



**T1 ESF CSU RM
Rackmount 1**

**Extended Superframe Format
Channel Service Unit**

Part Number 1202066L1

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About this Manual

The following conventions are used in this manual.



Cautions signify information that could prevent service interruption.



Notes provide additional useful information.



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

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 a bathtub, 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 Important Safety Instructions

Affidavit Requirements for Connection to Digital Services

- An affidavit is required to be given to the telephone company whenever digital terminal equipment without encoded analog content and billing protection is used to transmit digital signals containing encoded analog content which are intended for eventual conversion into voiceband analog signals and transmitted on the network.
- The affidavit shall affirm that either no encoded analog content or billing information is being transmitted or that the output of the device meets Part 68 encoded analog content or billing protection specifications.
- End user/customer will be responsible for filing an affidavit with the local exchange carrier when connecting unprotected customer premise equipment (CPE) to 1.544 Mbps or subrate digital services.

Until such time as subrate digital terminal equipment is registered for voice applications, the affidavit requirement for subrate services is waived.

**Affidavit for Connection of Customer Premises Equipment
to 1.544 MBPS and/or Subrate Digital Services**

For the work to be performed in the certified territory of _____ (telco name)

State of _____

County of _____

I, _____ (name), _____ (business address),
_____ (telephone number) being duly sworn, state:

I have the responsibility for the operation and maintenance of the terminal equipment to be connected to 1.544 Mbps and/or _____ subrate digital services. The terminal equipment to be connected complies with Part 68 of the FCC rules except for the encoded analog content and billing protection specification. With respect to encoded analog content and billing protection:

I attest that all operations associated with the establishment, maintenance and adjustment of the digital CPE with respect to encoded analog content and billing protection information continuously complies with Part 68 of the FCC rules and Regulations.

The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.

The encoded analog content and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s) maintainer(s) of the digital CPE responsible for the establishment, maintenance and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully having completed one of the following (check appropriate blocks):

A. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or

() B. A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals; or

() C. An independent training course (e.g., trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals; or

() D. In lieu of the preceding training requirements, the operator(s)/maintainer(S) is (are) under the control of a supervisor trained in accordance with _____ (circle one) above.

I agree to provide _____ (telco's name) with proper documentation to demonstrate compliance with the information in the preceding paragraph, if so requested.

_____ **Signature**

_____ **Title**

_____ **Date**

Subscribed and sworn to before me

This _____ day of _____, 20__

Notary Public

My commission expires: _____

FCC regulations require that the following information be provided in this manual:

1. This equipment complies with Part 68 of FCC rules. On the back of the equipment housing is a label showing the FCC registration number and ringer equivalence number (REN). If requested, provide this information to the telephone company.
2. If this equipment causes harm to the telephone network, the telephone company may temporarily discontinue service. If possible, advance notification is given; otherwise, notification is given as soon as possible. The telephone company will advise the customer of the right to file a complaint with the FCC.
3. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of this equipment. Advance notification and the opportunity to maintain uninterrupted service are given.
4. If experiencing difficulty with this equipment, please contact ADTRAN for repair and warranty information. The telephone company may require this equipment to be disconnected from the network until the problem is corrected or it is certain the equipment is not malfunctioning.
5. This unit contains no user-serviceable parts.
6. An FCC compliant telephone cord with a modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using an FCC compatible modular jack, which is Part 68 compliant.
7. The following information may be required when applying to the local telephone company for a leased line facilities:

Service Type	Digital Facility Interface Code	Service Order Code	Network Jacks
1.544 Mbps SF without line power	04DU9-BN	6.0N	RJ-48C
1.544 Mbps ANSI ESF without line power	04DU9-DN	6.0N	RJ-48C
1.544 Mbps ANSI ESF and B8ZS without line power	04DU9-IKN	6.0N	RJ-48C
1.544 Mbps SF and B8ZS without line power	04DU9-ISN	6.0N	RJ-48C

8. The REN is useful in determining the quantity of devices you may connect to your telephone line and still have all of those devices ring when your number is called. In most areas, the sum of the RENs of all devices should not exceed five. To be certain of the number of devices you may connect to your line as determined by the REN, call your telephone company to determine the maximum REN for your calling area.

9. This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. Contact your state public utility commission or corporation commission for information.

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.



Shielded cables must be used with this unit to ensure compliance with Class A FCC limits.



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

Industry Canada Compliance Information

Notice: The Industry Canada label applied to the product (identified by the Industry Canada logo or the “IC:” in front of the certification/registration number) signifies that the Industry Canada technical specifications were met.

Notice: The Ringer Equivalence Number (REN) for this terminal equipment is supplied in the documentation or on the product labeling/markings. The REN assigned to each terminal device indicates the maximum number of terminals that can be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the RENs of all the devices should not exceed five (5).

Canadian Emissions Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled “Digital Apparatus,” ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Class A prescrites dans la norme sur le matériel brouilleur: “Appareils Numériques,” NMB-003 édictée par le ministre des Communications.

Warranty and Customer Service

ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found at www.adtran.com/warranty.

Customer Service, Product Support Information, and Training

ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found at www.adtran.com/warranty.

A return material authorization (RMA) is required prior to returning equipment to ADTRAN. For service, RMA requests, training, or more information, use the contact information given below.

Repair and Return

If you determine that a repair is needed, please contact our Customer and Product Service (CAPS) department to have an RMA number issued. CAPS should also be contacted to obtain information regarding equipment currently in house or possible fees associated with repair.

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
901 Explorer Blvd. (East Tower)
Huntsville, Alabama 35806

RMA # _____

Pre-Sales Inquiries and Applications Support

Your reseller should serve as the first point of contact for support. If additional pre-sales support is needed, the ADTRAN Support web site provides a variety of support services such as a searchable knowledge base, latest product documentation, application briefs, case studies, and a link to submit a question to an Applications Engineer. All of this, and more, is available at:

<http://support.adtran.com>

When needed, further pre-sales assistance is available by calling our Applications Engineering Department.

Applications Engineering (800) 615-1176

Post-Sale Support

Your reseller should serve as the first point of contact for support. If additional support is needed, the ADTRAN Support web site provides a variety of support services such as a searchable knowledge base, updated firmware releases, latest product documentation, service request ticket generation and trouble-shooting tools. All of this, and more, is available at:

<http://support.adtran.com>

When needed, further post-sales assistance is available by calling our Technical Support Center. Please have your unit serial number available when you call.

Technical Support (888) 4ADTRAN

Installation and Maintenance Support

The ADTRAN Custom Extended Services (ACES) program offers multiple types and levels of installation and maintenance services which allow you to choose the kind of assistance you need. This support is available at:

<http://www.adtran.com/aces>

For questions, call the ACES Help Desk.

ACES Help Desk (888) 874-ACES (2237)

Training

The Enterprise Network (EN) Technical Training Department offers training on our most popular products. These courses include overviews on product features and functions while covering applications of ADTRAN's product lines. ADTRAN provides a variety of training options, including customized training and courses taught at our facilities or at your site. For more information about training, please contact your Territory Manager or the Enterprise Training Coordinator.

Training Phone	(800) 615-1176, ext. 7500
Training Fax	(256) 963-6700
Training Email	training@adtran.com

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Chapter 1 Introduction

General Description

Most carriers that supply T1 services require an interface to monitor the T1 line. The ADTRAN T1 ESF CSU RM (Extended Super Frame Channel Service Unit, rackmount), in either the stand alone or the rackmount version for the SMART 16 shelf, provides a reliable interface between the telco or private T1 facilities and the customer premises equipment (CPE), such as channel banks, T1 multiplexers, and PBXs.

The T1 ESF CSU RM provides functions such as surge protection, signal regeneration, alarm displays, and loopbacks necessary for circuit operation. The unit provides the simultaneous use of performance report messages (PRMs) specified in ANSI T1.403 and maintenance messages specified in AT&T TR 54016. The T1 ESF CSU RM can convert T1 data from superframe format (SF) to extended superframe format (ESF), allowing older SF CPEs to take advantage of the superior diagnostic capabilities of ESF facilities.

The unit complies with Part 68 of FCC rules and with applicable sections of AT&T 62411, ANSI T1.102, and T1.403.

Chapter 2 Physical Description

The T1 ESF CSU RM is composed of two cards. The first is the T1 ESF CSU RM main card, which has a front panel with 12 LED indicators. The second card is the T1 ESF CSU RM interface board, which mounts on the rear of the shelf and contains all the jacks necessary for connection to the network, CPE, and T1 test equipment.

Front Panel

The front panel of the T1 ESF CSU RM contains 12 LED indicators for OK status, network (labeled **NET**), CPE (labeled **EQ** for equipment), and test status. (See *Figure 2-1 on page 25*.) These indicators are described in this section.

OK Status (green)

The **OK** LED indicates the result of the last self-test. When the test passes, the LED is On.

NET/EQ Status (red)

The five LEDs enclosed in the NET bracket represent network interface alarms, and the five enclosed in the EQ bracket represent CPE interface alarms. A description of each of these alarms is shown in Table 2-1 on page 24.

Table 2-1. Alarm Conditions

INDICATOR	DEFINITION
LOS	loss of signal
AIS	AIS received
OOF	out of frame
YEL	yellow alarm received
CVs	code violations received

The alarm indication signal (AIS) is an all ones signal sent in place of the received signal when the unit is in red alarm. The AIS signal is sent in the same direction as the received alarm condition. If a red alarm condition exists on the network side, AIS is transmitted toward the data terminal equipment (DTE). If a red alarm exists on the DTE side, AIS is transmitted toward the network. A yellow alarm is a fixed byte pattern sent toward the origin of the red alarm. A red alarm is caused by out-of-frame/loss-of-signal (OOF /LOS) conditions and involves an integration process. Code violations (CVs) are cyclic redundancy check (CRC) errors or bipolar violations (BPVs) in ESF mode or BPVs in SF mode.

Test Status (yellow)

The **Test** LED indicates that the T1 ESF CSU RM is in a test mode. The test modes are local loopback, remote loopback, or test pattern generation. During all of these test modes, the **Test** LED is On.



Figure 2-1. T1 ESF CSU Front Panel

Rear Panel

A drawing of the rear panel of the T1 ESF CSU RM is shown in Figure 2-2. Connections to the T1 network are made through the eight-pin modular jack labeled **NET RJ45**. Connections to the CPE are made through the eight-pin modular jack labeled **EQ RJ45**. The pin assignments for these connectors are described in the section *Network and DTE Connections* on page 28 of *Chapter 3: Installation*. The three test jacks are Bantam connectors that are used when troubleshooting the T1 link. The monitor jacks, **NET MON** and **EQ MON**, are resistively isolated from the **NET IN** and **EQ IN**. This allows them to be used during normal operation of the T1 line. The **IN** and **OUT** jacks for **NET** and **EQ** are intrusive test jacks. When a test connector is plugged into one of these jacks, the corresponding connections on the RJ45 jacks are bypassed. The **IN** jack receives data from a test set to the T1 ESF CSU RM while the **OUT** jack transmits data from the T1 ESF CSU RM to a test set.

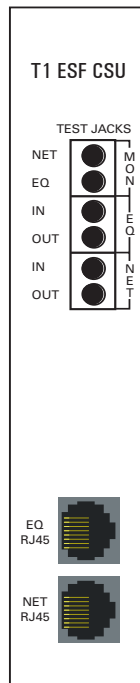


Figure 2-2. T1 ESF CSU Rear Panel

Chapter 3 Installation

Unpacking

After unpacking the T1 ESF CSU RM, carefully inspect it for shipping damage. If damage is suspected, immediately file a claim with the carrier and contact ADTRAN Customer Service (see *Customer Service, Product Support Information, and Training* on page 10). If possible, keep the original shipping container for use in returning the unit to ADTRAN for repair or verification of shipping damage.

Powering

The T1 ESF CSU RM receives all the power necessary for operation from the ADTRAN SMART 16 shelf. The shelf supplies +5 VDC to the T1 ESF CSU RM after the unit is installed in one of the 16 slots of the shelf.

Network and DTE Connections

Network Connections

There is an eight-position modular jack labeled **NET RJ45** on the rear of the T1 ESF CSU RM interface board. This connector provides for connections to the network connector. See Table 3-1 for the pinout of the network connector.

Connector Type = (USOC) RJ48C

Table 3-1. Network RJ45 Pinout

Pin	Name	Descriptions
1	R1	RX data ring
2	T1	RX data tip
3	Unused	-
4	R	TX data ring
5	T	TX data tip
6, 7, 8	Unused	-

DTE Connections

The rear of the T1 ESF CSU RM interface board also has eight-position modular jack labeled **EQ RJ45**. This connector provides connections to the DTE. See Table 3-1 for the pinout of the EQ connector.

Connector Type = (USOC) RJ48C

Table 3-2. Equipment (EQ) RJ45 Pinout

Pin	Name	Descriptions
1	R1	TX data ring (to DTE)
2	T1	TX data tip (to DTE)
3	Unused	-
4	R	RX data ring (from DTE)
5	T	RX data tip (from DTE)
6, 7, 8	Unused	-

Chapter 4 Operation

The user configures and controls the T1 ESF CSU RM through the controller card in the SMART 16 shelf. The user has two choices of input/output devices for the controller card.

- An EIA-232 port, mounted on the rear of the shelf, provides a VT100 compatible ASCII terminal interface. For remote applications a modem can be used.
- The ADTRAN DATAMATE, an optional hand-held control unit, provides a 2 x 16 character LCD display and an 18-position keypad.

Menu Structures

The T1 ESF CSU RM uses a hierarchical menu structure to access its features from either the DATAMATE or terminal interface on the controller. All of the setup features of the T1 ESF CSU RM are accessed by first making a choice from the main menus shown in Figure 4-1 on page 30 and Figure 4-2 on page 30 and pressing **Enter**.

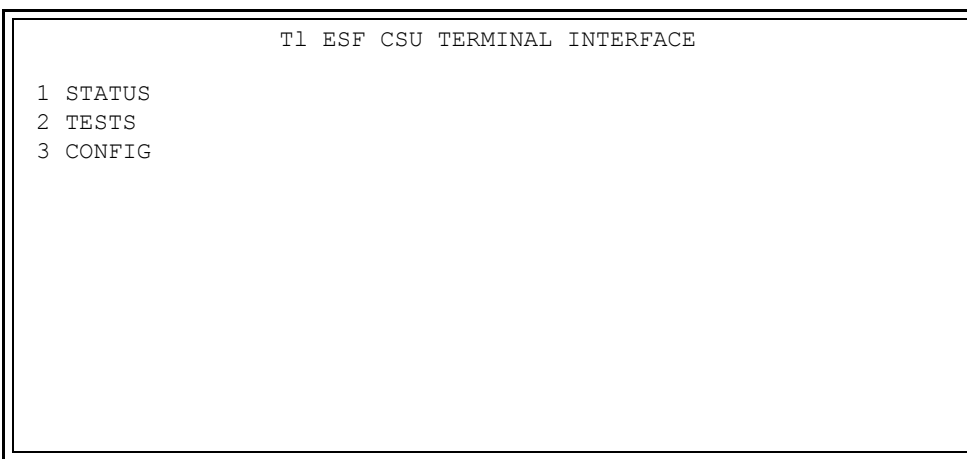


Figure 4-1. Display of Terminal Main Menu

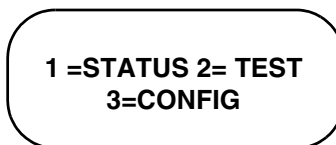


Figure 4-2. Display of DATAMATE Main Menu

Configuration

The T1 ESF CSU RM has nine network options and three CPE options (See Figure 4-3 and Figure 4-4 on page 31). These options are set from the terminal or DATAMATE interface under the NETWORK or CPE options. To enter the Configuration menu from the main menus shown above, select **3** and press **Enter**. The individual options are described following the Configuration menus shown below. To change any of the options, select the option number and press **Enter**. A list of choices is then displayed. Select the proper configuration parameter from this list.



The CPE is also referred to as data terminal equipment (DTE).

```

T1 ESF CSU CONFIGURATION MENU

NETWORK OPTIONS
1 FORMAT=ESF
2 LINE CODE=B8ZS
3 YELLOW ALARM=ENABLED
4 XMIT PRM=OFF
5 TX LBO=0.0 dB
6 BIT STUFFING=DISABLED
7 KEEP ALIVE=FRAMED
8 NETWORK LBS=ENABLED
9 RX SENSITIVITY=NORMAL

DTE/OTHER OPTIONS
9 FORMAT=ESF
10 LINE CODE=B8ZS
11 TX LBO=0-133 FT
12 FACTORY RESTORE

```

Figure 4-3. Display of Terminal Configuration Menu

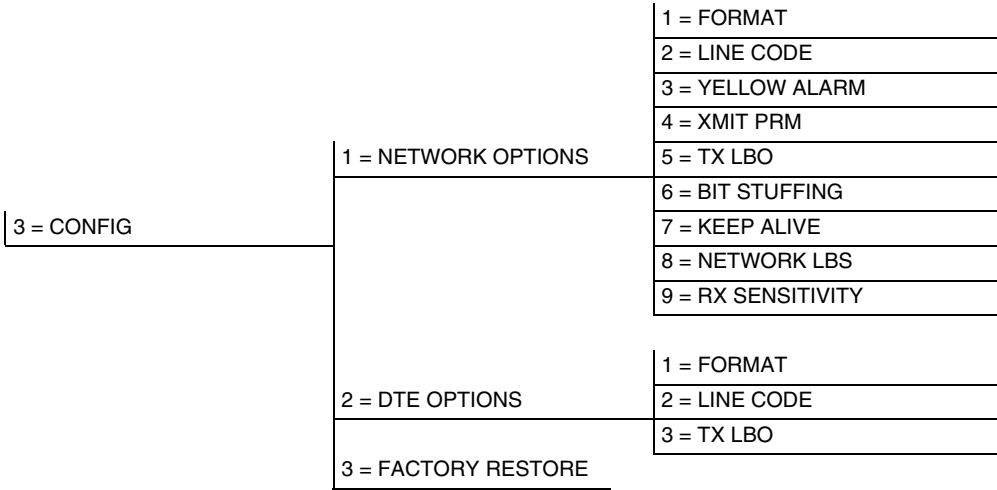


Figure 4-4. DATAMATE Configuration Menu Tree

Network Options

Format (network)

This option selects the framing format for the network interface. Superframe format (**SF**) and extended superframe format (**ESF**) are the two choices. **ESF** provides an out-of-band communications channel when used on the network side that allows the carrier or remote user to retrieve performance monitoring data and initiate loopbacks in accordance with ANSI TIA03 and AT&T 54016. When connected to a public network, the framing format must be compatible with the carrier-provided service. The DTE interface framing format must match that of the DTE. The network and equipment interfaces may use different framing formats from each other with the T1 ESF CSU RM performing translation between formats.

Line Code (network)

This option selects whether the T1 ESF CSU RM uses straight **AMI** line coding or **B8ZS**. **B8ZS** ensures 1s density requirements on the network by replacing an all 0s byte with a specific byte containing two intentional bipolar violations. When connected to a public network, the framing format must be compatible with the carrier-provided service. The T1 ESF CSU RM can convert AMI to B8ZS so that older equipment can use **B8ZS** lines.

Yellow Alarm

This option enables or disables the transmission of yellow alarms by the T1 ESF CSU RM. When the T1 ESF CSU RM is in red alarm (caused by LOS / OOF conditions) a pattern may be sent towards the network to alert the carrier / far end of the red alarm. In D4/SF format, the yellow alarm is sent in-band and thus corrupts the data in the outgoing direction. Some private network applications may require the yellow alarm transmission be disabled. If using a carrier-provided T1, enable the **YELLOW ALARM**.

Transmit Performance Report Message

A performance report message (PRM) is a status update sent towards the network by the T1 ESP CSU RM when in ESP mode. This report is sent in accordance with ANSI T1.403 and is a summary of the last four seconds of operation. Enable this option unless instructed otherwise by the carrier. The PRM is sent when this option is **ON**.

Transmit Line Build Out (network)

Transmit line build out (**TX LBO**) selects the transmit level of the outgoing T1 stream. Attenuation of the T1 signal can be added to avoid overdriving repeaters on the T1 line. A smart jack is installed at the network demarcation point on most carrier-provided T1 lines and it should receive a 0 dB signal. If there is no smart jack, the auto line build out feature may be used. This feature enables the T1 ESP CSU RM to base its transmit level on the level of the signal received from the network. If trouble exists with the auto line build out feature, try each of the selections until achieving reliable operation.

Bit Stuffing

Bit stuffing is an option used to ensure pulse density requirements on carrier-provided T1 lines in accordance with ANSI T1.403 and AT&T 62411. If B8ZS is enabled, pulse density requirements are already met so bit stuffing should be **DISABLED**.

**NOTE**

Bit stuffing corrupts the user data from the DTE when they fail to meet the 12.5% 1s density requirement. If the DTE data do not meet this requirement, select B8Z5.

Keep Alive

When the transmit signal from the DTE is lost, an all Is signal is sent in its place. This option selects whether the signal is sent **FRAMED** or **UNFRAMED**.

Network Loopbacks

When **ENABLED**, the CSU will respond to loopback codes received from the network interface.

Receiver Sensitivity

Selects the desired network receiver sensitivity setting. The factory default is **NORMAL**, which is adequate for most applications. The extended setting should be used only in applications where the **NORMAL** setting will not suffice.

DTE Options

Format (DTE)

This option selects the framing format for the DTE interface. Superframe format (**SF**) and extended superframe format (**ESF**) are the two choices. The DTE interface framing format must match that of the DTE. The network and equipment interfaces may use different framing formats from each other with the T1 ESF CSU RM doing the translation.

Line Code (DTE)

This option selects whether the T1 ESF CSU RM uses straight **AMI** line coding or **B8ZS** at the DTE interface. **B8ZS** ensures 1s density requirements on the network by replacing an all 0s byte with a specific byte containing two intentional bipolar violations (BPVs). The T1 ESF CSU RM can convert **AMI** to **B8ZS** so that older equipment can use **B8ZS** lines.

TX LBO (DTE)

This option selects the boost necessary to transmit a signal up to 655 feet from the T1 ESF CSU RM. The settings are based on the distance from DTE to T1 ESF CSU RM.

Factory Restore

This selection resets all the configuration options to the factory preset values as shown in Table 4-1 and Table 4-2.

Network Factory Defaults

Table 4-1. Network Factory Defaults

OPTIONS	SETTING
FORMAT	ESF
LINE CODE	B8ZS
YELLOW ALARM	ENABLED
XMIT PRM	OFF
TX LBO	0.0 dB
BIT STUFFING	DISABLED
KEEP ALIVE	UNFRAMED
NETWORK LBS	ENABLED
RX SENSITIVITY	NORMAL

DTE Factory Defaults

Table 4-2. DTE Factory Defaults

OPTIONS	SETTING
FORMAT	ESF
LINE CODE	B8ZS
TX LBO	0-133 FT

Tests

The **TEST** menus are used to initiate different types of tests and to view test results. The **TEST** menu can be accessed by selecting **TESTS** on the main menu. The **TEST** menus are shown in Figure 4-5 through Figure 4-8. They are followed by a discussion of each test item.

```
T1 ESF CSU TEST OPTIONS

LOCAL TESTS                REMOTE TESTS
1 RUN SELF-TEST            3 REMOTE LBS-NO LOOPBACK
2 LOCAL LBS-NO LOOPBACK    4 TEST PATTERN=NO PATTERN
```

Figure 4-5. Display of Terminal Test Menu

```
CSU TEST RESULTS

CODE VIOLATION = 0
1 EXIT TEST
2 CLEAR VIOLATIONS
```

Figure 4-6. Display of Terminal Test Results

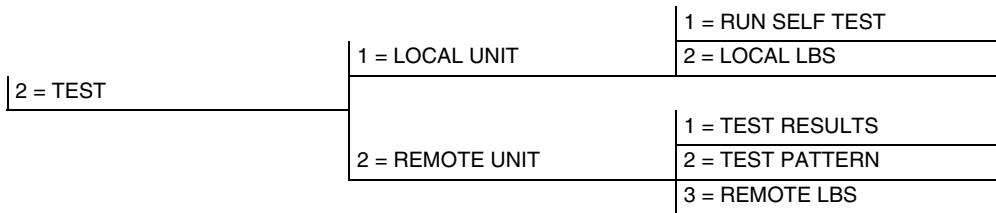


Figure 4-7. DATAMATE Test Menu Tree



Figure 4-8. Display of DATAMATE Test Results

Self-Test

The T1 ESF CSU RM has an extensive set of self-test functions. When these tests are initiated from the terminal, the T1 ESF CSU RM switches to the status display where the self-test results are shown. When these tests are initiated from the DATAMATE, the firmware checksum is displayed followed by the self-test result. The LEDs on the front of the T1 ESF CSU RM scroll during self-test.

Local Loopbacks

When the T1 ESF CSU RM is performing a local loop back, it loops the data received at one of its interfaces back to the transmit data for that interface. When in line loopback, every bit received at the network interface is looped back to the network. When in payload loopback, the T1 ESF CSU RM loops back all the data (payload) bits within the T1 stream and regenerates the framing bits. When in DTE loopback, the T1 ESF CSU RM loops all the data received at the DTE interface back to the DTE. The various loopbacks are shown in Figure 4-9 on page 40 through Figure 4-11 on page 41.

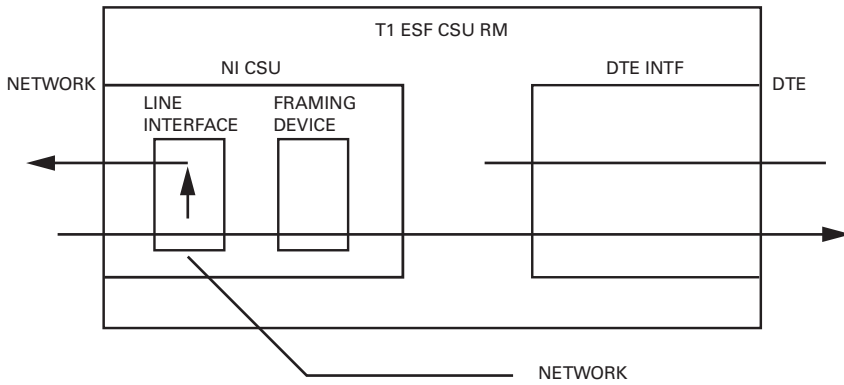


Figure 4-9. Local Line Loopback

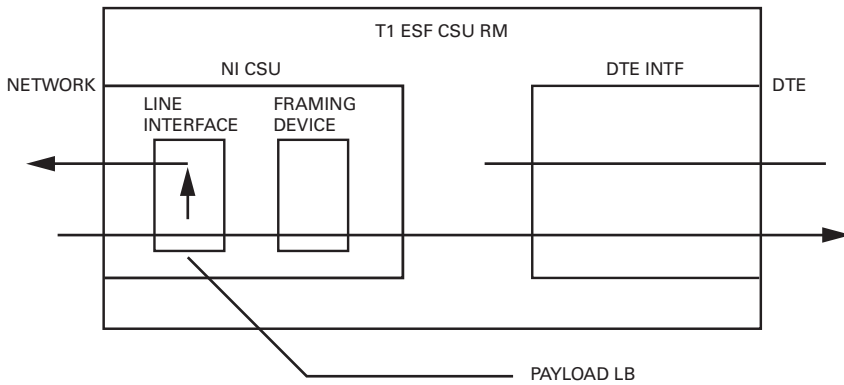


Figure 4-10. Payload Loopback

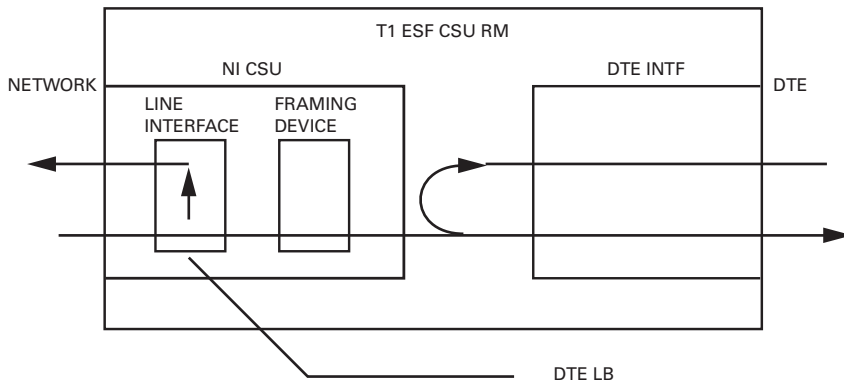


Figure 4-11. Local DTE Loopback

Remote Loopbacks

When a remote loopback is chosen, a code is sent towards the network that is intended to loopback the far-end T1 ESF CSU RM. These loopbacks will be either line (**LLB**) or payload (**PLB**) as described in the section *Local Loopbacks* on page 39. Some of these codes are sent out-of-band in the ESF Facility Data Link (FDL -4 kbps control channel) and some are sent in-band. The FDL codes work only when in **ESF** mode. The AT&T INBAND LLB does not require the FDL and may be used in **SF** or **ESF** mode.

Test Patterns

The T1 ESF CSU RM can send three different data patterns to the network for testing the T1 link. The **ALL ONES** pattern sends all 1s in every channel of the T1. The **ALL ZEROS** pattern sends all 0s in every channel of the T1.

The **1 IN 8** pattern sends a fixed pattern where one out of every eight bits is a one. When a pattern is started from the terminal, a test results screen displays a count of Code Violations (**CV**). If the pattern is started from the DATAMATE, then the **CV** total is found under the **TEST RESULTS** selection. The **CV** total is cleared when the test is initiated.

Status

The Status menus of the DATAMATE and terminal allow errors and alarms to be viewed and error / alarm histories to be cleared. If an alarm occurs after power up or after the history registers were last cleared, the history registers are set again. Current errors/ alarms reflect only the current status. For a discussion of the errors and alarms, see the *Front Panel* section of Chapter 2: *Physical Description*. The terminal STATUS menus and the DATAMATE STATUS tree are shown in Figures 4-12 through 4-15.

```

T1 ESF CSU STATUS

1 CLEAR HISTORY
2 DISPLAY STATUS
3 LOCAL PERFORMANCE

```

Figure 4-12. Display of Terminal Status Selection

```

T1 ESF CSU STATUS DISPLAY

CURRENT ERRORS/ALARMS RESULTS          HISTORY ERRORS/ALARMS
NI RX LOS = YES                        NI RX LOS = YES
NI RX AIS = NO                          NI RX AIS = YES
NI RX OOF = YES                         NI RX AIS = YES
NI RX YELLOW = NO                       NI RX AIS = YES
NI RX CVS = NO                           NI RX OOF = YES
NI RX BPVS = NO                          NI RX YELLOW = YES
T1 RX LOS = YES                          NI RX CVS = YES
T1 RX AIS = NO                           NI RX BPVS = YES
T1 RX OOF = YES                           NI RX LOS = YES
T1 RX YELLOW = NO                        NI RX AIS = YES
T1 RX CVS = NO                           NI RX OOF = YES
T1 RX BPVS = YES                         NI RX YELLOW = YES
SELF TEST = PASS                         NI RX CVS = YES
SOFTWARE REV = REVISION B                NI RX BPVS = YES
CHECKSUM = C919

```

Figure 4-13. Terminal Status Display

1 = STATUS	1 = CLEAR HISTORY
	2 = CURR/ALM
	3 = ERR/ALM HIST
	4 = RESET LOC PERF
	5 = VIEW LOC PERF

Figure 4-14. DATAMATE Status Menu Tree

(*YES, -NO)
NI RXAIS *

Figure 4-15. DATAMATE Status Display Example

NOTE

In the status displays above, NI means network interface and TI means terminal or DTE interface. In the DATAMATE status display example above, the first line indicates that an asterisk () means Yes and a dash (-) means No. The second line lists the applicable interface alarm in question. The last field is the state of the error/alarm.*

Performance Monitoring statistics for either the local or the remote TI ESF CSU RM can be viewed on the DATAMATE or displayed on a CRT screen via the terminal interface for the SMART 16 shelf.

The parameters available in the performance monitoring reports are:

- %AV percent available seconds
- %EF percent error-free seconds
- ES errored seconds
- UAS unavailable seconds
- SES severely errored seconds
- BES Bursty errored seconds
- LOFC loss of frame count.

With the DATAMATE, statistics for the local TI ESF CSU RM are viewed by selecting **VIEW LOC PERF** in the **STATUS** menu shown in Figure 4-14 on page 43. A sample DATAMATE performance monitoring display is shown in Figure 4-16 on page 44. The performance parameter plus the 15-minute and 24-hour legends are shown on the first line of the display. The current 15-minute and 24-hour totals for the selected parameter are shown on the second line of the display under their respective legends.

Other performance parameters are displayed by using the arrow keys to cycle the display through the complete list of the available parameters.

The statistics for the local TI ESF CSU RM can be cleared by selecting **RESET LOC PERF** from the menu shown in Figure 4-14 on page 43.

For the terminal interface, the performance monitoring menu for the local TI ESF CSU RM is displayed by selecting **LOCAL PERFORMANCE** in the **STATUS** menu shown in Figure 4-12 on page 42.

Both a performance summary and a detailed report are available with the terminal interface. The performance summary report shows statistics for the current 15-minute interval, the 24-hour totals, the number of valid 15-minute intervals, and the seconds into the current 15-minute interval. A performance summary report is shown in Figure 4-18 on page 45. The detailed report provides a 24-hour history of anyone of the available parameters. One-hour totals for the last 24 hours are displayed for the selected parameter as shown in Figure 4-19 on page 46.

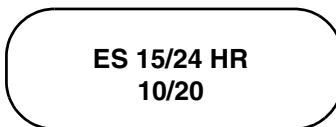


Figure 4-16. DATAMATE Performance Monitoring Display Example

```
CSU LOCAL PERFORMANCE MONITORING

1 CLR LOCAL PERF.
2 PERFORMANCE SUMMARY
3 24 HOUR ES REPORT
4 24 HOUR VAS REPORT
5 24 HOUR SES REPORT
6 24 HOUR BES REPORT
7 24 HOUR LOFC REPORT
```

Figure 4-17. Display of Terminal Performance Monitoring Selection

```
CSU LOCAL PERFORMANCE SUMMARY

VALID INTERVALS = 96
CURRENT SECONDS = 320
CURRENT %AV = 0.3
%EF = 0.3
VAS = 320
SES = 0
BES = 0
LOFC = 0
24 HOUR % AV = 93.1
%EF = 93.4
ES = 65289
VAS = 5983
SES = 10
BES = 65279
LOFC = 0
```

Figure 4-18. Display of Terminal Performance Summary

CSU LOCAL ES			
INTERVAL (HR)	TOTAL	INTERVAL (HR)	TOTAL
1	0	13	0
2	899	14	0
3	11	15	0
4	0	16	0
5	0	17	0
6	0	18	11
7	0	19	45
8	0	20	30
9	0	21	1
10	0	22	0
11	0	23	0
12	0	24	12

Figure 4-19. Terminal Detailed Report Example

Chapter 5 Specification Summary

Specifications and Features

The following list describes the T1 ESF CSU RM specifications and features.

Network Interface

DS1 interface per AT&T 62411 and ANSI T1.403

Network Framing Format

D4 (SF) or ESF

Network Line Code

AMI or B8ZS

Network TX LBO

Auto or Manual from 0.0 dB to -22.5 dB

Performance Monitoring

As per ANSI T1.403 and AT&T 54016

DTE Interface

DSX-1 interface per ANSI T1.102

DTE Framing Format

D4 (SF) or ESF

DTE Line Code

AMI or B8ZS

DTE TX LBO

DSX-1 up to 655 ft of 22 Ga. ABAM cable

Diagnostics

- Self-test
- Local Loopbacks
- Remote Loopbacks
- Test Patterns

Power

+5 VDC @ 250 mA

Environment

Temperature

Operating 0 to 50° C
 (32 to 1.22°F)

Storage -20 to 70°C
 (-4 to 1.58°F)

Relative humidity — up to 95% non-condensing

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