Drop and Insert Option Module

Part Number 1200065L1-1

User Manual

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September 1999

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ADTRAN Web Site	www.adtran.com
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Notes provide additional useful information.

Cautions signify information that could prevent service interruption.

Warnings provide information that could prevent damage to the equipment or endangerment to human life.

Federal Communications Commission Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio frequencies. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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

Important Safety Instructions

When using your telephone equipment, please follow these basic safety precautions to reduce the risk of fire, electrical shock, or personal injury:

1. Do not use this product near water, such as near a bath tub, wash bowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool.
2. Avoid using a telephone (other than a cordless-type) during an electrical storm. There is a remote risk of shock from lightning.
3. Do not use the telephone to report a gas leak in the vicinity of the leak.
4. Use only the power cord, power supply, and / or batteries indicated in the manual. Do not dispose of batteries in a fire. They may explode. Check with local codes for special disposal instructions.

SAVE THESE INSTRUCTIONS

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 specifications or if it fails while in service. For detailed warranty, repair, and return information see the ADTRAN Equipment Warranty and Repair and Return Policy Procedure on the inside back page of this manual.

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

For service, RMA requests, or more information, contact one of the numbers found on the inside back page of this manual.

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Chapter 1 Introduction

FULL DROP AND INSERT OVERVIEW

The Full Drop and Insert (D & I) option module is one of the secondary interface option modules available for use with the ADTRAN TSU 100/600 and provides a second T1 interface.

The D & I module is capable of inserting and extracting data on a secondary T1 using a DS0 map, the same as is used for the base TSU 100/600. The D & I should be used in applications requiring a TSU 100/600 to send data from different DTE interfaces out two separate T1s. An example is shown in Figure 1-1. The amount of bandwidth can be selected.

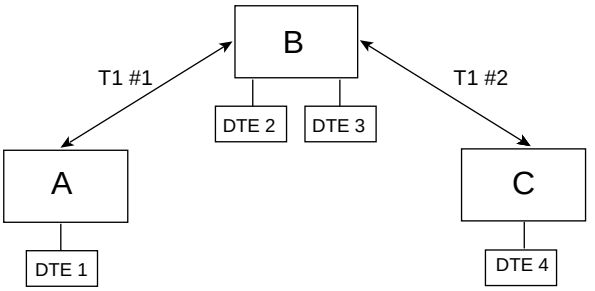

Figure 1-1. D & I Used With Two Separate T1s

FUNCTIONAL DESCRIPTION

The Full Drop and Insert is designed to fit in the option slot of the TSU 100/600 and is subject to its operation and control. The D & I is configured from the front panel of the TSU 100/600 or by an external personal computer (PC) using the optional controlling software T-Watch. The internal menus for its configuration are a part of the D & I option module and are automatically installed when the D & I is plugged into the unit.

Features

The Full Drop and Insert option module has the following features:

- Operates using 1 to 24 DS0s
- Operates as a Full Drop & Insert or as a passthru module
- Accommodates an additional plug-on (piggyback) interface such as the Nx56/64 or OCU-DP
- Includes an elastic store and controlled frame slip permitting loop timing on the network interface, as well as on the D & I T1 circuit
- Provides timing for the TSU 100/600 as an option
- Displays menu options for easy configuration
- Includes a configurable DS0 assignment map
- Accumulates performance data on the T1 loop to which it is attached
- Executes an extensive self-test

Interfaces

The Full Drop and Insert option module has the following interfaces:

- Performance per ANSI T1.403 and AT&T 54016.
- RJ48C network interface connector
- AMI or B8ZS coding
- ESF or SF(D4) framing

- Line build-out settings: -22.5, -15, -7.5, 0, and automatic
- Monitor jacks
- Line loopback (front panel / remote / in-band)

Full Drop and Insert Option Module Specifications

The D & I option module conforms to the following specifications:

Line rate	1.544 Mbps
Capacity	1 to 24 DS0s (can be user configured, contiguous or non-contiguous)
Line codes	Alternate mark inversion (AMI) Bipolar Return to Zero (B8ZS)
Framing options	ESF per ANSI T1.403 and AT&T Publication TR 54016 D4 per AT&T Publication 62411
Clock source	allows secondary T1 to be master timing source
Tests	power-on circuit self test line loopback port loopback (internal toward Mux)
Connectors	RJ48C

PHYSICAL DESCRIPTION

The Full Drop and Insert is an option module which plugs into the option slot in the rear of the TSU 100/600. See Figure 1-2.

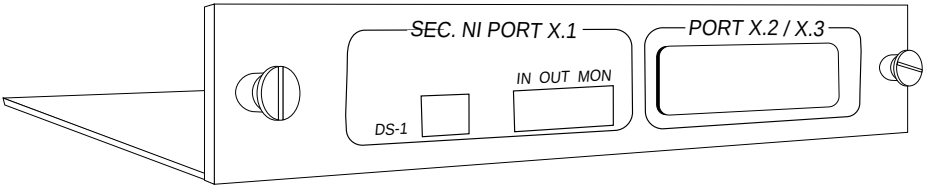

Figure 1-2. Full Drop and Insert Option Module

The D & I rear panel includes a plastic plug over a cutout for a V.35 connector. This allows aV.35 Nx56/64 or an OCU DP interface plug-on board to be added to the D & I card.

The PORT X.1 identification on the rear panel is linked to the port numbering philosophy of the TSU 100/600 product family. The **X** represents the slot number, and the **.1** indicates the port number. For the TSU 100 application, there is only one option slot. Therefore the port designation for the D & I port is 1.1. If added, the Nx56/64 or OCU DP port designation would be **1.2**. These port numbers appear in the front panel LCD menu displays.

Chapter 2 Installation

UNPACK AND INSPECT

Carefully inspect the Full Drop and Insert option module for any shipping damages. If damage is suspected, file a claim immediately with the carrier and then contact ADTRAN Customer Service. If possible, keep the original shipping container for use in shipping the D & I module back for repair or for verification of damage during shipment.

Shipped by ADTRAN

The following items are included in the ADTRAN shipment:

- Full Drop and Insert option module
- User Manual (to be inserted into main TSU 100/600 Manual)

Provided by Customer

The customer must provide a cable for connection to DS1 interface.

INSTALLING THE OPTION MODULE

Power to the TSU 100/600 should be off when installing the Full Drop and Insert option module.

Placement of the Option Module

Figure 2-1 represents the action required for proper placement of the option module.

1. Remove coverplate from the TSU 100/600 rear panel.
2. Slide option module into the rear panel until it is positioned firmly against the front of the TSU 100/600.
3. Fasten thumb-screws at both edges of the option module.

> **NOTE** *Full Drop and Insert option module can only be used in slot 6 of the TSU 600.*

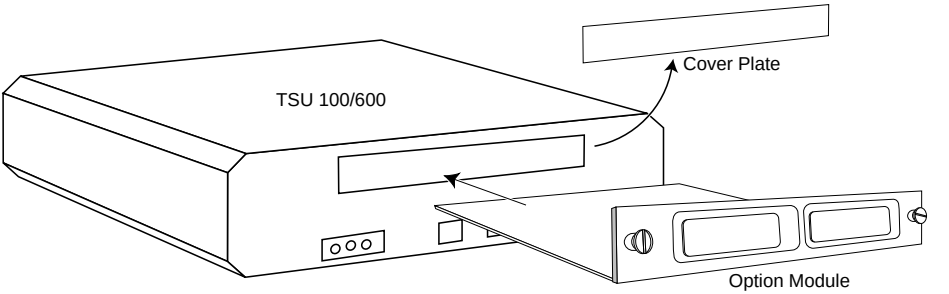

Figure 2-1. Installing Option Module

Power Connection

Each Full Drop and Insert option module derives power from the base TSU 100/600 unit. Power to the TSU 100/600 is supplied by a captive eight-foot power cord.

Wiring

The D & I module offers a single connector for interface to the T1 circuit. The pinout is given in Table 2-1 *Network Pinout Connection*.

The required wiring connection is:

Connector Type (USOC) = RJ48C

Table 2-1. Network Pinout Connection

Pin	Name	Description
1	R1 RXDATA	Receive Data
2	T1 RXDATA	Receive Data
3	Unused	-
4	R TXDATA	Send Data
5	T TXDATA	Send Data
6, 7, 8	Unused	-

POWER UP TESTING

The Full Drop and Insert option module executes a self-test during the power-up sequence, as described in the *TSU 100/ 600 User Manual.* No initialization input is required. Any previously configured setting for the D & I is restored automatically upon power-up.

Successful Self Test

The yellow TEST LED, located with the Module LEDs on the front panel, extinguishes when self-test is completed and the configuration is successfully restored. See *Front Panel Operation, TSU 100/600 User Manual*.

Failed Self Test

If the D & I module fails one or more of the self-tests, a message is displayed in the LCD during power up. See *TSU 100/600 User Manual*. Specific failures of the D & I module are identified in the Failure Message listings in the appendix of this manual.

Operation Alarms

The red ALARM LED with the Module LEDs on the front panel illuminates when an alarm condition is detected.

Chapter 3 Operation

OVERVIEW

The Full Drop and Insert option module is controlled as part of the TSU 100/600 using the same methods as described in the user manual.

Refer to the *TSU 100/600 User Manual* for descriptions of front panel indicators and buttons.

Menu Structure

When an option module is installed in the TSU 100/600, the unit adds it to the list of available options under the Port menu items. These menu items are shaded in the limited overview of the TSU 100 menu shown in Figure 3-1. (A complete menu diagram is shown in the appendix of the *TSU 100 User Manual*.)

Menu Operation

An option module must be selected from the listing in one of the Port menu options before its menus are applicable. With the cursor on one of the Port menu items, press **Enter** to display a list of the currently installed option modules. To activate menus for the Full Drop and Insert option module scroll through the list to display 1.1 Full D & I and press **Enter.**

Once the option module is selected, the D & I menus appear as a subset of, and operate the same as, menus for the TSU 100/600. With the cursor on one of the TSU 100/600 four

main menu choices press **Enter** or a menu number to display the first two submenu items.

Use the up and down arrows to place the cursor on the desired item and press **Enter** to display the first two submenu choices.

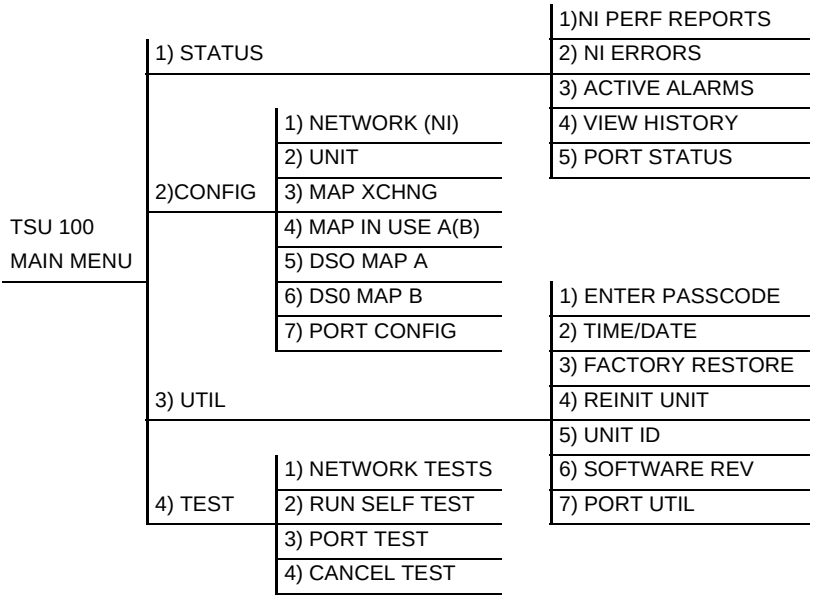

Figure 3-1. TSU 100 Main Menu

FULL DROP AND INSERT MENU ITEMS

The Full Drop and Insert menus are accessed from and operated the same as menus for the TSU 100/600. The D & I items are submenu choices of the TSU 100/600 four main menus, as shown (in bold italics) in Figure 3-1 on page 3-2. For information on Factory Restore and Run Self Test see *TSU Features used with Full Drop and Insert Options on page 3-12*.

The D & I menu items are as follows:

- Port Status
- Port Configuration
- Port Utility
- Port Test

Port Status

PORT STATUS, a submenu of the TSU 100/600 main menu item Status, is used to determine the status of the T1 connected to the D & I module. Two submenu items are used:

- Performance Reports
- D & I Errors

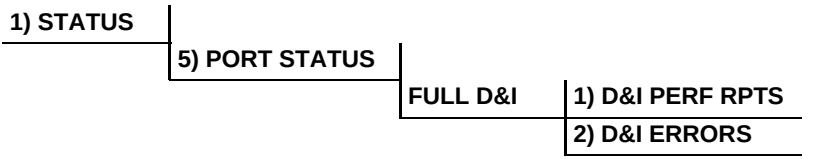

Figure 3-2. Port Status Menu Path

Performance Reports

The Full Drop and Insert Interface Performance Reports are accessed from the TSU 100/600 main menu **STATUS**, submenu item **PORT STATUS**. The Interface Performance Reports are used to display the user copy of the performance data. The D & I maintains this performance data on the secondary interface in compliance with ANSI T1.403 and AT&T document TR54016. The data displayed is data

accumulated over the last 15 minutes and over the last 24 hours. This data is only available when configured for the ESF network format.

With the cursor on main menu item **STATUS**, activate the menu with **Enter** or **Number 1**. The unit displays the first two Status submenu items. Scroll to place the cursor on **PORT STATUS**, and activate by pressing **Enter**.

Only the bottom line of the LCD changes display. Scroll to place the cursor on 1.1 Full D & I and press **Enter**.

The unit displays the two submenu items of Port Status:

- Drop and Insert Performance Reports (D & I PERF RPTS)
- D & I ERRORS

If menu item number 1 is selected, the unit displays the first of five items in the Secondary Interface Performance report. See Figure 3-3. The equal symbol on the right of the item indicates a noneditable field.

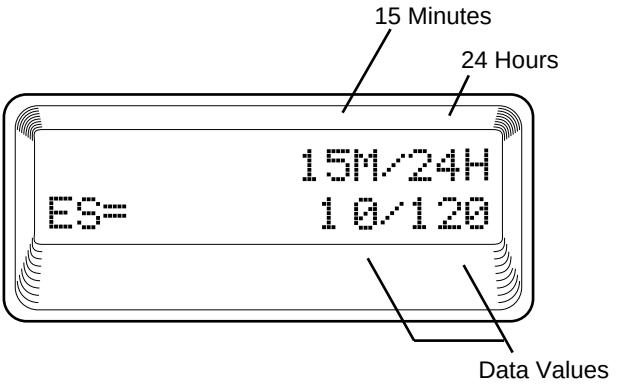

Figure 3-3. Secondary Interface Performance Report

Scroll to access the display of the individual report fields, which are as follows.

%AS	% of Available seconds
%EF	% of Error free seconds
ES	Number of Errored seconds (1 or more errors / second)
SES	Number of Severely Errored Seconds (more than 320 errors / second)
UAS	Number of Unavailable Seconds (10 or more consecutive seconds)

If insufficient time has passed to collect data or the network format is configured as D4, an **NA** is displayed.

Continue with standard operating procedures to exit the display.

When this menu is active, performance data can be cleared by pressing **Clear** (**shift 9**) on the keypad. Only the user copy of the performance data is cleared.

Since only the user copy of performance data is cleared by the TSU 100/600, the data displayed here might be different from the data being sent to the network as PRM data.

D & I Errors

The D & I Errors submenu provides current error information about the T1 connected to the D & I module. There are four different errors, as shown in Figure 3-4.

CRC	Cyclic redundancy check
BPV	Bipolar violations
XS0	Excess zeros
FER	Framing errors

The asterisk (*) above an item indicates the type of errors detected.

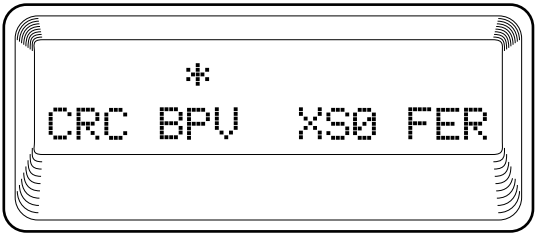

Figure 3-4. D & I Errors Display

Port Configuration (PORT CONFIG)

PORT CONFIGURATION, a submenu of TSU 100/600 main menu item **CONFIGURATION**, is used to configure the Full Drop and Insert option module. Three submenu items are used to configure the parameters associated with the secondary interface on the Full Drop and Insert.

- DS 1 Interface
- Map A
- Map B

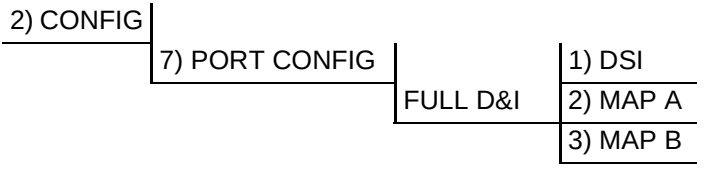

Figure 3-5. Port Configuration Menu Path

Place the cursor on **CONFIG** and press **Enter** to activate. Use number 7 or scroll down to place the cursor on **PORT CONFIG** and press **Enter** to activate the display of available configurations.

Notice that when scrolling through the list only the bottom line of the LCD changes display. When 1.1 Full D & I is displayed, press **Enter** to access the three submenus.

DS1 Interface

The DS1 interface configuration uses options and settings identical to the network configuration for the TSU 100/600. For a description of these settings refer to the *Operation chapter* of the *TSU 100/600 User Manual.*

Map A and Map B

Except for the absence of the passthru bit selection the functionality of the map configuration for the Full Drop & Insert are the same as on the TSU 100/600. Refer to the *Operation chapter* of the *TSU 100/600 User Manual.* The screen for the Full Drop & Insert appears as in Figure 3-6.

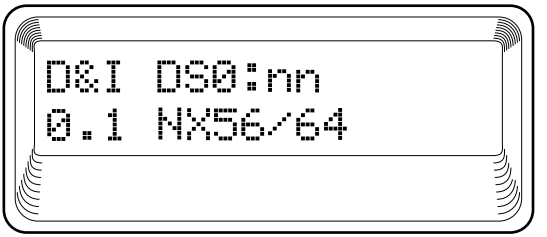

Figure 3-6. DS0 Port Assignment

Map Coordination

Coordination of maps between the Full Drop and Insert and the TSU 100/600 is performed automatically.

Passthru

If a DS0 is marked as passthru in the TSU 100/600 map, it is also marked as passthru in the Full Drop and Insert map. This marking is not available for change. The display in Figure 3-7 appears in the LCD.

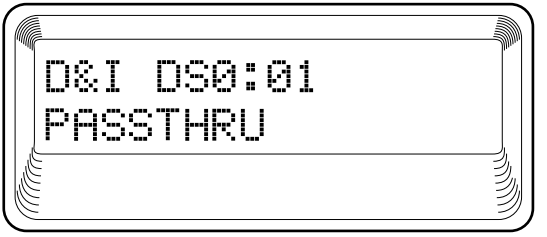

Figure 3-7. DS0 Passthru Marking

In Use

If a port is in use in the corresponding map on the TSU 100/600, it will be unavailable for use in the Full Drop and Insert map. See Figure 3-8.

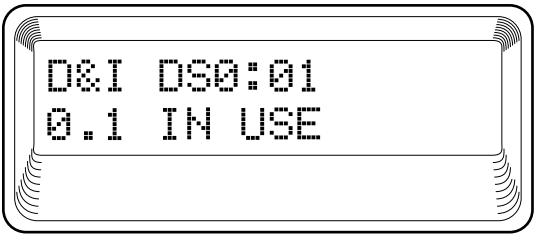

Figure 3-8. In Use Port Display

DI Map Conflict

If a port that is in use by the Full Drop and Insert is added to the NI map of the TSU 100/600, a conflict message is displayed. The DS0s on the Full Drop and Insert that were mapped to that port will be changed to IDLE. See Figure 3-9.

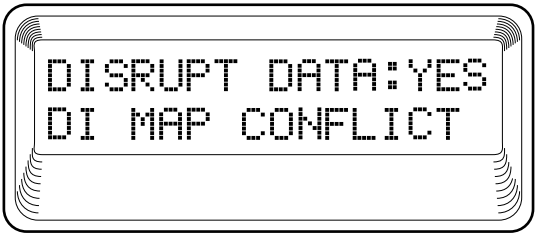

Figure 3-9. DI Map Conflict Display

The DI MAP CONFLICT message appears in the TSU 100/600 standard DS0 map configuration when APPLY MAP is selected. The message indicates that the D & I map has been modified.

Port Utility (PORT UTIL)

Port Utility, a submenu of the TSU 100/600 main menu item Utilities (UTIL) displays the current software revision for each port installed in the unit. This information is required when requesting assistance from ADTRAN Customer Service or when updates are needed.

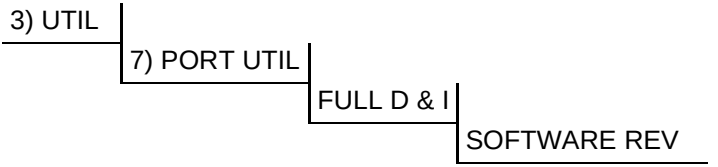

Figure 3-10. Port Utility Menu Path

When **PORT UTILITY** is displayed, place the cursor on it and press **Enter** to display the first available port.

Scroll to display 1.1 Full D & I, and press **Enter** to activate. The unit displays the option card name and the software version currently installed. Press **Cancel** to exit or select another port.

Port Test

PORT TEST, a submenu of the TSU 100/600 main menu item **TEST**, activates tests of the selected data ports. Selecting Full D & I displays the first two of four loopback tests available for this option module. See Figure 3-11.

- Local Loopback
- Remote Loopback
- Test Pattern
- Pattern Result

The functionality of these items are the same as the Network Tests option on the TSU 100/600. For a full description refer to the Network Tests in the *Operation chapter* of the *TSU 100/600 User Manual.*

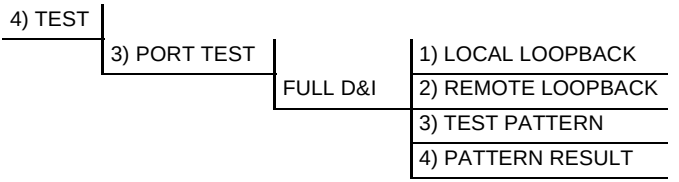

Figure 3-11. Port Test Menu Path

When **PORT TEST** is displayed, place the cursor on it and press **Enter** to display the first available port. Scroll to select **1.1 FULL D & I** and press **Enter** to activate. Continue with standard operations.

TSU FEATURES USED WITH FULL DROP AND INSERT OPTIONS

In addition to the Full Drop and Insert menu items, two additional menu items of the TSU 100/600 may be operated in conjunction with the D & I option module. These are **FACTORY RESTORE** and **RUN SELF TEST**.

Factory Restore

FACTORY RESTORE, a submenu of the TSU 100/600 main menu item **UTILITIES (UTIL)** restores the factory installed default setting for all D & I option module parameters.

When Factory Restore is displayed, place the cursor on it and press **Enter.** The unit is restored to preset factory defaults and returns to the main TSU 100/600 menu.

Run Self Test

RUN SELF TEST, a submenu of the TSU 100/600 main menu item **TEST**, executes both the D & I internal test and the TSU 100/600 internal test. The internal test for the TSU 100/600 is the same self-test executed upon power-up. The results of the self-test are displayed in the LCD. For additional information on Self-Test see the *TSU 100/600 User Manual.*

When **RUN SELF TEST** is displayed, place the cursor on it and press **Enter** to execute the test. The unit continuously changes the display in the LCD window until all test results are shown.

Appendix A Failure Messages

FAILURE MESSAGES FROM SELF TEST

The following messages indicate a probable component failure on the Drop and Insert Module:

DI EPROM CHKSM	EPROM checksum error
DI RAM ERROR	Static RAM error
EEPROM ERROR	Map storage error
TX MAP ERROR	TX mapping RAM failed
RX MAP ERROR	RX mapping RAM failed

DROP AND INSERT ALARM MESSAGES

The following messages indicate an alarm condition on the Drop and Insert Module:

Alarm	Description
Red Alarm	not able to frame data coming from the DS-1 interface; sometimes referred to as out of frame (OOF)
Yellow Alarm	remote alarm indicator (RAI) being received from the DS-1 Interface
Blue Alarm	receiving unframed all 1s from the DS-1 interface, alarm indicator signal (AIS).
Loss of Signal	no signal detected from the DS-1 interface

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Product Support Information

Presales Inquiries and Applications Support

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

Applications Engineering	(800) 615-1176
Sales	(800) 827-0807

Post-Sale 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, Inc.
CAPS Department
6767 Old Madison Pike
Progress Center
Building #6, Suite 690
Huntsville, AL 35807

RMA # _____