O Connectors

Four connectors (P1-P4) are provided on the backplane for use in applications where wire wrap terminations are not desired. These connectors bring out the DSX-1 and HDSL loop signals from each HTU-C unit as illustrated in Figure 5.

Figure 6 identifies the connector locations on the backplane. The P1-P4 connectors are AMP P/N 554758-1 or equivalent male plugs.

After all wiring is complete, reinstall the protective backplane cover using the screws provided.

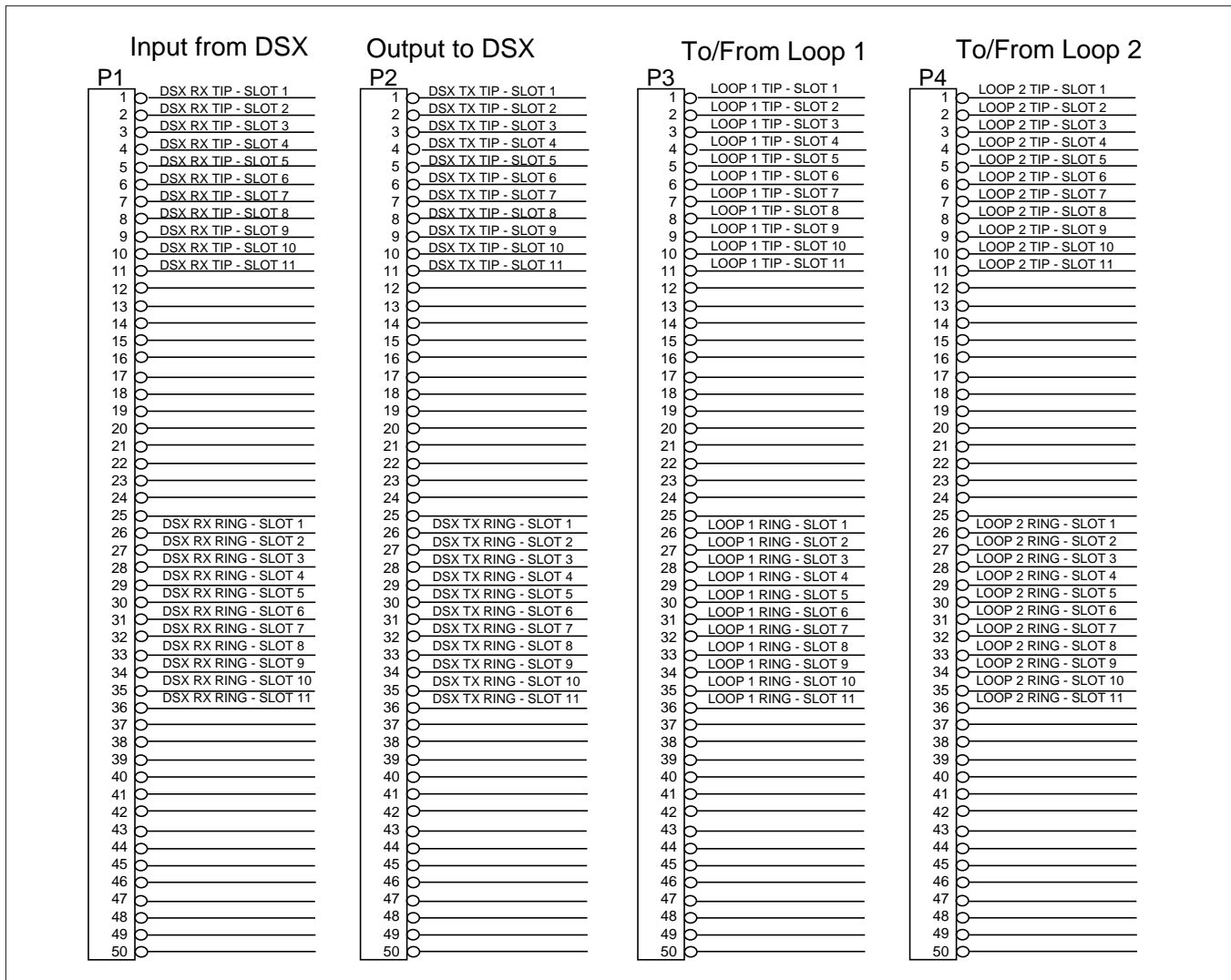


Figure 5. Signal I/O Pinouts for Amp-Type Connectors

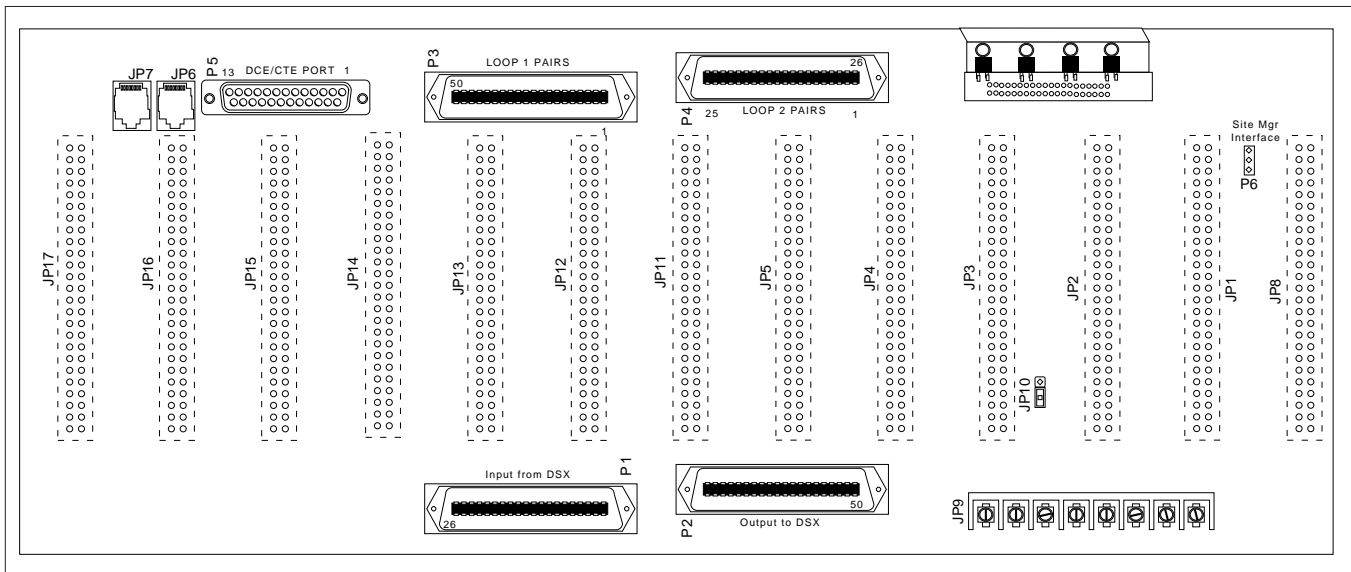


Figure 6. Signal I/O Connector Locations

### 3. INSTALLATION OPTIONS

#### Fault Locate Option

The ADTRAN E220 RP shelf is equipped with a fault locate bus for use with T1 repeater cards that have fault location capability. A jumper strap is located near JP4 on the backplane allowing use of this function, if needed. The factory default position of this strap is the SHORT position. The strap should be left in this position unless fault location equipment is actually in use. For fault location activity, use the ACTIVE strap position.

#### System Communications

Two RJ-45S jacks, JP6 and JP7, located on the backplane provide shelf-to-shelf communication when the system is controlled by an HCOT-CTL system controller card. A 4- or 8-wire cable with RJ45S-type jacks should be used to supply these interconnections. The sequence of connections should be from the RS-422 OUT port of the shelf that contains the system controller to the RS-422 IN port of the next shelf. Follow this procedure for each shelf.

#### OSS Interface

A DB25 connector, P5, is provided on the backplane for connection of the HCOT-CTL system controller to an operations support system interface. See the HCOT-CTL practice for more information on this port connection.

### 4. INSTALLATION OF PLUG-INS

The E220 RP has 12 available slots for plug-in cards. The far left slot is reserved for an HFAC shelf controller. Slots 1 through 11 are available for HTU-C units. Slot 1 can also accept an HCOT-CTL controller.

If the application requires a shelf controller, insert an HFAC unit into the far left slot. This slot is labeled HFAC on the lower edge of the E220 RP shelf. These slot connectors are offset and will only accept an HFAC controller card. Push firmly to insure that it is seated properly.

If the application requires a system controller, insert an HCOT-CTL controller into slot 1 (see Figure 8). The HCOT-CTL will physically plug into any of slots 1 through 11, but will only function properly in slot 1. Push firmly to insure that it is seated properly.

If no system controller is used in the shelf, HTU-C units can occupy slots 1 through 11 (see Figure 9). Load HTU-C cards according to the application and insure that they are all seated into their connectors.

### 5. MAINTENANCE

The ADTRAN E220 RP requires no routine maintenance to operate properly. Tests and maintenance for the individual plug-ins should be connected in accordance with the recommendations and procedures prescribed by the manufacturer of specific plug-in.

ADTRAN recommends that major repairs on the shelf not be performed in the field. Repair services may be obtained by returning defective units to ADTRAN.



JP1	
1	not used
2	RS485 TX+ (HTU-C/HFAC communications link)
3	RS485 TX- (HTU-C/HFAC communications link)
4	not used
5	not used
6	RS422 TX+ output to next shelf
7	RS422 TX- output to next shelf
8	RS422 RX+ input from next shelf
9	RS422 RX- input from next shelf
10	RS422 TX+ input from HCOT-CTL
11	RS422 TX- input from HCOT-CTL
12	RS422 RX+ output to HCOT-CTL
13	RS422 RX- output to HCOT-CTL
14	not used
15	-48V return
16	-48V return
17	-48V return
18	-48V return
19	RS485 termination
20	RS485 termination
21	-48RET shelf ID
22	Remote ACO input
23	Remote ACO input
24	HCOT-CTL detect input
25	Frame Ground
26	Visual Critical alarm/normally open
27	Visual Critical alarm/common
28	Visual Critical alarm/normally closed
29	Audible Critical Alarm/normally open
30	Audible Critical alarm/common
31	Audible Critical alarm/normally closed
32	Visual Major alarm/normally open
33	Visual Major alarm/common
34	Visual Major alarm/normally closed
35	Audible Major alarm/normally open
36	Audible Major alarm/common
37	Audible Major alarm/normally closed
38	Visual Minor alarm/normally open
39	Visual Minor alarm/common
40	Visual Minor alarm/normally closed
41	Audible Minor alarm/normally open
42	Audible Minor alarm/common
43	Audible Minor alarm/normally closed
44	Card sense 9
45	Card sense 10
46	Card sense 11
47	Fault locate tip
48	Fault locate ring
49	not used
50	not used

JP8	
1	-48 VDC (HCOT-CTL supply)
2	
3	
4	
5	
6	
7	
8	
9	
10	BPV/LOS alarm
11	Fuse alarm
12	HCOT-CTL fuse TST
13	DCD
14	DTR
15	TXD
16	RXD
17	CTS
18	RI
19	DSR
20	RTS
21	not used
22	-48V return
23	-48V return
24	-48V return
25	-48V return
26	Site Manager B
27	Site Manager A
28	
29	
30	not used
31	not used
32	not used
33	
34	Card sense 1
35	Card sense 2
36	Card sense 3
37	Card sense 4
38	
39	
40	Circuit B fuse alarm
41	
42	
43	Circuit A fuse alarm
44	
45	
46	
47	Card sense 5
48	Card sense 6
49	Card sense 7
50	Card sense 8

Figure 7. HFAC Slot Pin Assignments

### Slot 1 JP2

1	Loss of signal alarm (active = closure to -48 return)
2	RS485 TX+ (HTU-C/HFAC communications link)
3	RS485 TX- (HTU-C/HFAC communications link)
4	-48 V (HCOT-CTL supply)
5	Used by the HFAC to detect presence of the HTU-C
6	Slot ID detect
7	Slot ID detect
8	Slot ID detect
9	Slot ID detect
10	RS422 TX+ RS422 input from HCOT-CTL
11	RS422 TX- RS422 input from HCOT-CTL
12	RS422 RX+ RS422 output to HCOT-CTL
13	RS422 RX- RS422 output to HCOT-CTL
14	not used
15	-48V return
16	-48V return
17	-48V return
18	-48V return
19	-48V return
20	DCD (HCOT-CTL/OS interface)
21	DTR (HCOT-CTL/OS interface)
22	TXD (HCOT-CTL/OS interface)
23	RXD (HCOT-CTL/OS interface)
24	not used
25	Frame Ground
26	HDSL loop 1 tip
27	HDSL loop 1 ring
28	CTS (HCOT-CTL/OS interface)
29	not used
30	not used
31	not used
32	Fuse alarm (no alarm = open; alarm = -48VDC)
33	not used
34	HDSL loop 2 tip
35	HDSL loop 2 ring
36	RI (HCOT-CTL/OS interface)
37	not used
38	HCOT-CTL presence identifier sense line
39	-48 VDC supplied from fuse 1
40	-48 VDC supplied from fuse 1
41	-48 VDC supplied from fuse 1
42	DSX-1 RX tip
43	DSX-1 RX ring
44	-48V return
45	DSR (HCOT-CTL/OS interface)
46	RTS (HCOT-CTL/OS interface)
47	Fault locate tip
48	Fault locate ring
49	DSX-1 TX tip
50	DSX-1 TX ring

Figure 8. HCOT-CTL/HTU-C Slot Pin Assignments

### SLOTS 2 - 11

1	BPV/LOS alarm
2	RS485 backplane TX+
3	RS485 backplane TX-
4	not used
5	Card sense
6	Slot prog 1
7	Slot prog 2
8	Slot prog 3
9	Slot prog 4
10	not used
11	not used
12	not used
13	not used
14	not used
15	-48V ret
16	
17	
18	
19	
20	Alarm relay 1 (normally open)
21	Alarm relay 2 (normally open)
22	not used
23	not used
24	not used
25	Frame ground
26	HDSL loop 1 tip
27	HDSL loop 1 ring
28	not used
29	not used
30	not used
31	not used
32	Fuse alarm
33	not used
34	HDSL loop 2 tip
35	HDSL loop 2 ring
36	not used
37	not used
38	not used
39	-48 VDC
40	-48 VDC
41	-48 VDC
42	DSX-1 RX tip
43	DSX-1 RX ring
44	-48 V return
45	not used
46	not used
47	Fault locate tip
48	Fault locate ring
49	DSX-1 TX tip
50	DSX-1 TX ring

Figure 9. HTU-C Slots 2-11 Pin Assignments

**6. SPECIFICATIONS**

E220 RP HDSL 19" System Shelf specifications are listed in Table A.

**Table A. E220 RP HDSL 19" System Shelf Specifications**

<b>Power</b>	
-48 VDC .....	9.0A maximum fully loaded shelf
<i>Power in the shelf is limited <b>only</b> by shelf fuse size (2@5A=10A).</i>	
<b>Physical</b>	
Dimensions: .....	19" wide x 6.969" high x 12.5" deep
Weight: .....	10 lbs, 8 oz
<b>Wire Wrap Connectors</b>	
Backplane wire wrap pins are .031-inch square posts and will withstand 22-gauge wire with torques not exceeding 4 oz/in, per MIL-STD-1130B.	
<b>Temperature</b>	
Operating: .....	-40 to +70°C
Storage: .....	-40 to +85°C

**7. WARRANTY AND CUSTOMER SERVICE**

ADTRAN will replace or repair this product within five years from the date of shipment if it does not meet its published specifications or fails while in service (refer to ADTRAN Equipment Warranty and Repair and Return Policy and Procedure).

A Return Material Authorization (RMA) is required prior to returning equipment to ADTRAN.

For service, RMA requests, or further information, contact one of the following numbers.

**ADTRAN Customer Service:**

ADTRAN Telco Technical Support ..... (800) 726-8663  
 Standard support hours: ..... Monday-Friday  
 7 a.m. - 7 p.m. CST  
 Emergency support: ..... 7 days/week, 24 hours/day  
 Sales ..... (800) 827-0807  
 RMA (repair service) ..... (205) 971-8722

**Repair and Return Address:**

ADTRAN, Inc.  
 Customer Service Department  
 901 Explorer Boulevard  
 Huntsville, Alabama 35806-2807