



HDLC Module User Manual

Part Number 1200222L1



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WARNING *Change or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.*

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Chapter 1 Introduction

WHAT IS HDLC?

HDLC (High-Level Data Link Control) is a synchronous, bit-oriented data link control protocol that is used extensively in wide-area networks. Because of its popularity, HDLC has been the basis for a number of other protocols including LAPD (ISDN), PPP, and Frame Relay.

HDLC MODULE OVERVIEW

The HDLC Module combines with other ATLAS components to implement a high-capacity HDLC resource pool in the ATLAS Integrated Access System. The HDLC Module, which occupies a single slot in the ATLAS chassis, supports 8 Mbps worth of HDLC traffic. This bandwidth is utilized through user-defined channels that range from 56 kbps to 2.048 Mbps each. Applications of the HDLC Module include private frame relay and Primary Rate ISDN (PRI) D channel implementation. Figure 1-1 shows a sample frame relay application using the HDLC Module.

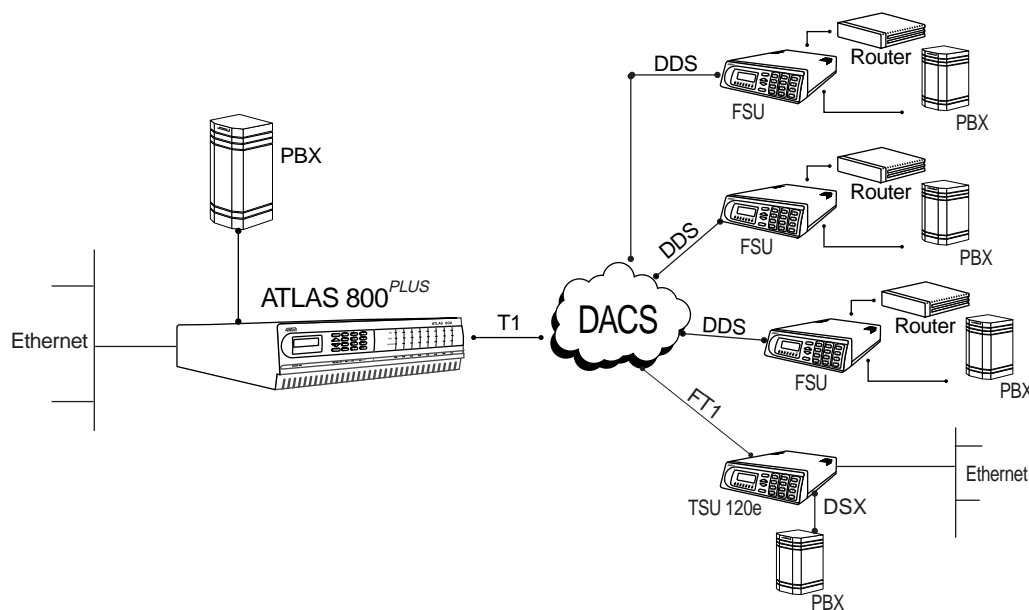


Figure 1-1. ATLAS Private Frame Relay Application

HDLC MODULE - WHEN IS IT NEEDED?

The HDLC Module is required for ATLAS applications requiring a large number of *HDLC Controllers* (the HDLC Module includes 128 HDLC Controllers). As a resource module for the ATLAS system, the HDLC Module has no external physical interfaces. All information is passed to and from the HDLC Module via the ATLAS internal backplane.

Whether an HDLC module is required is determined by the user-application. An HDLC Controller is needed to process the following:

- **An ISDN D Channel.** The HDLC Module is needed to terminate a PRI from the ATLAS T3 Module (PN 1200223L1 and 1200225L1). One HDLC controller is needed for every D Channel that ATLAS handles, regardless if it is PRI or BRI. For example, a system configured to convert a single PRI circuit into 11 BRI circuits would need 12 HDLC controllers. This can also be accomplished without the HDLC module, using the HDLC controllers that are built into the Octal BRI module and the Base Unit (assuming the PRI circuit is connected to the interface provided on the Base Unit).
- **An ISDN B Channel, but** only if the call is being processed by ATLAS, as in the case of remote access applications. For remote access applications, one HDLC controller is required for every B Channel call that is being terminated inside ATLAS. For example, an ATLAS system configured to support a single PRI line's worth of ISDN calls for remote access, that directs all the calls to async ports, would need 24 HDLC controllers - one for the D Channel and 23 for the B channels.

In situations where ATLAS is not terminating the ISDN calls, as in the case for PRI to T1 conversion, HDLC controllers are not needed for the B Channels, just for the D Channel.



ISDN calls that are directed to synchronous V.35 ports at 56 or 64 kbps do not require HDLC processing of the B channels.

- **A frame relay link.** One HDLC controller is required for every frame relay link in an ATLAS system. For example, a single T1 connection to the public frame relay network would require one HDLC controller. In a private frame relay network, each DS0 in a T1 may represent a frame relay link to a particular remote site, in which case 24 HDLC controllers would be required.

Frame relay links can be found on the DTE interface as well as the network interface. If ATLAS is passing frame relay out individual V.35 ports, each V.35 port passing frame relay is counted as a frame relay link and requires an HDLC controller.

ATLAS SUPPORT OF HDLC CONTROLLERS

ATLAS allocates HDLC Controllers to meet the user-application requirements without user intervention. Table 1-1 describes ATLAS hardware components that include HDLC controllers.

Table 1-1. ATLAS Components and Integrated HDLC Controllers

Component	Controllers	Description
ATLAS 800 Base Unit	2	Two HDLC Controllers are tied to the T1/PRI interfaces built into the Base Unit, and can be used to process D Channels when the port is configured as a PRI.
ATLAS 800 ^{PLUS} Base Unit	4	Two HDLC Controllers are tied to the T1/PRI interfaces built into the Base Unit and can be used to process frame relay links or D Channels when configured as a PRI. The other two HDLC controllers are general purpose and can be used to process frame relay links, D Channels, or ISDN B Channels, as required.
Quad T1/PRI Module	4	Each HDLC Controller is tied to a specific T1/PRI port on the module and can only be used to process the D Channel when the port is configured as a PRI. If a T1 port on the Quad T1/PRI module is configured as a frame relay link, an HDLC controller from the 800 ^{PLUS} Controller or the HDLC Module must be used.
Octal BRI Module	8	These HDLC Controllers can only be used to process the D channel of the associated BRI interface.
Modem-16 Module	16	These HDLC Controllers can only be used to process ISDN B Channels for remote access applications.
HDLC Module	128	The HDLC Controllers on this module are general purpose and can be used to process frame relay links, ISDN B Channels, and ISDN D Channels as the system requires.

EXAMPLES USING THE HDLC MODULE

Some examples using the HDLC Module are listed below:

1. Remote Access - Mostly ISDN Calls

For remote access applications, use the HDLC module when the majority of calls are expected to be ISDN. While it is possible to populate a system with Modem-16 Modules solely for the purpose of processing ISDN calls, a more economical route would be to install a single HDLC Module to accomplish the same task.

2. Private Frame Relay Application

In a private frame relay application, you might see 24 individual frame relay links inside a T1 circuit, going to 24 different destinations.

This situation requires 24 HDLC Controllers and, therefore, requires the HDLC Module.

3. T3 Transporting One or More PRI Circuits

When a T3 circuit is transporting one or more PRI circuits, the HDLC Module is required to process the PRI's D Channels.



Two general-purpose HDLC Controllers can terminate a PRI from the T3 as needed, if you are using the ATLAS800^{PLUS}.

HDLC MODULE FUNCTIONAL DESCRIPTION

The HDLC Module installs into any available slot in the ATLAS chassis (Base Unit). The ATLAS Front Panel displays the module status. Additional status information is available via the terminal menu, accessible through either a VT-100 terminal connected to the ATLAS Base Unit's control port, or via a Telnet session established through the Base Unit's Ethernet port. If needed, application software necessary for the HDLC Module can be downloaded using the terminal menu.

Features

- Each module provides up to 8.192 Mbps of bandwidth.
- Each module supports up to 128 bidirectional HDLC channels.
- For each channel, bandwidth is selectable to be Nx56/64 kbps (N=1-32).
- Each channel's HDLC receiver supports flag sequence detection, bit destuffing, and CRC-16 validation.
- Each channel's HDLC transmitter supports flag sequence generation, bit stuffing, and CRC-16 generation.
- Performance information such as the number of frames transmitted and received is provided on a per channel basis.
- Errors that occur such as CRC errors and aborted frames are reported on a per channel basis.

PHYSICAL DESCRIPTION

The HDLC Module provides no external interfaces. Both the network and customer interfaces are provided on other ATLAS components. Information is passed to and from the HDLC Module via ATLAS' internal bus.

Chapter 2 Installation

UNPACK AND INSPECT

Carefully inspect the HDLC Module for shipping damages. If damage is suspected, file a claim immediately with the carrier and then contact ADTRAN Technical Support. If possible, keep the original shipping container for use in returning the HDLC Module for repair or for verification of shipping damage.

Contents of ADTRAN Shipment

The following items are included in the ADTRAN shipment:

- HDLC Module
- *HDLC Module User Manual* (insert into main *ATLAS User Manual*)

INSTALLING THE HDLC MODULE

The installation procedure is described below, and Figure 2-1 shows the proper placement of the HDLC Module.

Step	Action
1	Remove the cover plate (corresponding to the slot in which the HDLC Module will be installed) from the ATLAS chassis rear panel.
2	Slide the HDLC Module into the ATLAS chassis until the module is positioned firmly against the front of the ATLAS unit.
3	Fasten the thumbscrews at both edges of the option module.
4	Install any additional modules in the Base Unit as specified in the Installation chapter of the ATLAS User Manual.

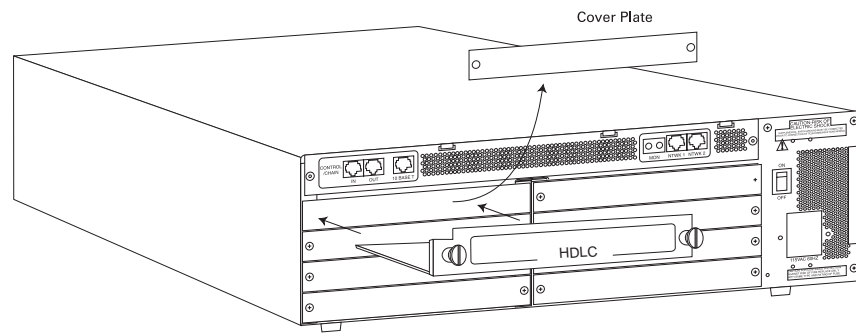


Figure 2-1. Installing the HDLC Module

POWER-UP AND INITIALIZATION

When the HDLC Module is inserted into the ATLAS chassis, the Front Panel **STATUS** indicator and **ONLINE** indicator are illuminated with a solid green light. Previously configured settings for the HDLC Module are automatically restored upon power-up. At this time, a system self-test can be invoked, as described in *ATLAS User Manual*. The **TEST** indicator on the Front Panel remains amber for the duration of the module self-test. Any self-test failures display in the terminal menu self-test log.

WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within five years from the date of shipment if the product does not meet its published specification, or if it fails while in service. For detailed warranty, repair, and return information, refer to the ADTRAN Equipment Warranty and Repair and Return Policy Procedure (see the last page of this manual for pertinent information).

A return material authorization (RMA) is required prior to returning equipment to ADTRAN.

For service, RMA requests, or more information, see the last page of this manual for the toll-free contact number.

Chapter 3 Operation

OVERVIEW

The HDLC Module menus can be viewed from two sources, as shown in Table 3-1. The *ATLAS User Manual* provides detailed instructions on operating each of the supported management approaches. The remainder of this chapter describes the menu items available for managing the HDLC Module using the terminal menu.

Table 3-1. Management Methods for the HDLC Module

Source	Purpose
ATLAS Front Panel	For minimal configuration and status support
Terminal Menu	For detailed status and diagnostics

*You must have the appropriate password level to edit items using the terminal menu. (See the section **Access Passwords** in the **ATLAS User Manual** for detailed information on working with passwords.)*



Security level 1 users can view and edit every available field. Security level 5 users can view any field, but they cannot edit. Each menu description in this section indicates the required password level required for read-and-write access.

TERMINAL MENU STRUCTURE

ATLAS uses a form of hierarchical menus to access all of its features. The top-most menu level leads to submenus which are grouped by functionality. All submenu options display in the VT-100 terminal window.

You can use the **MODULES** terminal menu to view the HDLC Module status and menus (see Figure 3-1). The **MODULES** menu option **TYPE** shows the HDLC Module as HDLC-128. The following sections describe the associated **MODULES** menu and submenus.

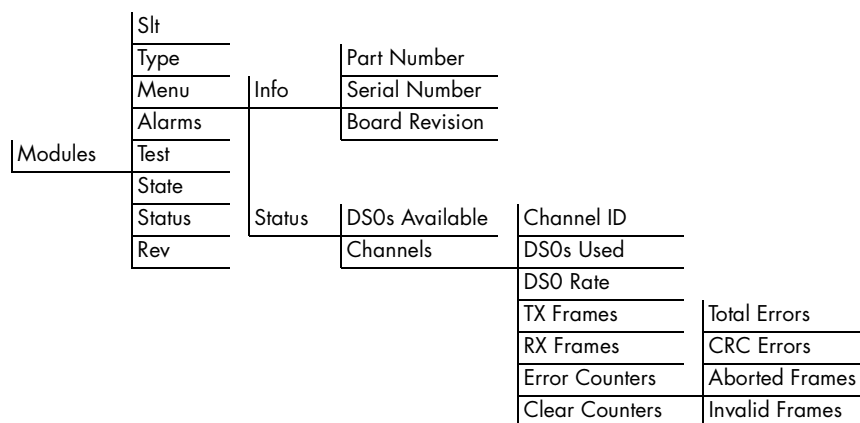


Figure 3-1. Modules Menu Tree for HDLC Module

MENU ACCESS

The ATLAS System Controller automatically detects the presence of the HDLC Module when it is installed in the system. To access the **MODULES** menu and submenus, use the keyboard arrow keys to scroll to the appropriate row and column; then press **Enter** on the keyboard. For example, to view the **MENUS** submenu for HDLC-128, use the keyboard arrow keys to move to the row **HDLC-128** and the column **MENU**; then press **Enter** on the keyboard.



Refer to the ATLAS User Manual for detailed instructions on how to navigate through the terminal menu.

MENU OPTIONS

The following sections describe the **MODULES** main menu options, followed by the **MODULES/MENU** submenus (see Figure 3-2).

Atlas 800 Plus/Modules								
	Slit	Type	Menu	Alarm	Test	State	Status	Rev
System Info	0	Sys Ctrl	[+]	[OK]	[OFF]	ONLINE	Online	A
System Status	1	EMPTY				ONLINE	Empty	-
System Config	2	T1/PRI-4	[+]	[OK]	[OFF]	ONLINE	Online	E
System Utility	3	T1/PRI-4	[+]	[OK]	[OFF]	ONLINE	Online	A
Modules	4	EMPTY				ONLINE	Empty	-
Packet Manager	5	HDLC-128	[+]	[n/a]	[n/a]	ONLINE	Online	A
Router	6	ASYNC-16	[+]	[OK]	[OFF]	ONLINE	Online	A
Dedicated Maps	7	T3-1	[+]	[OK]	[OFF]	ONLINE	Online	B
Dial Plan	8	V35Nx4	[+]	[OK]	[OFF]	ONLINE	Online	A

SVS: OK CSU:ONLN 1: -- 2:ONLN 3:ONLN 4: -- 5: OK 6: OK 7:ONLN 8:ONLN
 Access module menus ^?=help 10:37

Figure 3-2. Modules Menu

> SLT**Write security: 3; Read security: 5**

(Slot) Displays the number of available slots in the ATLAS chassis. Slot 0 refers to the ATLAS Base Unit.

> TYPE**Write security: 3; Read security: 5**

Displays the module type currently installed in the slot or the module type you plan to install in the slot. If an HDLC Module is installed, **TYPE** automatically defaults to **HDLC-128** (the HDLC Module). You can use this field to preconfigure the system before installing modules by specifying the module that you want to install into each slot.



*If a module is installed, **TYPE** automatically displays the name of the installed module, and it cannot be set to any other option.*

> MENU

Displays additional information and status submenus for the HDLC Module. To access the submenus for this item, use the arrow keys to scroll to the **MENU** column for the module you want to edit, and press **Enter**. (Submenus for this option are discussed beginning with *Submenu Options* on page 3-4.)

> ALARMS**Read security: 5**

Displays whether there is an alarm condition on the HDLC Module. To view the **ALARM**, press **Enter** in this field. If no alarm conditions are available to report, this field reports [n/a].

> TEST**Read security: 5**

Displays whether the HDLC Module is executing a test. To activate the **TEST** menu, press **Enter** in this field. If no tests are currently available to report, this field reports [n/a].

> STATE**Write security: 3; Read security: 5**

Displays whether the module is **ONLINE** or **OFFLINE**. Even though a module is physically installed, it must be marked **ONLINE** for it to be considered an available resource.

Marking an installed module **OFFLINE** may be useful in system maintenance or troubleshooting. If you choose **OFFLINE**, the module will not be in alarm condition, but will display Offline. The front panel **STATUS** indicator blinks green if the module has been placed **OFFLINE** and the **ONLINE** indicator turns off.



Only if **STATE** reads **ONLINE**, can ATLAS use an installed module's resources.

> STATUS

Read security: 5

Displays status information on the following:

- Online** The module is enabled and is responding to the System Controller's status polls. This is the normal response of the system.
- No Response** The module is enabled but is not responding to the System Controller's status polls. This response indicates either a problem in the system or the module is not installed.
- Empty** The System Controller has not detected the presence of a module in the option slot, nor has a module been manually enabled for this option slot.
- Offline** The module is installed but has been taken **OFFLINE** by a user. The module is still responding to System Controller polls.
- Offline / No Response** The module is installed but has been taken **OFFLINE** by a user. The module is not responding to polls. This response indicates either a problem in the system or the module is not installed.

> REV

Read security: 5

(Hardware Revision) Displays the hardware revision of the HDLC Module .

SUBMENU OPTIONS

The submenus discussed here are located under the **MODULES/MENU** option (see Figure 3-3). You may also want to refer back to the menu tree in Figure 3-1.

```

Atlas 800 Plus/Modules[5]/HDLC-128 Menus
HDLC-128 Menus
Info      [+ ]
Status    [+ ]

SYS: OK   CSU:ALARM  1: -- 2:ALARM 3:ONLN 4: -- 5:ALARM 6: OK  7:ALARM 8:ALARM
HdLc-128 Menus                                     ?=help 11:27

```

Figure 3-3. Menu Panel

> INFO MENU

Read security: 5

(Information) Displays information about the HDLC Module (see Figure 3-4).

```

Atlas 800 Plus/Modules[5]/HDLC-128 Menus/Info
Info      Part Number 1200222L1
Status    Serial Number 04CAW2672
          Board Revision C

SYS: OK   CSU:ALARM  1: -- 2:ALARM 3:ONLN 4: -- 5:ALARM 6: OK  7:ALARM 8:ALARM
Module Information                                     ?=help 11:28

```

Figure 3-4. Info Menu

- » **Part Number** Displays the part number of the HDLC Module.
- » **Serial Number** Displays the serial number of the HDLC Module.
- » **Board Revision** Displays the printed circuit board revision of the HDLC Module.

> STATUS MENU

Read security: 5

Displays submenus for available resources on the HDLC Module.

- » **DS0s Available** Displays total number of DS0s currently available for allocation on the HDLC Module (see Figure 3-5). The maximum value is 128.

```

Atlas 800 Plus/Modules[5]/HDLC-128 Menu/Status
Info DSUs Available 50
Status Channels 1+1

SYS: OK CSU:ALARM 1: -- 2:ALARM 3:ONLN 4: -- 5:ALARM 6: OK 7:ALARM 8:ALARM
?/=help 11:29

```

Figure 3-5. Status Submenu

» Channels

Read security: 5

Displays status information about the resources that have been allocated on the HDLC Module (see Figure 3-6).

```

Atlas 800 Plus/Modules[5]/HDLC-128 Menu/Status/Channels
Channels

```

Chan ID	DSUs	56/64K	Tx Frames	Rx Frames	Errors	ClrCntr
1 000	2	64K	22775	0	[0]	<+>
2 001	2	64K	1102	0	[0]	<+>
3 002	1	64K	762	0	[0]	<+>
4 003	1	64K	623	0	[0]	<+>
5 004	4	64K	510	0	[0]	<+>
6 006	1	64K	532	0	[0]	<+>
7 007	2	64K	576	0	[0]	<+>
8 008	24	64K	403	0	[0]	<+>
9 009	5	64K	360	0	[0]	<+>
10 010	16	64K	501	0	[0]	<+>
11 011	2	64K	5254	0	[0]	<+>
12 012	18	64K	946	0	[0]	<+>

```

SYS: OK CSU:ALARM 1: -- 2:ALARM 3:ONLN 4: -- 5:ALARM 6: OK 7:ALARM 8:ALARM
?/=help 11:30

```

Figure 3-6. Channels Submenu

»» Channel ID

Indicates the resource number of the allocated resource listed. If a number does not appear in the list, that resource is not currently allocated.

»» DS0s Used

Displays the number of DS0s that are being used by the resource. This value multiplied by the DS0 Rate yields the bandwidth that has been assigned to the resource.

»» DS0 Rate, 56 / 64 K

Displays the per DS0 rate that is being used by the resource. This value multiplied by the number of DS0s yields the bandwidth that has been assigned to the resource.

»» TX Frames

(Transmit Frames) Displays the number of frames that have been transmitted by this resource. **CLR CNTR** (Clear Counters) clears this menu item.

»» RX Frames

(Receive Frames) Displays the number of frames that have been received by this resource. **CLR CNTR** (Clear Counters) clears this menu item.

-
- »» **Error Counters** Displays the total number of errors received by the resource. Press **Enter** on this field to view the number of **TOTAL ERRORS**, **CRC ERRORS**, **ABORTED FRAMES**, and **INVALID FRAMES**. **CLR CNTR** (Clear Counters) clears this menu item.
- »» **Clr Cntr** Write security: 4; Read security: 5
(Clear Counters) Resets *all* counters for the channel.

ATLAS FEATURES USED WITH THE HDLC MODULE

In addition to the HDLC Module menu items, the **SYSTEM SELF-TEST** ATLAS menu item may be operated in conjunction with the HDLC Module.

> **SYSTEM SELF-TEST**

SYSTEM SELF-TEST, a submenu of the ATLAS main menu item **SYSTEM UTILITY**, executes both the HDLC Module and the ATLAS internal tests. The results of the self-tests are displayed in the front panel LCD or the self-test log screen of the terminal menus. For additional information on self-tests, see the *ATLAS User Manual*.

When **SYSTEM SELF-TEST** displays, place the cursor on it and press **Enter** to execute the test. The unit continuously changes the display on the self-test log screen until all test results are shown.

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Product Support Information

Pre-sales Inquiries and Applications Support

Please contact your local distributor, ADTRAN Applications Engineering, or ADTRAN Sales:

Applications Engineering (800) 615-1176

Post-sales Support

Please contact your local distributor first. If your local distributor cannot help, please contact ADTRAN Technical Support and have the unit serial number available.

Technical Support (888) 4ADTRAN

Repair and Return

If ADTRAN Technical Support determines that a repair is needed, Technical Support will coordinate with the Customer and Product Service (CAPS) department to issue an RMA number. For information regarding equipment currently in house or possible fees associated with repair, contact CAPS directly at the following number:

CAPS Department (256) 963-8722

Identify the RMA number clearly on the package (below address), and return to the following address:

ADTRAN Customer and Product Service
6767 Old Madison Pike
Progress Center
Building #6 Suite 690
Huntsville, Alabama 35807

RMA # _____

