E220 HFAC HDSL / HDSL2 FUSE Alarm Control Unit
Installation and Maintenance

CONTENTS

FIGURES

TABLES

Figure 1. ADTRAN E220 HFAC

1. GENERAL

The ADTRAN E220 HDSL / HDSL2 Fuse/Alarm/ Control (HFAC), P/N 61221051L1, unit is a shelf controller unit designed for operation in the ADTRAN E220 HDSL / HDSL2 Central Office (CO) shelf. **Figure 1** is an illustration of the E220 HFAC.

Revision History

Revisions to this practice will be summarized in this paragraph.

The E220 HFAC provides a common access point to performance and provisioning information related to each HDSL / HDSL2 transceiver unit for the central office (HTU-C and H2TU-C) deployed in the E220 shelf. By addressing the HTU-C or H2TU-C, the HFAC also provides support for the HDSL / HDSL2 range extender (HRE and H2R) and the HDSL / HDSL2 transceiver unit for the remote end (HTU-R and H2TU-R). The shelf supports one shelf controller (HFAC) and up to 13 HTU-C / H2TU-C cards for the 23-inch shelf or 11 HTU-C / H2TU-C cards for the 19-inch shelf. A faceplate-mounted DB9 connector provides a VT 100 compatible terminal interface for controlling the system.

The HFAC supports the HTU-Cs / H2TU-Cs listed below.

- 1242024L1
- 1242002L2
- 1242002L5
- 1242002L6
- 1245001L2
- 1245001L9
- 1245011L1
- 1242002L7
- 1242029L1
- 1242029L2
- 1244001L1
- 1246001L2
- 1221001L2

The differences in functionality when working with list-specific HTU-Cs / H2TU-Cs or HREs / H2Rs, if any, are called out in this practice. Also, the HFAC has necessary interface software for communications with the HCOT-CTL (ADTRAN p/n: 1240009L1, 1244051L1, 1221051L1). See appropriate HCOT practices for installation and maintenance information.

The HFAC collects and presents performance information for each circuit deployed in the shelf. It also allows control of all provisioning information for each circuit. The unit can also be configured to provide advanced alarm processing features.

2. INSTALLATION

C A U T I O N !
SUBJECT TO ELECTROSTATIC DAMAGE
OR DECREASE IN RELIABILITY.
HANDLING PRECAUTIONS REQUIRED.

After unpacking the unit, inspect it for damage. If damage is discovered, file a claim with the carrier, then contact ADTRAN. See Warranty and Customer Service.

Electrical cable compliance

Table 1 shows the Compliance Codes for HFAC. The HFAC complies with the requirements covered under UL 1950 third edition and is intended to be installed in an enclosure with an Installation Code (IC) of "B" or "E."

NOTE

This product is intended for installation in Restricted Access Locations Only. Input current at maximum load is 1A at -48 VDC. Maximum output at overcurrent condition is 165 mA at -190 VDC.

Table 1. Compliance Codes

Code	Input	Output
IC	A	-
TC	-	-
PC	F	C

Configuration

Operation of the HFAC is influenced by three sets of configuration option switches (see **Figures 2 and 3**).

Shelf Address

Two rotary switches (U38 and U39) are provided to program the shelf's address. In a system where several shelves are under the common control of one ADTRAN E220 HCOT-CTL System Controller, each individual shelf must be programmed with a unique shelf address. Addresses range from 00 to 99. In a system that does not utilize the HCOT-CTL System Controller, the shelf address is not used.   To program
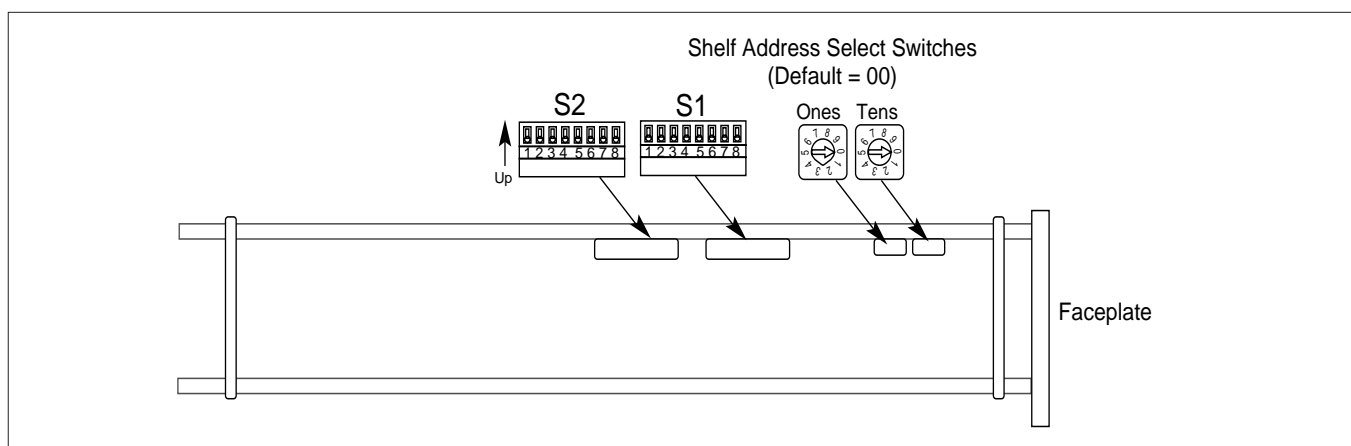

Figure 2. Configuration and Shelf Address Switches

the address, select the desired address in the Options Setup Screen (**Figure 11**), or set the rotary switches as indicated in Figure 2.

Unit Options
Two banks of configuration switches (S1, S2 and S3, see Figure 2 and 3) are used to select advanced alarm reporting features (see **Tables 2, 3 and 4**).

Errored Seconds (ES) Alarm
The locations shown in **Figure 4** are monitored for errored seconds and counts are maintained for each location.

If any of these counts exceed the ES programmed threshold (see Tables 1 and 2) an alarm will be generated. This alarm threshold and the alarm type (minor or major) can be programmed by setting switches S1 and S2 (Figure 2) to the appropriate positions, according to Tables 1 and 2.

The alarm thresholds are for the 15-minute registers only, and the 15-minute ES counts are zeroed at each 15-minute boundary. The ES alarm threshold and alarm type can also be configured in the Craft interface Options Setup screen.
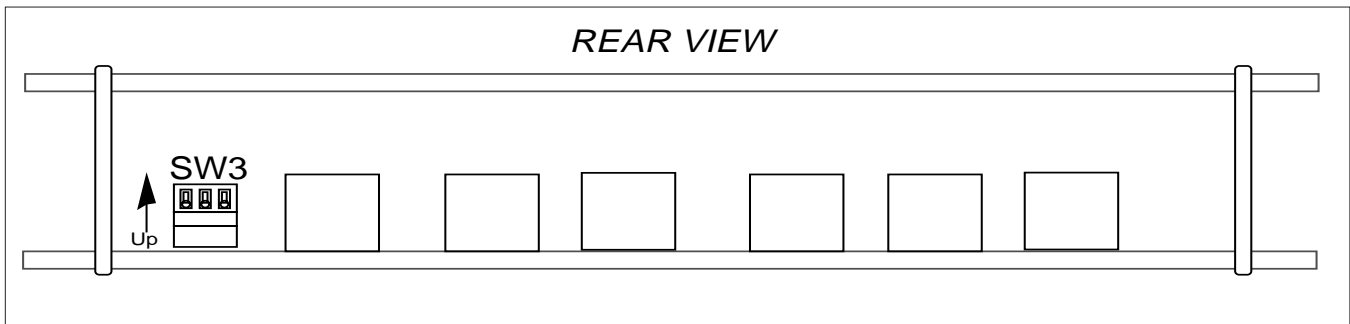
Figure 3. SW3 Location and Options

Table 2. S1 Switch Options (arrow indicates default setting)

Switch	Function	Description
S1-1 .... ➤Down .... Up (open)	Errored Seconds Minor Alarm Major Alarm	Selects the type of alarm generated when the errored seconds (ES) counter exceeds the programmed threshold (see Table 2, S2-1, S2-2).
S1-2 .... ➤Down .... Up (open)	Severely Errored Seconds Minor Alarm Major Alarm	Selects the type of alarm generated when the severely errored seconds (SES) counter exceeds the programmed threshold (see Table 2, SW2-3, SW2-4).
S1-3 .... ➤Down .... Up (open)	Unavailable Seconds Major Alarm Critical Alarm	Selects the type of alarm generated when the unavailable seconds (UAS) counter exceeds the programmed threshold (see Table 2, SW2-5, SW2-6).
S1-4 .... S1-5 .... Down .... Down .... Up (open) .. Down .... ➤Down .... Up (open) ..... Up (open) .. Up (open)	HFAC Fuse Alarm Type No Alarm Minor Alarm Major Alarm Critical Alarm	Selects the type of alarm generated in response to an HFAC fuse failure. Switch SW3 must also be set correctly for this alarm to function properly (see Table 3). This option is hardware-selectable only.
S1-6 .... S1-7 .... Down .... Down .... Up (open) .. Down .... Down .... Up .... ➤Up (open) .. Up (open)	HTU-C Fuse alarm Type No Alarm 1 or more: Critical 1: Major, 2-13: Critical 1-5: Major, 6-13: Critical	Selects the type of alarm generated in response to a specific number of HTU-C fuse failures.
S1-8 .... ➤Down .... Up (open)	HCOT-CTL Fuse Alarm Type Major Alarm Critical Alarm	Selects the type of alarm generated in response to an HCOT-CTL system controller fuse failure. This option can only be selected by switch.

Table 3. S2 Switch Options (arrow indicates default setting)

Switch	Function	Description
S2-1 .... S2-2 .... Down .... Down .... Up (open) .. Down .... Down .... Up (open) ..... ➤ Up (open) .. Up (open)	ES Alarm Threshold No Alarm 15 30 150	Selects the threshold for generating an ES alarm. Once the number detected exceeds the threshold, an alarm is generated as programmed by S1-1. The alarm condition is cleared at the next 15-minute boundary.
S2-3 .... S2-4 .... Down .... Down .... Up (open) .. Down .... Down .... Up .... ➤ Up (open) .. Up (open)	SES Alarm Threshold No Alarm 5 15 75	Selects the threshold monitored for generating an SES alarm. Once the number detected exceeds the threshold, an alarm is generated as programmed by S1-2. The alarm condition is cleared at the next 15-minute boundary.
S2-5 .... S2-6 .... Down .... Down .... Up (open) .. Down .... Down .... Up (open) ..... ➤ Up (open) .. Up (open)	UAS Alarm Threshold No Alarm 5 15 75	Selects the threshold monitored for generating an UAS alarm. Once the number detected exceeds the threshold, an alarm is generated as programmed by S1-3. The alarm condition is cleared at the next 15-minute boundary.
S2-7 .... S2-8 .... Down .... Down .... ➤ Up (open) .. Down .... Down .... Up .... Up (open) .. Up (open)	COMM Link Loss Alarm No Alarm Minor Major Critical	Selects the type of alarm generated when a loss of communication between the HFAC controller and an HTU-C occurs. This option is switch-selectable only.

Table 4. S3 Switch Options (arrow indicates default setting)

NOTE: Only one of the S3 Switches should be in the down position.

| Switch	Function	Description
S3-1 .... Down .... ➤ Up	HFAC Fuse Alarm Control Critical No Alarm	Selects Critical as the type alarm generated if the HFAC fuse is blown.
S3-2 .... ➤ Down .... Up	HFAC Fuse Alarm Control Major No Alarm	Selects Major as the type alarm generated if the HFAC fuse is blown.
S3-3 .... Down .... ➤ Up	HFAC Fuse Alarm Control Minor No Alarm	Selects Minor as the type alarm generated if the HFAC fuse is blown.
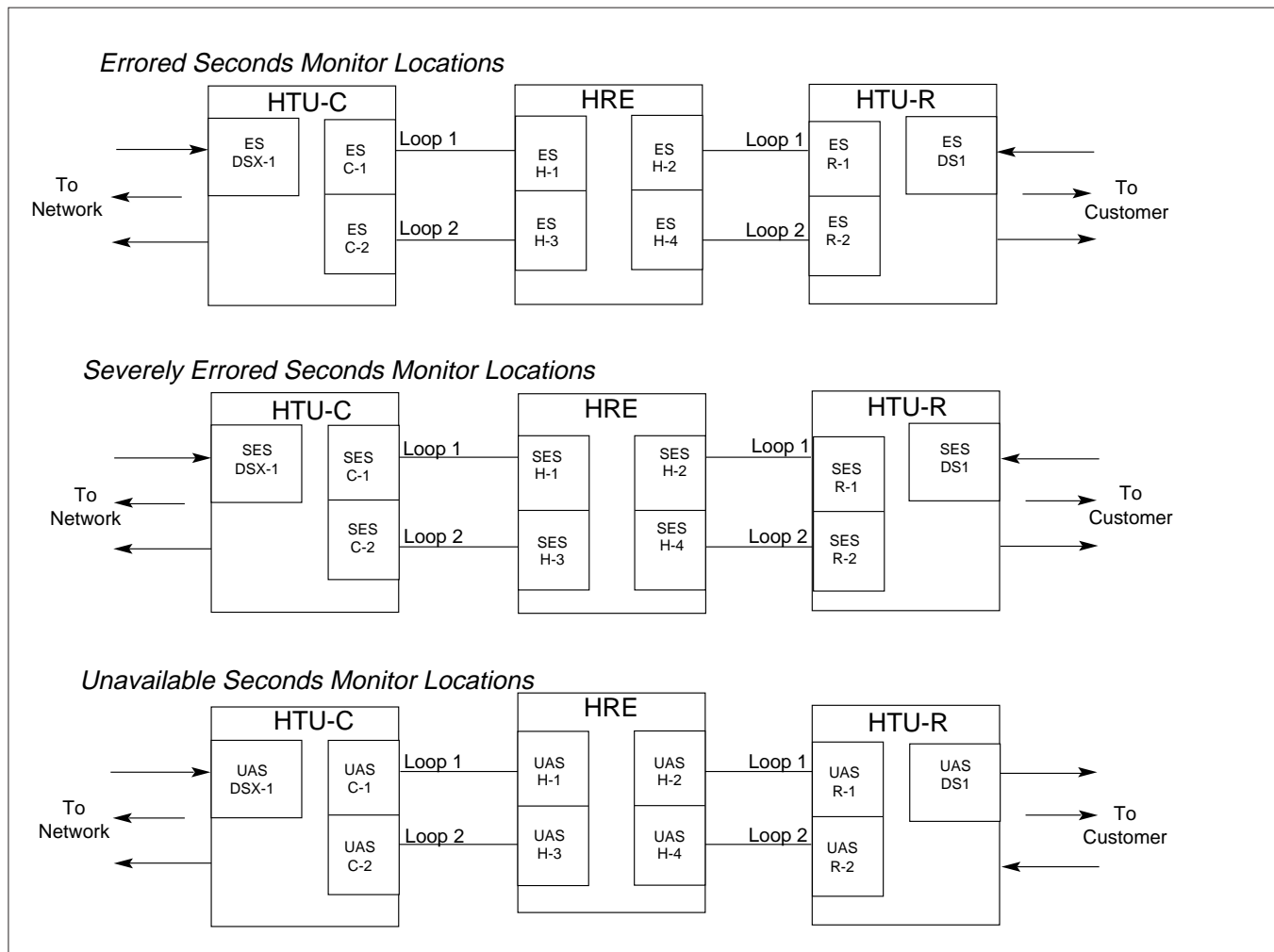
Figure 4. ES, SES, and UAS Monitor Locations

Severely Errored Seconds (SES) Alarm

The locations shown in Figure 4 are monitored for Severely Errored Seconds and counts are maintained for each location. If any of these counts exceed the SES programmed threshold (see Tables 1 and 2) an alarm will be generated. This alarm threshold and the alarm type (minor or major) can be programmed by setting switches S1 and S2 (Figure 2) to the appropriate positions according to Tables 1 and 2. The alarm thresholds are for the 15-minute registers only, and the 15-minute SES counts are zeroed at each 15-minute boundary. The SES alarm threshold and alarm type can also be configured in the Craft interface Options Setup screen (see Figure 11).

Unavailable Seconds (UAS) Alarm

The locations shown in Figure 4 are monitored for unavailable seconds. Seconds and counts are maintained for each location. If any of these counts exceed the UAS programmed threshold (see Tables 1 and 2), an alarm will be generated. This alarm threshold and the alarm type (major or critical) can be programmed by setting switches S1 or S2 (Figure 2) to the appropriate positions according to Tables 1 and 2. The alarm thresholds are for the 15-minute

registers only, and the 15-minute UAS errored second counts are zeroed at each 15-minute boundary. The UAS alarm threshold and alarm type can also be configured in the Craft interface Options Setup screen (see Figure 11). Note that HDSL2 two wire units only have Loop 1.

HFAC Alarm Outputs

If an HFAC is present in the shelf, alarm outputs are available on the backplane wirewrap pins corresponding to the HFAC slot (see **Figure 5**). These outputs are dry contact relay connections and provide normally open, normally closed and common connection points for alarm monitoring equipment. Alarm connection points corresponding to critical major, and minor alarms (both visible and audible) are provided. These alarms are generated by the HFAC as a result of processed data collected from the HTU-Cs / H2TU-Cs.

Alarm outputs presented on these pins are programmable and can be provisioned in the HFAC Options Setup screen (see Options Setup screen), or using the HFAC dip switch settings (see Tables 1, 2, and 3). Alarm severity can be provisioned for alarms
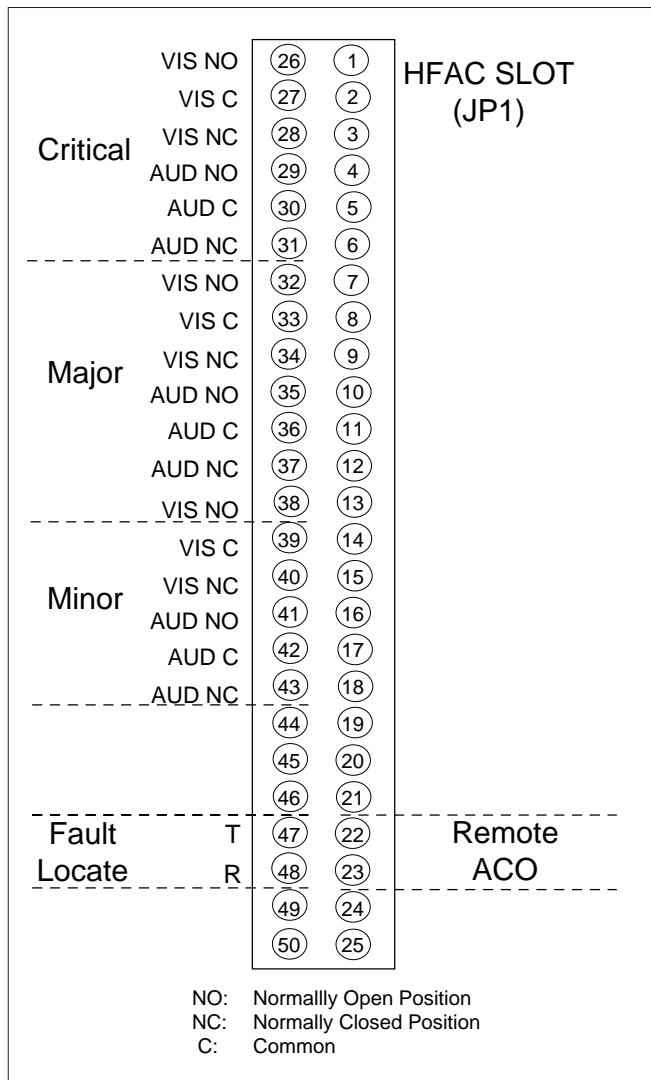
Figure 5. HFAC Wire-Wrap Pin-Out Design

Within the figure:

HFAC SLOT (JP1)

Critical
- VIS NO — 26 | 1
- VIS C — 27 | 2
- VIS NC — 28 | 3
- AUD NO — 29 | 4
- AUD C — 30 | 5
- AUD NC — 31 | 6

Major
- VIS NO — 32 | 7
- VIS C — 33 | 8
- VIS NC — 34 | 9
- AUD NO — 35 | 10
- AUD C — 36 | 11
- AUD NC — 37 | 12

Minor
- VIS NO — 38 | 13
- VIS C — 39 | 14
- VIS NC — 40 | 15
- AUD NO — 41 | 16
- AUD C — 42 | 17
- AUD NC — 43 | 18

(44 | 19)
(45 | 20)
(46 | 21)

Fault Locate
- T — 47 | 22 — Remote ACO
- R — 48 | 23

(49 | 24)
(50 | 25)

NO: Normallly Open Position
NC: Normally Closed Position
C: Common

resulting from blown fuses in the HFAC, HTU-C, or HCOT units, or from communications failure between any HTU-C and the HFAC. Alarm severity and threshold value can be provisioned for the errored second, severely errored second, and unavailable second parameters.

An option available on the HFAC Option Setup screen allows external DSX-1 or DS1 alarms to be enabled or disabled. This option can only be changed in the HFAC menu (no dip switch option) and the factory default is disabled (see **Table 5**).

HFAC Fuse Alarm

An alarm may be generated as a result of an HFAC fuse failure. For alarm processing to work, two sets of switches (S1 and S3) must be programmed. See Table 1 and 4. Both switches must be set properly for the HFAC fuse alarm to operate correctly.

Table 5. External HTU-C/HTU-R Alarm Options
(Software-Selectable Only)
(arrow indicates default setting)

Options Screen Menu Item No.	Function	Description
5	EXT HTU-C/R	Alarms Disables and enables the alarms resulting from external DSX-1 or DS1
➤ Disabled		
Enabled		

HTU-C Fuse Alarm

An alarm may be generated as a result of an HTU-C fuse failure. The HFAC controller will sense the failure and process this alarm event according to switch settings as defined in Table 2.

3. CONNECTIONS

The HFAC plugs into Slot 0 (labeled HFAC) of the ADTRAN E220 shelf. Push firmly to ensure the card seats properly. Connections to the HFAC are made by wire wrap connections to the backplane-mounted connector. JP1 is the primary interface connector for the HFAC. Figure 5 shows the wire-wrap connector terminal pin assignments.

Alarms

A set of alarm contacts is provided through backplane wire-wrap connections (Figure 5). Wiring can be made to the appropriate pins on JP1 for normally open or normally closed connections for alarm conditions. Connection is made to the Common (C) pin and to the Normally Open (NO) or Normally Closed (NC) pin. Visible and audible alarm contact connections are provided for critical, major, and minor alarms. An audible alarm cutoff function can be initiated by pressing the ACO push-button on the HFAC, or by providing closure between the Remote ACO pins on the JP1 connector. The backplane is labeled with appropriate markings for the alarm and alarm cutoff connections.

System Communications

If the HFAC is to be used as part of a larger system under the control of an ADTRAN E220 HCOT-CTL system controller, then shelf-to-shelf connections are required. Two RJ45S jacks, JP6 and JP7, located on the shelf backplane, provide shelf-to-shelf communications. 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 RS422 OUT port of the shelf containing the E220 HCOT-CTL system controller to the RS422 IN port of the next shelf. Follow this procedure to

interconnect subsequent shelves. Each shelf controller should be assigned unique sequential shelf addresses. No connection should be made to the RS422 in connector on the shelf containing the E220 HCOT-CTL.

4. FACEPLATE FEATURES

Table 6 defines the faceplate features of the HFAC.

5. CONTROL PORT OPERATION

The HFAC provides a faceplate-mounted DB9 connector which supplies an RS232 interface for connecting to a controlling terminal. Pin assignments are shown in **Figure 6**.

DSR — 6 · 1
RTS — 7 · 2 — TXD (TXD to DTE)
CTS — 8 · 3 — RXD (TXD from DTE)
· 9 · 4 — DTR
· 5 — SGN GND
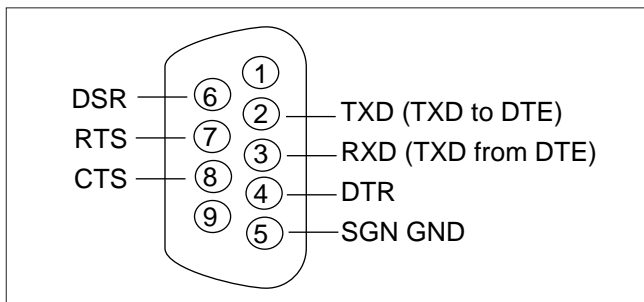
Figure 6. Control Port Pin Assignments (DCE Configuration)

The terminal interface operates at a data rate range of 4.8 kbps to 19.2 kbps. The asynchronous data format is fixed at eight data bits, no parity, one stop bit. The supported terminal type is VT 100, or compatible.

Optional terminal parameters should be set as follows:

•XON/XOFF flow control	On
•TX carriage return	<CR> (not <CRLF>)
•Send ACK*	Off
•Linewrap	Off
•Duplex setting	Full
•Asynchronous format	8 data bits, no parity, 1 stop bit
•Cursor	Off (if possible)
•Display Width	80 columns
•Display Height	24 lines (minimum)

or any other autonomously-sent character from terminal

Screen Abbreviations

Screen diagram abbreviations used are defined in **Table 7**.

Table 6. HFAC Faceplate Features

HFAC
1221051L1

ALARMS
○ CRITICAL   ○ PWR
○ MAJOR   ACO
○ MINOR

SHELF ADDRESS

CRAFT INTERFACE

RS232   BUSS GMT-X
0.25 AMP

ADTRAN
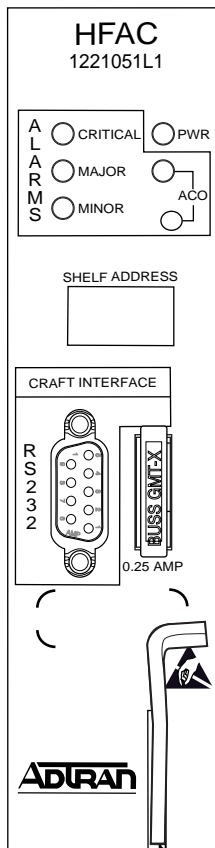
| Indicators and LEDs	Description
PWR	Indicates that power is present to the HFAC card.
ALARMS	Critical (red)...... Indicates that a critical alarm condition is present. Major (red)........ Indicates that a major alarm condition is present. Minor (yellow) ... Indicates that a minor alarm condition is present. ACO .... Alarm cut off. Indicates that the audible portion of an alarm has been terminated.
SHELF ADDRESS	The shelf address is indicated using two 7-segment LED displays. The address is programmed using the switches described in subsection 2 and tables A and B; or using the Options Setup screen (see Figure 11).
Button ACO	A single momentary push-button provided to operate the alarm cut off function. When the button is present, the audible portion of an active alarm is silenced. The condition of the alarm itself is not affected.
Fuse	This 0.25 -amp fuse is provided to protect the card from power-related failures. The fuse is a BUSS BMT-0.25, or equivalent. If the fuse opens, a fuse alarm is generated as described in subsection 2. The fuse has a visual tripped indicators. When the metal tab (visible through the cover) flips up, the fuse has opened.
RS232	A faceplate-mounted DB9 connector which supplies an RS232 interface for connection to a controlling terminal. Refer to subsection 5.

Table 7. Screen Abbreviations

Abbreviations	Description
DSX/DS1	
BPV	Second in which a bipolar violation occurs.
ES	SF: Second in which a BPV or frame bit error occurs. ESF: Second in which a BPV or CRC error occurs.
SES	Second in which 1544 BPVs or 8 frame bit errors occur.
UAS	Second in which there is a loss of signal or loss of sync.
HDSL Loops	
ES	Second in which a CRC error occurs.
SES	Second in which 165 CRC errors occur.
UAS	Second in which there is a loss of signal or loss of sync.
General	
SF	Superframe format.
ESF	Extended superframe format.
B8ZS	Binary 8 zero substitution.
AMI	Alternate mark inversion.
LBO	Line build-out.
NIU	T1 network interface unit.
DOM	Date of manufacture.
S/N	Serial number.
15M	Fifteen-minute period.
24H	Twenty-four-hour period.

A terminal session is initiated by entering multiple space bar characters which are used by the HFAC to determine the speed of the terminal. Once the speed has been derived, an Introductory Menu is presented as illustrated in **Figure 7**. This screen includes ADTRAN technical support phone numbers along with serial numbers, CLEI codes, date of manufacture information for each active HDSL / HDSL2 system element, and if the circuit has an installed HDSL / HDSL2 range extender (HRE / H2R).

NOTE

The command keys valid for each screen are shown at the bottom of the display. Pressing keys other than these may cause the HFAC to adjust to a different speed. If this happens, the HFAC will not respond to keyboard commands and may display random characters. Press the space bar repeatedly until the screen is re-displayed.

Main Menu

From the Introductory Screen, select Main Menu by typing **M**. **Figure 8** illustrates the Main Menu Screen.

From the Main Menu select:

1. Shelf Status Summary
2. Performance Data
3. Alarm Status
4. Loopback Control
5. ADTRAN Information
6. Troubleshooting
7. Self-Test Options
8. Provisioning
9. Protection Switching

Selection of 5, ADTRAN Information, presents the same screen as the Introductory Screen. Description of other screen selections available from the Main Menu follow.

```
 08/08/70  17:55:57              A D T R A N              SHELF ADDRESS = 00
            901 Explorer Boulevard, Huntsville, Alabama 35806-2807

    ********** Technical Support **********    HFAC Information [Version 3.00]
    Voice  (888) 873-HDSL or (800) 726-8663    Serial Number :
    Fax  .................. (256) 963-6217        CLEI Code :
    Internet .............. www.adtran.com    Date of Manf. :

     HTU-C Serial# CLEI Code  DOM   HRE?        HTU-R Serial# CLEI Code  DOM
  1 : -------------- ---------- -----   -      1 : -------------- ---------- -----
  2 : -------------- ---------- -----   -      2 : -------------- ---------- -----
  3 : -------------- ---------- -----   -      3 : -------------- ---------- -----
  4 : -------------- ---------- -----   -      4 : -------------- ---------- -----
  5 : -------------- ---------- -----   -      5 : -------------- ---------- -----
  6 : -------------- ---------- -----   -      6 : -------------- ---------- -----
  7 : A12344321      T1LIDPX2AA 01/97   -      7 : B805A5458      T1L2CRVBAA 02/98
  8 : -------------- ---------- -----   -      8 : -------------- ---------- -----
  9 : -------------- ---------- -----   -      9 : -------------- ---------- -----
 10 : -------------- ---------- -----   -     10 : -------------- ---------- -----
 11 : -------------- ---------- -----   -     11 : -------------- ---------- -----
 12 : A11111111      T1LIDP02AA 01/97   -     12 : -------------- ---------- -----
 13 : A12345678      T1L2BUCBAA 08/99   -     13 : -------------- ---------- -----

          PRESS :    "M"  - main menu, "R" - range extender info
```

Figure 7. Introductory Menu

```
08/08/70  17:57:06                                    SHELF ADDRESS = 00



                         HFAC MAIN MENU


                1: SHELF STATUS SUMMARY
                2: PERFORMANCE DATA
                3: ALARM STATUS
                4: LOOPBACK CONTROL
                5: ADTRAN INFORMATION
                6: TROUBLESHOOTING
                7: SELF-TEST OPTIONS
                8: PROVISIONING
                9: PROTECTION SWITCHING

                CHOOSE 1-9 :
```

Figure 8. Main Menu Screen

Shelf Status Summary Screen

The Shelf Status Summary Screen shown in **Figure 9** provides a top-level look at the alarm and provisioning of data for the shelf and each circuit within the shelf.

HDSL / HDSL2 Status Screen

From the Shelf Status Summary Screen, detailed information related to a particular circuit may be accessed. The HDSL / HDSL2 Shelf Status Summary screen related to a particular slot may be displayed by typing the desired slot number and **S**. For example, to access Slot 6 information, type **6S**. The HDSL / HDSL2 Status Summary Screen is shown in **Figure 10**. This screen gives both local and remote performance and provisioning information for the selected slot. If a supported HRE is present in the HDSL / HDSL2 circuit, screen 10A is available to view the performance of the HRE.

```
08/08/70  17:59:19                                  SHELF ADDRESS = 00
                  SHELF STATUS SUMMARY    [ BYPASS = OFF ]

ACTIVE SHELF ALARMS            HFAC ALARM THRESHOLD OPTION SETTINGS
_____           _____
CRITICAL - YES               ES              SES              UAS
MAJOR    - NO        SLOT  TYPE  THRSHLD   TYPE  THRSHLD   TYPE  THRSHLD
MINOR    - NO        ----  -------------   -------------   -------------
                      1:   ---    ---      ---    ---      ---    ---
FUSE ALARM SETTINGS   2:   ---    ---      ---    ---      ---    ---
_____   3:   ---    ---      ---    ---      ---    ---
HFAC  : CRIT          4:   ---    ---      ---    ---      ---    ---
HTU-C : 1-5  = MAJ,   5:   ---    ---      ---    ---      ---    ---
        6-13 = CRIT   6:   ---    ---      ---    ---      ---    ---
                      7:*  MAJ    150      MAJ    075      CRIT   075
                      8:   ---    ---      ---    ---      ---    ---
      LEGEND          9:   ---    ---      ---    ---      ---    ---
_____   10:  ---    ---      ---    ---      ---    ---
NA    = NOT ALARMED   11:  ---    ---      ---    ---      ---    ---
*     = DEFAULT       12:* MAJ    150      MAJ    075      CRIT   075
—     = EMPTY SLOT    13:* MAJ    150      MAJ    075      CRIT   075

PRESS :  "O" - change options,    "D" - read HFAC switch defaults (all slots),
       nn"S" - slot select  (HDSL STATUS),   "M" - main menu :
```

Figure 9. Shelf Status Summary Screen

```
08/08/70  18:00:37        SUMMARY - [ SLOT 7 ]         SHELF ADDRESS = 00
LOOP #1 <NETWORK> LOOP #2   ELAPSED TIME 00:09:56    LOOP #1 <CUSTOMER>LOOP #2
--------- HTU-C ---------                            --------- HTU-R ---------
  01 dB          01 dB       <-    LOSS    ->       01 dB          01 dB
   YES            YES        <-    SYNC    ->        YES            YES
000/00001      000/00001     <- ES  15M/24H ->    000/00001      000/00001
000/00000      000/00000     <- SES 15M/24H ->    000/00000      000/00001
000/00026      000/00025     <- UAS 15M/24H ->    000/00026      000/00025
   LOOPBACKS INACTIVE                                 LOOPBACKS INACTIVE


 HTU-C SIGNAL QUALITY     DSX-1                 DS1    HTU-R SIGNAL QUALITY
   [X]  9  [X]        ---------------     [X]  9  [X]
  L[X]  8  L[X]       SF      <- FRAME ->    SF     L[X]  8  L[X]
  O[X]  7  O[X]       AMI     <- CODE  ->    AMI    O[X]  7  O[X]
  O[X]  6  O[X]       EXT     <- LBO   ->    0 dB   O[X]  6  O[X]
  P[X]  5  P[X]       N/A     <- NIU   ->    NO     P[X]  5  P[X]
   [X]  4   [X]       00000   <- BPV   ->    00000   [X]  4   [X]
  1[X]  3  2[X]       00000   <- ES    ->    00000  1[X]  3  2[X]
   [X]  2   [X]       00000   <- SES   ->    00000   [X]  2   [X]
   [X]  1   [X]       00324   <- UAS   ->    00302   [X]  1   [X]
   [X]  0   [X]       RED     <- ALARMS ->   RED     [X]  0   [X]
               SEALING CURRENT PRESENT
          "P" - prev scrn,
          "M" - main menu,   "Z" - clr current reg,   nn"S" - slot:
```

Figure 10. Status Summary Screen

Figures 10 and 10A consolidate current information for the HDSL / HDSL2, DSX-1, and DS1 interfaces. A key to the information provided is found in the center of the screen. Arrows indicate the key applies to both the HTU-C and HTU-R.

LOSS	Pulse Attenuation Measurement
SYNC	HDSL Loop 1 and Loop 2 Sync Status
ES 15M/24H	Errored Seconds*
SES 15M/24H	Severely Errored Seconds*
UAS 15M/24H	Unavailable Seconds*

*   *The first number is for the current 15-minute period and the second is the current 24-hour period (Loop 1 and Loop 2 numbers are displayed).*

An indication of Pair Reversal (if present) is given at the bottom of the first key column. Loopback status for the HTU-C, HRE, and HTU-R is indicated on these screens. Status and configuration information for the DS1 and DSX-1 signals is located in the center of the screen near the bottom.

FRAME	T1 Framing Format select
CODE	T1 Line Code selected
LBO	Line Build-Out selected (for DSX-1); Customer signal of 0, -7.5, -15, and -22.5 dB (for DS1)
NIU	Network Interface Unit enabled?

BVP	Bipolar Violations detected (DSX-1 and DS1)
ES	Errored Seconds (DSX-1 and DS1)
SES	Severely Errored Seconds (DSX-1 and DS1)
UAS	Unavailable Seconds (DSX-1 and DS1)
Alarms	Lists current alarm condition status

A measure of signal quality for each HDSL / HDSL2 loop is displayed in graphic form on the bottom right of the screen. The measure is from 0 (poor signal quality) to 9 (excellent signal quality). Guidelines for interpreting the indicators are given below.

0	Noise margin is ≤ 0 dB ($\approx 10^{-7}$ BER)
1-8	Margin measurement above 10^{-7} BER in dB
9	Margin is ≥ 9 dB above 10^{-7} BER

Predicting performance based upon signal quality varies with each loop. Generally, a noise margin of 0 or higher will support a bit error rate of better than 10^{-7}.

ADTRAN has defined the following as guidelines that correspond to the operation of the HTU-C and HTU-R faceplate LEDs labeled LP1 and LP2.

Margin < 0	Poor Loop Signal Quality
$0 \leq$ Margin ≤ 2	Marginal Loop Signal Quality
Margin > 2	Good Loop Signal Quality (better than 10^{-9} BER)

```
 08/08/70  18:05:00          SUMMARY - [ SLOT 8  ]           SHELF ADDRESS = 00
 LOOP #1 <NETWORK> LOOP #2   ELAPSED TIME 00:14:17    LOOP #1 <CUSTOMER>LOOP #2
 --------- HRE #1---------                            --------- HRE #1---------
   00 dB           00 dB      <-     LOSS    ->         01 dB           01 dB
    YES             YES       <-     SYNC    ->          YES             YES
 000/00000      000/00001     <- ES   15M/24H ->     001/00001       001/00001
 000/00000      000/00000     <- SES  15M/24H ->     000/00000       000/00000
 001/00001      001/00001     <- UAS  15M/24H ->     006/00006       001/00001
    LOOPBACK INACTIVE


 HRE#1 NET SIGNAL QUALITY  N = NETWORK  SIDE RECEIVER   HRE#1 CUST SIGNAL QUALITY
    [X]  9   [X]            C = CUSTOMER SIDE RECEIVER      [X]  9   [X]
   L[X]  8  L[X]                                           L[X]  8  L[X]
   O[X]  7  O[X]      ____  LP1 ____  LP1 ____      ____   O[X]  7  O[X]
   O[X]  6  O[X]     |HTUC|    |HRE1|    |HRE2|    |HTUR|  O[X]  6  O[X]
   P[X]  5  P[X]     |    |===N|    |C===|    |====|    |  P[X]  5  P[X]
    [X]  4   [X]     |    |   |    |    |    |    |    |   |   [X]  4   [X]
   1[X]  3  2[X]     |    |===N|    |C===|    |====|    |  1[X]  3  2[X]
    [X]  2   [X]     |____|    |____|    |____|    |____|     [X]  2   [X]
    [X]  1   [X]           LP2       LP2                      [X]  1   [X]
    [X]  0   [X]                                              [X]  0   [X]

           "P" - prev scrn,   n"H" - element (0H=HTU-C/R,  1H=HRE1, 2H=HRE2)
           "M" - main menu,     "Z" - clr current reg,   nn"S" - slot:
```
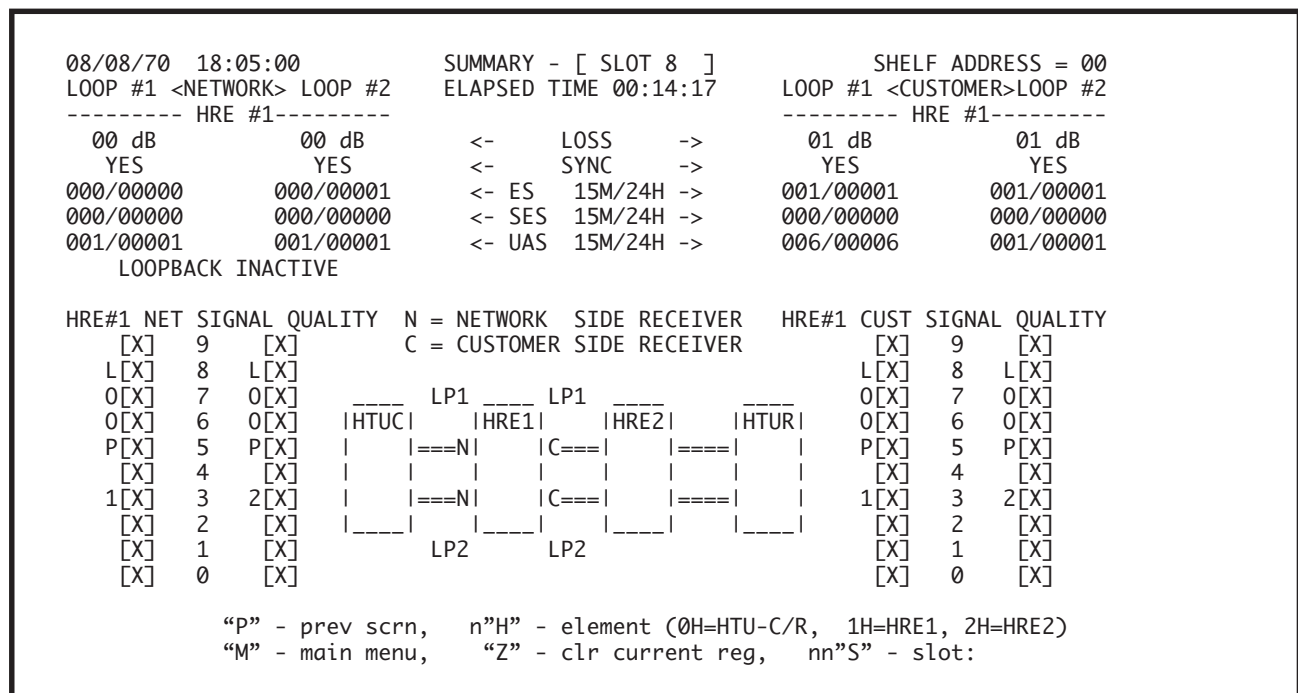
Figure 10A. HDSL Status Summary -HRE Screen

Shelf Controller Options

From the Shelf Status Summary Screen, all shelf controller options may be reviewed. By typing O at the Shelf Status Summary Screen, the Shelf Options Setup Screen may be accessed. This screen is illustrated in **Figure 11**.

External DSX-1 or DS1 threshold alarms (ES, SES, UAS) can be enabled and disabled for a specific slot by selecting the desired setting from the menu. If disabled, these alarms will be suppressed, regardless of how the HTU-C and HTU-R units are provisioned.

Performance Data Screen

From the Main Menu, a screen summarizing the 8-hour performance data for all slots may be selected. From the Main Menu, item 2 presents the Performance Data Screen shown in **Figure 12**. This screen graphically summarizes the performance information for each slot. A key for understanding the display is also presented.

```
                    OPTIONS SETUP  [SLOT = 8 ]

              OPTION #      OPTION                     SETTING
              ----------------------------------------------------------
            --->  1:    HTU-C FUSE ALARM TYPE    --->  1-5 = MAJ, 6-13 = CRIT
    SHELF   |     2:    SHELF ADDRESS            --->  00
   OPTIONS  |     3:    SHELF BYPASS             --->  OFF
            --->  4:    SET DATE/TIME            --->  11/22/99   09:30:31
            --->  5:    EXT HTU-C/HTU-R ALARMS   --->  DISABLED
            |     6:    ES ALARM TYPE            --->  MAJOR
    SLOT    |     7:    SES ALARM TYPE           --->  MAJOR
   OPTIONS  |     8:    UAS ALARM TYPE           --->  CRITICAL
            |     9:    ES ALARM THRESHOLD       --->  150
            |    10:    SES ALARM THRESHOLD      --->  075
            --->  11:   UAS ALARM THRESHOLD      --->  075


              PRESS:  "P"  - previous screen
                    nn"X"  - change option n (ex. 4X)
                    nn"S"  - select slot (ex. 11S)
                      "D"  - read HFAC switch defaults(this slot only)
                      "M"  - main menu

                          ->    <-
```

Figure 11. Shelf Options Setup Screen

```
  11/23/99  00:15:21              [ SLOT =  8  ]           SHELF ADDRESS = 00
                    PERFORMANCE DATA <VIEW 1  -  HTU-C DSX-1 RECEIVER>

   24 HOUR REGISTERS                            15 MINUTE REGISTERS
   -------ES------SES-                 ------ES----SES------------ES----SES
       00000   00000 <---- CURRENT ---->    000   000
   -1 : 00000   00000 <--          --> -1 : 000   000      -17 : ---    ---
   -2 : -----   -----  |           |   -2 : 000   000      -18 : ---    ---
   -3 : -----   -----  |           |   -3 : 000   000      -19 : ---    ---
   -4 : -----   -----  |--PREVIOUS -- |  -4 : ---    ---     -20 : ---    ---
   -5 : -----   -----  |           |   -5 : ---    ---      -21 : ---    ---
   -6 : -----   -----  |           |   -6 : ---    ---      -22 : ---    ---
   -7 : -----   -----  <-          |   -7 : ---    ---      -23 : ---    ---
                                   |   -8 : ---    ---      -24 : ---    ---
                                   |   -9 : ---    ---      -25 : ---    ---
          VIEW LOCATION DIAGRAM    |  -10 : ---    ---      -26 : ---    ---
                                   |  -11 : ---    ---      -27 : ---    ---
  1-->|H|-3---|H|-----|H|---4-|H|->  |  -12 : ---    ---      -28 : ---    ---
      |T|     |R|     |R|    |T|    |  -13 : ---    ----      29 : ---    ---
      |U|     |E|     |E|    |U|    |  -14 : ---    ---      -30 : ---    ---
  <-- |C|-5---|1|-----|2|---6-|R|<-2 |  -15 : ---    ---      -31 : ---    ---
                                   --> -16 : ---    ---      -32 : ---    ---
  PRESS : n"V" - view (ex. 4V),  "nH" - element (0H=HTU-C/R,  1H=HRE1,  2H=HRE2),
        nn"S" - slot (ex. 3S),  "M"  - main menu,    "P"  - prev. screen  :
```

Figure 12. Performance Data Screen

Performance History Screen

Detailed information concerning 15-minute performance history and 24-hour performance history for any given slot may be viewed by typing the slot number and S from the slot specific Performance Data Screen. The resulting screen is shown in **Figure 13,** Slot Specific Performance Data Screen. Performance information for six different monitored locations is available. Also, for circuits with HREs, more detailed information is available by typing **1H** to view HRE points.

An on-screen view location diagram indicates the six monitored locations. Seven previous 24-hour periods and 32 previous 15-minute periods are maintained for each view location.

```
11/22/99  09:35:05                                      SHELF ADDRESS = 00
                             PERFORMANCE DATA


          SLOT     8 HOUR PERFORMANCE HISTORY

           1: [                                  ]  SPACE = HTU-C NOT PRESENT
           2: [*                                 ]     -  = ERROR FREE 15 MIN REG
           3: [*                                 ]     E  = REGISTER CONTAINS ES
           4: [*                                 ]     S  = REGISTER CONTAINS SES
           5: [*                                 ]     U  = REGISTER CONTAINS UAS
           6: [                                  ]     *  = PERIOD < 15 MINUTES
           7: [*                                 ]
           8: [*                                 ]
           9: [*                                 ]
          10: [*                                 ]
          11: [*                                 ]
          12: [*                                 ]
          13: [*                                 ]

           0  -1  -2  -3  -4  -5  -6  -7  -8
                      HOURS

          PRESS :   nn"S"  - select slot(ex. 5S),    "M" - main menu :
```
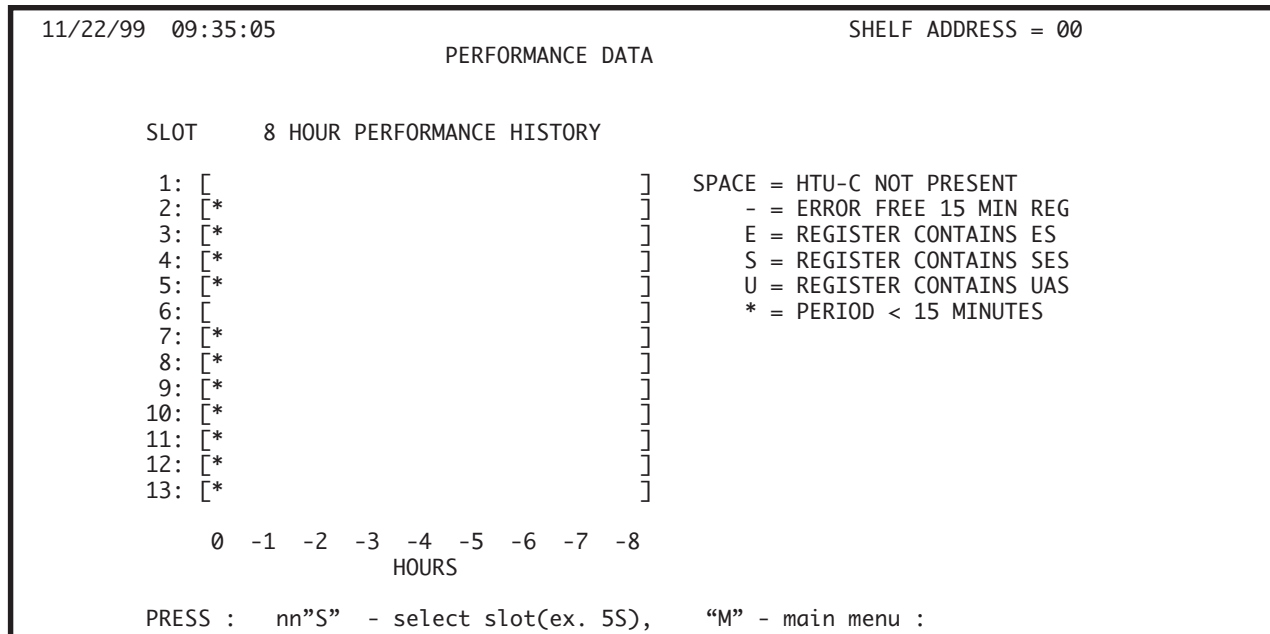
Figure 13. Slot Specific Performance Data Screen

Alarm Status Screen

Selection of item 3 from the Main Menu presents the Alarm Status Screen, **Figure 14**. This screen is a composite display of all current alarms for each of the 13 slots. Alarm types are indicated by the number 1 for Critical, 2 for Major, and 3 for Minor alarms.

A capital **A** indicates the alarm is current while a trailing ***** indicates the alarm cutoff has been exercised. **ES** or **SES** indicates the programmed threshold has been exceeded, resulting in an alarm. The position of the alarm indicator codes in the screen matrix indicates both the alarm location and slot number.

Alarm History Screen

The Alarm History Summary Screen (**Figure 15**) can be accessed from the Alarm Status Screen by pressing **H**. This screen provides a time and date stamp for up to 100 alarm events. These events include alarm initiation and alarm clear. For convenience, a user marker can be invoked by pressing **X**. This produces a highly visible marking point so that subsequent alarm events can be easily distinguished from older ones.

```
 11/23/99  00:16:44              ALARM STATUS              SHELF ADDRESS = 00

                            B/ HTUC [ HTUC ]  [ HRE1 ]  [ HRE2 ]  HTUR
  ACTIVE SHELF ALARMS    SLOT UAS FUS COM SIG  LP1  LP2  LP1  LP2  LP1  LP2  SIG
  -------------------    -------------------- --------- --------- --------- ----
  CRITICAL - YES           1: --- --- --- ---- ---- ---- ---- ---- ---- ---- ----
  MAJOR    - NO            2: --- --- --- ---- ---- ---- ---- ---- ---- ---- ----
  MINOR    - NO            3: --- --- --- ---- ---- ---- ---- ---- ---- ---- ----
                           4: --- --- --- ---- ---- ---- ---- ---- ---- ---- ----
  DEFAULT ALARM TRIGGERS   5: 1A  --- --- --- ---- ---- ---- ---- ---- ---- ----
  ---------------------    6: --- --- --- ---- ---- ---- ---- ---- ---- ---- ----
  CRIT: 6-13 HTU-C FUSES   7: --- --- 1C  ---- ---- ---- ---- ---- ---- ---- ----
        UAS THRESHOLD      8: --- --- --- ---- ---- ---- ---- ---- ---- ---- ----
        HCOT-CTL FUSE      9: 1A  --- --- ---- ---- ---- ---- ---- ---- ---- ----
        COMM LINK LOSS    10: 1A  --- --- ---- ---- ---- ---- ---- ---- ---- ----
        HFAC FUSE         11: --- --- --- ---- ---- ---- ---- ---- ---- ---- ----
                          12: 1A  --- --- ---- ---- ---- ---- ---- ---- ---- ----
  MAJ:  1-5 HTU-C FUSES   13: 1A  --- --- ---- ---- ---- ---- ---- ---- ---- ----
        ES  THRESHOLD
        SES THRESHOLD     1 = CRIT, 2 = MAJ, 3 = MIN,     A = UAS OR FUSE ALARM,
                          B = BER ALARM ON PROTECTED CIRCUIT,   C = COMM ALARM,
  MIN:  NONE              E/S = ES/SES THRESHOLD ALARM,   * = ALARM CUTOFF (ACO)

          PRESS :  "C" - alarm cutoff,  "H" - alarm history,  "M" - main menu
```

Figure 14. Alarm Status Summary Screen

```
  08/08/70 17:51:59          -UAS THRESHOLD CROSSING AT HTU-R LP1, SLOT 10.
  08/08/70 17:51:59          -UAS THRESHOLD CROSSING AT HTU-R LP2, SLOT 10.
  08/08/70 17:52:09 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-C LP1, SLOT 5.
  08/08/70 17:52:09 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-C LP2, SLOT 5.
  08/08/70 17:52:34 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-C LP1, SLOT 9.
  08/08/70 17:52:34 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-C LP2, SLOT 9.
  08/08/70 17:52:36 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-C LP1, SLOT 10.
  08/08/70 17:52:36 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-C LP2, SLOT 10.
  08/08/70 17:52:36 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-R LP1, SLOT 10.
  08/08/70 17:52:36 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-R LP2, SLOT 10.
  08/08/70 17:52:41 *CLEARED* -LOSS OF COMMUNICATION WITH SLOT 12.
  08/08/70 17:52:42          -LOSS OF COMMUNICATION WITH SLOT 12.
  08/08/70 17:52:43 *CLEARED* -LOSS OF COMMUNICATION WITH SLOT 12.
  08/08/70 17:54:00          -UAS THRESHOLD CROSSING AT HTU-C LP1, SLOT 12.
  08/08/70 17:54:00          -UAS THRESHOLD CROSSING AT HTU-C LP2, SLOT 12.
  08/08/70 17:55:04 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-C LP1, SLOT 7.
  08/08/70 17:55:04 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-C LP2, SLOT 7.
  08/08/70 17:55:05          -UAS THRESHOLD CROSSING AT HTU-C LP2, SLOT 7.
  08/08/70 17:55:07          -LOSS OF COMMUNICATION WITH SLOT 7.
  08/08/70 17:55:07 *CLEARED* -UAS THRESHOLD CROSSING AT HTU-C LP2, SLOT 7.
  ----------------------------------------------------------------------
  PRESS:                        |  ALARM HISTORY  PAGE  3 OF 5
  1 TO 5 - Select Page,  "X" - Set Marker   |  11/23/99  00:18:37
    "P" - Prev Screen,  "M" - Main Menu      |  SHELF ADDRESS = 00
```

Figure 15. Alarm History Screen

Loopback Status Summary Screen

Item selection 4, Loopback Control, from the Main Menu displays the loopback status information for all of the HTU-C, HRE, and HTU-R units monitored by the HFAC. Loopback Status (On, Off, or Not available) is presented for loopbacks to both the network and the customer at both the HTU-C, HRE, and HTU-R. **Figure 16** illustrates the Loopback Status Summary Screen.

Loopback Options

By pressing a slot number followed by an S from the

Loopback Status Summary Screen, you will be presented with a slot-specific Loopback Options Screen (**Figure 17**). Multiple loopbacks can be initiated for each circuit. This screen graphically depicts the loopback activated by showing through reverse video, the path of the loopback and the locations it loops to. Also, the status indication changes from inactive to active. The initiation of a loopback is accomplished by pressing the corresponding number of the loopback desired, followed by an **L**.

```
 11/23/99  00:19:57              LOOPBACK STATUS            SHELF ADDRESS = 00

                HTU-C           HRE1      HRE2        HTU-R
            <--        -->      <--       <--       <--        -->
      SLOT# NET        CUST     NET       NET       NET        CUST
      ----- ------------       ----      ----      ------------
        1 :  ---        ---      ----      ----      ----       ----
        2 :  OFF        OFF      xxxx      xxxx      OFF        OFF
        3 :  OFF        OFF      xxxx      xxxx      OFF        OFF
        4 :  OFF        OFF      OFF       xxxx      OFF        OFF
        5 :  OFF        OFF      xxxx      xxxx      OFF        OFF
        6 :  ---        ---      ----      ----      ----       ----
        7 :  OFF        OFF      xxxx      xxxx      OFF        OFF
        8 :  OFF        OFF      OFF       OFF       OFF        OFF
        9 :  OFF        OFF      xxxx      xxxx      OFF        OFF
       10 :  OFF        OFF      xxxx      xxxx      OFF        OFF
       11 :  OFF        OFF      xxxx      xxxx      OFF        OFF
       12 :  OFF        OFF      xxxx      xxxx      OFF        OFF
       13 :  OFF        OFF      xxxx      xxxx      OFF        OFF

       ON   =  LOOPBACK ON
       OFF  =  LOOPBACK OFF          PRESS  "nnS"  - Slot Select,
       xxxx =  NOT AVAILABLE                "M"   - Main Menu :
       ---- =  EMPTY SLOT
```

Figure 16. Loopback Status Summary Screen

```
 11/23/99  00:21:48      LOOPBACK OPTIONS  [ SLOT = 8  ]      SHELF ADDRESS = 00

               _____      _____       _____       _____
              |HTU-C|    |HRE 1|     |HRE 2|     |HTU-R|
              |     |    |     |     |     |     |     |
              |     | LP1 |     | LP1 |     | LP1 |     |
          ->| |    |<===>|     |<===>|     |<===>|<--, |<--
              |     |    |     |     |     |     |    | |
        NET |     |    |     |     |     |     |    | | CUST
              |     | LP2 |     |LP2  |     | LP2 |    | |
          <-| |    |<===>|     |<===>|     |<===>|<--, |->
              |     |    |     |     |     |     |    | |
              |     |    |     |     |     |     |    | |
              |_____|    |_____|     |_____|     |_____|

              1) LOOPBACK TO NETWORK  AT HTU-C = UNAVAILABLE
              2) LOOPBACK TO CUSTOMER AT HTU-C = UNAVAILABLE
              3) LOOPBACK TO NETWORK  AT HTU-R = ACTIVE
              4) LOOPBACK TO CUSTOMER AT HTU-R = UNAVAILABLE
              5) LOOPBACK TO NETWORK  AT HRE1  = UNAVAILABLE
              6) LOOPBACK TO NETWORK  AT HRE2  = UNAVAILABLE

       Press  "nL"  - Toggle Loopback(ex. 3L),  "nnS"  - Select Slot,
              "P"   - Previous Screen,  "M" - Main Menu :
```

Figure 17. Loopback Options Screen

Troubleshooting Screen

The Troubleshooting Screen (Main Menu, Item 6) provides a graphical presentation of trouble areas. Different parts of the diagram will be highlighted (on terminals that support reverse video) to indicate the trouble locations. In addition, in-band alarms and indicated problem areas are presented in text under the troubleshooting diagram. Use of this screen in conjunction with performance data and alarm status screens provides a reliable method of quickly locating system faults. **Figure 18** shows the Troubleshooting Display.

```
 11/23/99  00:24:05        TROUBLESHOOTING DISPLAY        SHELF ADDRESS = 00
                              [ SLOT =  8 ]
              _____       _____       _____       _____
             |HTU-C|     |HRE 1|     |HRE 2|     |HTU-R|
             |     |     |     |     |     |     |     |
             |     |     |     |     |     |     |     |
          ->|     |<===>|     |<===>|     |<===>|     |<--
             |     |     |     |     |     |     |     |
      NET |     |     |     |     |     |     |     | CUST
             |     |     |     |     |     |     |     |
          <-|     |<===>|     |<===>|     |<===>|     |->
             |     |     |     |     |     |     |     |
             | T1  |     |     |     |     |     | T1  |
             |_____|     |_____|     |_____|     |_____|

                 ALARMS:            PROBLEM INDICATED:
               HTU-C  RED           DSX-1 RX  LOSS
               BLUE ON DS1 RX       CUSTOMER  LOSS




           PRESS:  "M" -  main menu,  "nnS" - select slot :
```
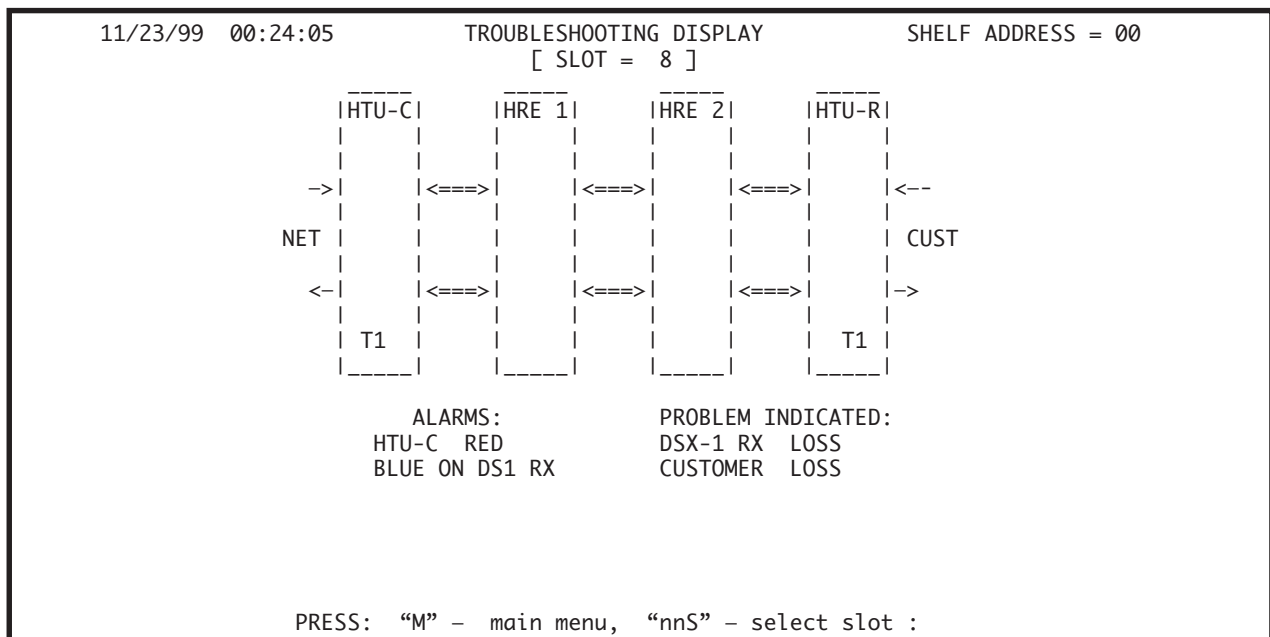
Figure 18. Troubleshooting Display Screen

Self-Test Options Screen

By selecting item 7 from the Main Menu, the Self-Test Options Screen (**Figure 19**) is presented. From this screen, a self-test for the HTU-C, HTU-R, and HFAC controller can be initiated. To initiate a self-test, press the desired test number followed by a **T**. Upon completion of the test, results will be presented. These tests are useful in diagnosing suspect hardware and circuits.

NOTE

Momentary communications loss between the HFAC and HTU-C units will occur when the HFAC is first plugged in, or when HFAC self-test is executed. If HFAC communications alarms are not disabled, a momentary alarm may also be generated.

```
  11/23/99  00:26:44                                    SHELF ADDRESS = 00


                       SELF-TEST     [ SLOT = 8  ]



             1.   INITIATE HTU-C AND HTU-R SELF-TESTS
             2.   INITIATE HFAC CONTROLLER SELF-TEST


         Press :  "nnS"  to select slot
                  "nT"   to select desired test
                  "M"    to return to Main Menu :
```

Figure 19. Self-Test Options Screen

Provisioning Summary Screen

Selection of item 8 from the Main Menu supplies provisioning information on individual circuits being accessed by the HFAC. **Figure 20** is a slot-specific provisioning screen showing the provision option item, current settings, and hardware settings for that particular circuit. A key at the bottom of the screen describes the options associated with this screen.

Menu item 7 provides a means of provisioning specific HTU-C units, from the HFAC, to enable or disable various HTU-C alarms. This option is different from the Disable Alarms option on the HFAC Options Setup screen. This option sets the selected HTU-C to enable or disable the alarms presented on the HTU-C edge connector pins 20 and 21 (closure between pins) and edge connector pin 1 (closure to ground).

The *Enable All* selection permits alarms to be presented on the aforementioned edge connector pins due to faults at any of the HDSL / HDSL2 loop, DSX-1, or DS1 locations. The *Disable All* disables all alarms due to external faults or faults within the HDSL / HDSL2 equipment or loops.

The *Disable EXT* selection allows only alarms caused by faults in the HDSL / HDSL2 equipment or HDSL / HDSL2 loops and suppresses alarms caused by external DSX-1 or DS1 faults.

NOTE
ADTRAN 220/E220 H2TU-Cs support an EXTERNAL LBO option for use in legacy 220 ORB shelves. The ADTRAN E220 shelf does not require the EXTERNAL LBO option. The E220 HFAC will not allow the selection of the EXTERNAL LBO setting when initiated through the HFAC terminal screen. It should be noted that the HFAC will not automatically override an EXTERNAL LBO setting.

```
11/23/99  00:28:34      PROVISIONING    [ SLOT = 8 ]        SHELF ADDRESS = 00

   _____ _____
  |                                            |                      |
  |     PROVISIONS              CURRENT SETTINGS |  HARDWARE SETTINGS  |
  |   ---------------------    --------------- |   ----------------   |
  |   1. DSX-1 LINE BUILDOUT  =  399-533 FEET  |     399-533 FEET     |
  |   2. DSX-1/DS1 LINE CODE  =  B8ZS          |     B8ZS             |
  |   3. DSX-1/DS1 FRAMING    =  ESF           |     ESF              |
  |   4. LOOPBACK TIMEOUT     =  NONE          |     NONE             |
  |   5. DS1 OUTPUT LEVEL     =  -15 dB        |     -15 dB           |
  |   6. NIU LOOPBACK         =  DISABLED      |     DISABLED         |
  |   7. DS0 BLOCKING                          |                     |
  |                                            |                     |
  |            00000000 00000000 00000000      |                     |
  |      CHANNELS  1                    24     |                     |
  |            "X" BLOCKS THE CHANNEL.         |                     |
  |_____|_____|


      Press :  "nP"   - to change corresponding provision (ex. 5P)
               "H"    - to copy hardware settings to current settings
               "I"    - to implement and save current setting changes
             "nnS"    - select slot,     "M"  - main menu
                            ->   <-
```

Figure 20. Provisioning Screen

Protection Configuration Screen

The protection configuration screens **(Figure 21 and 22)** provides status and control details for fault protected circuits.

```
11/23/99  00:32:51          PROTECTION  CONFIGURATION        SHELF ADDRESS = 00
                                  [ SLOT 2  ]
                   _____
                   |      PROTECTION OPTIONS     CURRENT SETTINGS  |
                   | --------------------------------------------- |
                   |   1. BER THRESHOLD      =  1E-7               |
                   |   2. BER INTERVAL       =  15 MINS            |
                   |                                               |
                   |                                               |
                   |                                               |
                   |                                               |
                   |                                               |
                   |                                               |
                   |_____|
                          MAIN CARD CAN ONLY SET THE BER OPTIONS.


     ----------------------------- SHELF STATUS ------------------------------
    |        SLOT ->  01  02  03  04  05  06  07  08  09  10  11  12  13      |
    |        STATUS ->      ^^----  **  **      **  **  **  **  **  **  **     |
    |_____|
       ^^-- = MAIN ACTIVE    --^^ = AUX ACTIVE     ** = STANDARD HTU-C

       Press: "nnS" - select slot,   "nP" - select option,
             "M" - main menu,  "I"  - implement and save current changes :
```

Figure 21. Protection Screen (Main)

```
11/23/99  00:29:33          PROTECTION  CONFIGURATION        SHELF ADDRESS = 00
                                  [ SLOT 3  ]
     _____
    |     PROTECTION OPTIONS      CURRENT SETTINGS  |     SWITCHOVER HISTORY       |
    | --------------------------------------------  |  ----------------------      |
    |   1. PROTECTION MODE       = AUTO             |     SWITCHOVERS -> 00         |
    |   2. MINIMUM HOLDIN TIME   = 01    MIN(S)      |     REVERSIONS  -> 00         |
    |   3. BER THRESHOLD         = 1E-7             |     FAILURES    -> 00         |
    |   4. BER INTERVAL          = 15    MINS        |     LOCKOUTS    -> 00         |
    |   5. LOCKIN HOURS          = 12    HR(S)       |                              |
    |   6. SWITCH TO AUX LIMIT   = 09    (1-9)       |                              |
    |   7. LOCKIN CHECK INTERVAL = 20    MIN(S)      |                              |
    |_____|_____|
     LOCKIN OPTIONS:  IF 09 SWITCHOVERS OCCUR IN 20 MINUTES,  LOCKIN FOR 12 HOURS.
     SYSTEM CURRENT STATUS : NORMAL OPERATION


     ----------------------------------- SHELF STATUS -------------------------
    |        SLOT ->  01  02  03  04  05  06  07  08  09  10  11  12  13       |
    |        STATUS ->      ^^----  **  **      **  **  **  **  **  **  **      |
    |_____|
       ^^-- = MAIN ACTIVE     --^^ = AUX ACTIVE     ** = STANDARD HTU-C

       Press:  "nnS" - select slot,   "nP" - select option,
              "M" - main menu,  "I" - implement and save current changes :
```

Figure 22. Protection Screen (Aux)

6. MAINTENANCE

The ADTRAN E220 HFAC requires no routine maintenance to operate properly.

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.

7. SPECIFICATIONS

Table 8 lists E220 HFAC specifications.

Table 8. E220 HFAC Specifications

Power
-48 VDC @ 60 mA (maximum)

Physical
Dimensions: ....5.6" high x 1.25" wide x 10.1" deep Weight: ....< 1 pound

Temperature
Operating: ....-40° C to +70° C Storage:....................-40° C to +85° C

Part Number
ADTRAN E220 Shelf Plug in, Single slot 1221051L1

8. WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within 10 years from the date of shipment if it does not meet its published specifications or fails while in service (see ADTRAN *Carrier Network Equipment Warranty, Repair, and Return Policy and Procedure,* document 60000087-10A).

Contact Customer and Product Service (CAPS) prior to returning equipment to ADTRAN.

For service, CAPS requests, or further information, contact one of the following numbers:

Part Number
1221051L1

ADTRAN Sales
Pricing/Availability
(800) 827-0807

ADTRAN Technical Support
Presales Applications/Postsales Technical Assistance
(888) 4-ADTRAN

Standard hours: Monday-Friday, 7 a.m. - 7 p.m. CST
Emergency hours: 7 days/week, 24 hours/day

ADTRAN Repair/CAPS
Return for Repair/Upgrade
(256) 963-8722

Repair and Return Address
ADTRAN, Inc.
CAPS
901 Explorer Boulevard
Huntsville, Alabama 35806-2807

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