Total Access® 3010 LTU
High-bit-rate Digital Subscriber Line Transceiver Unit for the Central Office Installation and Maintenance

CONTENTS

FIGURES

TABLES

1. GENERAL

The ADTRAN Total Access 3010 HDSL Transceiver Unit for the Central Office (LTU), part number 1182007L1, is the Central Office (CO) unit used to deploy an HDSL E1 circuit using 4-wire metallic facilities. See **Figure 1**.

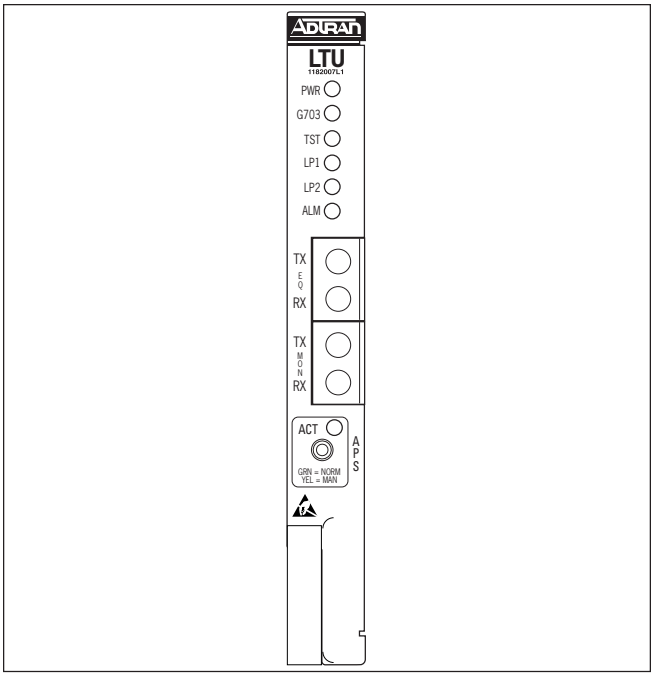

Figure 1. ADTRAN Total Access 3010 LTU

The E1 input signal is supplied from the network via individual G.703 lines or an E3 multiplexer. The HDSL signals are provided to the local loop. The Total Access 3010 LTU works in conjunction with the ADTRAN NTU and REG to provide an E1 service up to 9.4 km on the local loop.

The LTU works with multiple list versions of the HDSL unit Remote end (NTU) and HDSL Range Extender (REG) as listed below:

- 1245043Lx Low Voltage T400 REG
- 1245031Lx, Low Voltage T200 NTU
- 1245033Lx, Nx64 NTU
- 1245044L3, 4th Gen - T400 NTU
- 1245035Lx, 5th Gen - T200 NTU

The Total Access 3010 LTU can be deployed in circuits consisting of one LTU and one NTU or in a protection configuration requiring two LTUs and two NTUs. When deployment requires the HDSL Range Extender (REG), this LTU can be deployed with one or two REGs and one NTU.

The HDSL local loop operates as two independent subsystems each operating over a single twisted pair. The LTU communicates over these two twisted pairs to the HDSL Transceiver Unit - Remote end (NTU). Each subsystem carries half of the total bandwidth along with a small amount of overhead used for maintenance and performance monitoring.

System power and alarm bus connections are made through the backplane of the Total Access 3010 shelf. E1 and HDSL signals are connected through the 50-pin shelf connectors related to each individual slot.

The LTU contains onboard fuses. If a fuse opens, it supplies a -48 Vdc voltage to the fuse alarm bus and all front panel indicators will be Off. These fuses are not field replaceable.

The Total Access 3010 LTU uses a DC-to-DC converter to derive its internal logic and span powering voltages from the -48 Vdc office supply. The Total Access 3010 LTU can span power REGs and NTUs as listed above. When used with REGs and NTUs, the LTU can span power one REG and an NTU at less than -120 Vdc. Span powering voltages meet all requirements of IEC 950.

REVISION HISTORY

This is the first issue of this practice. Future changes to this document will be summarized in this paragraph.

2. INSTALLATION

CAUTION!
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.*

The Total Access 3010 LTU occupies one line card slot in a Total Access 3010 shelf. Power and alarm signals are provided to the card through the backplane of the shelf. E1 and HDSL loop signals are connected to the mass termination shelf connectors corresponding to the slot the unit occupies. See **Figure 2** for LTU edge connector wiring.

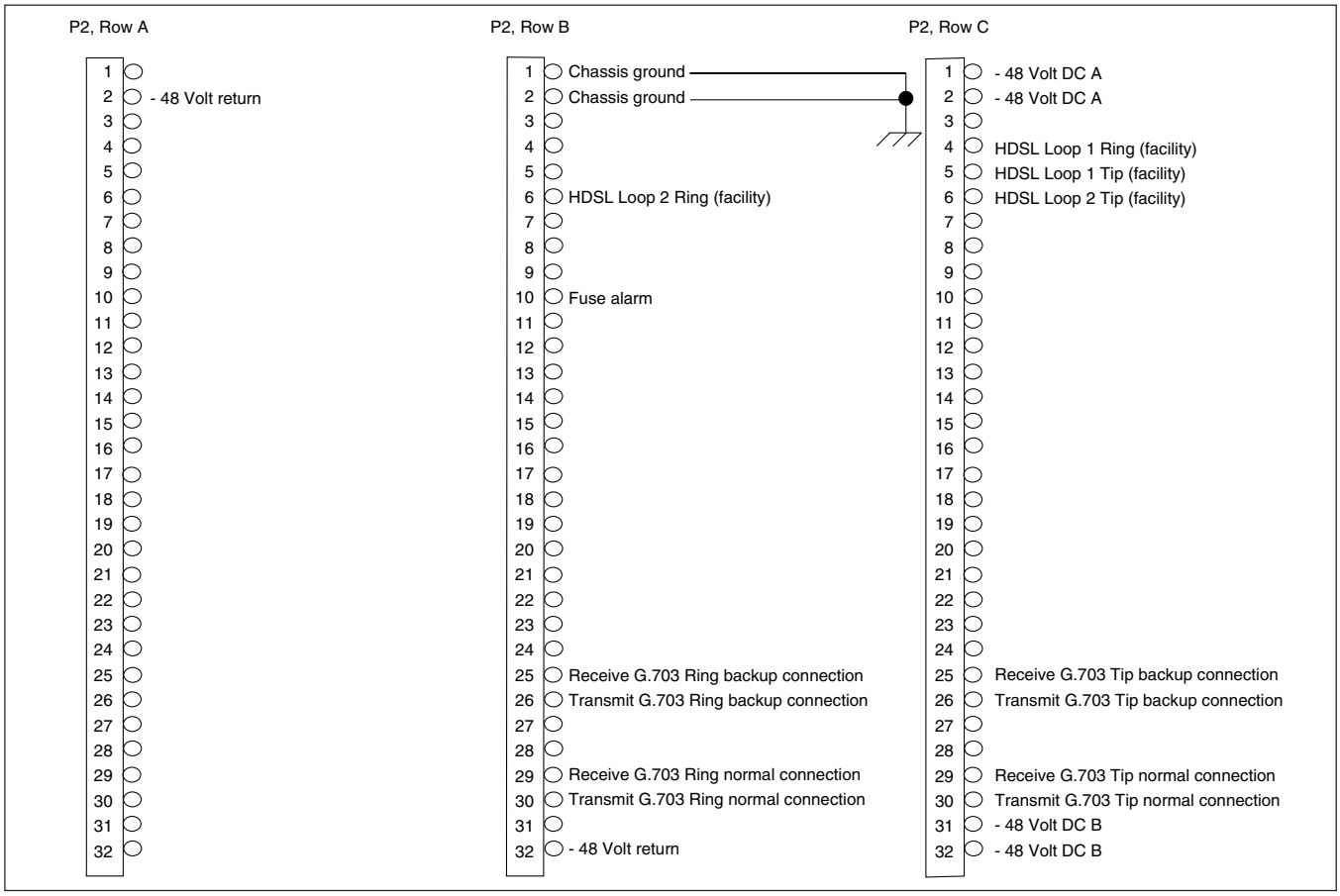

Figure 2. LTU Edge Connector Wiring

3. OPERATION

Powering Options

The unit features automatic sensing based on the current load detected on the HDSL circuit. Span powering at less than -120 Vdc allows for span powering of circuits without REGs or with one REG.

LTU Alarm Outputs

Pin B10 of the LTU edge connector interface provides a fuse alarm signal that connects -48 Vdc to this pin in the presence of a blown fuse. This indicates the card has malfunctioned and should be replaced.

Front Panel Operation Using the Total Access 3010 SCU (P/N 1181017L1)

The front panel interface consists of a 4-character alphanumeric LED display and a 3-position switch that controls the display.

The switch positions are:

Center	OFF
Up	MODE
Down	SELECT

The switch is spring-loaded to the center (OFF) position. The display is used to report the loop margins (dB), and other operational conditions.

Faceplate Indicators

The Total Access 3010 LTU has seven faceplate LEDs, illustrated in **Table 1**, which indicate operational status.

The Total Access 3010 LTU plugs directly into the Total Access 3010 shelf. No installation wiring is required.

Table 1. Faceplate LED Indicators

LED	Indication	Description
PWR	Off	No power to card
	Green	Power present, In-Service
	Yellow	Power present, Out-of-Service, Maintenance or unassigned
	Flashing Green	In-Service, Card being accessed by SCU FCD
	Flashing Yellow	Out-of-Service, Card being accessed by SCU FCD
G703	Off	Network-side E1 signal is absent or is of a format that does not match the provisioning of the HDSL circuit
	Flashing Green	Frame bit error or CRC error detected on received E1 signal
TST	Off	Unit is not in loopback or armed state
	Yellow	Local (LTU) loopback is active
LP1	Off	No synchronization between the LTU and NTU on Loop 1
	Red	Poor signal quality on Loop 1 (≤ 10-7 BER)
	Yellow	Marginal signal quality on Loop 1 (≤ 2 dB margin above 10-7 BER)
	Green	Good signal quality on Loop 1 (> 2 dB margin above 10-7 BER)
	Flashing	An error detected on either end of Loop 1 will cause this LED to blink briefly
LP2	Off	No synchronization between the LTU and NTU on Loop 2
	Red	Poor signal quality on Loop 2 (≤ 10-7 BER)
	Yellow	Marginal signal quality on Loop 2 (≤ 2 dB margin above 10-7 BER)
	Green	Good signal quality on Loop 2 (> 2 dB margin above 10-7 BER)
	Flashing	An error detected on either end of Loop 2 will cause this LED to blink briefly
ALM	Off	No alarm conditions detected
	Red	Alarm condition detected either locally (LTU), or locally and remotely (LTU and NTU)
ACT	Green	Normal operation
	Yellow	Manual operation

Status Mode

After selecting the LTU from the SCU, the display enters Status mode. It alternately displays loop margin for each HDSL loop, any active alarm condition, and general status conditions.

The HDSL loop margin is displayed for each loop that is active with the messages "1=xx" and "2=xx" where xx is the HDSL loop margin for that loop. The loop margin is held on the display for 2 seconds. The loop margin will not be displayed if that loop is in start-up or LOS condition.

E1 Core Frame Mapping

The function of E1 core frame mapping is to assign 2048 kbps framed E1 data to a 2304 kbps core frame filled with 2048 kbps data. This converts a 32-byte E1 frame into a 36-byte core frame (a ratio of 1:1.125). The extra four bytes are filled with TSO, TS16, or AIS data. Once the 36-byte core frame data block reaches the HDSL loops, the data is split between the two HDSL loop pairs.

4. HDSL SYSTEM TESTING

The ADTRAN HDSL system provides extensive ability to monitor the status and performance of the G.703 signals and HDSL loop signals. Detailed performance monitoring is provided by the V.24 Control Port on the ADTRAN System Controller Unit (SCU). These features are valuable in troubleshooting and isolating any system level problems that may occur at installation or during operation of the HDSL system.

LTU G.703 Bantam Jack

The LTU provides two dual Bantam jacks on the front panel. These jacks provide a metallic splitting and test access of the G.703 interface for connecting test equipment to transmit and receive signals with the LTU. See **Figure 3**.

HDSL Loopbacks

The E1 LTU offers five diagnostic loopbacks for use in verifying proper data path operation. These loopbacks are activated via the V.24 craft interface.

These loopbacks disrupt normal data transmission. Make sure that you receive prior authorization to place an HDSL circuit out of service prior to activating any loopback. These loopbacks remain active until cleared or by expiration of the loopback timeout period. See **Figure 4**.

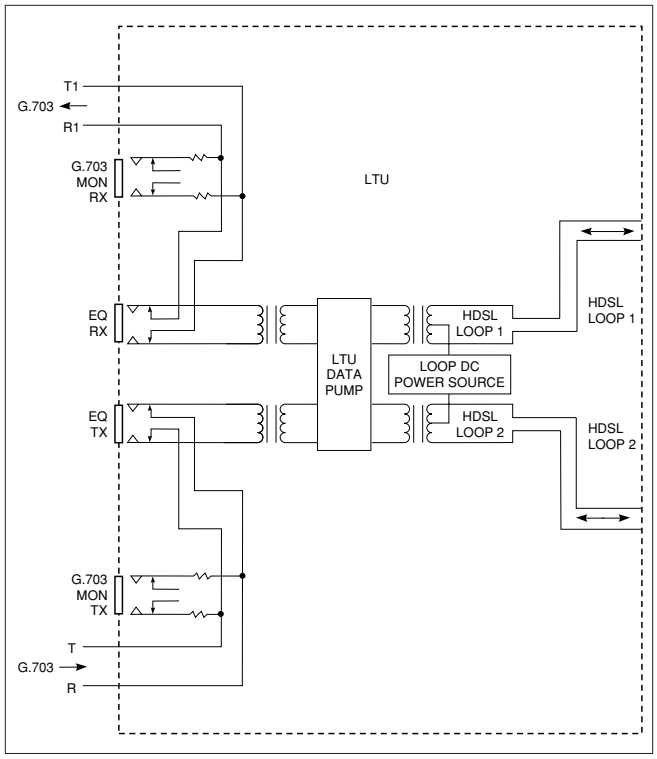

Figure 3. LTU Span Powering Diagram

NTU Local Loopback

The NTU HDSL transceivers are looped back at a point immediately before the HDSL termination. This loopback enables a complete checkout of the NTU data path. The NTU Local Loopback is activated via the V.24 craft interface.

NTU Remote Loopback

The NTU HDSL transceivers are looped back at a point immediately before the G.703 termination. This loopback enables a complete checkout of the NTU data path, the HDSL link, and the LTU data path. The NTU Remote Loopback is activated via the V.24 craft interface.

LTU Local Loopback

The LTU HDSL transceivers are looped back at a point immediately before the HDSL termination. This loopback enables a complete checkout of the LTU data path. The LTU Local Loopback is activated via the V.24 craft interface.

LTU Remote Loopback

The LTU HDSL transceivers are looped back at a point immediately before the G.703 termination. This loopback enables a complete checkout of the NTU data path, the HDSL link, and the LTU data path. The LTU Remote Loopback is activated via the V.24 craft interface.

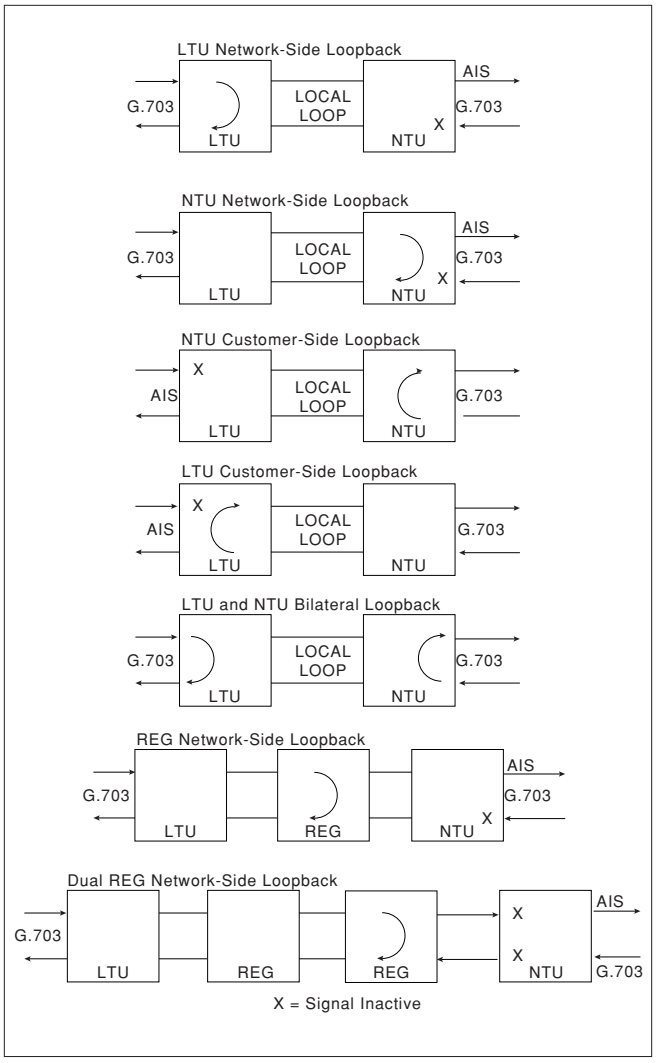

Figure 4. HDSL Loopbacks

REG Loopback

The REG HDSL transceivers are looped back toward the LTU. This loopback enables a complete checkout of the LTU data path, the HDSL link between the LTU and the REG, and the REG data path. The REG loopback is activated via the V.24 craft interface.

Front Panel

Display Message/Condition:

LLOS LTU E1 Loss of Sync

NLOS NTU E1 Loss of Sync

LERR LTU E1 error

NERR NTU E1 error

LBPV LTU E1 Bipolar violation (BPV)

NBPV LTU E1 Bipolar violation (BPV)

LOS1 No synchronization of LTU and NTU on loop 1

LOS2 No synchronization of LTU and NTU on loop 2

HER1 HDSL loop1 error

HER2 HDSL loop2 error

1=XX* Loop 1 in Sync

2=XX* Loop 2 in Sync

* XX is the Signal Quality Level of the loop and ranges from 0-20, where 0 is an indicator of poor signal quality and 20 represents good signal quality.

Display Off Mode

The display enters Display Off Mode from Status Mode after 5 minutes with no activity on the display switch. While in this mode, the display is completely off.

The display will return to Status Mode under the following conditions:

- When either MODE or SELECT is activated. Display starts again when the switch is released
- When a message other than loop margin is to be displayed

5. SCU CONTROL PORT OPERATION (HDSL)

The Total Access 3010 SCU provides a faceplate-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The pinout of the DB-9 is illustrated in **Figure 5**. The terminal interface operates at data rates from 1.2 kbps to 19.2 kbps. The asynchronous data format is fixed at 8 data bits, no parity, and 1 stop bit. The supported terminal type is VT100 or compatible.

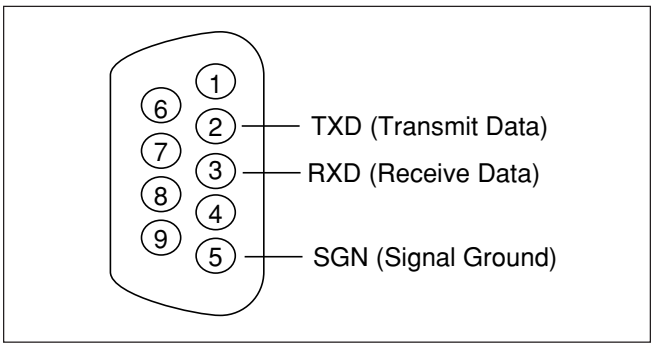

Figure 5. RS-232 (DB-9) Pin Assignments

Many portable personal computers use power-saving programs that are known to interfere with applications running on the personal computer. If using a portable personal computer with terminal emulation capability, communication between the computer and the HDSL unit may be periodically disrupted if power-saving programs are being used on the personal computer. The symptoms may include misplaced characters appearing on the screen and/or the occurrence of screen timeouts. These symptoms are not disruptive to the operation of the circuit and are avoidable if the power-saving options are disabled or removed.

Menus

For abbreviations used in the screen diagrams, see **Table 2**.

The screens illustrated in Figure 6 through Figure 18 are for an HDSL circuit deployed with ADTRAN's Low Voltage HDSL technology. The circuit includes an LTU, NTU, and two REG. This scenario was chosen for inclusiveness of functionality. However, other configurations are possible, such as one REGs, and the display will vary slightly from those shown in this section.

Table 2. Screen Abbreviations

Abbreviation		Definition
ES		Errored Seconds
SES		Severely Errored Seconds
UAS		Unavailable Seconds
FRAMING	CCS CAS Unframed	Common Channel Signaling Channel Associated Signaling Unframed E1 Operation
CODE	HDB3 AMI	High Density Bipolar Order 3 Alternate Mark Inversion
CRC4		Cyclic Redundancy Check 4 error detection
CFM		Core Frame Mapping (Method 0, Method 1)
BPV		Bipolar Violation
S/N		Serial Number
15M		Fifteen-Minute period
24H		Twenty-four-Hour period
Alarms		Lists current alarm condition status
0		Poor signal quality: Noise margin is -0 dB (3 10-7 BER)
1-8		Margin measurement above 10-7 BER in dB
9		Excellent signal quality: Margin is 9 dB above 10^{-7} BER

Accessing the HDSL circuit information via the Total Access SCU requires Logon and a Password using the SCU Control Port. See **Figure 6**, Logon Screen.

After successful logon, the Total Access System Screen will appear as illustrated in **Figure 7**.

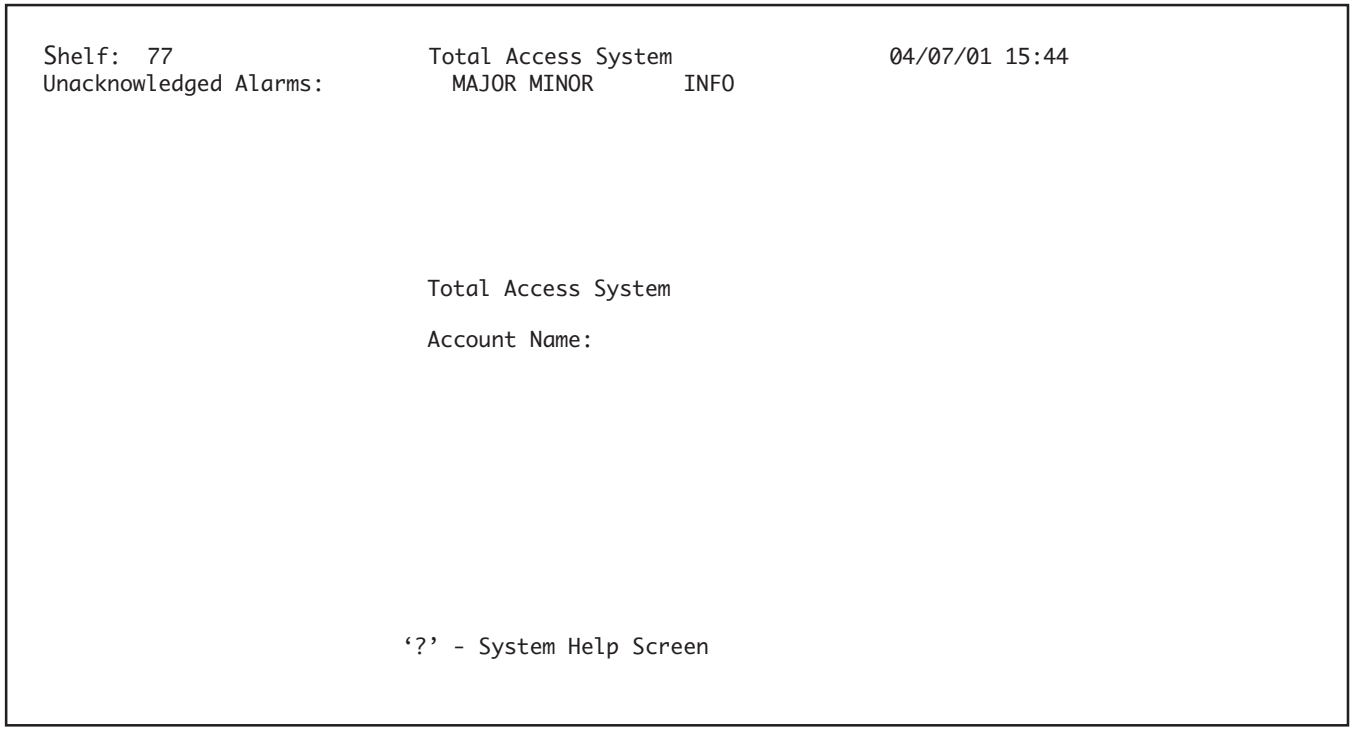

Figure 6. Logon Screen

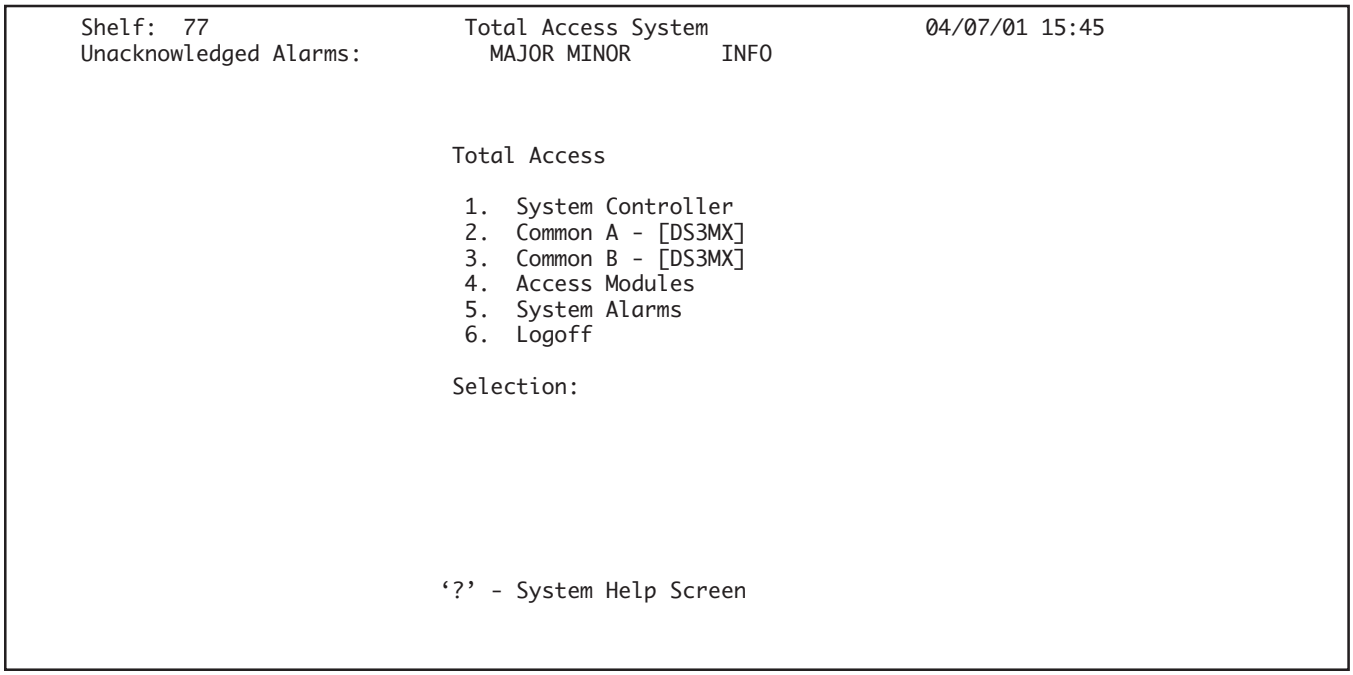

Figure 7. Total Access Screen

From the Total Access System Screen, select Access Modules by typing the number corresponding to the option followed by <Enter>. This will display the Access Module Menu Screen, illustrated in **Figure 8**, which will display the Access Modules occupying the Total Access 3010 shelf. Select the corresponding channel slot number for an LTU.

```
Shelf:  77                    Total Access System                 04/07/01 15:46
Unacknowledged Alarms:          MAJOR MINOR       INFO

                              Access Module Menus

                1 - LTU..... [Major]     15 - ..... [None]
                2 - ..... [None]         16 - ..... [None]
                3 - ..... [None]         17 - ..... [None]
                4 - ..... [None]         18 - ..... [None]
                5 - ..... [None]         19 - ..... [None]
                6 - ..... [None]         20 - ..... [None]
                7 - ..... [None]         21 - ..... [None]
                8 - ..... [None]         22 - ..... [None]
                9 - ..... [None]
               10 - ..... [None]
               11 - ..... [None]
               12 - ..... [None]
               13 - ..... [None]
               14 - ..... [None]

                       Enter Channel Slot Number :


                       Inverse = Busy Modules
```

Figure 8. Access Module Menus Screen

This will display the ADTRAN HDSL Main Menu as illustrated in **Figure 9**.

From the ADTRAN HDSL Main Menu, the following screens can be accessed.

1. Configuration
2. Provisioning
3. Status
4. Alarms
5. Test
6. Performance Monitoring
7. Protection Configuration
8. Circuit ID
9. Alarm Options

The Configuration Screen, illustrated in **Figure 10**, provides serial numbers and the manufacturing date for each component in the HDSL circuit.

```
Shelf:  1  Slot:  5          Total Access System              04/07/01 09:05
Unacknowledged Alarms:         MAJOR MINOR
Circuit ID:



                          HDSL Line Termination Unit

                          1.  Configuration
                          2.  Provisioning
                          3.  Status
                          4.  Alarms
                          5.  Test
                          6.  Performance Monitoring
                          7.  Protection Configuration
                          8.  Circuit ID
                          9.  Alarm Options




                               Selection:
                         '?' - System Help Screen
```

Figure 9. HDSL Main Menu Screen

```
Shelf:  1  Slot:  5          Total Access System              04/07/01 09:30
Unacknowledged Alarms:         MAJOR MINOR
Circuit ID:


                                 Configuration

  Unit Name           LTU                  Unit Name           NTU
  Part Number         1182007L1            Serial Number       0100001481
  Serial Number       HW098765432109       Product Revision    01
  Product Revision    HW                   Manufacture Date    10/00
  Software Revision   A
  Manufacture Date    01/95

  Unit Name           REG1                 Unit Name           REG2
  Serial Number       0100748669           Serial Number       0100477236
  Product Revision    01                   Product Revision    01
  Manufacture Date    10/00                Manufacture Date    10/00



                          '?' - System Help Screen
```

Figure 10. Configuration Screen

The Provisioning Screen, as illustrated in **Figure 11**, displays current provisioning settings and allows for changing the system configuration. Provisioning changes are only allowed at the CO end of the circuit. The unit retains the last provisioning changes to determine its operating mode.

The Network Source Screen, illustrated in **Figure 12**, allows the user to provision the unit to receive its network signal from either MUX or a G.703 source.

```
Shelf:  1  Slot:  5          Total Access System              04/07/01 09:06
Unacknowledged Alarms:         MAJOR MINOR
Circuit ID:




                              Provisioning

                    1.  Framing                   CAS
                    2.  CRC4                      Enabled
                    3.  Coding                    HDB3
                    4.  G.703 Clock               Internal
                    5.  Loopback Timeout          None
                    6.  Service State             In Service
                    7.  Network Source            G.703
                    8.  G.703 External Alarms     Disabled
                    9.  Core Frame Mapping        Method 1



                              Selection:
                         '?' - System Help Screen
```

Figure 11. Provisioning Screen

```
Shelf:  1  Slot:  5          Total Access System              04/07/01 09:27
Unacknowledged Alarms:         MAJOR MINOR
Circuit ID:




                             Network Source

                              1.  G.703
                              2.  MUX A
                              3.  MUX B




                              Selection:
                         '?' - System Help Screen
```

Figure 12. Network Source Screen

The Status Screen, illustrated in **Figure 13,** provides quick access to status information for both the LTU and NTU, in addition to any regenerators.
Type “3” to view the status screen for REG #1, as illustrated in **Figure 14**. If the circuit involves a second REG, press “4” from the REG #1 Status Screen to view the REG#2 Status Screen.

Figure 13 and Figure 14 consolidate current information for the HDSL and E1 interfaces. A key to the information provided is found in the center of the screen. Arrows indicate the key statistics, which apply to both the remote and customer site components.

Indications of Loopback and Sealing Current (if present) are given at the bottom of the first key column. Status and configuration information for the LTU and NTU E1 signals are located in the center of the Status Screen near the bottom.

```
Shelf:  1  Slot:  5          Total Access System                04/07/01 09:15
Unacknowledged Alarms:         MAJOR MINOR
Circuit ID:
          LTU                    LTU/NTU Status                    NTU
 Loop 1 <Network> Loop 2                                  Loop 1 <Customer> Loop 2
   01 dB           01 dB       <-     Loss    ->          01 dB           01 dB
   Yes             Yes         <-     Sync    ->          Yes             Yes
000/00000       000/00000      <-ES   15M/24H ->       000/00000       000/00000
000/00000       000/00000      <-SES  15M/24H ->       000/00000       000/00000
000/00000       000/00000      <-UAS  15M/24H ->       000/00000       000/00000
    Loopbacks Inactive       Sealing Current Present      Loopbacks Inactive
  LTU Signal Quality      LTU E1                NTU E1      NTU Signal Quality
    [X]   9    [X]                                          [X]   9    [X]
    [X]   8    [X]        CAS     <-  Frame ->     CAS       [X]   8    [X]
    [X]   7    [X]        HDB3    <-  Code  ->    HDB3       [X]   7    [X]
    [X]   6    [X]        ENABLED <-  CRC4  -> ENABLED       [X]   6    [X]
    [X]   5    [X]        METH1   <-  CFM   ->   METH1       [X]   5    [X]
    [X]   4    [X]        00000   <-  BPV   ->   00000       [X]   4    [X]
    [X]   3    [X]        00000   <-  ES    ->   00000       [X]   3    [X]
    [X]   2    [X]        00000   <-  SES   ->   00000       [X]   2    [X]
    [X]   1    [X]        00000   <-  UAS   ->   00000       [X]   1    [X]
    [X]   0    [X]        None    <- Alarms ->    None       [X]   0    [X]
   1.  Zero Registers            Selection:                  3.  REG1 Status
   2.  LTU/NTU Status      ‘?’ - System Help Screen          4.  REG2 Status
```

Figure 13. Status Screen

```
Shelf:  1  Slot:  5          Total Access System                04/07/01 09:14
Unacknowledged Alarms:         MAJOR MINOR
Circuit ID:

 Loop 1 <Network> Loop 2                                  Loop 1 <Customer> Loop 2
   00 dB           00 dB       <-     Loss    ->          00 dB           00 dB
   Yes             Yes         <-     Sync    ->          Yes             Yes
000/00000       000/00000      <-ES   15M/24H ->       000/00000       000/00000
000/00000       000/00000      <-SES  15M/24H ->       000/00000       000/00000
000/00000       000/00000      <-UAS  15M/24H ->       000/00000       000/00000
    Loopback  Inactive       Sealing Current Present      Loopback  Inactive

    [X]   9    [X]                                          [X]   9    [X]
    [X]   8    [X]                                          [X]   8    [X]
    [X]   7    [X]      ____ LP1  ____ LP1  ____      ____    [X]   7    [X]
    [X]   6    [X]     |LTU |    |REG1|    |REG2|    |NTU |    [X]   6    [X]
    [X]   5    [X]     |    |===N|    |C===|    |====|    |    [X]   5    [X]
    [X]   4    [X]     |    |    |    |    |    |    |    |    [X]   4    [X]
    [X]   3    [X]     |    |===N|    |C===|    |====|    |    [X]   3    [X]
    [X]   2    [X]     |____|    |____|    |____|    |____|    [X]   2    [X]
    [X]   1    [X]           LP2       LP2                     [X]   1    [X]
    [X]   0    [X]                                          [X]   0    [X]
   1.  Zero Registers            Selection:                  3.  REG1 Status
   2.  LTU/NTU Status      ‘?’ - System Help Screen          4.  REG2 Status
```

Figure 14. REG #1 Status Screen

Predicting performance based upon signal quality varies with each loop. Generally, a noise margin of 0 or higher will support a bit error rate (BER) of better than 10-7. The following guidelines correspond to the operation of the LTU faceplate LEDs labeled LP1 and LP2. **See Table 3**.

Table 3. LP1 and LP2 Guidellines

Margin	Color	Quality
Margin < 0	Red	Poor Loop Quality
0 < Margin < 2	Yellow	Marginal Loop Quality
Margin > 2	Green	Good Loop Quality

Figure 15 and **Figure 16** depict the HDSL Alarms and Test Screens. Current alarm conditions are displayed on the Alarms Screen, while a self test or loopbacks may be initiated or terminated using the Test Screen.

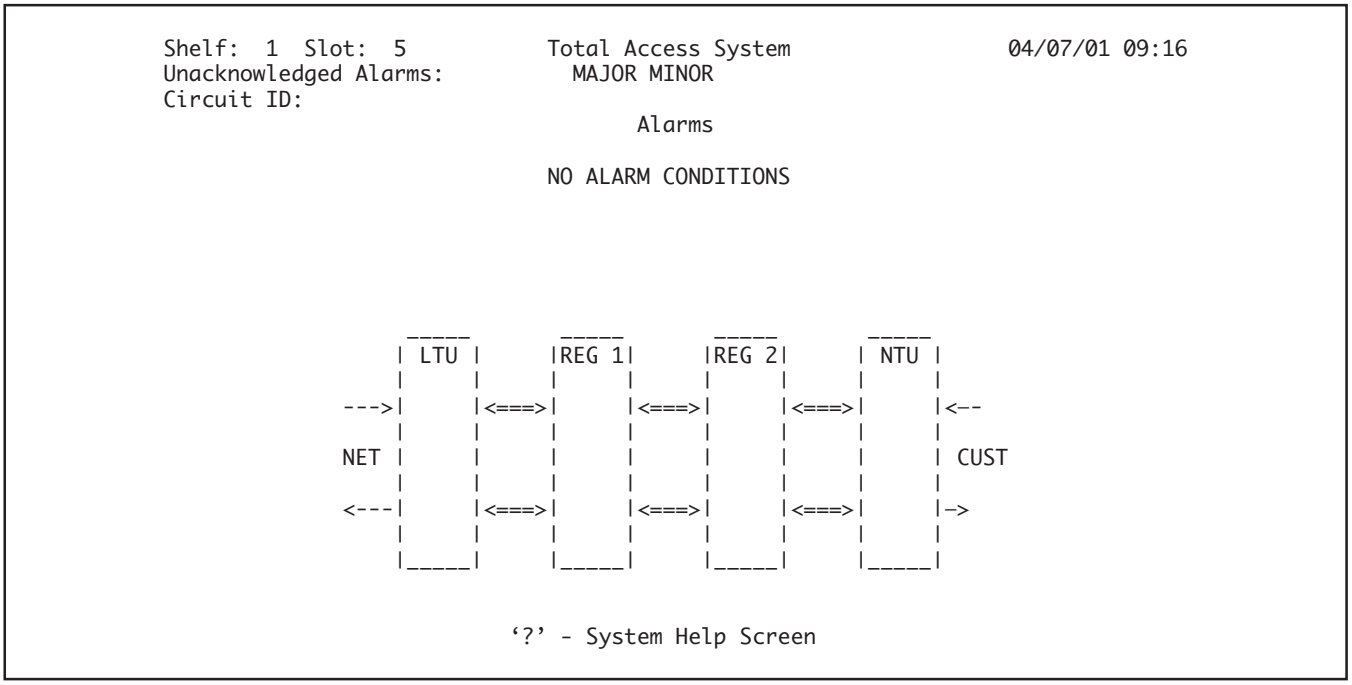

Figure 15. Alarms Screen

At each 15-minute interval, the performance information is transferred to the 15-minute performance data register accessed from the Performance History screen. At each 24-hour interval, the performance data is transferred into the 24-hour performance data register also accessed using the Performance History screen. The Performance History screen is shown in **Figure 17**.

Type the corresponding number to view the Performance History data for customer or network loops.

From the Status Screen, type “1” to reset the current performance registers to zero on the Status and Performance History Screens.

```
Shelf:  1  Slot:  5          Total Access System              04/07/01 09:16
Unacknowledged Alarms:         MAJOR MINOR
Circuit ID:
                                    Test

                  1.  Selftest
                  2.  Loopback to Network  at LTU   = Inactive
                  3.  Loopback to Customer at LTU   = Inactive
                  4.  Loopback to Network  at NTU   = Inactive
                  5.  Loopback to Customer at NTU   = Inactive
                  6.  Loopback to Network  at REG-1 = Inactive
                  7.  Loopback to Network  at REG-2 = Inactive

                   _____      _____      _____      _____
                  | LTU |  LP1  |REG 1|  LP1  |REG 2|  LP1  | NTU |
                --->|-----|<=====>|-----|<=====>|-----|<=====>|-----|<--
                  |     |       |     |       |     |       |     |
                NET |     |       |     |       |     |       |     | CUST
                  |     |  LP2  |     |  LP2  |     |  LP2  |     |
                <---|-----|<=====>|-----|<=====>|-----|<=====>|-----|-->
                  |_____|       |_____|       |_____|       |_____|

                                  Selection:
                              ‘?’ - System Help Screen
```

Figure 16. Test Screen

```
Shelf:  1  Slot:  5          Total Access System              04/07/01 09:17
Unacknowledged Alarms:         MAJOR MINOR
Circuit ID:
                        LTU G.703 Performance Data
                                                              15 Minute History
                                 Current Error Regs                ES SES UAS BPV
       Menu                        ES   SES   UAS   BPV    09:15 000 000 000 000
  1.  LTU G.703          15 Min:  000   000   000   000    09:00 --- --- --- ---
  2.  LTU Loop 1         24 Hr: 00000 00000 00000 00000    08:45 --- --- --- ---
  3.  LTU Loop 2                                           08:30 --- --- --- ---
  4.  NTU G.703                                            08:15 --- --- --- ---
  5.  NTU Loop 1                  24 Hour History          08:00 --- --- --- ---
  6.  NTU Loop 2                 ES    SES   UAS   BPV     07:45 --- --- --- ---
  7.  REG1 NET Lp1       09/21  ----- ----- ----- -----     07:30 --- --- --- ---
  8.  REG1 NET Lp2       09/20  ----- ----- ----- -----     07:15 --- --- --- ---
  9.  REG1 CST Lp1       09/19  ----- ----- ----- -----     07:00 --- --- --- ---
  10. REG1 CST Lp2       09/18  ----- ----- ----- -----     06:45 --- --- --- ---
  11. REG2 NET Lp1       09/17  ----- ----- ----- -----     06:30 --- --- --- ---
  12. REG2 NET Lp2       09/16  ----- ----- ----- -----     06:15 --- --- --- ---
  13. REG2 CST Lp1       09/15  ----- ----- ----- -----     06:00 --- --- --- ---
  14. REG2 CST Lp2                                         05:45 --- --- --- ---
                                                           05:30 --- --- --- ---
   B.  Page back                  Selection:                      Page 1
   F.  Page forward           ‘?’ - System Help Screen          most recent data
```

Figure 17. Performance History Screen

The Protection Configuration Screen - Main, illustrated in **Figure 18**, displays the current settings for Protection Mode, BER Threshold and BER Interval. The BER Threshold allows the user to select a bit error rate that, when exceeded, will cause a switchover to an auxiliary circuit. The BER Interval defines the interval over which errors will be accumulated for comparison with the BER Threshold.

The option settings for BER Threshold and BER Interval are detailed in **Table 4.**

The Protection Configuration Screen – Auxiliary, illustrated in **Figure 19**, displays the current settings for Protection Mode, Minimum Hold-in Time, BER Threshold, BER Interval, Lock-in Hours, Switch-to -Aux Limit, and Lock-in Check Interval. A History count for Switchovers, Reversions, Failures, and Lockouts is provided, while the Lock-in Options and

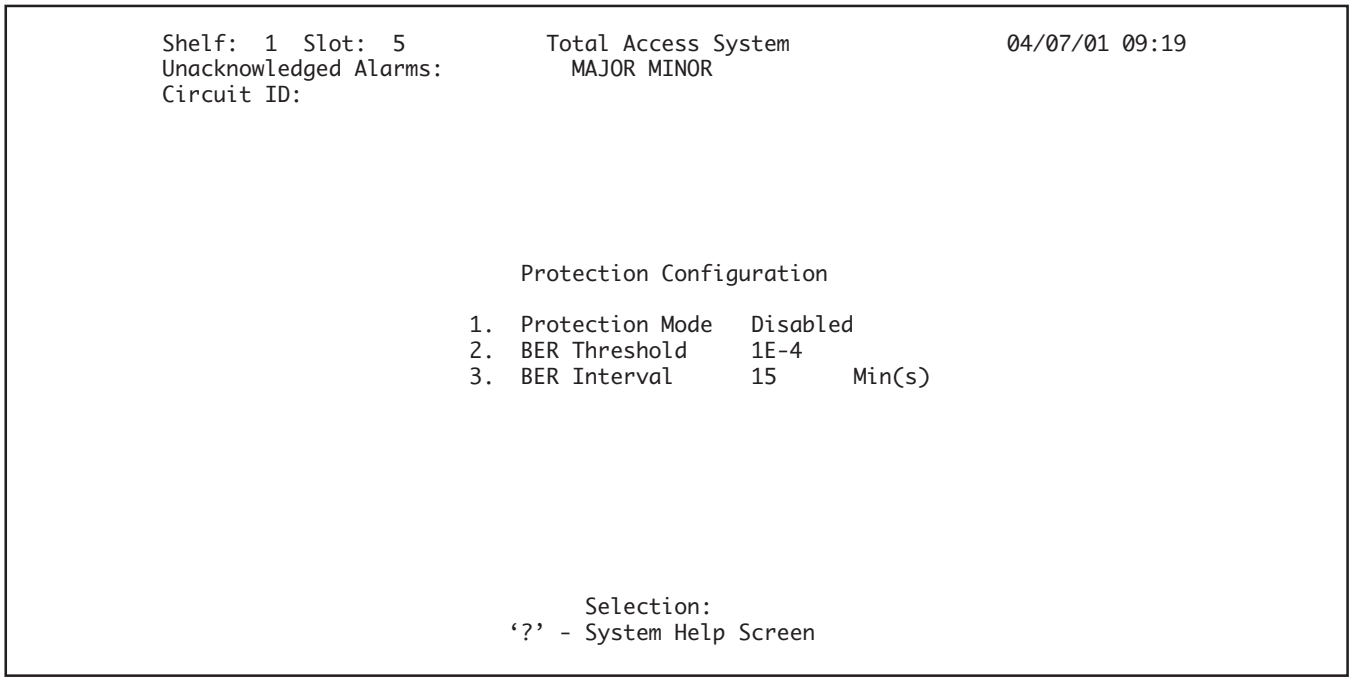

Figure 18. Protection Configuration Screen – Main

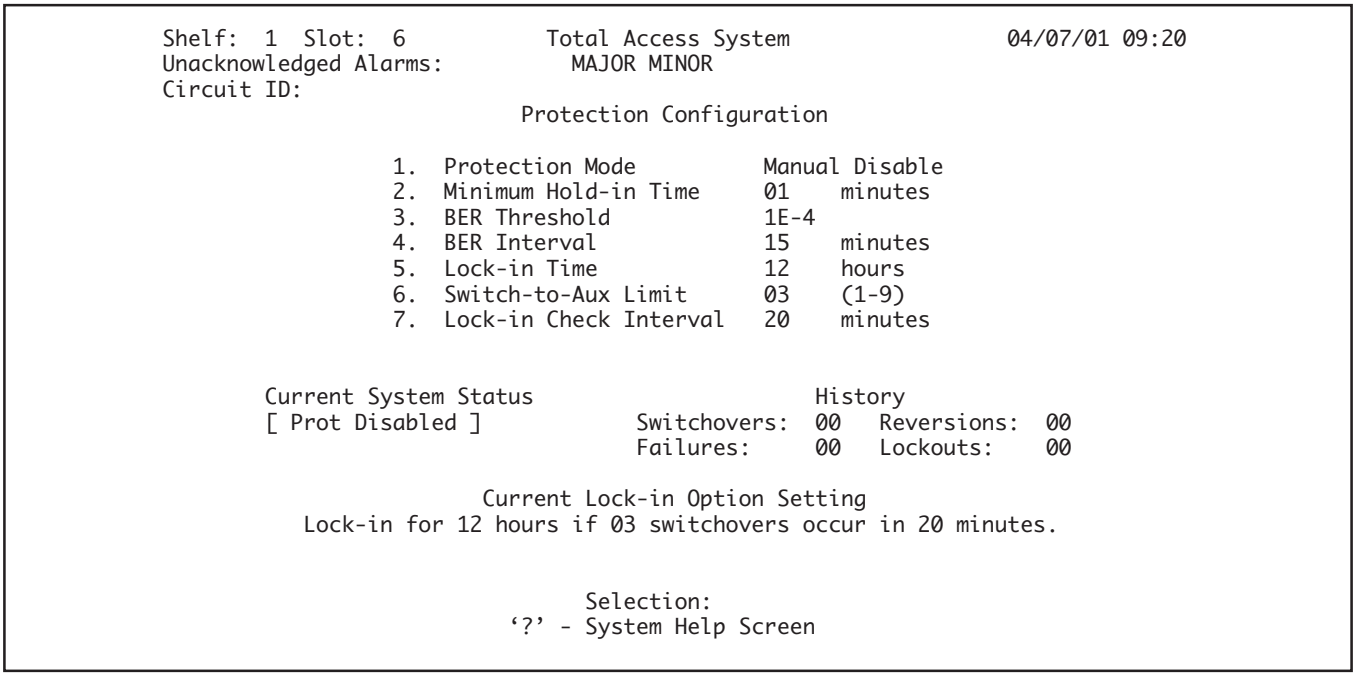

Figure 19. Protection Configuration Screen – Auxiliary

Table 4. Protection Configuration Option Settings

Protection Options	Settings	Description
Protection Mode	Auto	System automatically switches from Main to AUX with no user intervention. Switch is initiated by loss of sync on Main or exceeding BER Threshold. Alarms and switchover notification are generated via the SCU. Auto Mode also allows reversion back to Main once sync is reestablished or the error count drops below the BER Threshold.
	Auto Hold	Auto Hold provides system protection identical to Auto Mode, except that reversions are not allowed to the Main without user intervention. Once switchover has occurred to the AUX circuit, data can only be reverted by modifying any option on the terminal screen or by the pushbutton on the faceplate of the LTU.
	Manual Main	Manual Main requires manual switchover to the AUX circuit by user intervention. Switchover can be accomplished via the faceplate pushbutton or the terminal screen. The SCU will make notification of a Main circuit failure, but will not report switchover until the data is manually switched to the AUX circuit.
	Manual AUX	Data is manually forced to the AUX circuit and will remain there until the mode is changed via the terminal screen or by pushbutton on the faceplate. All other option settings are ignored while in this mode.
	Manual Disable	In the Manual Disable mode, the Main and AUX circuits act as two independent units. Separate data can run on either circuit without affecting the operation of the other. All other option settings are ignored while in this mode.
Minimum Hold-in Time	1-99 minutes	Defines the minimum time that data will remain on the AUX circuit. This option is only valid when in Auto or Auto Hold Protection Modes.
BER Threshold	1E-4, 1E-5, 1E-6, 1E-7	Allows the user to set the Bit Error Rate that will cause switchover from the Main to AUX circuit when exceeded. BER Threshold can also be set from the Main card's protection configuration and should coincide with the settings used on the AUX card.
BER Interval	5, 10, 15 minutes	Defines the interval over which errors will accumulate for comparison with the BER Threshold setting. BER Interval can also be set from the Main card's protection configuration and should coincide with the settings used on the AUX card.
Lock-in Hours	0-99	Defines duration of locking to the AUX circuit upon reaching the Switch to AUX Limit.
Switch to AUX	Limit 1-9	Defines the number of times switch can occur from Main to AUX over the defined Locking Check Interval before the system is locked to the AUX circuit for the defined Locking Hours.
Lock-in Check Interval	1-99	Defines the interval over which the Switch to AUX Limit is compared before locking in the data to the AUX circuit for the Locking Hours duration.

System Current Status are also displayed beneath the Current Settings summary. The Current System Status message displays the current operational state (Normal, Switched to AUX, Locked Out, Forced to Main, Forced to AUX, Locked to Main). The following messages are displayed according to the current status of the protection system.

- NORMAL OPERATION – Unit is in AUTO mode with data passing over the MAIN circuit.
- SWITCHED TO AUX – Data has been switched to the AUX circuit because of an auto switch or the protection mode has been set to MANUAL AUX.
- LOCKED OUT – The system has violated the lock-in option settings and has locked data to the AUX circuit for the user-defined lock-in hours.
- FORCED TO MAIN – The MAIN unit's button has been pressed once and is forced online. An additional press of the MAIN unit's button will revert to software control.
- FORCED TO AUX – the AUX unit's button has been pressed once and is forced online. An additional press of the AUX unit's button will revert to software control.
- LOCKED TO MAIN – The protection mode is set to MANUAL MAIN which doesn't auto switch to the AUX circuit but relies on manual intervention to switch the data to the AUX circuit; however, alarm indications will be updated.

A detailed description of the Protection Configuration parameter settings is included in Table 3.

The Protection Configuration Screen – Auxiliary also displays a history of switching occurrences. The following conditions are shown with a history count of occurrences:

- Switchovers – Number of times data has been switched from the Main to the Auxiliary circuit. Switchovers will only occur in the Auto and Auto Hold protection modes.
- Reversions – Number of times data has been switched from the Auxiliary back to the Main circuit. Reversions will only occur in the Auto protection mode.
- Failures – Number of times the APS system has attempted to switch data from either the Main to Auxiliary circuit or from the Auxiliary to Main circuit. A failure would typically occur as a result of an HTU-R in the circuit that was not compatible for APS service. Only the 1245026LX HTU-R's should be used when deployed in APS circuits. Failures can occur in any protection mode.
- Lockouts – Number of times a lockout has occurred due to the number of APS switches exceeding the Switch to AUX Limit over the preset Lock-in Check Interval. Lockouts can only occur in Auto or Auto Hold protection modes.

Figure 20 illustrates the Set Circuit ID Screen. The Circuit ID can be defined using up to 25 characters, and will be displayed on each of the Total Access HDSL Screens.

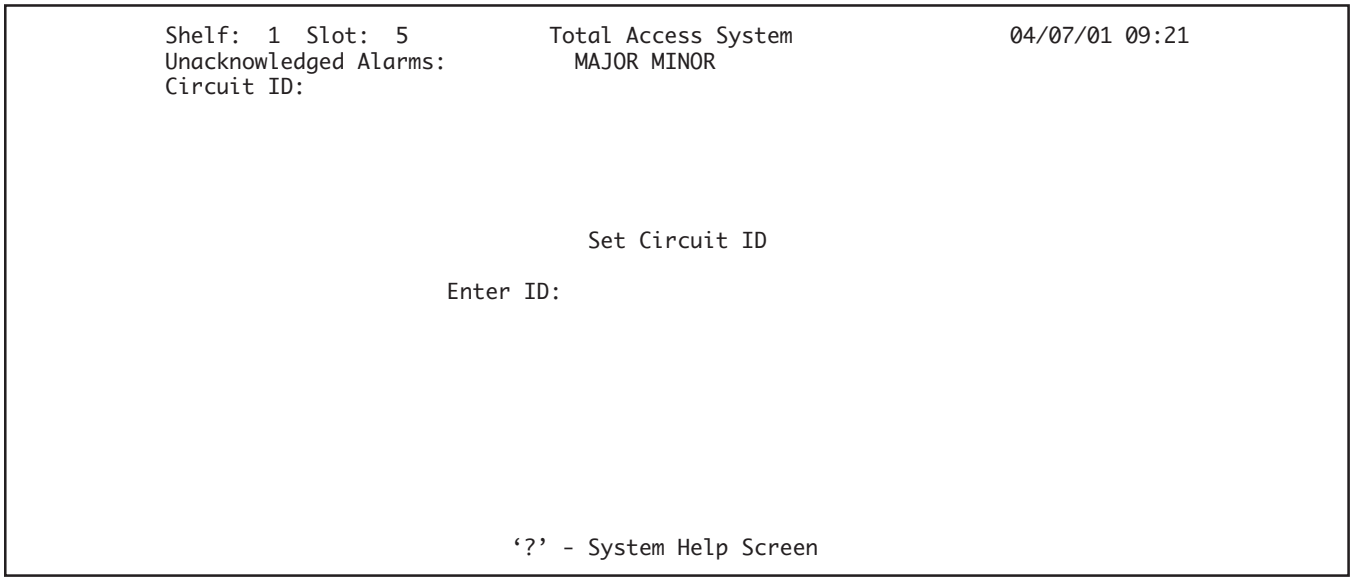

Figure 20. Set Circuit ID Screen

Figure 21 illustrates the Alarm Options Screen. This option allows the user to first set a 15-minute threshold for both ES and SES alarms and subsequently to categorize the crossing of those thresholds as a MINOR or MAJOR alarm. Setting a threshold to 900 will disable it.

6. HDSL DEPLOYMENT GUIDELINES

The ADTRAN HDSL system is designed to provide E1 services over loops designed to comply with ETSI guidelines. Deployment guidelines are given below.

1. All loops are non-loaded only.
2. For loops with 0.4 mm cable, the maximum loop length including bridged tap lengths is 2.7 km.
3. For loops with 0.5 mm cable, the maximum loop length including bridged tap lengths is 4.7 km.
4. Any single bridged tap is limited to 500 m.
5. Maximum number of bridged taps is 2.

7. MAINTENANCE

The ADTRAN Total Access LTU requires no routine maintenance. In case of equipment malfunction, use the faceplate Bantam jack connectors to help locate the source of the problem.

ADTRAN does not recommend that repairs be performed in the field. Repair services may be obtained by returning the defective unit to the ADTRAN Customer Service RMA Department.

```
Shelf:  1  Slot:  5          Total Access System              04/07/01 09:22
Unacknowledged Alarms:         MAJOR MINOR
Circuit ID:


                          Alarm Options         Current Settings

                     1.  ES Alarm Level        =    Major
                     2.  SES Alarm Level       =    Major
                     3.  ES Alarm Threshold    =    000
                     4.  SES Alarm Threshold   =    000









                                    Selection:
                               '?' - System Help Screen
```

Figure 21. Alarm Options Screen

8. PRODUCT SPECIFICATIONS

Product specifications are detailed in **Table 4**.

Table 5. Total Access 3000 LTU Specifications

Loop Interface

Modulation Type	2B1Q
Mode	Full Duplex, Echo Canceling
Number of Pairs	Two
Bit Rate	1168 kbps per pair
Baud Rate	584K baud per pair
Service Range	2.7 km over 0.4 mm cable;* 4.7 km over 0.5 mm cable*
Loop Loss	27 dB maximum @ 150 kHz
Bridged Taps	2 Taps, 500 meters maximum each
Performance	Compliant with ETSI TS 135 101
HDSL Tx Signal Level	13.5 dBm
Input Impedance	135 Ω
Return Loss	20 dB (40 kHz to 200 kHz)

Network Interface

4-wire E1	2.048 Mbps CCITT G.703 and G.704 compatible
E1 Output Level	0 dB
Impedance	75 or 120 Ω
E1 Core Frame	Method 0, Method 1 (see Section 5)
E1 Line Code	AMI, HDB3
E1 Format	CCS, CAS, Unframed
E1 Error Checking	CRC4

Power

Total Power	-48 Vdc @ 10 W typical
E1 LTU Power Dissipation	<7 W maximum
E1 LTU -48 Vdc Current Drain	< .3 A maximum
Sealing Current	current limited at 10 mA
Span Power	-120 Vdc (internally generated) current limited at 60 mA (CE compliant)

Clock

Clock Sources	Internal, E1 Derived
Internal Clock Accuracy	+ 25 ppm (Stratum 4)

Tests

Diagnostics	Self-Test, Local Loopback (LTU), Remote Loopback (NTU)

Physical

Dimensions	6 in. (152.4 mm) high x 5/8 in. (15.9 mm) wide x 10 in. (254 mm) deep
Weight	Less than 1 lb.

Environment

Temperature	Operating (Standard): -40°C to +70°C; Storage: -40°C to +85°C
Safety	In conformance with EN41003 and EN60950, IEC 950
Overvoltage Protection	In conformance with CCITT K.20
EMC	In conformance with EN55022 and EN50082

Part Number

Total Access LTU	1182007L1

9. WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within five (5) years from the date of shipment if it does not meet its published specifications or fails while in service. (See ADTRAN *International Equipment Warranty,* document 60000003-3).

Contact Customer And Product Services (CAPS) prior to returning equipment to ADTRAN.

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

ADTRAN, Inc.
Attention: International Department
901 Explorer Boulevard
Huntsville, Alabama 35806
USA
www.adtran.com

Asia Pacific - Hong Kong
852 2824-8283 voice
852 2824-8928 fax
sales.asia@adtran.com

Canada - Ontario
1 416 290-0585 voice
1 416 296-1259 fax
sales.ontario@adtran.com

Canada - Quebec
1 877 923-8726 toll free
1 514 940-2888 voice
1 514 940-2890 fax
sales.quebec@adtran.com

Canada - Other Provinces
1 877 923-8726 toll free
sales.canada@adtran.com

Europe - Zurich, Switzerland
41 1 880 27 77 voice
41 1 880 27 78 fax
sales.europe@adtran.com

Latin America
1 954 746-5355 voice
1 954 746-7540 fax
sales.latin@adtran.com

Mexico/Caribbean
1 954 577-0357 voice
1 954 577-0358 fax
sales.mexico@adtran.com

U. S. Headquarters
1 256 963-2500 voice
1 256 963-6300 fax
1 256 963-8200 fax back
international@adtran.com

Appendix A
HDSL H-LSS Circuit Configuration and Turnup for G.703 Fed Systems

Introduction

This section provides step-by-step instructions for the configuration and turnup of an HDSL Loop Support System (H-LSS) circuit on an HDSL loop fed from the network via individual G.703. Configuration procedures include installing appropriate line and remote cards, configuring the Total Access LTU cards for protection switching operation and enabling the protection switching feature.

Protection pairs on the Total Access 3010 system are adjacent odd-even slots, indicated on the Total Access 3010 front shelf screening. The odd slot on the left is the MAIN circuit; the even slot to the right is the AUX, or backup circuit.

Prerequisite Procedures

Before beginning the configuration and turnup procedure described in this NTP, the user should ensure that a Total Access 3010 shelf is properly installed and wired for G.703 network feeds. Also, ensure the SCU is installed and provisioned.

NOTE

Valid protection pairs are the adjacent odd-even slots in the Total Access 3010 shelf, and are further designated by the "brackets" on the lower front silkscreen of the Total Access 3010 chassis. The left (odd-numbered) slot in the pair is the MAIN; the right (even-numbered) slot is the AUX circuit for the pair. Thus, Slots 1 and 2 are a valid protection pair, but *Slots 6 and 7 are not*. The pair must have the odd-numbered slot to the left in the pair.

NOTE

This procedure assumes that the technician turning up the protected circuit knows which pair of slots has been assigned to the circuit, and that a single G.703 signal from the appropriate source, generally a G.703 cross connect, has been routed and wired to the appropriate pairs of pins on backplane connectors labeled Pair 7 and Pair 8. For a protected circuit, the appropriate pin pairs that should receive the G.703 from the network are the odd numbered pins corresponding to the MAIN, odd numbered slot.

Materials Required

- Total Access 3010 chassis installed and wired, with SCU.
- Two Total Access 3010 LTUs.
- Two protection switching capable NTUs. These NTUs are the following - 1246035L1 T200 mechanics.
- One dual-slot remote housing, ADTRAN P/N 1245034L2.

1. INSTALL THE LTUs INTO TOTAL ACCESS 3010

Electronic modules can be damaged by static electrical discharge. Before handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.

1.1 Gently but firmly push the LTU into the appropriate odd-numbered slot (which will be the MAIN HDSL circuit). Compatible slots can be any slot pair that starts with an odd number (MAIN) and includes the adjacent (to the right) even-numbered slot (AUX). Compatible slot pairs are further designated by the bracket notation around the slot pairs on the silk screen just below the physical slots on the front of the Total Access 3010. Simultaneous thumb pressure at the top (above the PWR LED) and bottom (below the ACT LED) of the unit will ensure a good seat of the LTU pins into the backplane connector. Repeat this step for the AUX LTU to be installed in the adjacent (even, to the right) slot.

1.2 Push the ejector tab up and closed against the LTU faceplate.

2. PROVISION THE LTU

If Module Auto-Provisioning is enabled on the SCU, and if the new cards are of the same type as the former, the provisioning of the former access cards of the two Total Access 3010 slots will be written to the new access cards upon installation.

If this is an initial installation, the units will require provisioning to appropriately configure them out of the factory default states.

2.1 Logon to Total Access system.

2.2 Check to ensure the LTU line cards are correctly provisioned according to circuit parameters. Under the Provisioning menu, set numbered option, Network Source, to G.703. This option causes the LTU to look to the individual G.703 backplane connector for its data feed.

2.3 Ensure the provisioning of both the MAIN and AUX LTUs is identical, except for the following options:

a. Provision the MAIN unit to *OUT OF SERVICE-MAINTENANCE* (*OOS-M)* mode.

b. Provision the AUX unit to the *OUT OF SERVICE-UNASSIGNED* (*OOS-U*) mode.

2.4 Enable protection switching

a. Access the MAIN Menu of the LTU in the odd-numbered (MAIN) slot.

b. Select Option 7, *Protection Configuration*.

c. Select Option 1, Protection Mode.

d. To enable protection switching, select Option 1, ENABLE.

NOTE

Unless the AUX circuit is in the OOS-U mode, the operator will not be able to change the Protection mode of the MAIN LTU.

---

e. Set Options 2 and 3, *BER Threshold* and *BER Interval* (see Table 3 in the Installation and Maintenance practice for definitions).

f. Back out of the menu for the MAIN slot and access the LTU in the even-numbered (AUX) slot.

g. Select Option 7, *Protection Configuration*.

h. Option 1, Protection Mode, will have been set to AUTO. If you desire to provision a different H-LSS mode, select Option 1, and choose between Auto, Manual AUX, Manual Main, and Auto Hold.

i. Set Options 2-7 as desired on the AUX unit.

2.5 From the provisioning menu of the AUX circuit, reset the AUX unit to *OOS-M*.

2.6 Logoff the system

a. From the *Total Access* Menu, select Option 7, Logoff, and press <Enter>.

b. From the *Exit and Logoff* screen, select "Y" and press <Enter>.

3. INSTALL THE DUAL-SLOT STANDALONE HOUSING

See the associated Installation and Maintenance practice, P/N 61245034L2-5, for mounting and wiring instructions.

4. INSTALL THE NTU

The NTU terminates local loop HDSL signals originating from the Central Office (CO) unit and transforms the HDSL signal into traditional G.703 signals to be delivered to the customer.

4.1 Install the NTU into the Dual-Slot Remote Housing

Electronic modules can be damaged by static electrical discharge. Before handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.

4.1.1 Connect the individual 4-wire HDSL circuits to the HDSL terminal block inside the Dual slot remote housing. The 4-wire MAIN circuit will connect to the Loop 1 and Loop 2 terminals labeled "MAIN" and the 4-wire AUX circuit will connect to the Loop 1 and Loop 2 terminals labeled "AUX."

4.1.2 Gently but firmly push the NTU into the lower dual slot remote housing slot. Repeat this step for the second NTU in the upper slot.

4.1.3 The LTUs will transfer provisioning data to the NTUs upon power up. Some provisioning of the NTU, however, may be necessary due to hardware DIP switches and jumpers. See the Installation and Maintenance practice for the specific NTU utilized by your company.

4.1.4 Upon provisioning of the NTUs, the faceplate LEDs should read as shown in Table 1.

NOTE

The condition of the ALM, G.703 and G.703 LEDs depends upon the status of the equipment on the ends of the installed circuit. If both terminations of the circuit are appropriately configured and prepared to pass data, the LTU ALM LEDs will be out, the LTU G.703 LEDs will be green (MAIN) and Off (AUX), the MAIN NTU G.703 LED will be green and ALM off, while the AUX NTU G.703 will be off, and ALM red.

5. RESET ALL EQUIPMENT TO OPERATING CONDITION

When the customers at both ends of the circuit have turned up their equipment and are running data (or test patterns, or are in loopbacks, or some other condition that will preclude the generation of alarms), the LTUs can be placed *In Service* to restore the alarm generating functions of the equipment to the network.

5.1 From the Total Access 3010 LTU Provisioning Screen for both the MAIN and AUX LTUs, select the *Service State* option, and place both LTUs *In Service*.

NOTE

Placing the LTUs *In Service* will change the PWR LED from slow flashing green to steady green.

6. DISABLING PROTECTION SWITCHING

Disabling the protection switching mode from the circuit converts both the MAIN and AUX circuits into independent standalone HDSL circuits.

CAUTION

Ensure that data has been removed from the AUX circuit before proceeding with the next step. Disabling PROTECTION SWITCHING before removing data from the AUX Loop will cause a loss of signal condition on that loop. Under normal circumstances, the data on the HLSS circuit will be running on the MAIN HDSL circuit, and this precaution is unnecessary.

6.1 Disabling Protection Switching

a. Access the AUX LTU and select Option 2, *Provisioning*, from the HDSL Main Menu.
b. From the Provisioning menu, choose the *Service State* option.
c. Select Option 3, Out Of Service-Unassigned.
d. Escape out of the AUX LTU menus and proceed to the MAIN LTU menu.
e. From the Main Menu, select Option 7, Protection Configuration.
f. From the Protection Configuration menu, select Option 1, Protection Mode.
g. Choose Option 2, Disable.

NOTE

There is no provisioning required at the NTUs to remove protection-switching capability. Upon completion of the above procedure, the MAIN circuit is an independent, non-protected HDSL circuit. The AUX circuit is also now independent, with protection switching disabled, and currently *OOS-U*.

6.2 Adjust Wiring at Dual Remote Housing

Once protection switching has been disabled in the LTUs, the housing is internally wired to provide a G.703 signal to both the MAIN G.703 and AUXILIARY/TEST G.703 RJ-48 jacks. Connect the customer's equipment to the AUX RJ-48 jack or the AUX G.703 terminal strip in the housing to complete a second independent HDSL circuit.

Appendix B
HDSL H-LSS Circuit Configuration and Turnup for DS3-Fed Systems

1. UNPACK AND INSPECT THE THE TOTAL ACCESS DS3 MUX MODULES

Each DS3 MUX Module is shipped in its own cardboard shipping carton. Open the carton carefully and avoid puncturing the carton with sharp objects. After removing the unit from the carton, unwrap the antistatic bubble-wrap and pull the unit from the protective plastic bag.

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*.

2. INSTALL THE DS3 MUX MODULES

2.1. Install the DS3 MUX Module into Total Access 3010. Electronic modules can be damaged by static electrical discharge. Before handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.

The procedure below assumes that the DS3 MUX is being newly installed into the Total Access 3010. If the MUX is already up and running, begin with Step 2.1.2.

2.1.1. Gently but firmly push the DS3 MUX into the second slot, slot A, at the left end of the shelf. Simultaneous thumb pressure at the top (above the POWER LED) and bottom (below the Test/ Enable button) of the unit will ensure a good seat of the DS3 pins into the backplane connector. Push the ejector tab up and closed against the DS3 ` faceplate.

2.1.2 Ensure that MUX A is in the *Out of Service-Maintenance (OOS-M)* mode. Placing the MUX in OOS-M will prevent the MUX from generating alarms back to the network, and will allow loopbacks to be initiated and taken down. Data traffic on other embedded G.703 circuits will not be disturbed. Note that while the DS3 MUX is in the OOS-M mode, no alarms will be passed to the network, including those of circuits that may already be in service on the MUX. After the APS circuit is turned up, be sure to reset the MUX to the In Service (IS) mode as indicated in Step 6.0.1 to regain alarm notification.

NOTE

If a single multiplexer module is used, skip Step 2.1.3. For redundant MUX applications, continue with 2.1.3 below. When using a single multiplexer, disregard all references to the Offline MUX.

2.1.3 Ensure that Linked Provisioning is "Enabled" on MUX A, and install the second MUX in Slot B of the Total Access 3010, using Steps 2.1.1 and 2.1.2 above for the B slot MUX. This will allow MUX B to be configured as MUX A when MUX B is installed. Linked Provisioning is factory defaulted to Enable, however, Linked Provisioning does not affect Service States. The factory default Service State for MUX B is Out of Service-Unassigned. Both muxes are now to be configured identically, and in the OOS-M service state. At this point, faceplate LED indicators for MUX A (Online) and MUX B (Offline) will be as in **Table B-1**.

Table B-1. Faceplate LED Indicators

ONLINE	POWER - Yellow STATUS - Green TEST - Off LOCKOUT - Off ONLINE - Green
OFFLINE	POWER - Yellow STATUS - Green TEST - Off LOCKOUT - Off ONLINE - Off

NOTE

Only one DS3 MUX is required for any data circuit to be operational. Two modules are used for electronics redundancy of the DS3 circuit.

2.2 Provision the DS3 MUX

NOTE

There are no settings on the SCU that will affect APS operation of either the DS3 MUX units or the LTU line cards.

2.2.1 Logon to Total Access system.

2.2.2 If you are building a new DS3 circuit, provision the DS3 MUX modules according to circuit parameters. If the HDSL H-LSS circuit is to be turned up in an existing Total Access 3010 with DS3 feed, assume that the parameters have already been set for the DS3 circuit. Disregard this step and continue.

2.2.3 When channel mapping the DS3 MUX to individual slots configured for protection switching, it is necessary to map a channel only to the MAIN (odd-numbered) slot. If a fault condition occurs and a protection switch is made from the MAIN circuit to the AUX circuit, the channel is temporarily mapped by the DS3 MUX into the AUX (even-numbered) slot and a Failure notice attached to the MAIN (odd) slot. Follow the steps below for mapping a channel to the MAIN slot.

For this procedure, the technician needs to know which embedded G.703 in the incoming DS3 data stream to map to the appropriate APS slot in the Total Access 3010. **Do not continue without this information**. In a newly installed DS3 MUX, thathas not been changed from factory defaults, the embedded G.703s in the DS3 will be mapped to the like-numbered slot (i.e. G.703#1 to Slot 1, G.703#2 to Slot 2, up to G.703#28 to Slot 28).

a. Access the Main Menu of the DS3 MUX module and select Option 8, *Channel Mapping*.

b. At the bottom of the screen where you see *"Selection or Enter Mapping (E1#/Slot#)*", enter the number of the embedded G.703 followed by "/" and the appropriate slot number, then <Enter>. This action will assign the desired G.703 to the slot in the Total Access 3010.

WARNING

Assigning the incorrect embedded G.703 from the DS3 to a slot in the Total Access 3010 could disrupt existing traffic.

2.2.4 APS configuration of the DS3 MUX units is NOT required for the LTUs to be in H-LSS configuration. The two APS configurations operate independently of each other.

NOTE - APS Faceplate Pushbutton -

1. When activated with the Test/Enable switch on the Offline unit, it forces a switch to protection. (Offline MUX becomes Online MUX).

2. When activated with the Test/Enable switch from the ONLINE unit, it toggles the APS Lockout Status.

3. INSTALL THE LTU

The Total Access 3010 LTU delivers an E1 signal over an HDSL local loop. The local loop in the H-LSS configuration includes two independent 4-wire circuits. The two LTUs communicate to their respective remote units, the NTUs. When an H-LSS switch occurs, the AUX circuit takes over transmitting the data load from the MAIN circuit until the MAIN circuit is restored.

3.1 Install The LTUs into Total Access 3010

Electronic modules can be damaged by static electrical discharge. Before handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.

3.1.1 Gently but firmly push the LTU into the appropriate odd-numbered slot (which will be the MAIN HDSL circuit). Compatible slots can be any slot pair that starts with an odd number (MAIN) and includes the adjacent (to the right) even-numbered slot (AUX). Compatible slot pairs are further designated by the bracket notation around the slot pairs on the silk screen just below the physical slots on the front of the Total Access 3010. Simultaneous thumb pressure at the top (above the PWR LED) and bottom (below the ACT LED) of the unit will ensure a good seat of the LTU pins into the backplane connector. Repeat this step for the AUX LTU to be installed in the adjacent (even, to the right) slot.

3.1.2 Push the ejector tab up and closed against the LTU faceplate.

3.2 Provision the LTU

If Module Auto-Provisioning is enabled on the SCU, and if the new cards are of the same type as the former, the provisioning of the former access cards of the two Total Access 3010 slots will be written to the new access cards upon installation.

If this is an initial installation, the units will require provisioning to appropriately configure them out of the factory default states.

3.2.1 Logon to Total Access system.

3.2.2 Check to ensure the LTU line cards are correctly provisioned according to circuit parameters. Under the Provisioning Menu, set numbered option, Network Source, to *Auto MUX*. This option causes the LTU to look to the ON-LINE MUX for its data in the event of a protection switch between the MUX modules.

3.2.3 Ensure the provisioning of both the MAIN and AUX LTUs is identical, except for the following options:

a. Provision the MAIN unit to *OOS-M* mode.
b. Provision the AUX unit to the *OOS-U* mode.

3.2.4 Enable protection switching.

a. Access the MAIN Menu of the LTU in the odd-numbered (MAIN) slot.
b. Select Option 7, *Protection Configuration*.
c. Select Option 1, *Protection Mode*.
d. To enable protection switching, select Option1, *Enable*. Unless the AUX circuit is in the OOS-U mode, the operator will not be able to change the Protection mode of the MAIN LTU.
e. Set Options 2 and 3, *BER Threshold* and *BER Interval* (see Table 2).
f. Back out of the menu for the MAIN slot and access the LTU in the even-numbered (AUX) slot.
g. Select Option 7, *Protection Configuration*.
h. Option 1, *Protection Mode*, will have been set to *AUTO*. If you desire to provision a different H-LSS mode, select Option 1, and choose between *Auto*, *Manual AUX*, *Manual Main,* or *Auto Hold.*
i. Set Options 2-7 as desired on the AUX unit. (see Table 2).

3.2.5 From the provisioning menu of the AUX circuit, reset the AUX unit to *OOS-M*.

3.2.6 Logoff the system.

a. From the Total Access Menu, select Option 7, *Logoff*, and press <Enter>.

b. From the Exit and Logoff screen, select "*Y*" and press <Enter>.

4. INSTALL THE DUAL-SLOT STANDALONE HOUSING

See the associated Installation and Maintenance practice, P/N 61245034L2-5, for mounting and wiring instructions.

5. INSTALL THE NTU

The NTU terminates local loop HDSL signals originating from the Central Office (CO) unit and transforms the HDSL signal into traditional E1 signals to be delivered to the customer.

5.1 Install the NTU into the Dual-Slot Remote Housing

Electronic modules can be damaged by static electrical discharge. Before handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.

5.1.1 Connect the individual 4-wire HDSL circuits to the HDSL terminal block inside the Dual slot remote housing. The 4-wire MAIN circuit will connect to the Loop 1 and Loop 2 terminals labeled "MAIN" and the 4-wire AUX circuit will connect to the Loop 1 and Loop 2 terminals labeled "AUX".

5.1.2 Gently but firmly push the NTU into the lower dual slot remote housing slot. Repeat this step for the second NTU in the upper slot.

5.1.3 The LTUs will transfer provisioning data to the NTUs upon power-up. Some provisioning of the NTU, however, may be necessary due to hardware DIP switches and jumpers. See the Installation and Maintenance practice for the specific NTU utilized by your company.

5.1.4 Upon provisioning of the NTUs, the faceplate LEDs should read as shown in Table 3.

NOTE

The condition of the ALM, DSX and E1 LEDs depends upon the status of the equipment on the ends of the installed circuit. If both terminations of the circuit are appropriately configured and prepared to pass data, the LTU ALM LEDs will be out, the LTU DSX LEDs will be green, the MAIN NTU E1 LED will be green and ALM off, while the AUX NTU E1 will be off, and ALM red.

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6. RESET ALL EQUIPMENT TO OPERATING CONDITION

When the customers at both ends of the circuit have turned up their equipment and are running data (or test patterns, or are in loopbacks, or some other condition that will preclude the generation of alarms), the LTUs and DS3 MUX can be placed *In Service* to restore the alarm generating functions of the equipment to the network.

6.0.1 From the Total Access 3010 DS3 MUX Provisioning Screen, select Option 4, *Service State*, and place the DS3 MUX into In Service. If dual multiplexers are being utilized, place MUX B In Service.

6.0.2 From the Total Access 3010 LTU Provisioning Screen for both the MAIN and AUX LTUs, select the *Service State* option, and place both LTUs In Service.

Placing the DS3 multiplexers *In Service* will change the Power LED from yellow to green. Placing the LTUs *In Service* will change the PWR LED from slow flashing green to steady green.

7. DISABLING PROTECTION SWITCHING

Disabling the protection switching mode from the circuit converts both the MAIN and AUX circuits into independent standalone HDSL local loops.

NOTE

Ensure that data has been removed from the AUX circuit before proceeding with the next step. Disabling protection switching before removing data from the AUX loop will cause a loss of signal condition on that loop. Under normal circumstances, the data on the H-LSS circuit will be running on the MAIN HDSL circuit, and this precaution is unnecessary.

7.0.1 Disabling protection switching.

a. Access the AUX LTU and select Option 2, *Provisioning*, from the HDSL Main Menu.
b. From the Provisioning Menu, choose the *Service State* option.
c. Select Option 3, *Out Of Service-Unassigned*.
d. Escape out of the AUX LTU menus and proceed to the MAIN LTU Menu.
e. From the Main Menu, select Option 7, *Protection Configuration*.
f. From the Protection Configuration menu, select Option 1, *Protection Mode*.
g. Choose Option 2, *Disable*.

NOTE

There is no provisioning required at the NTUs to remove protection switching capability. Upon completion of the above procedure, the MAIN circuit is an independent, non-protected HDSL circuit. The AUX circuit is also now independent, with protection switching disabled, and currently *OOS-U*.

7.0.2 Adjust wiring at Dual remote housing. Once protection switching has been disabled in the LTUs, the housing is internally wired to provide an E1 signal to both the MAIN E1 and AUXILIARY/TEST E1 RJ-48 jacks. Connect the customer's equipment to the AUX RJ-48 jack or the AUX E1 terminal strip in the housing to complete a second independent HDSL circuit.

NOTE

G.703 DS3 multiplexer channel mapping to the even-numbered (formerly AUX) slot in the Total Access 3010 chassis will *not* automatically be restored. Assignment of an embedded G.703 in the DS3 data stream to the even slot will have to be made prior to using the slot as a DS3-fed HDSL circuit.