

BLACK BOX

1510 T1/FT1 CSU/DSU

With Drop & Insert, And SNMP

(Stand Alone)

USER'S MANUAL

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TABLE OF CONTENTS

1. PRODUCT DESCRIPTION	13
1.1 Description	13
1.2 Applications	2
2. INSTALLATION.....	5
2.1 Unpacking	5
2.2 Site Selection.....	6
2.3 Mechanical and Electrical Installation.....	6
2.3.1 Mechanical Installation.....	6
2.3.2 Electrical Installation	7
2.4 Configuration Setting.....	12
2.4.1 Hardware Configuration Setting.....	12
2.4.2 Software Configuration Setting	12
3. OPERATION.....	15
3.1 Quick Start for 1510 T1/FT1 CSU/DSU.....	15
3.1.1 Power On	15
3.1.2 Return to Default Setting.....	15
3.1.2.1 Using Front Panel	15
3.1.2.2 Review of Default Settings	15
3.1.2.3 Line	15
3.1.2.4 DTE.....	16
3.1.2.5 Map Setup	16
3.1.3 Using Terminal Setup.....	16
3.1.3.1 Review of Default Settings	16
3.1.3.2 Line	17
3.1.3.3 Serial Port #1 - DTE	17
3.1.3.4 Drop And Insert Port – DSX.....	17
3.1.3.5 System Clock	17
3.1.3.6 DS0-Map Setup.....	17
3.2 System Operation.....	17
3.2.1 Date.....	17
3.2.2 System Clock	17
3.2.3 Console Port	18
3.2.4 Security System	18
3.2.5 Configuration.....	18
3.3 DS0 Channel Map	18
3.4 T1 Network Line Configuration	18
3.4.1 Framing Format	19
3.4.2 Line Code	19
3.4.3 Line Build Out.....	19
3.4.4 Density.....	19
3.4.5 Network Diagnostics	19
3.4.6 Yellow Alarm	19
3.4.7 Facility Data Link	19
3.4.8 Idle Code.....	19
3.5 DSX Drop And Insert Configuration	20
3.5.1 Frame Format Mode	20
3.5.2 Line Code Mode	20
3.5.3 Distance	20
3.6 DTE Configuration (Serial Port #1).....	21
3.6.1 Speed	21

3.6.2	Request To Send (RTS).....	21
3.6.3	Data Polarity	21
3.6.4	Clock Polarity	21
3.6.5	Remote Loop	21
3.6.6	DTE Interface Type.....	21
3.7	System Clock.....	22
3.8	Alarms and Indicators	22
3.8.1	Alarms	22
3.8.1.1	LOS - Loss Of Signal.....	22
3.8.1.2	AIS – Alarm Indication Signal.....	22
3.8.1.3	Red – Alarm.....	22
3.8.1.4	Yellow – Alarm.....	22
3.8.1.5	FErr – Frame Error Alarm	22
3.8.1.6	CRC6 – Circular Redundancy Check 6 Alarm	22
3.8.1.7	BPV – BiPolar Violation Alarm	23
3.8.2	Indicators	23
3.8.2.1	RTS – Request To Send.....	23
3.8.2.2	CTS – Clear To Send.....	23
3.8.2.3	DCD – Data Carrier Detect.....	23
3.8.2.4	DTR – Data Terminal Ready	24
3.8.2.5	Loop Status	24
3.9	Performance Registers.....	24
3.9.1	ES – Errored Seconds	24
3.9.2	BES – Bursty Errored Seconds.....	24
3.9.3	SES – Severely Errored Seconds.....	24
3.9.4	UAS – UnAvailable Seconds.....	24
3.9.5	Time in Interval	24
3.9.6	Number of Valid Intervals	24
3.9.7	Performance Register Intervals.....	25
3.10	Event Log	25
3.11	System Utilities	25
3.11.1	Set System Date	26
3.11.2	Enter Unit Identification Number.....	26
3.11.3	Clear System Configuration.....	26
3.11.4	Configure Console	27
3.11.4.1	Console Port Speed	27
3.11.4.2	Console Parity	27
3.11.4.3	Console Data Bits.....	27
3.11.4.4	Console Flow Control	27
3.11.5	Enter New Password.....	27
3.11.6	Enable/Disable Security.....	28
3.12	LED Operation	29
3.13	Embedded SNMP Agent	30
4.	MAINTENANCE.....	31
4.1	System Initialization.....	31
4.2	Diagnostics	31
4.3	Near End Loopback	32
4.3.1	CSU Loopback	32
4.3.2	Network Interface Local Loopback – Ni LLB.....	32
4.3.3	Payload Loopback	32
4.3.4	DTE Local Loopback	33
4.4	Far End Loopbacks.....	33
4.4.1	Remote Line Loopback (REM LN/LP)	33
4.4.2	Remote Payload Loopback (REM PAYLD).....	34

4.4.3	Remote DTE Loopback (REM DTE/LP)	34
4.4.4	Remote Drop And Insert Loopback (DSX RM/LP)	34
4.5	Test Pattern.....	35
4.5.1	3:24 Pattern.....	35
4.5.2	1:8 Pattern.....	35
4.5.3	1:1 Pattern.....	35
4.5.4	QRSS Pattern.....	35
4.5.5	2047 Pattern.....	35
4.6	Verifying 1510 Operations	35
4.6.1	Quick Test.....	36
4.6.2	Substitution.....	36
4.6.3	Using Loopback Plugs.....	36
4.6.4	Using Bert Test Set.....	36
5.	FRONT PANEL OPERATION	37
5.1	Configuration Menu.....	38
5.1.1	NI Configuration Menu	38
5.1.1.1	Framing Format	38
5.1.1.2	Line Code.....	38
5.1.1.3	Line Build Out - LBO.....	39
5.1.1.4	Network Diagnostics.....	39
5.1.1.5	Density.....	39
5.1.1.6	Yellow Alarm.....	39
5.1.1.7	ESF Format	40
5.1.1.8	Clear Registers Function.....	40
5.1.2	DSX Interface Menu.....	41
5.1.2.1	DSX Frame Format.....	41
5.1.2.2	DSX Line Code.....	41
5.1.2.3	DSX Distance	42
5.1.3	Timing Source	42
5.1.3.1	Source	42
5.1.4	Serial Port #1	43
5.1.4.1	Rate	43
5.1.4.2	RTS	43
5.1.4.3	Data Normal or Inverted	44
5.1.4.4	Clock Normal or Inverted	44
5.1.4.5	Remote Loop.....	44
5.1.5	DS0 MAP	45
5.1.5.1	Channel	45
5.1.6	Channel Review.....	46
5.1.6.1	Channel Mode.....	46
5.2	Diagnostics	47
5.2.1	NI Diagnostics	47
5.2.1.1	CSU Loop	47
5.2.1.2	Network Interface Local Loop Back (NI LLB)	48
5.2.1.3	Remote Pay Load Loop Back (REM PAYLD).....	48
5.2.1.4	Remote Line Loop (REM LN/LP)	49
5.2.1.5	Pay Load Loop (PAYLD Loop)	50
5.2.1.6	Test Pattern Selection (Test Pat).....	51
5.2.1.7	Bit Error Rate Testing (BERT)	52
5.2.1.8	Errored Seconds (Err Secs).....	52
5.2.1.9	Seconds In Test Mode (Sec/Test)	53
5.2.1.10	Insert Error Command (Insert Error)	53
5.2.2	DSX Diagnostics	54
5.2.2.1	Drop And Insert Remote Loop (DSX RM/LP).....	54
5.2.2.2	Drop And Insert Local Loop Back (DSX LLB)	54

5.2.3	SP 1 Diagnostics.....	55
5.2.3.1	Local Loop.....	55
5.2.3.2	Remote Loop Back (REM Loop).....	56
5.2.3.3	Test Pattern Selection (Test Pat).....	56
5.2.3.4	Bit Error Rate Testing (BERT).....	57
5.2.3.5	Local Errored Secs (Loc ES).....	57
5.2.3.6	Seconds In Test Mode (Sec/Test).....	58
5.2.3.7	Insert Error Command (Insert Error).....	58
5.3	Alarms and Stats.....	59
5.3.1	NI Alarms.....	59
5.3.1.1	Loss Of Signal (LOS).....	59
5.3.1.2	Alarm Indication Signal (AIS).....	60
5.3.1.3	Red Alarm (Red).....	60
5.3.1.4	Yellow Alarm (Yel).....	61
5.3.1.5	Frame Error (Ferr).....	61
5.3.1.6	Circular Redundancy Check Six Alarm (CRC6).....	62
5.3.1.7	BiPolar Violation Alarm (BPV).....	62
5.3.2	DSX Alarms.....	63
5.3.2.1	DSX Loss Of Signal (LOS).....	63
5.3.2.2	DSX Alarm Indication Signal (AIS).....	64
5.3.2.3	DSX Red Alarm (Red).....	64
5.3.2.4	DSX Yellow Alarm (Yel).....	65
5.3.2.5	DSX Frame Error (Ferr).....	65
5.3.2.6	DSX Circular Redundancy Check Six Alarm (CRC6).....	66
5.3.2.7	DSX BiPolar Violation Alarm (BPV).....	66
5.3.3	ESF Statistics.....	67
5.3.3.1	Current Statistics (Current Stats).....	67
5.3.3.2	24 Hour Statistics (24 Hour Stats).....	67
5.3.3.3	ESF Registers.....	68
5.4	Event Log.....	68
5.4.1	Event Log Entry.....	68
5.5	Utilities.....	69
5.5.1	Utilities.....	69
5.5.1.1	Set Date/Time.....	69
5.5.1.2	Default Configuration (Default Config).....	70
5.5.1.3	Software Version (Software).....	70
5.5.1.4	Console Port.....	71
5.5.1.5	SNMP/SLIP Port.....	71
5.5.1.6	Clear Event Log.....	72
6.	CONSOLE OPERATIONS.....	73
6.1	System Configuration.....	74
6.1.1	DS0 Map.....	74
6.2	System Diagnostics.....	75
6.3	System Alarms and Indicators.....	75
6.4	Performance Registers.....	76
6.5	Event Log.....	78
6.6	System Utilities.....	78
6.6.1	Set System Time.....	79
6.6.2	Set System Date.....	79
6.6.3	Enter Unit Identification Number.....	80
6.6.4	Clear System Configuration.....	80
6.6.5	Configure Console.....	81
6.6.6	Enter New Password.....	81
6.6.7	Enable/Disable Security.....	82

6.6.8	Configure SNMP/SLIP Port	82
6.7	SNMP/SLIP Configuration	83
APPENDIX A: PRBS (PSEUDO-RANDOM BIT SEQUENCE).....		84
APPENDIX B: MENU TREE		85
APPENDIX C: GLOSSARY OF ABBREVIATIONS.....		89

FIGURES

Figure 1-1 1510 T1/FT1 CSU/DSU Stand-Alone Model -----	13
Figure 1-2 Application Illustration -1 -----	3
Figure 1-3 Application Illustration -2 -----	3
Figure 1-4 Application Illustration -3 -----	4
Figure 1-5 Application Illustration -4 -----	4
Figure 2-1 1510 T1/FT1 CSU/DSU Front Panel View -----	6
Figure 2-2 1510 CSU/DSU Rear Panel - Three Versions Shown -----	7
Figure 3-1 SNMP Connection-----	30
Figure 4-1 Loopback Block Diagram-----	32
Figure 5-1 1510 T1/FT1 CSU/DSU Front Panel-----	37
Figure 5-2 LCD Main Menu -----	37
Figure 6-1 Console Main Menu -1 -----	73

TABLES

Table 1-1 1510 T1/FT1 CSU/DSU Product Family-----	13
Table 2-1 Shipping Material List -----	5
Table 2-2 DB9 Console/SNMP - Serial Port -----	8
Table 2-3 RJ48 Line Connector -----	8
Table 2-4 RJ48 DSX Connector-----	8
Table 2-5 V.35/M34 DTE Port Pin Definition -----	9
Table 2-6 EIA530/DB25 DTE Port Pin Definition-----	10
Table 2-7 RS449/DB37 DTE Port Pin Definition -----	11
Table 2-8 Default Software Configuration-----	13
Table 3-1 Console Port Default Setting -----	18
Table 3-2 T1 Line Default Setting-----	20
Table 3-3 DSX Drop and Insert Default Setting -----	20
Table 3-4 DTE Serial Port #1 Default Setting -----	21
Table 3-5 System Clock Default Setting -----	22
Table 3-6 Alarm Type Table -----	23
Table 3-7 Performance Parameter List -----	25
Table 3-8 Front-Panel LED Table -----	29
Table 4.1 In-band Control Codeword – D4 Mode-----	33
Table 4.2 AT&T ESF Data-Link Codeword -----	34
Table 4.3 ANSI T1.403 Bit-Oriented ESF Data-Link Codeword-----	34

FCC Requirements, Part 15

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 communications. 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 the user's own expense.

FCC Requirements, Part 68

This equipment complies with Part 68 of the FCC rules. On the bottom cover of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) is not used for this digital equipment. If requested, this information must be provided to the Telephone Company.

1510 T1/FT1 CSU/DSU registration number and REN is as follows:

FCC 68 Registration Number: 1U5USA33109-DE-N

REN: 0.0B

FACILITY INTERFACE CODE FOR DIGITAL SERVICES

CODE	DESCRIPTION
04DU9-BN	1.544 Mbps Superframe Format (SF) without line power.
04DU9-DN	1.544 Mbps SF and B8ZS without line power.
04DU9-1KN	1.544 Mbps ANSI ESF without line power.
04DU9-1SN	1.544 Mbps ANSI ESF and B8ZS without line power.

SERVICE ORDER CODES FOR DIGITAL SERVICES

CODE	DESCRIPTION
6.0N	Does not provide billing and encoded analog protection. Uses either an integrated or external CSU. Affidavit to telco is required.

1510 T1/FT1 CSU/DSU connects to the network using a RJ48 connector.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the Telephone Company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the Telephone Company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

Normally, this equipment will be used in conjunction with FCC registered equipment that limits the Encoded Analog Content and provides the required Billing Protection. If the connected equipment is not of this type, an affidavit must be supplied to the telephone company where the network connection is to be made. The affidavit is to be notarized, and is to be filed at least ten days before the initial connection.

If trouble is experienced with this equipment, please contact Black Box Customer Support Facility for repair and warranty information. If the trouble is causing harm to the telephone network, the Telephone Company may request you remove the equipment from the network until the problem is resolved. All repairs should be handled by authorized Black Box Personnel. Service can be facilitated through our office at:

Black Box.

U.S.A.
(Tel)
(Fax)

This equipment cannot be used on telephone company-provided coin service. Connection to Party Line Service is subject to state tariffs.

Safety Requirements

CAUTION:

- **Never install telephone wiring during a lightning storm.**
- **Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.**
- **Never touch un-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.**
- **Use caution when installing or modifying telephone lines.**

Refer to the installation chapter in this manual for a safe and proper installation procedure. All wiring external to this equipment should follow the current provision of the National Electrical Code.

Safety Compliance

The 1510 T1/FT1 CSU/DSU including this equipment, is in compliance with CSA NRTL 1950 Third Edition and as such, UL 1950. The CSA control number for the 1510 T1/FT1 CSU/DSU is LR113152.

DOC CS-03 Requirements

NOTICE: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, user should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alternations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

User should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: User should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Number of all the devices does not exceed 100.

Standard Lists

1510 T1/FT1 is designed to meet the following standards:

- AT&T 62411, AT&T 54016, ANSI T1.403

1. PRODUCT DESCRIPTION

1.1 Description

1510 T1/FT1 is a family of intelligent Fractional T1 Channel Service Unit and Data Service Unit (CSU/DSU) products as shown in Table 1-1. This product family provides a T1 network interface, DS0 channel multiplexing, and direct connections to data, and video DTE (Data Terminal Equipment). This manual applies only to the Stand-Alone model.

Table 1-1 1510 T1/FT1 CSU/DSU Product Family

Model	NI (Network Interface)	Physical	DTE Port
1510-1, with SNMP	100 ohm Twisted Pair T1	Stand-Alone – One Port	V.35 / M34 EIA530 / M34 RS449/M34
1510-1X, with SNMP	100 ohm Twisted Pair T1	Stand-Alone – One Port, With Drop & Insert	V.35 / M34 EIA530 / M34 RS449/M34

1510 T1/FT1 CSU/DSU can be configured via a front panel interface, local terminal (RS-232) control, or through the use of a Simplified Network Management Protocol (SNMP) management system.

Figure 1-1 1510 T1/FT1 CSU/DSU Stand-Alone Model



1.2 Applications

The 1510 T1/FT1 CSU/DSU application examples are illustrated in Figures 1-2 through 1-5. Via DACS (Digital Access Cross-Connect System), the 1510 interfaces various applications such as LAN (Local Area Network) to WAN (Wide Area Network) communications, Host to workstation communications, video conferencing and data communication of PBXs (Private Branch Exchanges). This allows the user to integrate different applications into a single communication link utilizing only part of the available bandwidth. Furthermore, this allows the user to expand bandwidth, up to 24 DS0 channels, on demand without additional physical links because they are already available. Data and video applications may include equipment such as video conferencing, bridge, router, gateway, workstation, host computer, and various high-speed data terminal equipment.

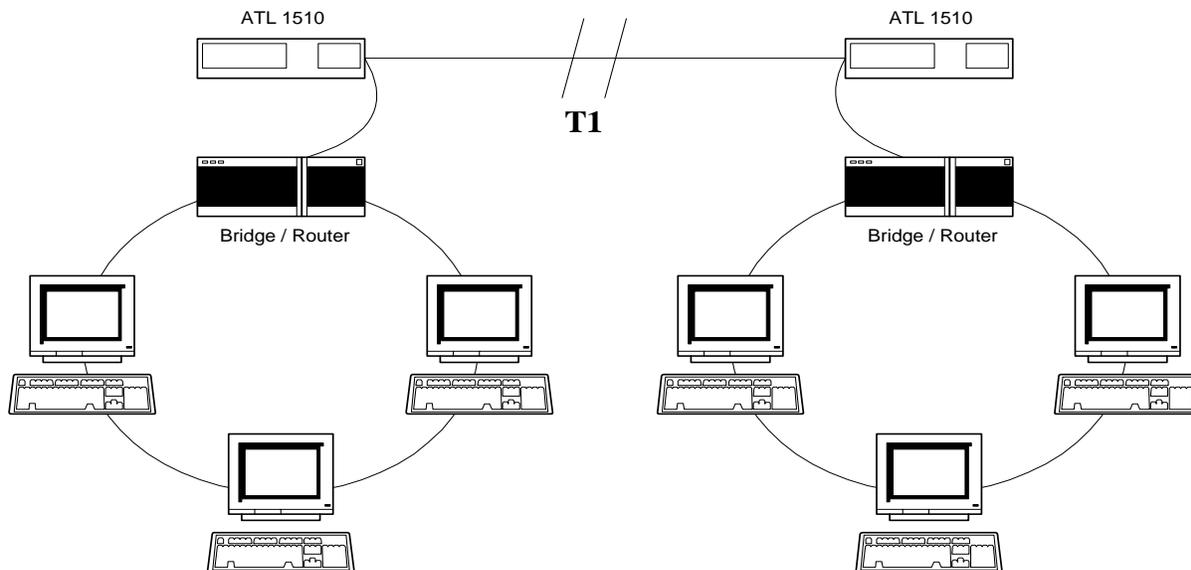


Figure 1-2 Application Illustration -1

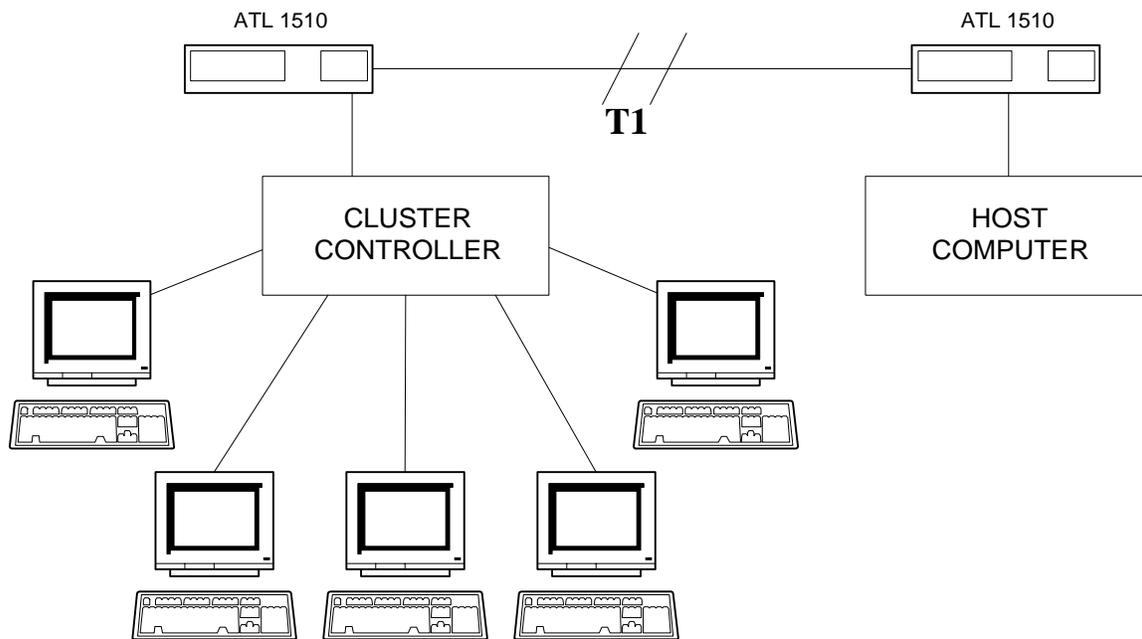


Figure 1-3 Application Illustration -2

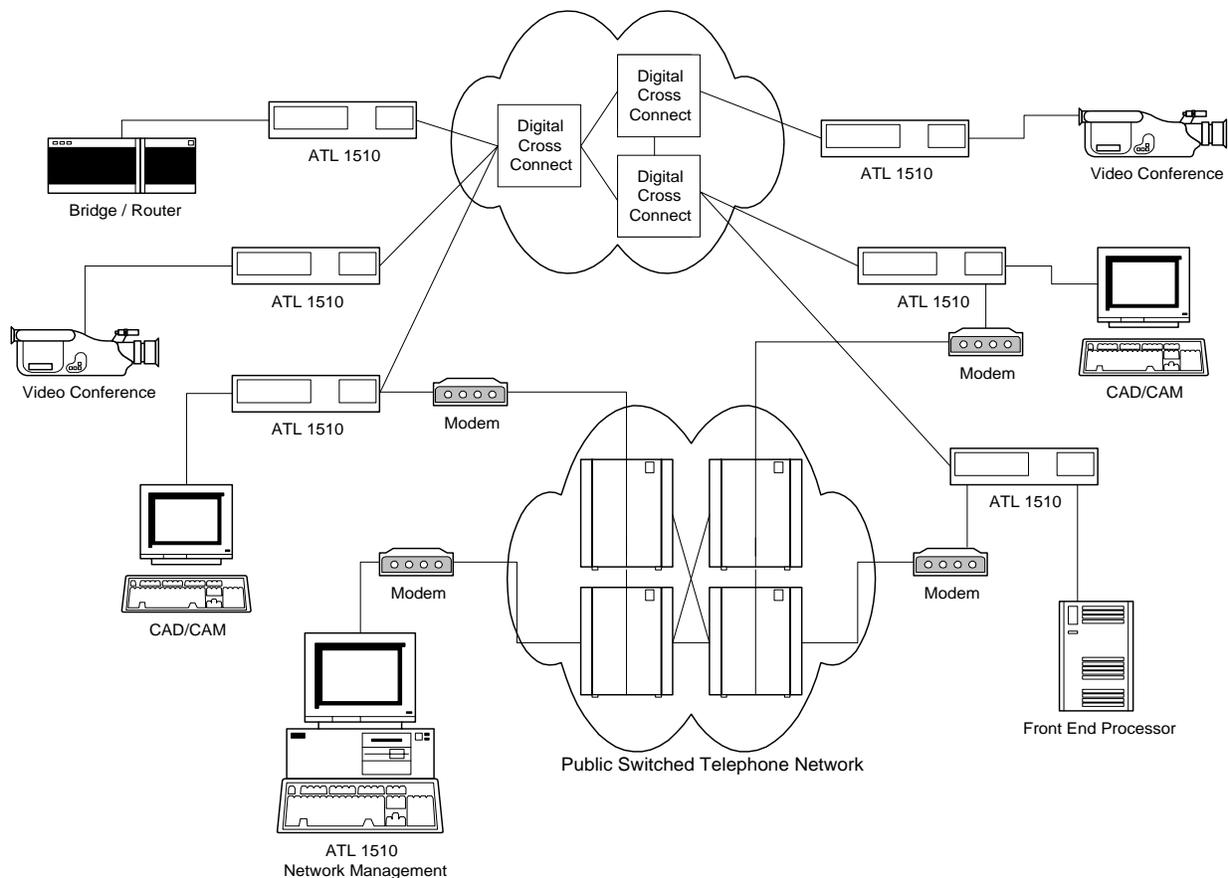


Figure 1-4 Application Illustration -3

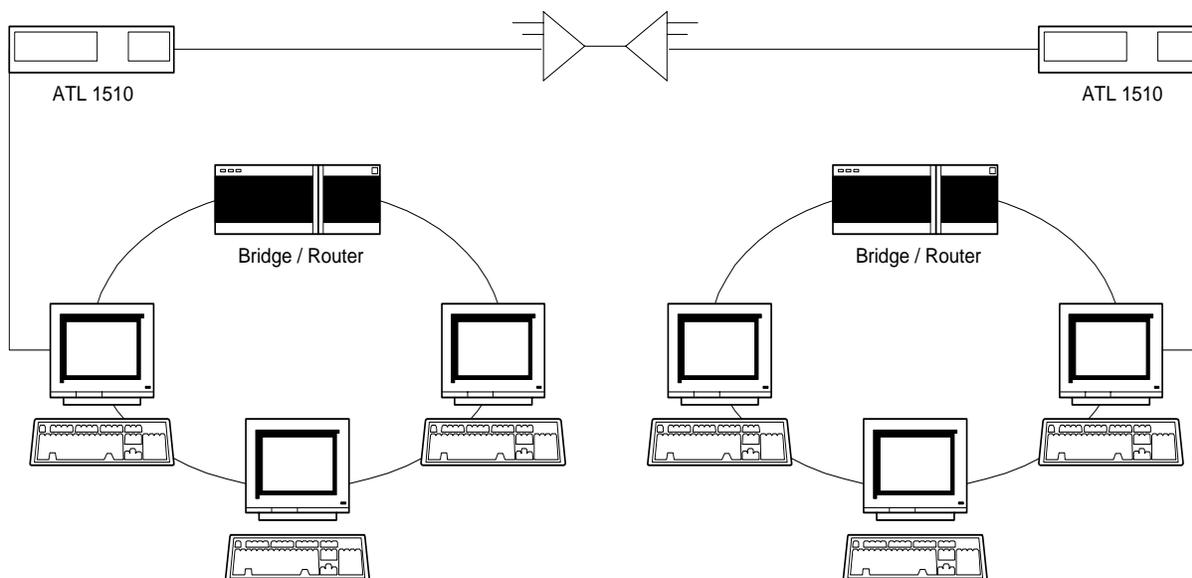


Figure 1-5 Application Illustration -4

2. INSTALLATION

CAUTION:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch un-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

2.1 Unpacking

This product is shipped in a complete package, which contains the 1510 T1/FT1 CSU/DSU and accessories. Check the shipping material against Table 2-1 Shipping Material List.

Table 2-1 Shipping Material List

Description	Item	Part Number
1510 T1/FT1 CSU/DSU (120 ohm) All models	*	

* Items vary depending on the order

1510 Parts Number List

User's Manual	Included	
Power Cord with External Transformer	Included	
Cable: RJ48C to RJ48C (T1 NI Interface)	Included	
Cable: DB9 to DB25 (Console/SNMP/Serial)	Special Order	
Cable: V.35/M34 male to V.35/M34 male (DTE-1 or 2 Interface)	Special Order	
Cable: RJ48C to RJ48C (DSX Interface)	Special Order	

Inspect the unit for any signs of damage. Report any damage to the carrier and contact Black Box customer support. Retain all packaging material in case you need to move or ship the unit in the future.

2.2 Site Selection

The following are guidelines for site selection. These guidelines must be followed to ensure a proper installation.

- The installation site should have an AC power receptacle.
- The following are the maximum suggested cable lengths:
 1. V.35 15m (50 ft)
 2. RS449 15m (50 ft)
 3. EIA530 15m (50 ft)

NOTE: If longer distance is desirable, a lower than maximum speed with proper cabling and grounding is advisable. For more information, please contact Black Box customer support.

- The installation site should provide space for adequate ventilation and cable routing. Reserve at least 12 cm (5 inches) at the rear of the unit for cables and airflow.
- The site should provide a stable environment. The operating area should be clean and free from extremes of temperature, humidity, shock, and vibration.
- Relative humidity should stay between 0 and 95%. Do not operate the unit at an altitude greater than 3000 meters (10,000 feet).

2.3 Mechanical and Electrical Installation

2.3.1 Mechanical Installation



Figure 2-1 1510 T1/FT1 CSU/DSU Front Panel View

1510 T1/FT1 CSU/DSU Stand-Alone version is a desk top unit, which is stackable. The front panel is shown in Figure 2-1, and the rear panel is shown in Figure 2-2.

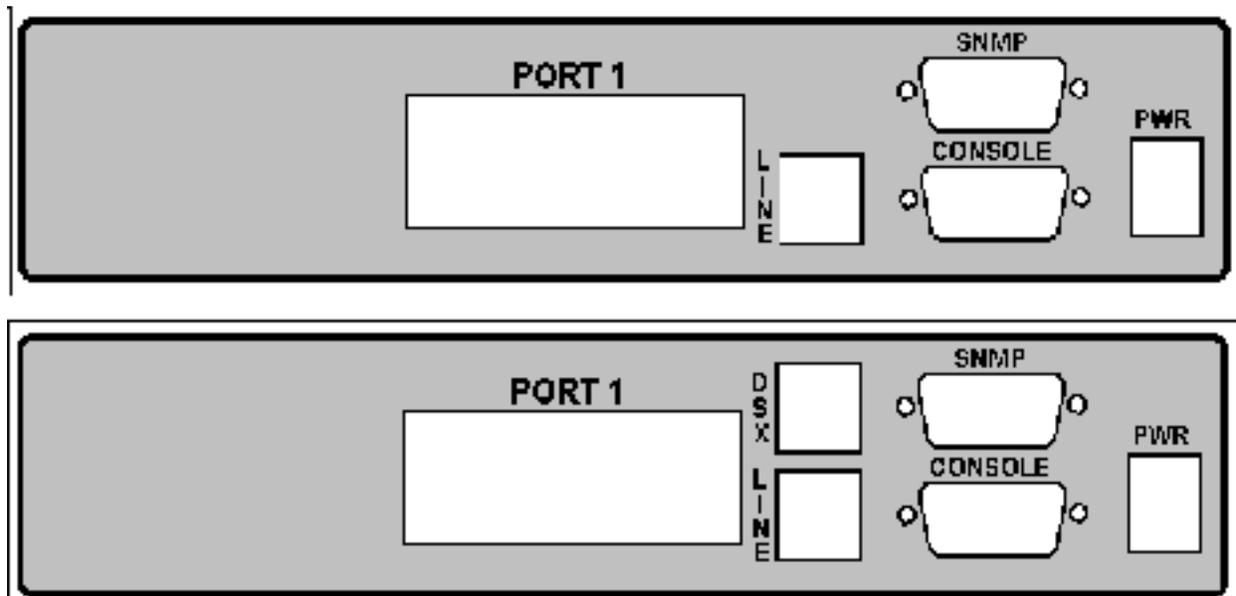


Figure 2-2 1510 CSU/DSU Rear Panel - Two Versions Shown

2.3.2 Electrical Installation

The 1510 T1/FT1 CSU/DSU Stand-Alone version is AC powered. Use the rear right power connector to connect to an AC power outlet using the inline power transformer and cord provided.

The console port is the lower DB9 connector, for this interface the 1510 T1/FT1 CSU/DSU is configured as a DCE device. This port may be connected directly to a DTE device. Pin definitions and pin connections are listed in Table 2-2.

The SNMP port is the upper DB9. The DB9 is a serial port. For the serial interface, the 1510 T1/FT1 CSU/DSU is configured as a DCE device. Using the same cable as used on the console port, it is possible to connect the serial SNMP port to an appropriate router auxiliary port at any one of the selected speeds using a conversion cable. Pin definitions and pin connections are also contained in Table 2-2.

Table 2-2 DB9 Console/SNMP - Serial Port

Pin Number	Signal	Source
1	Unassigned	
2	Receive Data	DTE
3	Transmit Data	DCE
4	Data Terminal Ready	DTE
5	Ground	DCE-DTE
6	Data Set Ready	DCE
7	Request To Send	DTE
8	Clear To Send	DCE
9	Unassigned	

Table 2-3 RJ48 Line Connector

Pin Number	Signal	Signal Direction
1	Receive Ring	From T1 Network
2	Receive Tip	From T1 Network
3	Unassigned	
4	Transmit Ring	To T1 Network
5	Transmit Tip	To T1 Network
6	Unassigned	
7	Unassigned	
8	Unassigned	

Table 2-4 RJ48 DSX Connector

Pin Number	Signal	Signal Direction
1	Transmit Ring	To PBX
2	Transmit Tip	To PBX
3	Unassigned	
4	Receive Ring	From PBX
5	Receive Tip	From PBX
6	Unassigned	
7	Unassigned	
8	Unassigned	

The DTE port is configured as a DCE device. All available signaling appears on an M34 connector. There are 3 different interfaces supported from the M34 connector. Signaling Interfaces: V.35/M34, EIA530/M34, and RS449/M34. The 1510 automatically recognizes each signaling convention and requires NO menu selection or manipulation. Appropriate conversion cables are available from ATL for EIA530 and RS449 connections. Pin definitions are defined in Tables 2-5 to 2-7.

Table 2-5 V.35/M34 DTE Port Pin Definition

Pin Number	Signal	Source
A	Cable Shield	
B	Signal Ground	
C	Request To Send	DTE
D	Clear To Send	DCE
E	Data Set Ready	DCE
F	Data Carrier Detect	DCE
H	Data Terminal Ready	DTE
J	Unassigned	
K	Unassigned	
L	Unassigned	
M	Unassigned	
N	Unassigned	
P	Transmit Data	DTE
R	Receive Data	DCE
S	Transmit Data Return	DTE
T	Receive Data Return	DCE
U	External Clock	DTE
V	Receive Clock	DCE
W	External Clock Return	DTE
X	Receive Clock Return	DCE
Y	Transmit Clock	DCE
Z	Unassigned	
AA	Transmit Clock Return	DCE
BB	Unassigned	
CC	Unassigned	
DD	Unassigned	
EE	Unassigned	
FF	Unassigned	
HH	Unassigned	
JJ	Unassigned	
KK	Unassigned	
LL	Unassigned	
MM	Unassigned	
NN	Unassigned	

Table 2-6 EIA530/DB25 DTE Port Pin Definition

Pin Number	Signal	Source
1	Cable Shield	
2	Transmit Data	DTE
3	Receive Data	DCE
4	Request To Send	DTE
5	Clear To Send	DCE
6	Data Set Ready	DCE
7	Signal Ground	
8	Data Carrier Detect	DCE
9	Receive Clock Return	DCE
10	Data Carrier Detect Return	DCE
11	External Clock Return	DTE
12	Transmit Clock Return	DCE
13	Clear To Send Return	DCE
14	Transmit Data Return	DTE
15	Transmit Clock	DCE
16	Receive Data Return	DCE
17	Receive Clock	DCE
18	Local Loopback	DTE
19	Request To Send Return	DTE
20	Data Terminal Ready	DTE
21	Remote Loopback	DTE
22	Data Set Ready Return	DCE
23	Data Terminal Ready Return	DTE
24	External Clock	DTE
25	Test Mode	DCE

Table 2-7 RS449/DB37 DTE Port Pin Definition

Pin Number	Signal	Source
1	Cable Shield	
2	Unassigned	
3	Unassigned	
4	Transmit Data	DTE
5	Transmit Clock	DCE
6	Receive Data	DCE
7	Request To Send	DTE
8	Receive Clock	DCE
9	Clear To Send	DCE
10	Local Loopback	DTE
11	Data Set Ready	DCE
12	Data Terminal Ready	DTE
13	Data Carrier Detect	DCE
14	Remote Loopback	DTE
15	Unassigned	
16	Unassigned	
17	External Clock	DTE
18	Test Mode	DCE
19	Signal Ground	
20	Unassigned	
21	Unassigned	
22	Transmit Data Return	DTE
23	Transmit Clock Return	DCE
24	Receive Data Return	DCE
25	Request To Send Return	DTE
26	Receive Clock Return	DCE
27	Clear To Send Return	DCE
28	Unassigned	
29	Data Set Ready Return	DCE
30	Data Terminal Ready Return	DTE
31	Data Carrier Detect Return	DCE
32	Unassigned	
33	Unassigned	
34	Unassigned	
35	External Clock Return	DTE
36	Unassigned	
37	Unassigned	

2.4 Configuration Setting

2.4.1 Hardware Configuration Setting

All configurations are software programmable. No DIP switches are available. Users should not open the case.

2.4.2 Software Configuration Setting

There is a single configuration that is maintained for the 1510 in battery backed up random access memory, or non-volatile memory.

The factory default configuration is not changeable. Each 1510 T1/FT1 CSU/DSU is shipped with the factory default configuration.

The current configuration can be changed at any time. The system automatically stores the current configuration into non-volatile memory. When the system is turned off and then turned back on again, the previous configuration is retrieved as the current configuration.

The factory default configuration may be set into the 1510 at any time by using the Utility routine, "Factory Default" from the front panel or the console terminal interface. Table 2-8 lists all factory defaults (below).

Table 2-8 Default Software Configuration

T1 Network Interface	Default
Framing	ESF
Line Code	B8ZS
LBO	0 db
Density	Clear
Network Diagnostics	No
Yellow Alarm	Off
ESF Format	54016
Clear Registers (Statistics)	Yes
DSX Interface	Default
Framing	ESF
Line Code	B8ZS
Distance	133 feet
Timing Source	Default
Source	Network Interface (NI)
Serial Port #1 (DTE)	Default
Rate	64K * N
RTS	Constant
Data (Normal or Inverted)	Normal
Clock (Normal or Inverted)	Normal
Clocks (Source)	NI
Remote Loop (Enabled)	Yes
DS0 Map	Default
All Channels	DTE-1
Console Port	Default
Port Speed	9600 bps
Data Bits	8
Parity	None
XON-XOF Flow Control	No
Security	Default
Enabled/Disabled	Disabled
Password	1510
Miscellaneous	Default
All Loops	Off
All Bert Functions	Off
Event Log	Cleared
ESF Statistics	Cleared
Date/Time	Unchanged
Software Version	Unchanged

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3. OPERATION

This chapter describes the 1510 T1/FT1 CSU/DSU configuration options and operational functions. The user should refer to Chapter 5: Front Panel Operation and Chapter 6: Terminal Operation for detailed operational procedures.

3.1 Quick Start for 1510 T1/FT1 CSU/DSU

After installation, the user may want to become familiar with the equipment immediately. The following abbreviated instructions will give the user a quick start.

3.1.1 Power On

Connect power by attaching the power/transformer cable at the rear of the unit. On the LCD, the unit will first display “System Init Now In Progress...” followed by the main menu – “1510 Configuration”.

3.1.2 Return to Default Setting

The unit is shipped with factory default settings.

To restore the factory settings in the future, use the main menu Utility routine – “Factory Default”. See Section 2 for factory default values that are restored.

3.1.2.1 Using Front Panel

To use the front panel to configure the unit, use the four keys to the right of the LCD. The menu is tree structured, with the main menu at the root of the tree. The SELECT key brings the user towards the root. The ENTER key is used (a) to descend to branches of the menu, or (b) to confirm a selection. The ADV LEFT and ADV RIGHT keys are used to move the selection left or right to other settings related to one another.

3.1.2.2 Review of Default Settings

All the default settings can be reviewed or changed. This is done by selecting the menu item. Either a sub-menu or the selected setting is shown.

3.1.2.3 Line

After power up, the main menu is set to configuration. Press ENTER to go to sub-menus. Use ADV LEFT or ADV RIGHT keys to select NI Interface. Then press ENTER. Under NI Interface, further sub-menus can be selected. For each sub-menu, the current NI Interface parameters are shown. The actual settings are shown for each parameter, which can be changed by pressing the ENTER key.

To change the settings, use ADV LEFT and ADV RIGHT keys to select the parameter, then use the ENTER key to view and select the new setting. When SELECT is pressed the setting last viewed will be the setting in use.

3.1.2.4 DTE

To review or change the Data Terminal Equipment settings use ADV LEFT or ADV RIGHT keys to display Serial Port #1. Then press ENTER. The current serial port #1 parameters are shown. The actual settings are shown for each parameter, which can be changed by pressing the ENTER key.

To change the settings, use ADV LEFT and ADV RIGHT keys to select the parameter, then use the ENTER key to view and select the new setting. When SELECT is pressed the setting last viewed will be the setting in use.

3.1.2.5 Map Setup

To review or change MAP settings, use ADV LEFT or ADV RIGHT keys to display DS0 MAP. Then press ENTER. The first channel is displayed. Use ADV LEFT and LEFT RIGHT keys to select the desired channel.

To change the settings, press the ENTER key. Use ADV LEFT and ADV RIGHT keys to select the DS0 channel number for new assignment, and then press ENTER again. Then using ADV LEFT or ADV RIGHT keys, select IDLE, DTE-1, or DSX, for the new channel assignment, press ENTER. The number of channels assigned to the particular device or status and the aggregate bandwidth appears in the upper right of the LCD. When the current channel is assigned to its desired status, press SELECT to go up in the menu then use ADV LEFT or ADV RIGHT keys to select the next channel to be manipulated.

3.1.3 Using Terminal Setup

To use an RS232 interface to configure the unit, connect a VT-100 terminal to the DB9/RS232 connector using a DB9-DB25 cable. The VT-100 terminal can be a PC running VT-100 emulation software. The DB9-DB25 configures the console port as a DCE. Thus a null modem plug or cable is not required for direct connection to a VT-100 (DTE device).

As soon as the 1510 detects that a terminal is present by the presence of Data Terminal Ready (DTR) it will output an initial screen. Normal operation of the terminal/1510 will show the following leads active: Pin 2 – DTE/TX, Pin 3 – DTE/RX, Pin 4 – DTE/RTS, Pin 5 – DCE/CTS, Pin 6 – DCE/DSR, Pin 7 – DTE/DCE Ground, Pin 8 – DCE/CD, Pin 20 – DTE/DTR. Should the terminal interface fail to operate, carefully check the above leads.

If “Security” is enabled, the initial screen will be a request for a password. If “Security” is disabled, the initial screen will be the ATL MAIN MENU screen.

When the Console Terminal access is active, the front panel is made inactive

3.1.3.1 Review of Default Settings

The MAIN MENU allows the user to enter any of the subsystems of the 1510: System Configuration, System Diagnostics, System Alarms and Indicators, ESF Registers, Event Log, and System Utilities. The following keys provide for a means to traverse the menu system: Cursor Up = [Up Arrow], Cursor Down [Down Arrow], Select Entry/Go Down In Menu = [ENTER], Go Up In Menu = [ESC twice]. On the MAIN MENU screen is also displayed the model number of the 1510, the Software version, the current Date and Time, the Unit ID, and the

current System Status. **PRESS ENTER TO VIEW THE SYSTEM CONFIGURATION SCREEN.**

3.1.3.2 Line

Use “Up Arrow” and “Down Arrow” keys to select any Line parameter that requires changing. Use “Right Arrow” to change to a desired parameter.

3.1.3.3 Serial Port #1 - DTE

Use “Up Arrow” and “Down Arrow” keys to select any Serial Port parameter that requires changing. Use “Right Arrow” to change to a desired parameter.

3.1.3.4 Drop And Insert Port – DSX

Use “Up Arrow” and “Down Arrow” to select any Drop and Insert Port (DSX-1) parameter which requires changing. Use “Right Arrow” to change to a desired parameter.

3.1.3.5 System Clock

Use “Up Arrow” and “Down Arrow” to select the System Clock parameter which requires changing. Use “Right Arrow” to change to a desired parameter.

3.1.3.6 DS0-Map Setup

Press “ENTER” to go to the DS0-Map menu. Use “Up Arrow” and “Down Arrow” keys to select the DS0 channel(s) you wish to modify. Use “Right Arrow” to change to a desired parameter. Press “ESC” twice when all changes have been made. Press “ESC” twice, again, to return to the MAIN MENU.

3.2 System Operation

3.2.1 Date

This product is equipped with a RTC (Real Time Clock). The user can change the current date and time as required. The RTC is activated by the manufacturer before shipping. This is to save RTC battery life. The RTC battery has a 10-year power off life cycle.

3.2.2 System Clock

This product has a system clock PLL (Phase Lock Loop) which may be phase locked to the T1 line, an external DTE-1 clock, the internal oscillator clock of the 1510, or the signal received by the DSX connection. The T1 line signal, the DSX signal, and the internal clock of the 1510 are all 1.544 Mbps. The DTE clock is either 56KxN or 64KxN bps (N is 1 to 24) as per the DTE rate configuration. The default system clock is derived from the T1 line signal often referred to as the Network Interface or NI for short.

When the assigned clock source is lost assuming it is not the internal clock of the 1510, the system will automatically switch to the internal clock source. This is to provide an alternative clock source when the primary clock source is lost. When the designated clock source returns, the CSU/DSU automatically returns to the use of that clock.

3.2.3 Console Port

The console port allows the user to use a local VT-100 terminal via a DB9/RS232 cable connection for system configuration, diagnostics, utilities, etc. The console port must be set to a proper operational mode. If necessary, the user must use the Front Panel to set up the console port. The default console port baud rate, data bit length, parity bit length, and XON-XOFF flow control are set as shown in Table 3-1.

Table 3-1 Console Port Default Setting

Item	Options	Default
Baud Rate	9600, 14400, 19200, 1200, 2400, 4800	9600
Data Bit	8, 7 bit per byte	8
Parity Bit	NONE, EVEN, ODD	NONE
XON-XOFF	ON, OFF	OFF

3.2.4 Security System

The LCD front panel and terminal are used to read events, system configurations, diagnostics, and system status. They also can be used to change system configurations and clear the event log, etc.. The front panel is always enabled for any function. By enabling the security system, the user may restrict terminal and SNMP access to users who know the password stored in the system. The default password stored in the 1510 prior to factory shipment is "1510". Once the Security System is enabled, the user may enter any new password into the 1510 after providing the old password.

- Password and Security System options are disabled by default.
- The default terminal access password is 1510.

3.2.5 Configuration

The system automatically saves the current configuration into non-volatile memory. The configuration is thus available at all times the unit is powered up. After a power cycle, the current configuration is retrieved and used by the 1510.

3.3 DS0 Channel Map

DS0 channel multiplexing is done by the DS0-MAP command. A map contains 24 DS0 channels where a single DS0 channel can be assigned to a DTE port, the Drop and Insert port, or not used. An idle code is transmitted on all unused channels.

3.4 T1 Network Line Configuration

A detailed option list of the T1 line configuration parameters is in Table 3-2. The following paragraphs will describe each item.

3.4.1 Framing Format

This equipment can be used as a T1/FT1 D4 or ESF frame format DS1 network interface. In ESF frame format mode, the user can choose either ESF or D4 facility data link protocol. The ESF or D4 framing format is supplied by the Telephone Company.

3.4.2 Line Code

The 1510 T1/FT1 CSU/DSU can be used in AMI (Alternate Mark Inversion) or B8ZS (Bipolar Eight Zero Substitution) line code format.

3.4.3 Line Build Out

The T1 line long haul transmit LBO can be programmed to 0 dB, -7.5 dB, -15 dB, or -22 dB relative to the DS1 transmit level.

3.4.4 Density

The 1's density of the 1510 may be set to either "Clear" or "62411". The "Clear" parameter selection causes the 1510 to make no modifications to the 1's density of the T1 bit stream. This is sufficient for the line code format that is B8ZS, since B8ZS guarantees a sufficient 1's density. For a line code mode of AMI, the user may wish to select "62411" which will guarantee a sufficient 1's density.

3.4.5 Network Diagnostics

Network Diagnostics allows initiation of the remote diagnostics facility from a remote 1510 over a point-to-point T1 circuit. The 1510 T1/FT1 CSU/DSU utilizes a proprietary facility data link to initiate remote system control, performance and statistics monitoring. In addition, the facility data link is also used to cause proprietary loop backs in a remote 1510 unit.

3.4.6 Yellow Alarm

The 1510 T1/FT1 transmits a yellow alarm when LOS (Loss of Signal) is detected, AIS (Alarm Indication Signal), is detected, or OOF (Out of Frame) is detected for 2.5 ± 0.5 seconds. Users may disable this feature by setting Yellow Alm to "Off".

3.4.7 Facility Data Link

ESF & T1.403 chooses ANSI ESF data link protocol and a performance report will be sent to the network every second automatically. Also, ANSI and AT&T data link messages are acceptable in ANSI ESF frame format mode. However, AT&T ESF frame format mode only accepts AT&T ESF data link protocol. Clear Registers

3.4.8 Idle Code

Any DS0 channel, which is not assigned to a DTE port, is an idle channel. An idle code is transmitted on the idle DS0 channels. The idle code is set to FFh by the 1510 and may not be modified by the user. The idle code is inserted into unused channels after any data inversion, if activated.

Table 3-2 T1 Line Default Setting

Item	Options	Default
Frame Format Mode	ESF, D4	ESF
Line Code	B8ZS, AMI	B8ZS
Line Build Out	0, 7.5, 15, 22 dB	0 dB
Density	Clear, 62411	Clear
Network Diagnostics	No, Yes	No
Yellow Alarm	Off, On	Off
ESF Format	54016, T1.403	54016

3.5 DSX Drop And Insert Configuration

A detailed option list of the DSX Drop and Insert configuration parameters is in Table 3-3. The following paragraphs will describe each item.

3.5.1 Frame Format Mode

The DSX Drop and Insert modes that may be selected are ESF, D4, and Not Used (N/U). If the DSX option card is not installed in the 1510 the above menu items do not appear in either LCD or Console menu systems. If the DSX option card is installed in the 1510 it should be set to one of the above options. If there is no desire by the user to use the DSX option card, it should be set to Not Used (N/U).

3.5.2 Line Code Mode

The 1510 DSX Drop and Insert capability may be used in AMI (Alternate Mark Inversion) or B8ZS (Bipolar Eight Zero Substitution) line code formats. The user should select the desired option.

3.5.3 Distance

The Distance parameter is a selection which declares the cable length used between the 1510 DSX port and the connected PBX. Five settings are available and should be interpreted in the following manner. 0 to 133 feet use 133, 134 to 266 feet use 266, 267 to 399 feet use 399, 400 to 533 feet use 533, and 534 to 655 feet use 655. Any PBX beyond 655 feet cabling distance cannot be accessed directly by the 1510.

Table 3-3 DSX Drop and Insert Default Setting

Item	Options	Default
Frame Format Mode	ESF, D4, Not Used (N/U)	ESF
Line Code	B8ZS, AMI	B8ZS
Distance	133, 266, 399, 533, 655 feet	133 feet

3.6 DTE Configuration (Serial Port #1)

This product is equipped with one DTE port. The information provided is specific to Serial Port #1. A detailed option list of DTE configuration parameters is in Table 3-4, and the following paragraphs describe each parameter.

3.6.1 Speed

The DTE port can operate at 56KxN or 64KxN bps, (N is 1 to 24). Use the Speed selection parameter to select 56K or 64K. Use DS0 MAP selection parameters to select the activity of the DS0 channels that the DTE port contains.

3.6.2 Request To Send (RTS)

The DTE facility can use RTS (Request To Send) to control transmission. When RTS is “External” and in the OFF state, all ones are sent to the T1 line side on the DTE port associated with the DS0 channels. When RTS is “Constant”, the RTS signal is ignored and forced ON permanently.

3.6.3 Data Polarity

Data polarity of the DTE port is either “Normal” or “Inverted” which is used as positive logic or negative logic.

3.6.4 Clock Polarity

Clock polarity of the DTE port is either “Normal” or “Inverted” and is used to drive the transmit data and to sample the receive data.

3.6.5 Remote Loop

The 1510 is either enabled or disabled to receive a proprietary remote loop command from an 1510 CSU/DSU connected to the other end of a circuit.

3.6.6 DTE Interface Type

The DTE Serial Port #1 interface type can be V.35, RS449, or EIA530. The 1510 automatically senses which interface is present. The user is not required to make any specification.

Table 3-4 DTE Serial Port #1 Default Setting

Item	Options	Default
Speed	56K x N, 64K x N (N = 1 - 24)	56K x N
Request To Send (RTS)	Constant, External	Constant
Data	Normal, Inverted	Normal
Clock	Normal, Inverted	Normal
Remote Loop	Enabled, Disabled	Enabled

3.7 System Clock

The system clock source may be any of four sources: the Network Interface (NI), DTE Serial Port #1 (DTE-1), Internal (INT - 1510 internal oscillator), or the Drop and Insert port (DSX). The default is shown in Table 3-5.

Table 3-5 System Clock Default Setting

Item	Options	Default
System Clock	NI, DTE-1, INT, DSX	NI

3.8 Alarms and Indicators

3.8.1 Alarms

The 1510 T1/FT1 has many types of alarms as listed in Table 3-6. Also, the 1510 T1/FT1 has an Event Log which records the latest 32 alarms with a time and date stamp. Below is listed each alarm together with its meaning and description.

3.8.1.1 LOS - Loss Of Signal

LOS is declared following 175 bit times \pm 75 bit times if no pulses of either positive or negative orientation are received by the 1510.

3.8.1.2 AIS – Alarm Indication Signal

The AIS alarm is both generated by the 1510 and received by the 1510. The AIS itself is a bit stream of all 1's. A LOS condition causes the 1510 to output an AIS pattern. In a similar manner, AIS is received by the 1510 when a remote unit, either CSU/DSU or central office unit, is in a LOS condition.

3.8.1.3 Red – Alarm

Red alarm is declared by the 1510 when it receives 192 consecutive 0's.

3.8.1.4 Yellow – Alarm

Yellow alarm is declared whenever a signal is present but the 1510 is unable to secure synchronization with it.

3.8.1.5 FErr – Frame Error Alarm

The 1510 receives a framing pattern in the 193rd bit position. FErr is declared when the 1510 detects an error in the framing pattern received.

3.8.1.6 CRC6 – Circular Redundancy Check 6 Alarm

In ESF mode, a circular redundancy check is generated as a result of the data processed from previous frame(s). Whenever the generated circular redundancy check does not match the calculated circular redundancy check value, a CRC6 alarm is declared.

3.8.1.7 BPV – BiPolar Violation Alarm

When the line code is set to B8ZS, BPV reflects the number of bipolar violations that have occurred not counting the code words of the B8ZS. In AMI mode, any bipolar violations are reflected in the BPV count. In other words, any BPV is reflective of an error that has occurred.

Table 3-6 Alarm Type Table

ALARM TYPE	ALARM DESCRIPTION
LOS	Loss Of Signal on Network Interface/DSX
AIS	Alarm Indication Signal – all 1's
Red	All 0's being received
Yellow	Loss of frame synchronization
Ferr	Frame error detected
CRC6	Circular Redundancy Check error
BPV	Bit errors are occurring

3.8.2 Indicators

The Indicators presented include the real time status of “Request To Send” (RTS), “Data Carrier Detect” (DCD), and the current status of loops that may be active at the Network Interface, the DTE port(s), and the DSX Interface.

3.8.2.1 RTS – Request To Send

RTS is a control signal presented by the DTE device when it is ready to transmit data to the 1510. In the “Configuration” section of the 1510, RTS is described as either Constant or External. If the 1510 is declared Constant, it is assumed to be present all of the time and shown as present regardless of whether it is present or not. If External, the true status of the control signal of the DTE is shown in real time.

3.8.2.2 CTS – Clear To Send

CTS is a control signal presented by the 1510 to the DTE indicating when it is permitted to receive transmitted data from the DTE device. The state of CTS is governed by several conditions. First, if the Network Interface is in an abnormal condition, CTS is held low indicating to the DTE device not to transmit data. Second, if RTS is External and the DTE device is not presenting the RTS signal, then the CTS signal is held low.

3.8.2.3 DCD – Data Carrier Detect

DCD is a control signal presented by the 1510 to the DTE indicating a signal is present at the Network Interface and that it is possible to transmit data from the DTE device. If RTS is set to Constant, DCD is always shown as present regardless of the state of the Network Interface.

3.8.2.4 DTR – Data Terminal Ready

DTR is a control signal presented by the DTE to the 1510. DTR generally reflects the DTE's ability to receive data from the 1510. If RTS is set to Constant, DTR is always shown as present regardless of the state of the Data Terminal Equipment attached.

3.8.2.5 Loop Status

For real time status purposes, the existence of a loop condition is shown for each physical part of the 1510 – NI, DTE, and DSX.

3.9 Performance Registers

The 1510 T1/FT1 has four performance registers that reflect operational statistics of the unit. A summary of the performance registers and their meaning are listed in Table 3-7. Each parameter is described in detail below.

3.9.1 ES – Errored Seconds

In T1/D4 line format, the definition of ES is the number of bipolar violations that have occurred during any second interval. In T1/ESF line format, the definition of ES is the number of CRC6 errors plus the number of OOF errors detected within any one second. Both current counts and the past 24 hour counts are displayed.

3.9.2 BES – Bursty Errored Seconds

In T1/D4 line format, this information is not available or defined. In T1/ESF line format, it is the total number of CRC6 errors that have occurred divided by 320. Both current counts and the past 24 hour counts are displayed.

3.9.3 SES – Severely Errored Seconds

In T1/D4 line format, SES is the total number of bipolar violations divided by 1510 in any one second. In T1/ESF line format, SES is the number of CRC errors divided by 320 plus the number of occurrences of OOF. Both current counts and the past 24 hour counts are displayed.

3.9.4 UAS – UnAvailable Seconds

In both T1/D4 and T1/ESF line formats, UAS is the number of occurrences of 10 or greater Severely Errored Seconds during any one second. Both current counts and the past 24 hour counts are displayed.

3.9.5 Time in Interval

An interval is 15 minutes duration. There are 96 intervals in 24 hours. The time in interval parameter shows the number of seconds within any 15-minute interval.

3.9.6 Number of Valid Intervals

The number of valid intervals is a count of up to 96 that indicates the number of previously recorded intervals that have been saved by the 1510. Each previously recorded interval is available for viewing on two separate screens.

3.9.7 Performance Register Intervals

By pressing “ENTER” from the Performance Register screen display, the 1510 goes to the next screen in the menu system – Performance Register Intervals. This screen is composed of two screens of 48 groupings of intervals on each page. By successive depressions of the “ENTER” key, the two screens will be alternately displayed. Each interval displayed represents 15 minutes of 1510 operation. In each interval, the number of Errored Seconds (ES), UnAvailable Seconds (UAS), Severely Errored Seconds (SES), and Bursty Errored Seconds (BES) is displayed. After 24 hours of operation, the display begins to overlay 24-hour-old information with current interval information. The Performance Register Intervals display is actually a First In First Out queue. The newest complete 15 minute interval appears in Interval “01”. That which is fifteen minutes older than the current interval appears in Interval “02”. The interval that is 23 hours 45 minutes old appears in Interval “96”. Knowing the current time of day and using this guideline, each interval can be correlated with the actual time of day. Any interval not containing valid information is shown as “NOT VALID INTV”.

Table 3-7 Performance Parameter List

Performance Parameter	Description	Definition (T1/D4)	Definition (T1/ESF)
ES	Errored Seconds	BPV \geq 1	CRC6 Error \geq 1, OOF \geq 1
BES	Bursty Errored Seconds	Not Available	1 < CRC6 < 320
SES	Severely Errored Seconds	BPV \geq 1510	CRC \geq 320, or OOF \geq 1
UAS	Unavailable Seconds	\geq 10 consecutive SES	\geq 10 consecutive SES

3.10 Event Log

The Event Log contains 32 chronological entries. Each entry is date and time stamped to indicate when it occurred. In addition, a status is provided indicating additional information about the event. Typical status will include the “Start” and “End” of a particular event. The event itself is identified as to source and type of event. As an example, an event might be a loss of signal on the DSX port. All alarms are placed in the Event Log. When the number of events exceeds 32, the log operates as a First In First Out (FIFO) queue. Thus the last 32 events in time are always available for viewing. The Event Log screen is NOT updated in real time. Upon entry to the Event Log, the current Event Log is presented. To see additional entries that may have been added since viewing the Event Log, press “ESC” twice, and then re-enter the Event Log.

3.11 System Utilities

System Utilities routines include:

- Set System Time/Date (Console and Front Panel LCD)

- Clear System Configuration
- Software Version
- Console Port Configuration
- SNMP/SLIP Port Parameters
- Clear Event Log
- Enter New Password
- Enable/Disable Security
- Set System Time

The system time is set at the factory and reflects Mountain Time. The user may change the system time by selecting the System Utilities – Set System Time function and pressing Enter. A small box is located near the center of the CRT screen containing the current Hours/Minutes/Seconds (Note: military time is used, where hours go from 0 to 23). The cursor is positioned to the hours field. To change the system time enter a new value for hours, minutes, and seconds. The Right Arrow and Left Arrow keys are also active allowing the user to skip over fields that are correct as is. When the update is complete, press “ESC” twice to go back up to the main utilities screen.

3.11.1 Set System Date

The user may change the system date by selecting the System Utilities – Set System Date function and pressing Enter. A small box is located near the center of the CRT screen containing the current Month/Day/Year. The cursor is positioned to the month field. To change the system date enter a new value for month, day, and year. The Right Arrow and Left Arrow keys are also active allowing the user to skip over fields that are correct as is. When the update is complete, press “ESC” twice to go back up to the main utilities screen.

3.11.2 Enter Unit Identification Number

The user may change the system Unit ID by selecting the System Utilities – Enter Unit Identification Number function and pressing Enter. A small box is located near the center of the CRT screen containing the current Unit Identification Number. The default Unit Identification Number is “00000001”. The cursor is positioned to the beginning of the numeric Unit Identification field. To change the Unit Identification Number, use the numeric keys to overwrite a new eight-digit number. The Unit Identification Number appears on certain CRT screens and helps to provide a unique identifier if screens are copied to a printer for later review. The Right Arrow and Left Arrow keys are also active allowing the user to skip over digits that are correct as is. When the update is complete, press “ESC” twice to go back up to the main utilities screen.

3.11.3 Clear System Configuration

The user may clear the current system configuration back to the factory default settings. Position the cursor on the main System Utilities screen to “Clear System Configuration” and press Enter. A small box is located near the center of the CRT screen containing a verification question “Clear All Configuration!!!”. A response of either (Y)es or (N)o is requested. If “N” is entered, the 1510 returns to the main System Utilities screen. If “Y” is entered, a new message appears “<<< ARE YOU SURE!!! >>>”, followed by (Y)es or (N)o. This is a second verification screen

as a safeguard against accidental resetting of the system to a factory configuration. If “N” is entered, the system returns to the main System Utilities screen. If “Y” is entered, the entire 1510 is reset to the factory configuration, the system is re-booted, and the main Console menu appears on the CRT following initialization of the unit.

3.11.4 Configure Console

This configuration screen allows the user to enter the communications parameters to be used to communicate with the Console terminal. Specifically, the user may set the following parameters:

- Console Port Speed
- Console Parity
- Console Data Bits
- Console Flow Control

There is no setting for the number of asynchronous stop bits. The 1510 uses “1” stop bit for all communications settings.

3.11.4.1 Console Port Speed

The Left and Right Arrow keys cycle through the available settings for the console port speed. These include 9600, 14400, 19200, 1200, 2400, and 4800bps. The default setting is 9600bps. The setting selected should match the speed of the Console terminal connected to the Console Port.

3.11.4.2 Console Parity

The Left and Right Arrow keys cycle through the available settings for the console asynchronous parity bit setting. These include: None, Odd, and Even. The default setting is None. The setting selected should match the parity setting of the Console terminal connected to the Console Port.

3.11.4.3 Console Data Bits

The Left and Right Arrow keys cycle through the available settings for the console asynchronous data bits setting. These include: 7 and 8. The default setting is 8. The setting selected should match the data bits setting of the Console terminal connected to the Console Port.

3.11.4.4 Console Flow Control

The Left and Right Arrow keys cycle through the available settings for the console asynchronous flow control setting. These include: NO and YES. “YES” indicates that XON-XOF flow control is to be used. The default setting is NO. The setting selected should match the flow control setting of the Console terminal connected to the Console Port.

3.11.5 Enter New Password

The philosophy of password security only affects the Console interface. The user is only restricted any access to the front panel LCD/front panel push buttons when the console port is occupied and active. If security is Enabled, a password has already been entered to access the Console terminal system. If security is Disabled, no prior check of any password has up to this point been of concern. The result of this is that no old password is checked prior to entering a new password. If security is enabled, a valid password must be entered prior to entering the

Console terminal menu system. This occurs following the next initialization of the 1510, whether from being powered off and on, or from having the factory configuration installed into the unit.

Upon entry to this screen, a small box displaying “ Enter New Password=> ***** ” is displayed. The cursor is positioned to the first of the eight asterisks. Using both numeric and alphabetic keys, enter up to eight characters. When complete, press “ESC” twice. A second screen then appears – “ Validate Password=> ***** ”. Re-enter the same password a second time and press “ESC” twice. If both first and second entries of the same password occur, the 1510 will accept the new password and stores it in its non-volatile memory. If the first and second entry do not match after pressing “ESC” twice, the message “Invalid Password” is displayed for approximately two seconds, followed by the user being returned to the System Utilities screen.

3.11.6 Enable/Disable Security

The user may Enable or Disable the system security function by selecting the System Utilities – Enable/Disable Security function and pressing Enter. A small box is located near the center of the CRT screen containing the message “Enable/Disable => Disabled”. The user may use the Right Arrow key to switch between Enable and Disabled. When the update is complete, press “ESC” twice to go back up to the main utilities screen.

If security is Disabled, any time a terminal is connected to the Console port, the main menu of the 1510 will appear. If security is Enabled, any time a terminal is connected to the Console port, a password must be entered before entry into the terminal functions of the 1510 is allowed.

3.12 LED Operation

The front panel has 16 LEDs for operation and error indications. Table 3-8 lists each LED and its color and meanings.

Table 3-8 Front-Panel LED Table

LED	Color	Meaning
N I	Alarm	Green Red No alarm condition present, the unit is operating normally Alarm condition present: LOS, LOF, CRC, Red, Yellow, or AIS
	BPV	Off Yellow No bipolar violations in the last second Bipolar violation present in the past one second
	Loop	Off Yellow No network interface loop is present Loop (remote or local) is present: Payload, CSU, Line
	Is Den	Off Red Ones density is within specification Ones density is insufficient to recover NI timing
	Test	Off Yellow Blinking Yellow No BERT is active BERT is active and detecting no errors BERT is active and at least one error has been received in the last second
D S X	Alarm	Off Red No alarm condition present Alarm condition is present: LOS, LOF, CRC, Red, Yellow, and AIS
	BPV	Off Red No bipolar violation is present Illegal bipolar violation has been detected in the past One second
	Loop	Off Yellow No loop is present at the DSX interface Remote loop or Line loop is present
D T E	DCD	Off Green The NI is not available due to LOS, Yellow, Red, or AIS alarms The NI is available to receive DTE data and is in a normal operating condition
	RTS	Off Green RTS is set external and no RTS is present from DTE RTS is constant or RTS is present from DTE
	Loop	Off Yellow No loop is present Local or remote loop is present
	Test	Off Yellow Blinking Yellow No test is active at the DTE interface BERT is active and detecting no errors BERT is active and at least one error has been received in the last second

3.13 Embedded SNMP Agent

The embedded SNMP agent for the 1510 T1/FT1 CSU/DSU offers standard RFC 1213 MIB II and RFC 1406 DS1 MIB as well as Black Box enterprise MIB. The network manager may use any SNMP compatible network management system such as Sun Connect's Sun Net Manager or Hewlett-Packard's HP Open View to monitor and control the 1510 T1/FT1 CSU/DSU. This allows the user to integrate WAN equipment management with LAN SNMP network management systems. The embedded SNMP agent also includes a Telnet implementation to allow users to access the 1510 T1/FT1 CSU/DSU terminal interface from any workstation in a network.

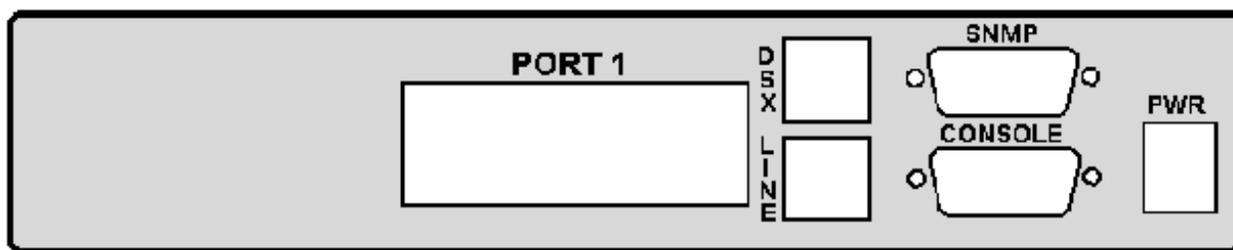


Figure 3-1 SNMP Connection

The 1510 T1/FT1 CSU/DSU uses the console port to provide the embedded SNMP agent functionality. Typically, a workstation can be configured to run the SLIP protocol on its Async ports. If there is only a few units that need a SLIP interface, no dedicated terminal server is needed.

Before SNMP is enabled, make sure the IP address for the 1510 T1/FT1 CSU/DSU is configured correctly and the communication parameters match the Terminal server port.

Once the SNMP agent is activated, the user can verify whether the 1510 T1/FT1 CSU/DSU is running successfully by using a PING command to check if the 1510 T1/FT1 CSU/DSU is responding or not. e.g.

```
$ ping 192.1.100.45
192.1.100.45 is alive
```

Please refer to each respective SNMP manager's operation instructions to incorporate the Black Box enterprise MIB into the system.

Telnet capability comes with an embedded SNMP agent. Once the SNMP agent is running, the user can use a telnet program that is simulated on a VT-100 to access the 1510 T1/FT1 CSU/DSU command screen. The most popular Telnet utility in the public domain is provided by NCSA. It can maintain several telnet connections simultaneously. It is recommended to set the console port running at the highest speed to reduce the jittery output on a terminal.

4. MAINTENANCE

4.1 System Initialization

At power up, a system initialization routine is run. During the system initialization, a “System Init Now In Progress...” message is shown on the LCD display. In addition, all LED’s are momentarily flashed to verify their functionality.

4.2 Diagnostics

There are several test patterns available on the 1510 inclusive of 1:1, 2047, QRSS, 3 in 24, and 1 in 8. Each of these test patterns may be used to provide diagnostic information to the user. In what follows, the QRSS test pattern is used as an example.

The QRSS (Quasi-Random Signal Sequence) pattern may be used in the 1510 T1/FT1 CSU/DSU as a test pattern to determine if equipment and/or the telco network is operating properly. The QRSS test pattern may be used to test the local 1510 T1/FT1 CSU/DSU system’s integrity by using a local loopback test. It can also be used to measure the T1 line quality. The diagnostics scenario is as follows:

1. First, send a remote line loopback (REM LN/LP) command to cause the remote facility to loopback DS0 channels. After initiation, wait for the remote loop to go from “Pend” to “On” which confirms the remote unit’s loopback status.
2. Then, activate the QRSS diagnostics operation, using the Diagnostics command to choose the QRSS pattern and turning the BERT to “On”.
3. The QRSS diagnostic uses a framed pattern. This is useful for testing full T1 loopbacks at the far-end.

When the QRSS pattern sync is found, bit errors, if occurring, are indicated by a flashing “Test” LED. If no errors are detected, the “Test” LED is illuminated in a constant non-flashing yellow. The user may inject errors on the LCD front panel by pressing the ENTER key at the “Insert Error” display. Pressing ENTER will cause an error to be output in the QRSS pattern. This will cause the “TEST” LED to momentarily blink. Optionally, the user may accomplish all of this via the Console interface. This is accomplished by pressing “N” to inject an error from the Console keyboard. Again the “TEST” LED will flash.

4.3 Near End Loopback

The near end loopbacks including CSU loopback, NI local loopback, Payload loopback, DSX-1 local loopback, and DTE local loopback, are activated by the local 1510 T1/FT1. The loopbacks occur at the near end facility. The following paragraphs describe each loopback in detail.

4.3.1 CSU Loopback

The CSU loopback is illustrated in FIGURE 4-1. The outgoing signal is looped back through the T1 PCM transceiver. All 24 DS0 channels are looped back to the receiver path. This loopback test is activated by the CSU LOOP command. This loopback test can be used with the QRSS diagnostic test pattern to validate the local 1510 T1 CSU/DSU's integrity. The CSU loopback test can be activated from the front panel or console terminal.

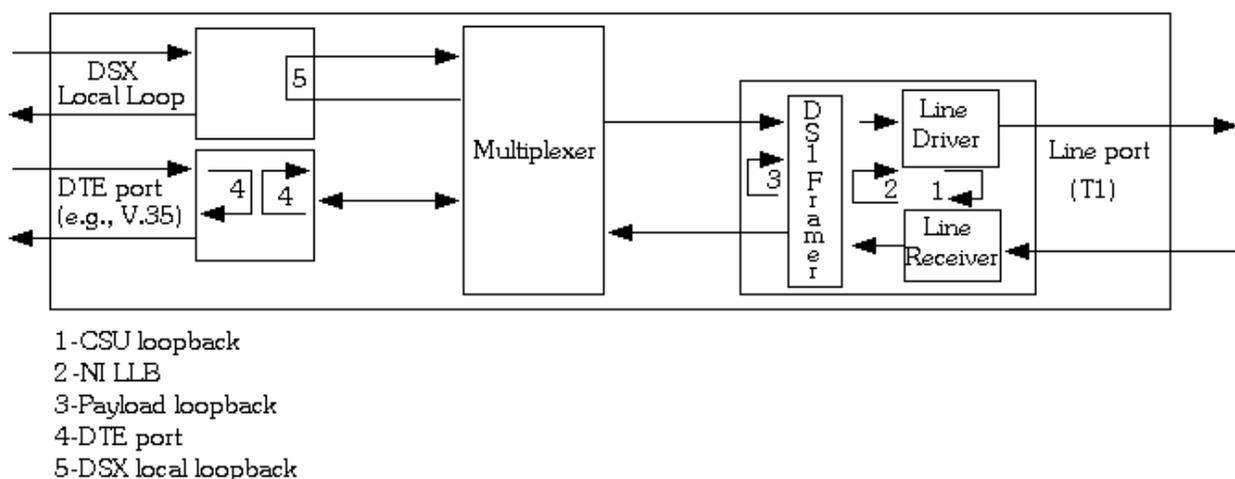


Figure 4-1 Loopback Block Diagram

4.3.2 Network Interface Local Loopback – Ni LLB

The Network Interface Local loopback (Ni LLB) is illustrated in Figure 4.1. The incoming T1 line signal is looped to the outgoing T1 signal before the T1 transceiver framer. This loopback is used to isolate the local equipment from a troubled T1 transmission line. The Ni LLB test can be activated from the front panel or console terminal.

4.3.3 Payload Loopback

The Payload loopback is illustrated in Figure 4.1. The incoming signal is looped to the outgoing T1 signal after the T1 transceiver framer. This loopback is used to isolate the DTE port from the troubled T1 transmission line. The Payload loopback test can be activated from the front panel or console terminal.

4.3.4 DTE Local Loopback

The DTE local loopback is illustrated in Figure 4.1. This is a bi-directional loop that loops all DTE data to the DTE and also loops all data that would normally be presented to the DTE back to the originator of DTE data. The DTE loopback test can be activated from the front panel or console terminal.

NOTE: The DTE local loopback works only when one or more DS0 channels are mapped to the DTE port.

4.4 Far End Loopbacks

The Far-end loopbacks (remote line loopback, remote payload loopback, remote DTE loopback, and remote drop and insert loopback) can be activated by the local CSU/DSU to cause the remote 1510 to perform the loopbacks. Inband codes, AT&T and ANSI FDL protocols, and proprietary codes are utilized to send remote loopback commands to the far-end facility. Inband codewords are supported by D4, ESF, or ESF&T1.403 framing format. When using AT&T FDL messages, the Line port must be set for ESF or ESF&T1.403 framing format. When using ANSI FDL messages, the Line port must be in ESF&T1.403 framing format. All remote loopbacks can be activated from the front panel or console terminal.

Upon initiation, a “Pend” message is shown on the LCD or console terminal screen. If the remote facility responds to a remote loopback activate command, an “On” message appears in the lower right corner of the display. If the remote facility does not respond to a remote loopback activate command, an “Off” message appears in the lower right corner of the display.

It is best to use remote loopbacks in conjunction with patterns (such as QRSS or 2047) designed to measure the T1 network line integrity. The procedure is as follows:

1. Send a remote loopback command to cause the remote facility to perform a loopback.
2. Activate an appropriate diagnostics test pattern.

The following are descriptions for each type of far-end loopback.

4.4.1 Remote Line Loopback (REM LN/LP)

The remote line loopback is illustrated in Figure 4.1. The remote line loopback is initiated by the remote equipment through inband signaling or ESF data link messages with AT&T or ANSI protocol. Table 4.1 shows the inband remote line loopback code used in D4. Table 4.3 shows the ANSI T1.403 ESF data link remote line loopback code. Remote line loopback tests can be activated from the front panel or console terminal.

Table 4.1 In-band Control Codeword – D4 Mode

REM LN/LP	Codeword
Activate	10000, receive 5+/-0.5 second
Deactivate	100, receive 5+/-0.5 second

4.4.2 Remote Payload Loopback (REM PAYLD)

The remote payload loopback is illustrated in Figure 4.1. The remote payload loopback is initiated by the remote equipment through ESF data link messages with AT&T or ANSI protocol. Remote payload loopback tests can be activated from the front panel or console terminal.

The telephone company service provider may also issue commands to cause a payload loopback in the remote 1510. Table 4.2 shows the AT&T ESF codeword used and Table 4.3 shows the ESF T1.403 data link remote payload loopback codewords used by the Telephone Company.

Table 4.2 AT&T ESF Data-Link Codeword

REM PAYLD	Codeword
Activate	ESF-DL SX.25 Request Message #1
Deactivate	ESF-DL SX.25 Request Message #2

Table 4.3 ANSI T1.403 Bit-Oriented ESF Data-Link Codeword

Remote LLB	Codeword
Activate	0 000111 011111111 repeat at least 10 times
Deactivate	0 011100 011111111 repeat at least 10 times
Remote PLB	Codeword
Activate	0 001010 011111111 repeat at least 10 times
Deactivate	0 011001 011111111 repeat at least 10 times

4.4.3 Remote DTE Loopback (REM DTE/LP)

The remote DTE loopback is illustrated in Figure 4.1. A proprietary protocol in the ESF facility data link is used to enable and disable a remote 1510 DTE port's bi-directional loopback. This loopback provides a unique way to isolate problems of a specific data path from the T1 network line toward the remote DTE port and vice versa.

4.4.4 Remote Drop And Insert Loopback (DSX RM/LP)

The remote DSX RM/LP loopback is illustrated in Figure 4.1. A proprietary protocol in the ESF facility data link is used to enable and disable a remote 1510 DSX RM/LP loopback. This loopback provides a unique way to isolate problems of a specific data associated with the drop and insert port.

4.5 Test Pattern

Six test patterns are available to determine faults such as deficient clock recovery, fault ALBO level recovery, inadequate jitter margin, presence of bridge taps, and mis-optional network interfaces. These six patterns are framed patterns with proper D4 or ESF frame patterns as described in the following paragraph.

4.5.1 3:24 Pattern

A framed 3:24 pattern is aligned with the frame bit and does not transmit a false yellow alarm. It tests consecutive zeros requirements and is useful in testing AMI loops.

4.5.2 1:8 Pattern

This framed 1:8 pattern tests the ability of a circuit to support a pattern having the minimum ones density. It is useful in revealing timing recovery problems.

4.5.3 1:1 Pattern

This framed 1:1 pattern tests AMI circuits. It will cause false yellow alarms in D4 frame format mode.

4.5.4 QRSS Pattern

The Quasi-Random Signal Sequence (discussed in Appendix A) or QRSS pattern is the most comprehensive pattern available for testing. The QRSS pattern forms every combination of a 20-bit sequence which repeats every 1,048,575-bits.

4.5.5 2047 Pattern

The 2047 pattern is a standard bit pattern which most Bit Error Rate Test sets (BERTs) generate. It is useful for testing in combination with external test equipment that may be connected to a DTE port or through the T1/FT1 network.

4.6 Verifying 1510 Operations

The purpose of this section is to help the user determine where a possible fault in the network may lie. For this, the user needs to know the exact architecture of the network. Then standard network trouble shooting procedures should be followed, which involve sectionalizing the network and performing loopback tests on segments of the network.

The purpose here is to help the user determine whether the 1510 equipment is at fault if tests have pointed a suspicious finger at this equipment. The procedures outlined here depend on test equipment and other equipment availability.

The organization of these procedures start from the simple to the complex. The procedure ends when a definitive conclusion is made that a particular piece of equipment is at fault. To verify that the 1510 equipment is not at fault, specialized equipment such as a BERT (Bit Error Rate Test) set may be needed.

4.6.1 Quick Test

See if the LCD display on the 1510 has normal text. If not, the 1510 may have failed.

Remove all line and DTE connections from the 1510. Remove power. After a few seconds, re-apply power. Observe the power-up initialization sequence. If this fails, then the 1510 has failed.

See if the LEDs show any abnormal displays. If yes, use the LED indications to guide the user to test other parts of the network, such as the T1 line, or DTE equipment.

Especially during initial installation, excessive errors may be due to (a) an incorrect configuration of either the 1510 or the equipment at the other end of the line, or (b) due to faulty line installation, which results in excessive noise, cross talk, or impedance mismatch. Especially in electrically noisy environments, such as central offices, use of shielded cables are mandatory.

4.6.2 Substitution

If a spare 1510 is available, then replace the non-working one with the spare. The user must carefully configure the spare exactly as the non-working one. If the substitution clears the problem, then the original non-working one is suspect. Note that this is not definitive as other reasons may cause the same symptom. A good practice is to reconfigure the original one and swap once more.

If both units behave the same, then the problem is probably elsewhere.

4.6.3 Using Loopback Plugs

Without a spare, loopback plugs are handy for diagnosis. Note that internal loopback facilities of the 1510 do not include the interface circuitry. Thus a set of plugs, one for each of the interfaces, line and DTE, are needed for complete tests. These plugs are wired such that transmit signals from the 1510 are looped by hard wire back to the receive pins of the same plug. Replace the line connector with a loopback plug. Observe if the line is in sync. If not then the 1510 may have failed. Then perform a QRSS test towards the line. If this fails, then the 1510 may have failed.

For the DTE ports, a loopback plug must be used in concert with a far end 1510, if such a terminal is available, then a QRSS test will determine if that DTE port is at fault. If the local DTE has diagnostic capabilities, then a loopback plug towards the DTE would help determine if the line to the DTE is good. This can further help isolate a problem.

Note that if a far end terminal is available, the first test should be a local line loopback to see if the line is good. If tests with loopback plugs all pass, then the problem is probably elsewhere.

4.6.4 Using Bert Test Set

If a BERT (Bit Error Rate Test) set is available then a comprehensive suite of tests are available to examine the functionality of the 1510.

With a BERT, each of the ports of the 1510 can be tested individually. The user must configure the BERT in the exact way the 1510 is configured. This is easily done by comparing each of the options one by one. After checking that the configuration matches, if any one of the ports fails, then the 1510 has failed.

5. FRONT PANEL OPERATION

The front panel operation utilizes a two by sixteen (2 x 16) character LCD display window and four keypads labeled with SELECT, ADV LEFT, ADV RIGHT, and ENTER as shown in Figure 5-1.

The ENTER key is used to move down the menu tree and enables a selection.

ADV LEFT and ADV RIGHT keys show other menu items at the same level.

The SELECT key returns the operation to an upper layer menu.

NOTE: The ENTER key is sometimes used to change a menu selection at a single level on the menu. As an example, the NI Configuration for Framing is changed by depressing the Enter key and displays either ESF or D4. Whichever selection is last displayed is the one used in the configuration.

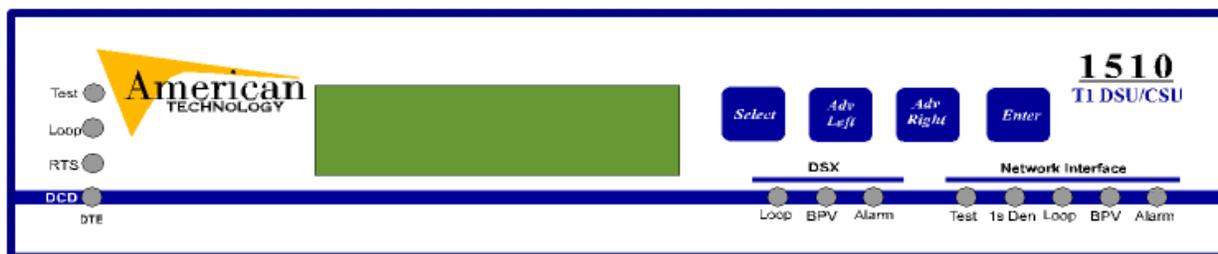


Figure 5-1 1510 T1/FT1 CSU/DSU Front Panel

Each display only deals with one menu item. The main menu is shown in Figure 5-2. It is the first menu displayed after power up.



Figure 5-2 LCD Main Menu

The first tier menu includes Configuration, Diagnostics, Alarms/Stats, Event Log, and Utilities. Each sub-menu is further broken down into sub-level menus. Subsequent chapters give detailed information regarding these menus.

To change a menu selection, use the ADV LEFT and ADV RIGHT keys to select a desired entry and then press the ENTER key.

NOTE: For compatibility with other Black Box product families where more than one DTE port is available, the DTE port for the 1510 T1/FT1 CSU/DSU is referred to as DTE-1.

5.1 Configuration Menu

The Configuration group includes NI Configuration, DSX Config, Timing Source, Serial Port #1, DSO MAP, and Channel Review.



Configuration
Diagnostics
Alarm/Stats
Event Log
Utilities

5.1.1 NI Configuration Menu

The NI Configuration menu is used to configure, test, and enable functions of the T1 line operational modes including Framing, Line Code, Line Build Out - LBO, Network Diagnostics, Density, Yellow Alarm, ESF Format, and Clear Registers function. Under the configuration menu, use the ENTER key to select the NI Configuration menu.

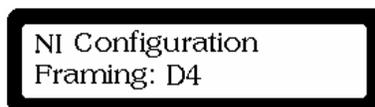


NI Configuration
DSX Config
Timing Source
Serial Port #1
DSO MAP
Channel Review

5.1.1.1 Framing Format



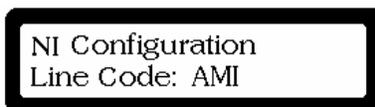
To change the Framing format simply use the ENTER key to cycle to a desired ESF or D4 setting and press SELECT. The current framing format is shown on the lower line of the LCD.



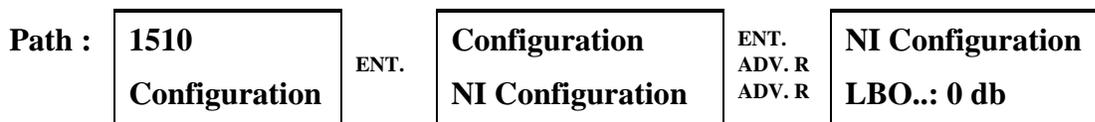
5.1.1.2 Line Code



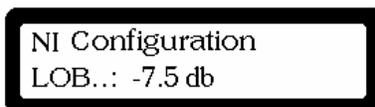
To change the Line Code simply use the ENTER key to cycle to a desired B8ZS or AMI setting and press SELECT. The current Line Code is shown on the lower line of the LCD.



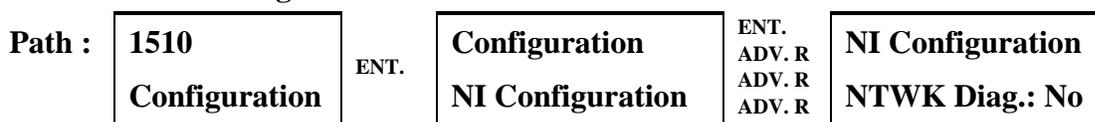
5.1.1.3 Line Build Out - LBO



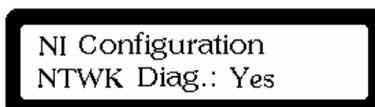
To change the transmit line attenuation level (LBO), simply use the ENTER key to cycle to a desired 0, -7.5, -15, or -22 setting and press SELECT. The current LBO setting is shown on the lower line of the LCD.



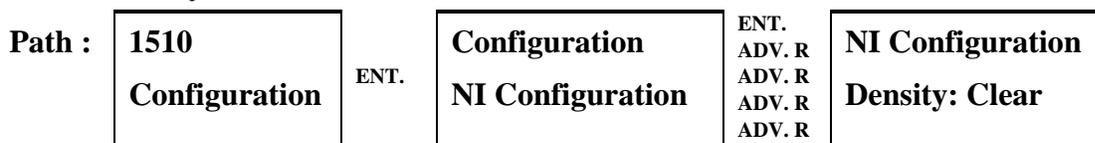
5.1.1.4 Network Diagnostics



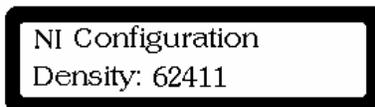
To enable or disable Network Diagnostics simply use the ENTER key to cycle to a desired Yes or No setting and press SELECT. The current Network Diagnostic status is shown on the lower line of the LCD.



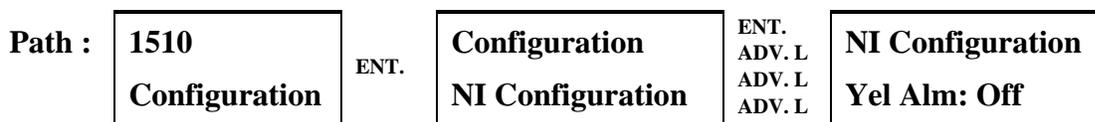
5.1.1.5 Density



To change the Density setting, simply use the ENTER key to cycle to a desired Clear or 62411 setting and press SELECT. The selection of the Clear option results in no enforcement of density requirements. The data itself must contain a sufficient number of marks or B8ZS line coding must be selected. If 62411 is selected, the 1510 will automatically enforce density requirements necessary to insure timing recovery. The current framing format is shown on the lower line of the LCD.



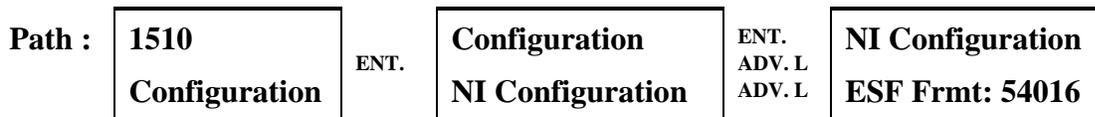
5.1.1.6 Yellow Alarm



To allow Yellow Alarm or not allow Yellow Alarm transmission from the 1510, simply use the ENTER key to cycle to a desired Off or On setting and press SELECT. Yellow Alarm Off causes the 1510 to never send a yellow alarm to the network. Yellow Alarm On causes the 1510 to send a yellow alarm if it is unable to correctly receive a normal T1 RX signal. The yellow alarm status is shown on the lower line of the LCD.

NI Configuration
YelAlm: On

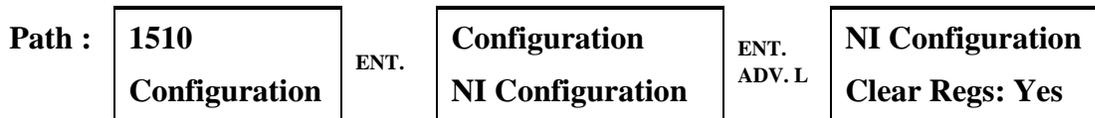
5.1.1.7 ESF Format



To change the ESF format simply use the ENTER key to cycle to a desired 54016 or T1.403 setting and press SELECT. 54016 is the normal setting for ESF operation. Some Telco central office equipment allows T1.403 operation. If so, the 1510 should be set to T1.403 (the newer standard). The ESF format is shown on the lower line of the LCD.

NI Configuration
ESF Frmt: T1.403

5.1.1.8 Clear Registers Function



The 1510 checks the status of this setting only on power up initialization. If a Yes is set, all of the ESF performance registers are cleared, if a No is set, the 1510 does not change the previously recorded ESF performance registers. To change the Clear Regs function, simply use the ENTER key to cycle to a desired Yes or No setting and press SELECT. The current Clear Regs function status is shown on the lower line of the LCD.

NI Configuration
Clear Regs: No

5.1.2 DSX Interface Menu

The DSX Interface menu is used to change the DSX Framing format assignment, the DSX Line Code, and the DSX Distance setting for the drop and insert line interface.

NI Configuration
DSX Config
Timing Source
Serial Port #1
DSO MAP
Channel Review



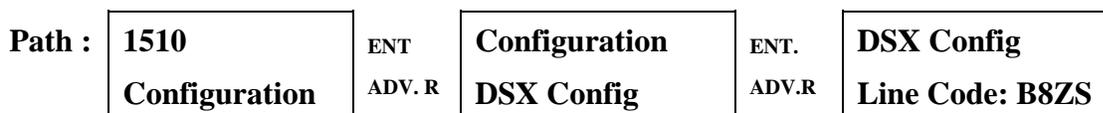
5.1.2.1 DSX Frame Format



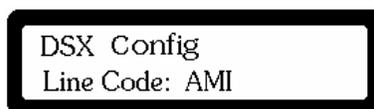
Use ENTER to alternate between ESF and D4 framing. When the desired frame format appears, press SELECT. The DSX format is shown on the lower line of the LCD.



5.1.2.2 DSX Line Code



Use ENTER to alternate between B8ZS and AMI line codes. When the desired line code appears, press SELECT. The DSX line code is shown on the lower line of the LCD.



5.1.2.3 DSX Distance



Use ENTER to cycle to the desired line length – 133, 266, 399, 533, or 655 feet. Press SELECT when the desired length appears in the LCD screen. This setting allows the 1510 to adjust its transmit level for a PBX which is a given number of cable feet distance from the 1510. The DSX Distance setting is shown on the lower line of the LCD.



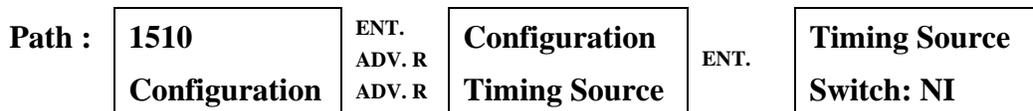
5.1.3 Timing Source

The Timing Source for the 1510 may be any of four options: the Network Interface (NI), DTE 1, Internal (INT), or the Drop and Insert port (DSX).

NI Configuration
DSX Config
Timing Source
Serial Port #1
DSO MAP
Channel Review



5.1.3.1 Source



To select the timing source for the 1510, press the ENTER key to cycle through the various options: NI, DTE 1, INT, or DSX. When the desired option is displayed, press SELECT. The selected option appears on the bottom line of the LCD.



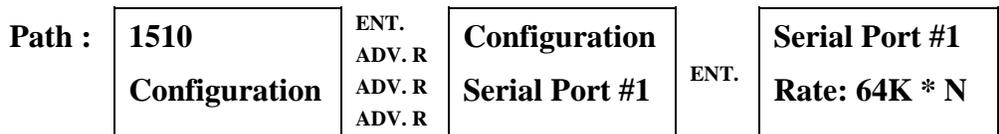
5.1.4 Serial Port #1

The Serial Port #1 set up provides the manipulation of the port parameters inclusive of the rate (64k x N, or 56k x N), RTS, data polarity, clock polarity, and an enable of a remote loop.

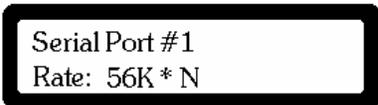
NI Configuration
DSX Config
Timing Source
Serial Port #1
DSO MAP
Channel Review



5.1.4.1 Rate



The serial port may be configured to either 64K * N, or 56K * N. Press the ENTER key until the desired selection is displayed. The meaning of 64K * N is that each DS0 channel will have a rate of 64,000bps that is assigned to the serial port. 56K * N has a similar meaning. The selected option appears on the bottom line of the LCD.



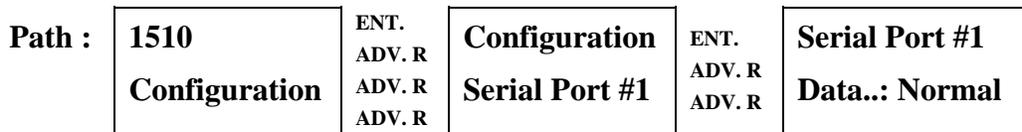
5.1.4.2 RTS



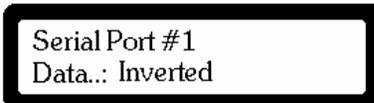
The control lead RTS (Request To Send) may be set to either External or Constant. An External setting follows the DTE equipment RTS setting where as a Constant setting ignores the DTE and assumes RTS is present at all times. Press the ENTER key until the desired selection is displayed. The selected option appears on the bottom line of the LCD.



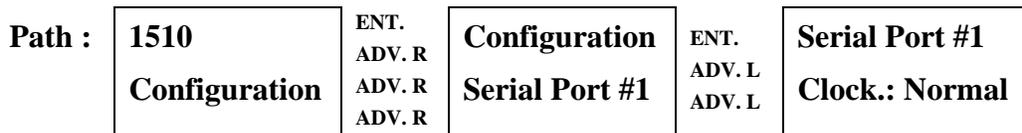
5.1.4.3 Data Normal or Inverted



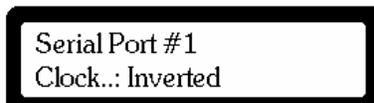
The user may have the data stream transmitted exactly as presented by the DTE device. This is the “Normal” case. Under those circumstances where a data stream is predominately spaces, the user may “Invert” the data to increase the 1’s density. Press the ENTER key until the desired option is displayed, then press SELECT. The selected option appears on the bottom line of the LCD.



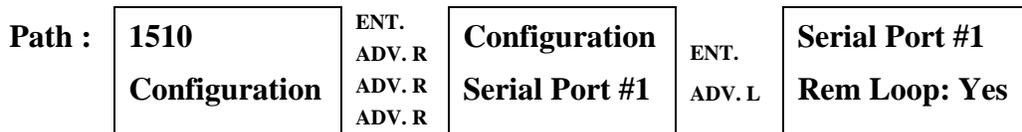
5.1.4.4 Clock Normal or Inverted



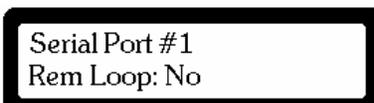
The user may select either a “Normal” or “Inverted” clock. Do to a phase shift between data and clock when long cable lengths are used, it may be necessary to invert the clock to insure proper data readings. Press the ENTER key to select either Normal or Inverted clock, then press SELECT. The selected option appears on the bottom line of the LCD.



5.1.4.5 Remote Loop



The 1510 will recognize a remote loop command from a remote unit if “Yes” is selected, conversely, it will ignore a remote loop command from a remote unit if “No” is selected. Press ENTER to select either Yes or No, and then press SELECT. The selected option appears on the bottom line of the LCD.



5.1.5 DS0 MAP

The DS0 MAP command sequence provides the means by which specific DS0 channels are assigned to either the DTE port, the DSX port or allowed to be in an Idle condition.

NI Configuration
DSX Config
Timing Source
Serial Port #1
DS0 MAP
Channel Review

Configuration
DS0 MAP

5.1.5.1 Channel



The user selects any of the 24 channels for assignment. This is accomplished by pressing either the ADV LEFT or ADV RIGHT keys until the desired channel appears on the lower line of the LCD display. When the desired selection appears, pressing ENTER causes the 1510 to go to the next menu display which allows assignment of the desired channel.

DS0 MAP
Chn-24



Following the channel selection process, the user may select either DTE-1, DSX-D, DSX-V, or Idle. By selecting DTE-1, the displayed channel is assigned to the DTE-1 port of the 1510. By selecting DSX, the channel is assigned to the drop and insert port of the 1510. By selecting Idle, the channel is declared as “not used”. When the desired selection has been displayed using the ADV LEFT and ADV RIGHT keys, ENTER is pressed to complete the assignment. When ENTER is pressed, the upper right of the first line of the display shows the number of channels assigned to the selected port and the total kilobits assigned to the selected port. This process is repeated for each of the 24 channels.

Chn-1 1:64K
Dsx

5.1.6 Channel Review

The MAP of the 1510 is a sequence of 24 entries that reflects the current assignment of each channel. A convenient and fast review of the channel assignments may be completed using the Channel Review command sequence.

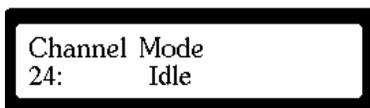


NI Configuration
DSX Config
Timing Source
Serial Port #1
DSO MAP
Channel Review

5.1.6.1 Channel Mode



Using the ADV LEFT and ADV RIGHT keys, each of the 24 channel assignments is displayed on the bottom line of the LCD display. Each channel will show it assigned to either DTE-1, DSX-D, or DSX-V or it will be shown as Idle.



5.2 Diagnostics

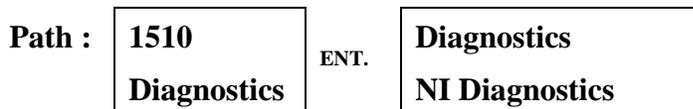
The Diagnostics menu group provides access to the 1510's network interface, drop and insert, and serial port(s) diagnostic capabilities. Included in this capability are loops and bit error rate testing (BERT).



Configuration
Diagnostics
Alarm/Stats
Event Log
Utilities

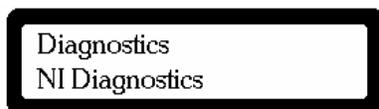
5.2.1 NI Diagnostics

The NI Diagnostics menu allows access to network interface diagnostics



NI Diagnostics
DSX Diagnostics
SP 1 Diagnostics

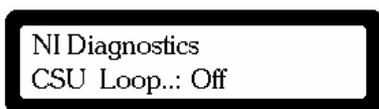
Press ENTER from the Diagnostics menu.



CSU Loop..:	Off
NI LLB....:	Off
REM PAYLD:	Off
REM LN/LP:	Off
PAYLD Loop:	Off
Test Pat:	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	

5.2.1.1 CSU Loop

The CSU Loop is one of several loop backs available for testing of the 1510.



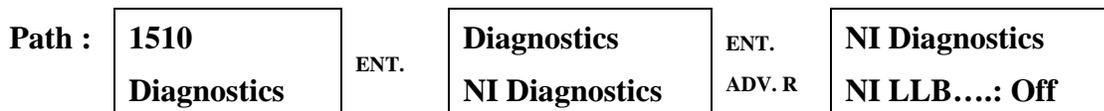
Press ENTER to cycle between Off and On. When in the On state, the 1510 places itself into a CSU loop back condition and lights the NI Loop LED. All data being transmitted from the 1510 continues as if in a normal operational condition, however, data being transmitted from the 1510 is also reflected back to the 1510 as if being received from the network interface. Among the loop backs available, the CSU loop is excellent for testing the unit utilizing a BERT pattern. See Figure 4-1 for a visual presentation of the CSU loop.

5.2.1.2 Network Interface Local Loop Back (NI LLB)

The NI LLB Loop is one of several loop backs available for testing of the 1510.

NI Diagnostics NI LLB...: Off

CSU Loop..:	Off
NI LLB....:	Off
REM PAYLD :	Off
REM LN/LP :	Off
PAYLD Loop:	Off
Test Pat :	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	



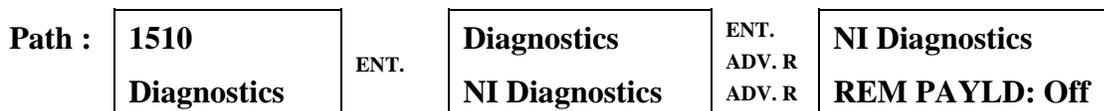
Press ENTER to cycle between Off and On. When in the On state, the 1510 places itself into a NI LLB condition. All data being received by the 1510 is as if it is in a normal operational condition, however, data being transmitted from the 1510 is the reflection of the received data from the network interface. Any bipolar violations received are transmitted unchanged. See Figure 4-1 for a visual presentation of the network interface Line Loop.

5.2.1.3 Remote Pay Load Loop Back (REM PAYLD)

The REM PAYLD is one of several loop backs available for testing of the 1510.

NI Diagnostics REM PAYLD : Off

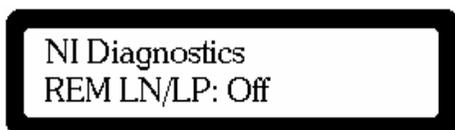
CSU Loop..:	Off
NI LLB....:	Off
REM PAYLD :	Off
REM LN/LP :	Off
PAYLD Loop:	Off
Test Pat :	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	



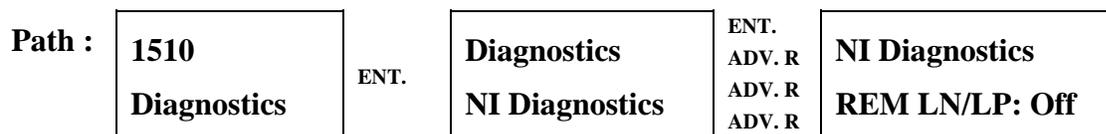
Press ENTER to cycle between Off and On. When in the On state, the 1510 transmits a code to cause the remote 1510 to go into a Payload Loop condition. Upon transmission of the code, the local 1510 shows a “Pend” message while it awaits a response from the remote unit confirming it has gone into a Payload Loop. If the response is forthcoming, “Pend” becomes “On”. If after approximately three seconds no response has been received, a “T/O” is shown indicating a time out has occurred. The Payload Loop is normally used only in ESF environments. The Payload loop reflects all channels received via the network interface correcting any bipolar violations which may have occurred. The framing pattern, CRC6 calculation, and the facility data link are not looped back but regenerated and reinserted. See Figure 4-1 for a visual presentation of the Payload Loop.

5.2.1.4 Remote Line Loop (REM LN/LP)

The REM LN/LP is one of several loop backs available for testing of the 1510.



CSU Loop..:	Off
NI LLB.....:	Off
REM PAYLD :	Off
REM LN/LP :	Off
PAYLD Loop:	Off
Test Pat :	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	



Press ENTER to cycle between Off and On. When in the On state, the 1510 transmits a code to cause the remote 1510 to go into a Line Loop condition. Upon transmission of the code, the local 1510 shows a “Pend” message while it awaits a response from the remote unit confirming it has gone into a Line Loop. If the response is forthcoming, “Pend” becomes “On”. If after approximately three seconds no response has been received, a “T/O” is shown indicating a time out has occurred. The Line loop reflects all channels received via the network interface without correcting any bipolar violations which may have occurred. Data received is also presented to the 1510 for processing, and under normal conditions will appear at the DTE interface as transmitted data. See Figure 4-1 for a visual presentation of the Line Loop.

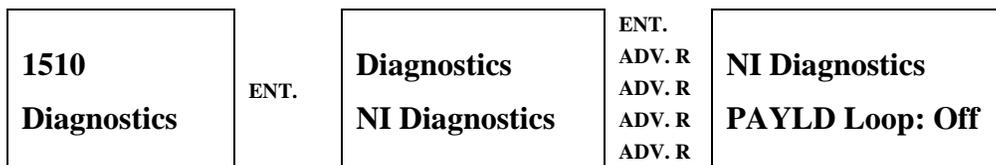
5.2.1.5 Pay Load Loop (PAYLD Loop)

The PAYLD Loop is one of several loop backs available for testing of the 1510.

CSU Loop..:	Off
NI LLB....:	Off
REM PAYLD :	Off
REM LN/LP :	Off
PAYLD Loop:	Off
Test Pat :	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	

NI Diagnostics
PAYLD Loop:Off

Path :



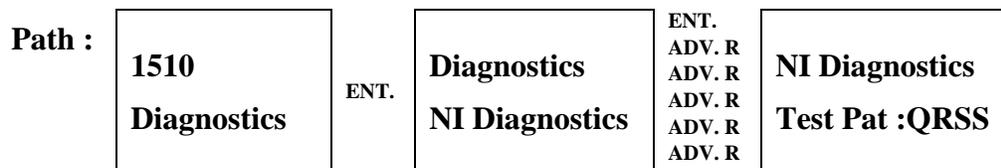
Press ENTER to cycle between Off and On. When in the On state, the 1510 goes into a Payload Loop condition. The Payload Loop is normally used only in ESF environments. The Payload loop reflects all channels received via the network interface correcting any bipolar violations which may have occurred. The framing pattern, CRC6 calculation, and the facility data link are not looped back but regenerated and reinserted. See Figure 4-1 for a visual presentation of the Payload Loop.

5.2.1.6 Test Pattern Selection (Test Pat)

The Test Pat capability provided allows selection of one of several available and standard test patterns normally appearing on a BERT.



CSU Loop..:	Off
NI LLB....:	Off
REM PAYLD :	Off
REM LN/LP :	Off
PAYLD Loop:	Off
Test Pat :	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	



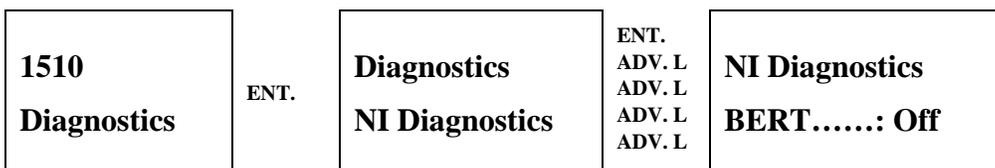
Press ENTER to cycle between the available BERT test patterns. Test patterns include QRSS, 2047, 3:24, 1:1, and 1:8. When the 1510 has the BERT in the On state, the selected test pattern is transmitted.

5.2.1.7 Bit Error Rate Testing (BERT)

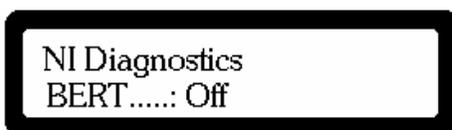
The BERT capability of the 1510 may be initiated and halted via the BERT command. The 1510 contains two internal BERTs. One of the two BERTs transmits towards the Network Interface and also seeks to detect a receive pattern matching the transmit pattern that has been selected. The second BERT transmits towards the serial port and also seeks to detect a pattern being received on the serial port. The controls for the serial port BERT are located in the menu system within the serial port menus. From either the network interface or the serial port menu structures, both BERTs are turned On or Off simultaneously. The BERTs are independent except for the On and Off coupling. Note that each BERT may have a different Test Pattern selected. When the BERTs have been activated, the yellow test LED illuminates. A flashing Test LED indicates errors are being detected on the BERT receiver, a non-flashing Test LED indicates no errors are being detected on the BERT receiver.

CSU Loop..:	Off
NI LLB....:	Off
REM PAYLD :	Off
REM LN/LP :	Off
PAYLD Loop:	Off
Test Pat :	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	

Path :



Press ENTER to cycle between Off and On. When in the On state, the 1510 outputs the test pattern that is selected.



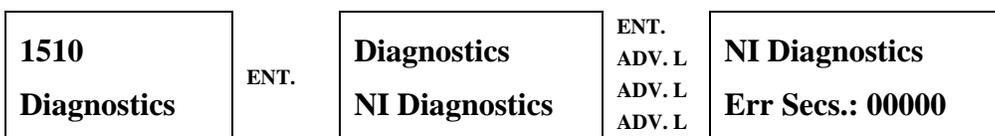
CSU Loop..:	Off
NI LLB....:	Off
REM PAYLD :	Off
REM LN/LP :	Off
PAYLD Loop:	Off
Test Pat :	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	

5.2.1.8 Errored Seconds (Err Secs)

The 1510 provides a real time accounting of the number of errored seconds. This value is displayed upon access to the Err Secs LCD screen.



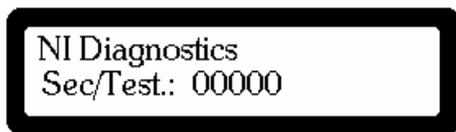
Path :



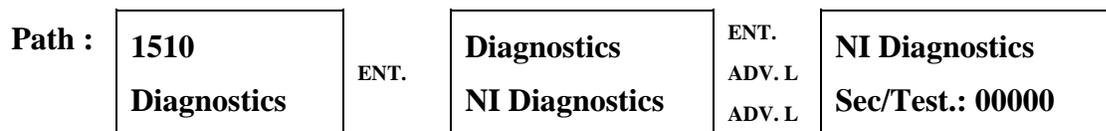
This display is for observation purposes only. The number of seconds up to 99999 during which an error in the selected BERT pattern has been observed is shown. Press ENTER to reset the errored seconds count to zero.

5.2.1.9 Seconds In Test Mode (Sec/Test)

The number of seconds since a test was initiated is available from the Sec/Test LCD display.



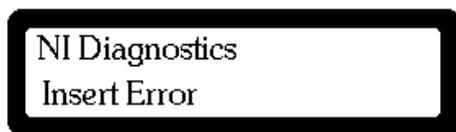
CSU Loop..:	Off
NI LLB....:	Off
REM PAYLD :	Off
REM LN/LP :	Off
PAYLD Loop:	Off
Test Pat :	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	



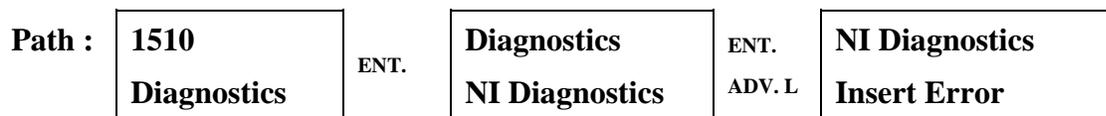
This display is for observation only. The number of seconds since the BERT has been set to the On state is shown. Press ENTER to reset the number of seconds to zero.

5.2.1.10 Insert Error Command (Insert Error)

The 1510 provides the capability to insert an error into a BERT test pattern to provide verification that the initiating unit is providing a valid test pattern.



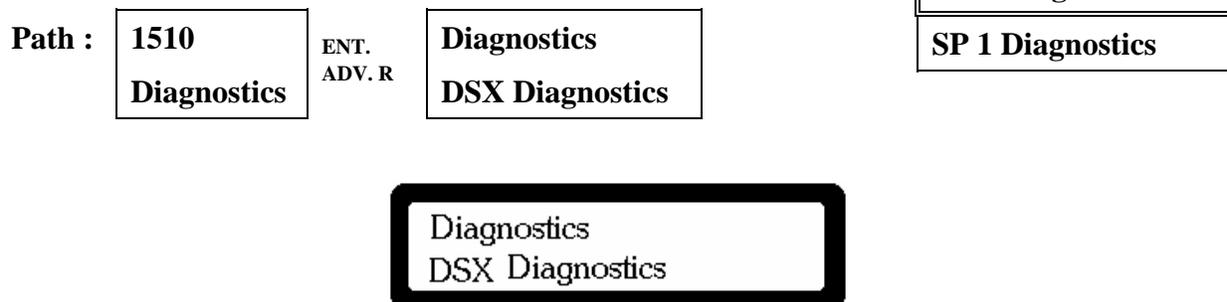
CSU Loop..:	Off
NI LLB....:	Off
REM PAYLD :	Off
REM LN/LP :	Off
PAYLD Loop:	Off
Test Pat :	QRSS
BERT.....:	Off
Err Secs.:	00000
Sec/Test.:	00000
Insert Error	



This display allows the user to insert errors into the BERT pattern by pressing the ENTER key. One error is inserted for each depression of the ENTER key. Visual confirmation of the error is presented to the user by briefly displaying “Error Inserted”.

5.2.2 DSX Diagnostics

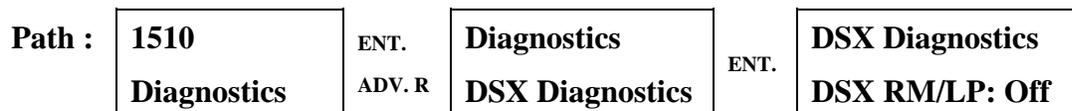
The DSX Diagnostics menu allows access to the drop and insert port interface diagnostics.



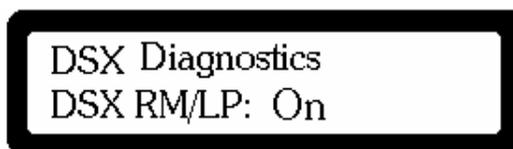
5.2.2.1 Drop And Insert Remote Loop (DSX RM/LP)

The DSX RM/LP is one of several loop backs available for testing of the 1510.

DSX RM/LP:	Off
DSX LLB:	Off



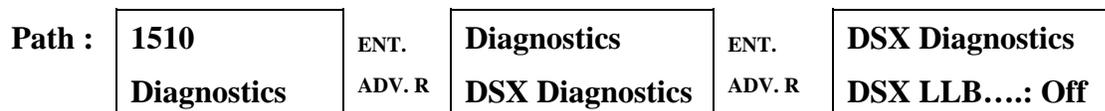
Press ENTER to cycle between Off and On. When in the On state, the 1510 sends a code to the remote unit requesting it to place itself into a DSX Local loop state. Upon transmission of the code, the local 1510 shows a "Pend" message while it awaits a response from the remote unit confirming it has gone into a DSX Local loop. If the response is forthcoming, "Pend" becomes "On", and the DSX Loop LED is illuminated. If after approximately three seconds no response has been received, a "T/O" is shown indicating a time out has occurred. The DSX Local loop is a loop that reflects data from the cable coming from the PBX. An external BERT or PBX test may then be used to validate external cabling. See Figure 4-1 for a visual presentation of the DSX Local loop.



5.2.2.2 Drop And Insert Local Loop Back (DSX LLB)

The DSX LLB is one of several loop backs available for testing of the 1510.

DSX RM/LP:	Off
DSX LLB:	Off



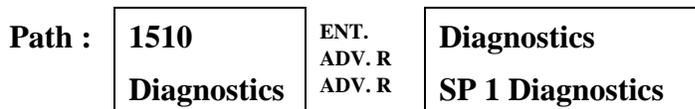
Press ENTER to cycle between Off and On. When in the On state, the 1510 places itself into a DSX Local loop state. The DSX Local loop is a loop that reflects data from the cable coming from the PBX. An external BERT or PBX test may then be used to validate external cabling. See Figure 4-1 for a visual presentation of the DSX Local Loop.

DSX Diagnostics
NILLB...: On

5.2.3 SP 1 Diagnostics

The SP 1 Diagnostics menu allows access to serial port interface diagnostics.

NI Diagnostics
DSX Diagnostics
SP 1 Diagnostics



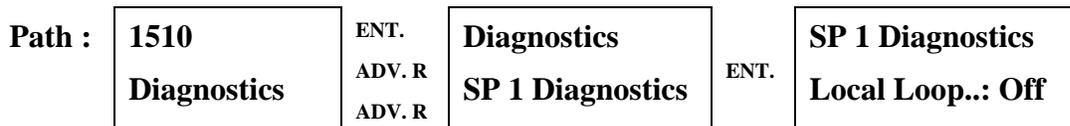
Diagnostics
SP 1 Diagnostics

5.2.3.1 Local Loop

The Local Loop is one of several loop backs available for testing of the 1510.

Local Loop.:	Off
REM DTE/LP:	Off
Test Pat :	QRSS
BERT.....:	Off
Loc ES...:	00000
Sec/Test.:	00000
Insert Error	

SP 1 Diagnostics
Local Loop.: Off



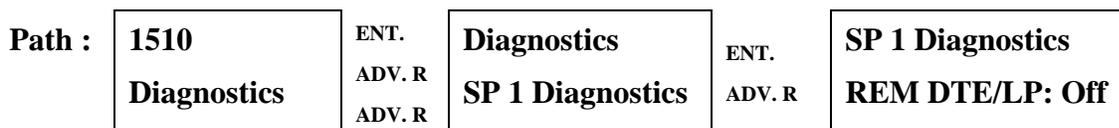
Press ENTER to cycle between Off and On. When in the On state, the 1510 places itself into a Local loop back condition and the DTE Loop LED is illuminated. The Local loop is a bi-directional loop that reflects to the port all data that has been received by the port, and to the network all data that has been received by the network. See Figure 4-1 for a visual presentation of the Local loop.

5.2.3.2 Remote Loop Back (REM Loop)

The REM Loop is one of several loop backs available for testing of the 1510.

SP 1 Diagnostics
Rem DTE/LP.: Off

Local Loop.:	Off
REM DTE/LP:	Off
Test Pat :	QRSS
BERT.....:	Off
Loc ES...:	00000
Sec/Test.:	00000
Insert Error	



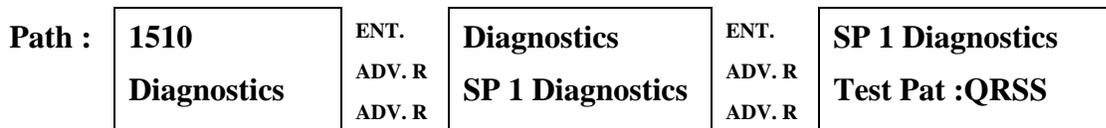
Press ENTER to cycle between Off and On. When in the On state, the 1510 sends a code to the remote unit requesting it place itself in to a Local loop state. Upon transmission of the code, the local 1510 shows a "Pend" message while it awaits a response from the remote unit confirming it has gone into a Local Loop. If the response is forthcoming, "Pend" becomes "On" and the DTE Loop LED is illuminated. If after approximately three seconds no response has been received, a "T/O" is shown indicating a time out has occurred. The Local loop is a bi-directional loop that reflects to the port all data that has been received by the port, and to the network all data that has been received by the network. See Figure 4-1 for a visual presentation of the network interface Local Loop.

5.2.3.3 Test Pattern Selection (Test Pat)

The Test Pat capability provided allows selection of one of several available and standard test patterns normally appearing on a BERT.

SP 1 Diagnostics
Test Pat.: QRSS

Local Loop.:	Off
REM DTE/LP:	Off
Test Pat :	QRSS
BERT.....:	Off
Loc ES...:	00000
Sec/Test.:	00000
Insert Error	

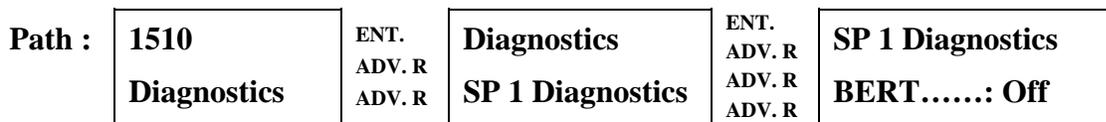


Press ENTER to cycle between the available BERT test patterns. Test patterns include QRSS, 2047, 3:24, 1:1, and 1:8. When the 1510 has the BERT in the On state, the selected test pattern is transmitted.

5.2.3.4 Bit Error Rate Testing (BERT)



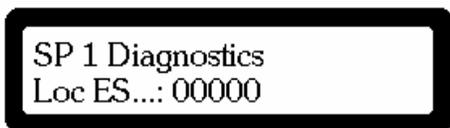
Local Loop.:	Off
REM DTE/LP:	Off
Test Pat :	QRSS
BERT.....:	Off
Loc ES...:	00000
Sec/Test.:	00000
Insert Error	



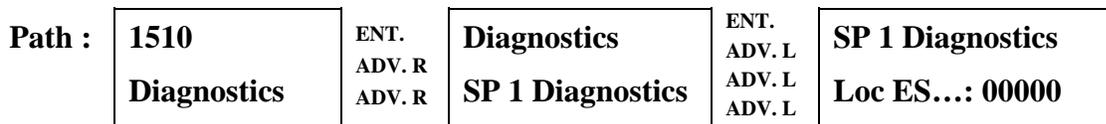
The BERT capability of the 1510 may be initiated and halted via the BERT command. The 1510 is implemented with two internal BERTs. One of the two BERTs transmits towards the Network Interface and also seeks to detect a receive pattern matching the transmit pattern that has been selected. The second BERT transmits towards the serial port and also seeks to detect a pattern being received on the serial port. The controls for the network interface BERT are located in the menu system within the network interface menus. From either the network interface or the serial port menu structures, both BERTs are turned On or Off simultaneously. The BERTs are totally independent except for their On and Off coupling. It should be noted that each BERT may have a different Test Pattern selected. When the BERTs have been activated via the On state, the yellow test LED illuminates. A flashing Test LED indicates errors are being detected on the BERT receiver, a non-flashing Test LED indicates no errors are being detected on the BERT receiver.

5.2.3.5 Local Errored Secs (Loc ES)

The 1510 provides a real time accounting of the number of errored seconds. This value is displayed upon access to the Loc ES LCD screen.



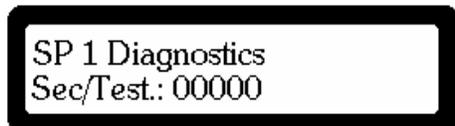
Local Loop.:	Off
REM DTE/LP:	Off
Test Pat :	QRSS
BERT.....:	Off
Loc ES...:	00000
Sec/Test.:	00000
Insert Error	



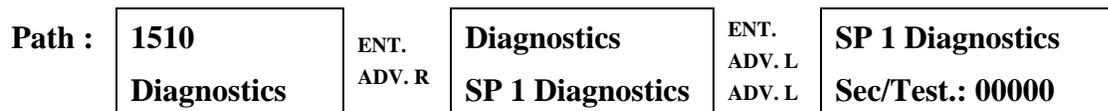
This display is for observation purposes only. The number of seconds up to 99999 during which an error in the selected BERT pattern has been observed is shown. Press ENTER to reset the errored seconds count to zero.

5.2.3.6 Seconds In Test Mode (Sec/Test)

The number of seconds since a test was initiated is available from the Sec/Test LCD display.



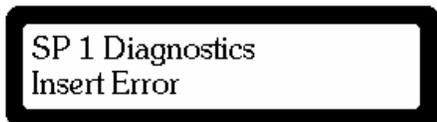
Local Loop.:	Off
REM DTE/LP:	Off
Test Pat :	QRSS
BERT.....:	Off
Loc ES...:	00000
Sec/Test.:	00000
Insert Error	



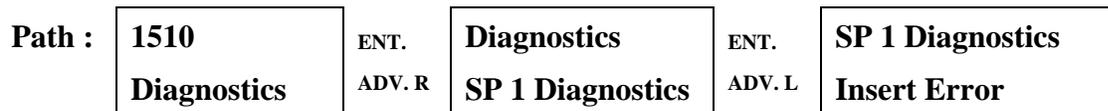
This display is for observation only. The number of seconds since the BERT has been set to the On state is shown. Press ENTER to reset the number of seconds to zero.

5.2.3.7 Insert Error Command (Insert Error)

The 1510 provides the capability to insert an error into a BERT test pattern to provide verification that the initiating unit is providing a valid test pattern.



Local Loop.:	Off
REM DTE/LP:	Off
Test Pat :	QRSS
BERT.....:	Off
Loc ES...:	00000
Sec/Test.:	00000
Insert Error	



This display allows the user to insert errors into the BERT pattern by pressing the ENTER key. One error is inserted for each depression of the ENTER key. Visual confirmation of the error is presented to the user by displaying "Error Inserted".

5.3 Alarms and Stats

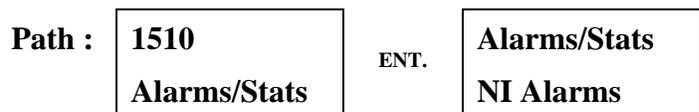
The Alarms and Stats menu group provides access to the 1510's alarms and statistics menus, drop and insert alarms and statistics, and ESF statistics.



Configuration
Diagnostics
Alarm/Stats
Event Log
Utilities

5.3.1 NI Alarms

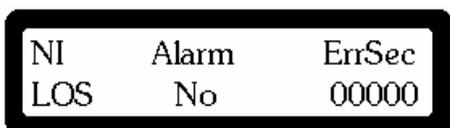
The NI Alarms menu allows access to network interface alarms.



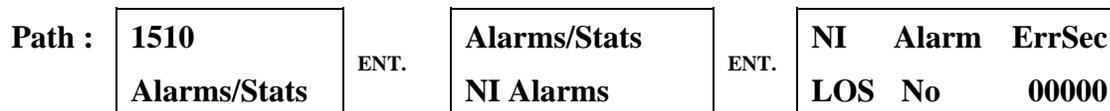
NI Alarms
DSX Alarms
ESF Statistics

5.3.1.1 Loss Of Signal (LOS)

The LOS is one of several alarms that indicate the functional conditions present in the 1510.



LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



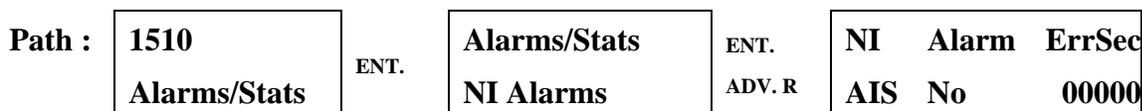
The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. LOS indicates a loss of signal. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.1.2 Alarm Indication Signal (AIS)

The AIS is one of several alarms that indicate the functional conditions present in the 1510.

NI	Alarm	ErrSec
AIS	No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



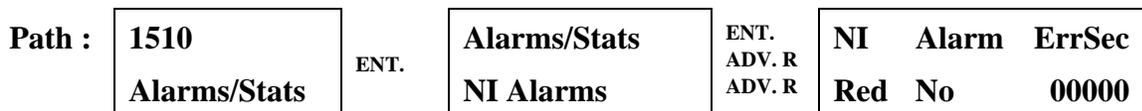
The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. AIS (also know as Blue Alarm) indicates the network interface receive signal is being received with errors. AIS is transmitted on the NI transmit pair. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.1.3 Red Alarm (Red)

The Red is one of several alarms that indicate the functional conditions present in the 1510.

NI	Alarm	ErrSec
RED	No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. A Red alarm is declared upon either a loss of signal condition (LOS), or continuous out of frame (OOF) condition, or an intermittent out of frame condition. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.1.4 Yellow Alarm (Yel)

The Yel is one of several alarms that indicate the functional conditions present in the 1510.

NI	Alarm	ErrSec
Yel	No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. A Yel alarm is shown as present when the central office transmits the condition. Yel Alarm is sent by the central office indicating to the 1510 that the signal being transmitted by the 1510 is not being received at the central office correctly. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.1.5 Frame Error (Ferr)

The Ferr is one of several alarms that indicate the functional conditions present in the 1510.

NI	Alarm	ErrSec
Ferr	No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. An Ferr alarm is shown as present when the 1510 is unable to detect a framing pattern from the network interface. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.1.6 Circular Redundancy Check Six Alarm (CRC6)

The CRC6 is one of several alarms that indicate the functional conditions present in the 1510.

NI	Alarm	ErrSec
CRC6	No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. CRC6 errors only are shown when in ESF mode. A CRC6 alarm is shown as present when the 1510 is receiving errors on the facility data link which contains the Circular Redundancy Check values. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.1.7 BiPolar Violation Alarm (BPV)

The BPV is one of several alarms that indicate the functional conditions present in the 1510.

NI	Alarm	ErrSec
BVP	No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000

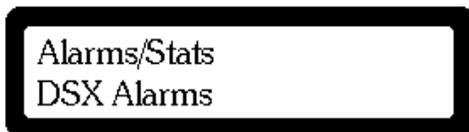


The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. A BPV alarm is shown as present when the 1510 is receiving errors due to illegal bipolar violations. In addition the NI LED indicating BPV errors are illuminated. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.2 DSX Alarms

The DSX Alarms menu allows access to the drop and insert network interface alarms.

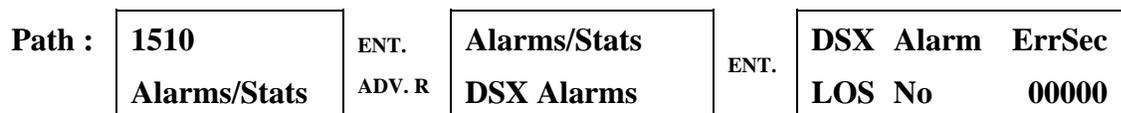
NI Alarms
DSX Alarms
ESF Statistics



5.3.2.1 DSX Loss Of Signal (LOS)

The DSX LOS is one of several alarms that indicate the functional conditions present in the 1510.

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. DSX LOS indicates a loss of signal on the drop and insert port. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.2.2 DSX Alarm Indication Signal (AIS)

The DSX AIS is one of several alarms that indicate the functional conditions present in the 1510.

DSX-1 Alarm	ErrSec
AIS No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



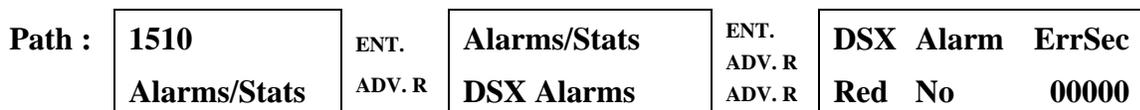
The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. DSX AIS (also know as Blue Alarm) indicates the network interface receive signal is being received with errors. DSX AIS is transmitted on the DSX transmit pair. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.2.3 DSX Red Alarm (Red)

The DSX Red is one of several alarms that indicate the functional conditions present in the 1510.

DSX-1 Alarm	ErrSec
RED No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



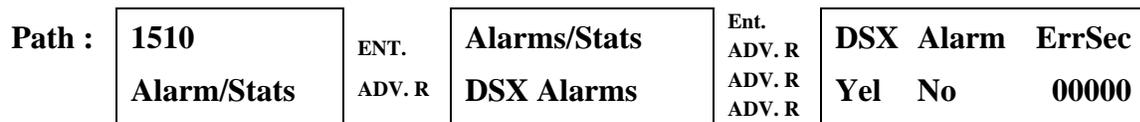
The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. A DSX Red alarm is declared upon either a loss of signal condition (LOS), or continuous out of frame (OOF) condition, or an intermittent out of frame condition. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.2.4 DSX Yellow Alarm (Yel)

The DSX Yel is one of several alarms that indicate the functional conditions present in the 1510.

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000

DSX-1 Alarm	ErrSec
Yel No	00000



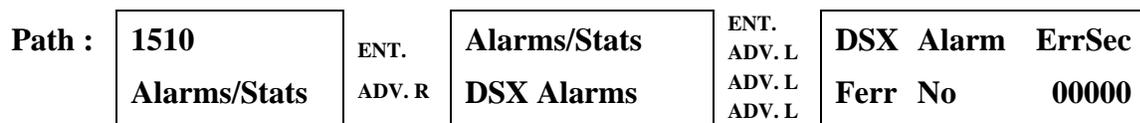
The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. A DSX Yel alarm is shown as present when the PBX transmits the condition. DSX Yel Alarm is sent by the PBX indicating to the 1510 that the signal being transmitted by the 1510 is not being received at the PBX correctly. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.2.5 DSX Frame Error (Ferr)

The DSX Ferr is one of several alarms that indicate the functional conditions present in the 1510.

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000

DSX-1 Alarm	ErrSec
Ferr No	00000



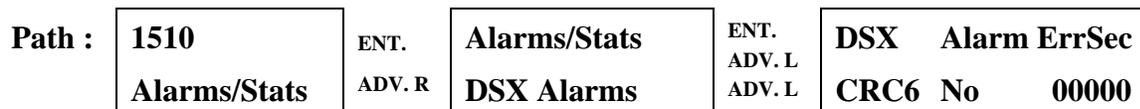
The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. A DSX Ferr alarm is shown as present when the 1510 is unable to detect a framing pattern from the DSX interface. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.2.6 DSX Circular Redundancy Check Six Alarm (CRC6)

The DSX CRC6 is one of several alarms that indicate the functional conditions present in the 1510.

DSX-1	Alarm	ErrSec
CRC6	No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



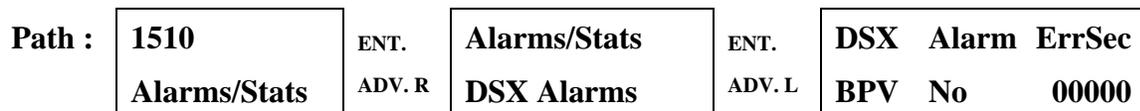
The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. DSX CRC6 errors only are shown when in ESF mode. A DSX CRC6 alarm is shown as present when the 1510 is receiving errors on the facility data link which contains the Circular Redundancy Check values. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.2.7 DSX BiPolar Violation Alarm (BPV)

The DSX BPV is one of several alarms that indicate the functional conditions present in the 1510.

DSX-1	Alarm	ErrSec
BVP	No	00000

LOS	No	00000
AIS	No	00000
Red	No	00000
Yel	No	00000
Ferr	No	00000
CRC6	No	00000
BPV	No	00000



The LCD display indicates the type of network interface alarm at the extreme left of the second line of the display. A DSX BPV alarm is shown as present when the 1510 is receiving errors due to illegal bipolar violations. In addition the DSX LED indicating BPV errors are illuminated. The second parameter in the center position of the lower line of the LCD display indicates that this alarm is either present (Yes) or not (No). If present, the number of errored seconds is presented at the extreme right of the second line of the LCD display. The count of errored seconds is in the range of 00000 to 99999. The count of errored seconds may be reset to zero by pressing the ENTER key.

5.3.3 ESF Statistics

The ESF Statistics menu allows access to the current operation statistics, the past 24 hour statistics, and the ESF registers.

NI Alarms
DSX Alarms
ESF Statistics

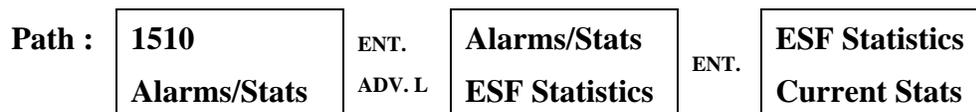


5.3.3.1 Current Statistics (Current Stats)

Current Stats
24 Hour Stats
ESF Registers



The Current Stats of the ESF registers of the 1510 are presented including Status, Errored Seconds (ES), Unavailable Seconds (UAS), Severely Errored Seconds (SES), Bursty Errored Seconds (BES), Time in Interval (Time/Int), and the number of Valid Intervals saved (Valid Ints). Press ENTER followed by ADV LEFT or ADV RIGHT to view each of the statistics values.

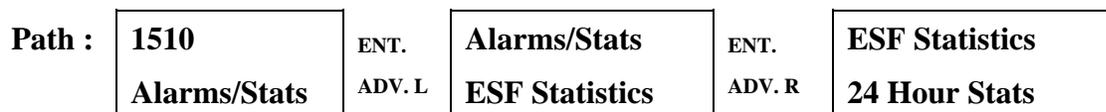


5.3.3.2 24 Hour Statistics (24 Hour Stats)

Current Stats
24 Hour Stats
ESF Registers



The 24-Hour Stats of the ESF registers of the 1510 are presented including Errored Seconds (ES), Unavailable Seconds (UAS), Severely Errored Seconds (SES), and Bursty Errored Seconds (BES). Press ENTER followed by ADV LEFT or ADV RIGHT to view each of the statistics values.

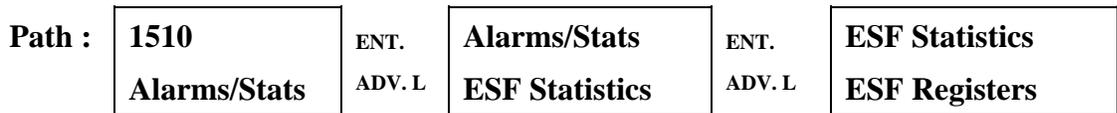


5.3.3.3 ESF Registers



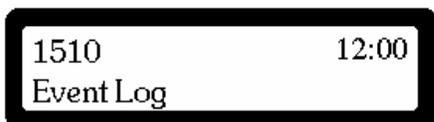
Current Stats
24 Hour Stats
ESF Registers

The ESF Registers of the 1510 are presented by intervals covering the past 24 hours in 15-minute increments. Each interval is numbered. Interval "01" is the first interval after the 1510 was powered on. ADV LEFT and ADV RIGHT may be used to view each of the 96 intervals. After 24 hours of operation, the oldest interval is over written. In each interval, the number of unavailable seconds (UAS), the number of severely errored seconds (SES), and the number of bursty errored seconds (BES) is shown.



5.4 Event Log

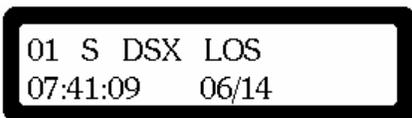
The Event Log menu group provides access to the 1510's 32 position first in first out queue of event log information.



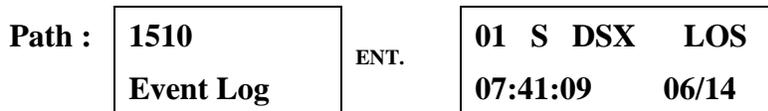
Configuration
Diagnostics
Alarm/Stats
Event Log
Utilities

5.4.1 Event Log Entry

The event log menu allows access to all significant events that have occurred in chronological order.



01 S DSX LOS
07:41:09 06/14



The event log displayed is in chronological order – oldest first. Each entry is numbered from 01 to 32. When the event log is full older entries are discarded and new entries recorded. The upper left corner of the display gives the entry number. The second entry on the top line is either an "S" or an "E". "S" denotes the start of an event, "E" denotes the end of an event. The third entry on the top line of the LCD is the source of the event (e.g. DSX, NI, SP 1, etc.). The fourth entry at the top right of line one of the LCD indicates the event that has occurred (e.g. LOS, AIS, Yel, etc.). The lower line of the LCD contains the time and date of the event. Press ADV LEFT and ADV RIGHT to scroll through each event in the event log.

5.5 Utilities

The Utilities menu group provides access to the 1510's utility menus. The Utilities menu group includes Date/Time, Default Configuration, Software revision level, Console Port, SNMP/SLIP port, Clear Event Log, and Clear Fault Indicator controls.



Configuration
Diagnostics
Alarm/Stats
Event Log
Utilities

5.5.1 Utilities

The Utilities menu allows access to various 1510 house-keeping functions. Press ENTER for the first of the Utilities menus.



Set Date/Time
Default Config
Software
Console Port
SNMP/SLIP Port
Clear Event Log

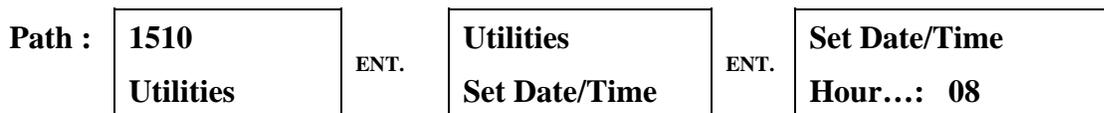


5.5.1.1 Set Date/Time

The Set Date/Time menu allows setting of the current date and time into the 1510. The date and time values appear throughout the 1510 configuration .



Hour:
Minutes:
Seconds:
Day:
Month:
Year:



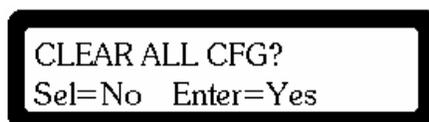
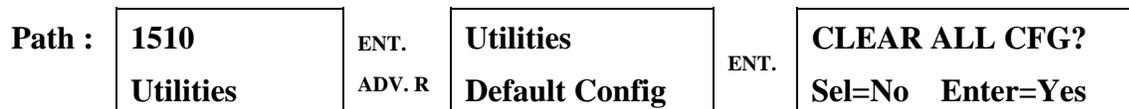
The Set Date/Time function initially displays the hours value to be set. By pressing the ENTER key in succession, hours will scroll through all values from 00 to 23. This convention is often called military time where 13 – 23 represent hours of 01:00pm through 11:00pm. By pressing the ADV LEFT and ADV RIGHT keys, similar displays are provided for setting Minutes, Seconds, Day, Month, and Year. All use the ENTER key to scroll through selections.

5.5.1.2 Default Configuration (Default Config)

This function allows a factory or default setting to be placed in the 1510.



Set Date/Time
Default Config
Software
Console Port
SNMP/SLIP Port
Clear Event Log



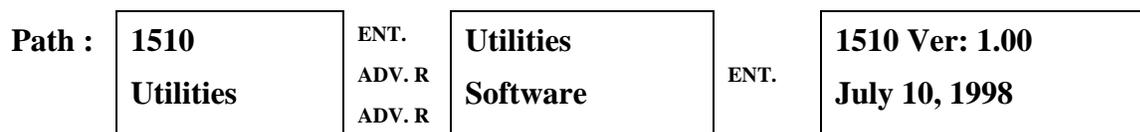
This function places the 1510 into a factory or default configuration. **All previous configuration information is overwritten and lost.** The 1510 provides a second chance to abort this function by asking for a confirmation: Select=No, Enter=Yes. If ENTER is pressed, the default software configuration is installed and the entire 1510 completes a power on reboot sequence. Table 2-7 lists the default software configuration

5.5.1.3 Software Version (Software)

The version and date of the software contained in the 1510 is displayed.



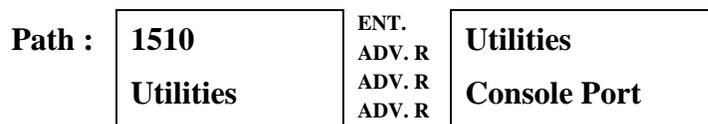
Set Date/Time
Default Config
Software
Console Port
SNMP/SLIP Port
Clear Event Log



This function displays the software version number and the date of the software version.

5.5.1.4 Console Port

The Console Port settings are manipulated using this menu group.

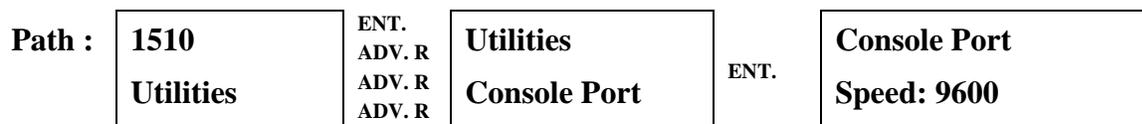


Set Date/Time
Default Config
Software
Console Port
SNMP/SLIP Port
Clear Event Log



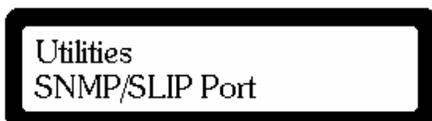
The console port settings are comprised of four elements: speed, parity, data bits, and XOF flow control. Press ADV RIGHT or ADV LEFT to display any of the settings. Available parameters for speed are 9600, 14400, 19200, 1200, 2400, and 4800. Available parameters for parity are None, Odd, and Even. Available parameters for data bits are 7 and 8. Note: 1 stop bit is assumed. XOF flow control may be enabled or disabled by settings of “YES” and “NO”. The ENTER key is used to cycle through each option for each parameter. What ever is last displayed on the LCD front panel becomes the configuration parameter.

Speed: 9600
Parity: None
Data Bits: 8
XOF Enabled: No

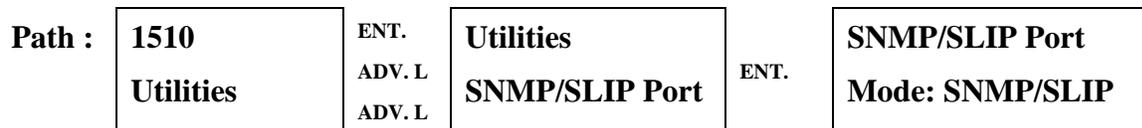


5.5.1.5 SNMP/SLIP Port

The SNMP/SLIP port configurations parameters may be set using this menu group.



Set Date/Time
Default Config
Software
Console Port
SNMP/SLIP Port
Clear Event Log



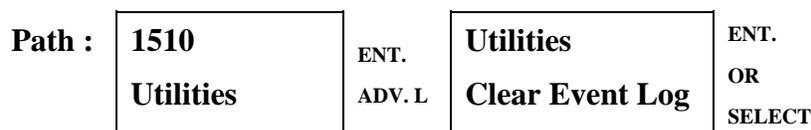
There are two parameters that may be set for the SNMP/SLIP port – enabled/disabled and speed. The ENTER key cycles between various options for each parameter, and the ADV LEFT and ADV RIGHT keys cycle between the two parameters. For the mode parameter, the available options are SNMP/SLIP and Disabled. For the speed parameter, available options are 1200, 2400, 4800, 9600, and 19200bps. What ever parameter is visible on the LCD is the selected parameter.

5.5.1.6 Clear Event Log

The Clear Event Log function clears all 32 entries in the Event Log.



The entries in the Event Log are cleared by this function. **By pressing ENTER, all entries in the Event Log are cleared.** If no action is desired, press SELECT.



6.1 System Configuration

To display the System Configuration screen, use the up and down arrow keys to position the cursor adjacent to the System Configuration menu item and press the ENTER key.

```
Black Box                               Jun 30, 1998
1510 T-1/FT-1 CSU/DSU ++                13:43:19
Unit ID: 00000001

                                SYSTEM CONFIGURATION

Network (NI)                DSX-1                Serial Port #1

Framing.....: ESF           Framing.....: ESF           Speed.....: 64K * N
Line Code.: B8ZS           Line Code.: B8ZS           RTS.....: Constant
LBO.(Neg).: 0 db           Distance..: 133ft         DATA.....: Norm
Density.....: Clear                            Clock.....: Norm
NTWK Diag.: No                               Rem Loop.: Enabled
Yellow Alm: Off
ESF Format: 54016

System Clock
Source.....: NI

DS0 Map = [Enter]
```

The system configuration may be changed by positioning the cursor adjacent to an entry that needs to be altered. This is done by using the up arrow and down arrow keys. Once positioned, left arrow and right arrow keys may be used to cycle through each parameter to a desired entry. When complete, press “ESC” twice to return to the main menu.

6.1.1 DS0 Map

From the System Configuration screen press ENTER to view the DS0 Map.

```
Black Box                               Jun 30, 1998
1510 T-1/FT-1 CSU/DSU ++                13:43:19
Unit ID: 00000001

                                T-Channel (DS0) Allocation

DS0 # Mode                DS0 # Mode
01: DTE 1                13: DTE 1
02: DTE 1                14: DTE 1
03: DTE 1                15: DTE 1
04: DTE 1                16: DTE 1
05: DTE 1                17: DTE 1
06: DTE 1                18: DTE 1
07: DTE 1                19: DTE 1
08: DTE 1                20: DTE 1
09: DTE 1                21: DTE 1
10: DTE 1                22: DTE 1
11: DTE 1                23: DTE 1
12: DTE 1                24: DTE 1
```

The DS0 Map may be changed by positioning the cursor adjacent to an entry that needs to be altered. This is done by using the up arrow and down arrow keys. Once positioned, left arrow and right arrow keys may be used to cycle through each parameter to a desired entry. When complete, press “ESC” twice to return to the System Configuration screen.

6.2 System Diagnostics

The System Diagnostics screen allows manipulation of network interface diagnostics, serial port #1 diagnostics, and drop and insert diagnostics. From the main menu, position the cursor adjacent to System Diagnostics and press ENTER.

```
Black Box                               Jun 30, 1998
1510 T-1/FT-1 CSU/DSU ++                13:43:19
Unit ID: 00000001

                                System Diagnostics

NI DIAGNOSTICS      Serial Port #1      DSX DIAGNOSTICS

Csu Loop.: Off      Local Loop.: Off    DSX Rm/Lp.: Off
Ni LLB.....: Off    Remote Loop: Off    DSX LLB.....: Off
Rem Payld.: Off     Test Patr.: 1:1
Rem Ln/Lp.: Off     BERT.....: Off
Payld Loop: Off
Test Patr: 1:1      Local ES...: 00000
BERT.....: Off      Sec in Test: 00000

Local ES.: 00000
Sec in Tst: 00000

                                Depress [N] insert error into NI BERT.
                                Depress [S] insert error into SERIAL BERT.
```

The System Diagnostics screen may be exercised by positioning the cursor adjacent to an entry where action is required. This is done by using the up arrow and down arrow keys. Once positioned, left arrow and right arrow keys may be used to cycle through each parameter to a desired entry. When complete, press “ESC” twice to return to the System Configuration screen. For test purposes, errors may be inserted into the BERT pattern by pressing either “N” (for the network interface) or “S” (for the serial port BERT).

6.3 System Alarms and Indicators

The System Alarms and Indicators screen provides information on the network interface, the DTE serial port, and the drop and insert port. All alarms and indicators are updated in real time. Counters may be reset by pressing “R”.

Chapter 6 Console Operations

```
Black Box                               Jun 30, 1998
1510 T-1/FT-1 CSU/DSU ++                13:43:19
Unit ID: 00000001

                                System Alarms and Indicators

      NI Interface          Serial Port #1          DSX Interface

      State  ErrSec          Indicators          State  ErrSec
LOS..: No   00000          RTS..: On          LOS..: No   00000
AIS..: No   00000          CTS..: On          AIS..: No   00000
Red..: No   00000          DCD..: On          Red..: No   00000
Yel..: No   00000          DTR..: On          Yel..: No   00000
FErr.: No   00000          Loop.: Off         FErr.: No   00000
CRC6.: No   00000          Loop.: Off         CRC6.: No   00000
BPV..: No   00000          Loop.: Off         BPV..: No   00000

Loop.: Off                               Loop.: Off

                                Reset Counters = [R]
```

6.4 Performance Registers

The performance registers are presented on the following screen. The performance registers include Errored Seconds, Unavailable Seconds, Severely Errored Seconds, and Bursty Errored Seconds. An interval is defined as fifteen minutes. Statistics are provided in real time for the current interval. As an interval completes, its information is stored in one of the past 24 hour intervals. Thus all intervals for the past 24 hours are available for examination. By pressing ENTER, from the screen below, previously stored intervals are available on two additional screens. Finally, the screen below also shows the number of seconds in the current interval and the number of valid intervals that have been stored away for examination.

```
Black Box                               Jun 30, 1998
1510 T-1/FT-1 CSU/DSU ++                13:43:19
Unit ID: 00000001

                                Performance Registers

      Register          Current   24 Hour
Errored Seconds.....: 000   00000
Unavailable Seconds.....: 000   00000
Severely Errored Seconds: 000   00000
Bursty Errored Seconds..: 000   00000

Time in Interval.....: 000
# Valid Intervals.....: 000

                                Performance Register Intervals = [ENTER]

Black Box                               Jun 30, 1998
1510 T-1/FT-1 CSU/DSU ++                13:43:19
Unit ID: 00000001

                                Performance Registers Intervals
```

Chapter 6 Console Operations

INT	ES	UAS	SES	BES	INT	ES	UAS	SES	BES	INT	ES	UAS	SES	BES
01.	000	000	000	000	17.	NOT	VALID	INTV		33.	NOT	VALID	INTV	
02.	000	000	000	000	18.	NOT	VALID	INTV		34.	NOT	VALID	INTV	
03.	000	000	000	000	19.	NOT	VALID	INTV		35.	NOT	VALID	INTV	
04.	000	000	000	000	20.	NOT	VALID	INTV		36.	NOT	VALID	INTV	
05.	NOT	VALID	INTV		21.	NOT	VALID	INTV		37.	NOT	VALID	INTV	
06.	NOT	VALID	INTV		22.	NOT	VALID	INTV		38.	NOT	VALID	INTV	
07.	NOT	VALID	INTV		23.	NOT	VALID	INTV		39.	NOT	VALID	INTV	
08.	NOT	VALID	INTV		24.	NOT	VALID	INTV		40.	NOT	VALID	INTV	
09.	NOT	VALID	INTV		25.	NOT	VALID	INTV		41.	NOT	VALID	INTV	
10.	NOT	VALID	INTV		26.	NOT	VALID	INTV		42.	NOT	VALID	INTV	
11.	NOT	VALID	INTV		27.	NOT	VALID	INTV		43.	NOT	VALID	INTV	
12.	NOT	VALID	INTV		28.	NOT	VALID	INTV		44.	NOT	VALID	INTV	
13.	NOT	VALID	INTV		29.	NOT	VALID	INTV		45.	NOT	VALID	INTV	
14.	NOT	VALID	INTV		30.	NOT	VALID	INTV		46.	NOT	VALID	INTV	
15.	NOT	VALID	INTV		31.	NOT	VALID	INTV		47.	NOT	VALID	INTV	
16.	NOT	VALID	INTV		32.	NOT	VALID	INTV		48.	NOT	VALID	INTV	

Next 48 Registers = [ENTER]

Black Box Jun 30, 1998
1510 T-1/FT-1 CSU/DSU ++ 13:43:19
Unit ID: 00000001

Performance Registers Intervals

INT	ES	UAS	SES	BES	INT	ES	UAS	SES	BES	INT	ES	UAS	SES	BES
49.	NOT	VALID	INTV		65.	NOT	VALID	INTV		81.	NOT	VALID	INTV	
50.	NOT	VALID	INTV		66.	NOT	VALID	INTV		82.	NOT	VALID	INTV	
51.	NOT	VALID	INTV		67.	NOT	VALID	INTV		83.	NOT	VALID	INTV	
52.	NOT	VALID	INTV		68.	NOT	VALID	INTV		84.	NOT	VALID	INTV	
53.	NOT	VALID	INTV		69.	NOT	VALID	INTV		85.	NOT	VALID	INTV	
54.	NOT	VALID	INTV		70.	NOT	VALID	INTV		86.	NOT	VALID	INTV	
55.	NOT	VALID	INTV		71.	NOT	VALID	INTV		87.	NOT	VALID	INTV	
56.	NOT	VALID	INTV		72.	NOT	VALID	INTV		88.	NOT	VALID	INTV	
57.	NOT	VALID	INTV		73.	NOT	VALID	INTV		89.	NOT	VALID	INTV	
58.	NOT	VALID	INTV		74.	NOT	VALID	INTV		90.	NOT	VALID	INTV	
59.	NOT	VALID	INTV		75.	NOT	VALID	INTV		91.	NOT	VALID	INTV	
60.	NOT	VALID	INTV		76.	NOT	VALID	INTV		92.	NOT	VALID	INTV	
61.	NOT	VALID	INTV		77.	NOT	VALID	INTV		93.	NOT	VALID	INTV	
62.	NOT	VALID	INTV		78.	NOT	VALID	INTV		94.	NOT	VALID	INTV	
63.	NOT	VALID	INTV		79.	NOT	VALID	INTV		95.	NOT	VALID	INTV	
64.	NOT	VALID	INTV		80.	NOT	VALID	INTV		96.	NOT	VALID	INTV	

Next 48 Registers = [ENTER]

6.6.1 Set System Time

Enter the digits of the current hour, minutes, and seconds. When complete press “ESC” twice.

```
Black Box                               Jun 30, 1998                               13:43:19
1510 T-1/FT-1 CSU/DSU ++
Unit ID: 00000001

                                     System Utilities

                                     Set System Time
                                     Set System Date
*****
*                                                                              *
*Enter Hr:Min:Sec => 13:43:19      *
*                                                                              *
*               End with [ESC twice] *
*****
```

6.6.2 Set System Date

Enter the digits of the current month, day, and year. When complete press “ESC” twice.

```
Black Box                               Jun 30, 1998                               13:43:19
1510 T-1/FT-1 CSU/DSU ++
Unit ID: 00000001

                                     System Utilities

                                     Set System Time
                                     Set System Date
*****
*                                                                              *
*Enter Mon:Day:Yr => 06/30/98     *
*                                                                              *
*               End with [ESC twice] *
*****
```

6.6.3 Enter Unit Identification Number

Enter the unique digits of the unit's identification number (max of 8 digits). When complete press "ESC" twice.

```
Black Box                               Jun 30, 1998                               13:43:19
1510 T-1/FT-1 CSU/DSU ++
Unit ID: 00000001

                                     System Utilities

                                     Set System Time
                                     Set System Date
*****
*                                                                              *
*Enter New Unit ID => 00000001      *
*                                                                              *
*               End with [ESC twice] *
*****
```

6.6.4 Clear System Configuration

This function clears the current 1510's configuration and places the 1510 into a factory default configuration. For specifics of the default configuration see Section 5.5.1.2. A response of either Yes "Y", or No "N" is required.

```
Black Box                               Jun 30, 1998                               13:43:19
1510 T-1/FT-1 CSU/DSU ++
Unit ID: 00000001

                                     System Utilities

                                     Set System Time
                                     Set System Date
*****
*                                                                              *
*               Clear All Configuration!!! *
*                                                                              *
*               (Y)es or (N)o           *
*****
```

6.6.5 Configure Console

The console terminal parameters may be configured from the screen below. Four parameters are required: Speed, Parity, Data Bits, and Flow Control. Parameters for speed are 9600, 14400, 19200, 1200, 2400, and 4800. Parameters for parity are None, Even, and Odd. Parameters for data bits are 7 and 8. Parameters for flow control (XON and XOFF) are No and Yes. Use the up and down arrow keys to position the cursor adjacent to the parameter to be changed. Use the left and right arrow keys to select a desired parameter. When complete, press “ESC” twice to exit.

```
Black Box                               Jun 30, 1998
1510 T-1/FT-1 CSU/DSU ++                13:43:19
Unit ID: 00000001

                                         Console Setup

Console Port Speed.....: 9600
Console Parity.....: None
Console Data Bits.....: 8
Console Flow Control.: No
```

6.6.6 Enter New Password

The 1510 may utilize password protection. If desired, a password should be entered (maximum of eight alpha/numeric characters). This function works in conjunction with enabling the security feature. Once a password is entered, a second verification entry is required. The entered password will be requested upon entry to the console terminal function if security is enabled.

```
Black Box                               Jun 30, 1998
1510 T-1/FT-1 CSU/DSU ++                13:43:19
Unit ID: 00000001

                                         System Utilities

                                         Set System Time
                                         Set System Date
*****
*
*Enter New Password=> *****
*
*           End with [ESC twice]
*****
```

6.6.7 Enable/Disable Security

The 1510 may utilize password security for entry into the console terminal. The combination of entering a password and enabling security accomplishes this function. Once entry has been gained into the console terminal functions, it is possible to enter a new password and also to disable security.

```
Black Box                               Jun 30, 1998                               13:43:19
1510 T-1/FT-1 CSU/DSU ++
Unit ID: 00000001

                                     System Utilities

                                     Set System Time
                                     Set System Date
*****
*
*Enable/Disable    =>  Disable      *
*
*                   EXIT [ESC twice]
*****
```

6.6.8 Configure SNMP/SLIP Port

The SNMP/SLIP port parameters may be configured from the screen below. Two parameters are selectable: Speed, and Port Enable/Disable. The parameters for speed are 1200, 2400, 4800, 9600, and 19200. The parameters for Port are SNMP/SLIP and Disabled. Use the up and down arrow keys to position the cursor adjacent to the parameter to be changed. Use the left and right arrow keys to select a desired parameter. When complete, press “ESC” twice to exit.

```
Black Box                               Jul 16, 1998                               22:56:02
1510 T-1/FT-1 CSU/DSU ++
Unit ID: 00000001

                                     SNMP/SLIP Port Setup
                                     Port Mode..: Disabled
                                     Port Speed.: 1200

                                     Exit - [ESC twice]
```

6.7 SNMP/SLIP Configuration

The 1510 has a complete SNMP/SLIP management facility. Included with each 1510 is a diskette containing a MIB II compliant file which may be printed and read with any editor. The screen below allows the user to specify, community names, IP addresses, TRAP IP addresses that are required for SNMP operation.

```
Black Box                               Jul 16, 1998
1510 T-1/FT-1 CSU/DSU ++                23:12:16
Unit ID: 00000001

                                     Snmp Variable Configuration

Local IP Address..: 124.123.123.123
Trap IP Address...: 255.255.255.255
Get Community.....: public
Set Community.....: netman
Trap Community....: public
Circuit Identifier:

                                     Arrow Keys to position cursor in IP address
                                     Select entry to change [ENTER]
                                     Exit - [ESC twice]
```

APPENDIX A: PRBS (Pseudo-Random Bit Sequence)

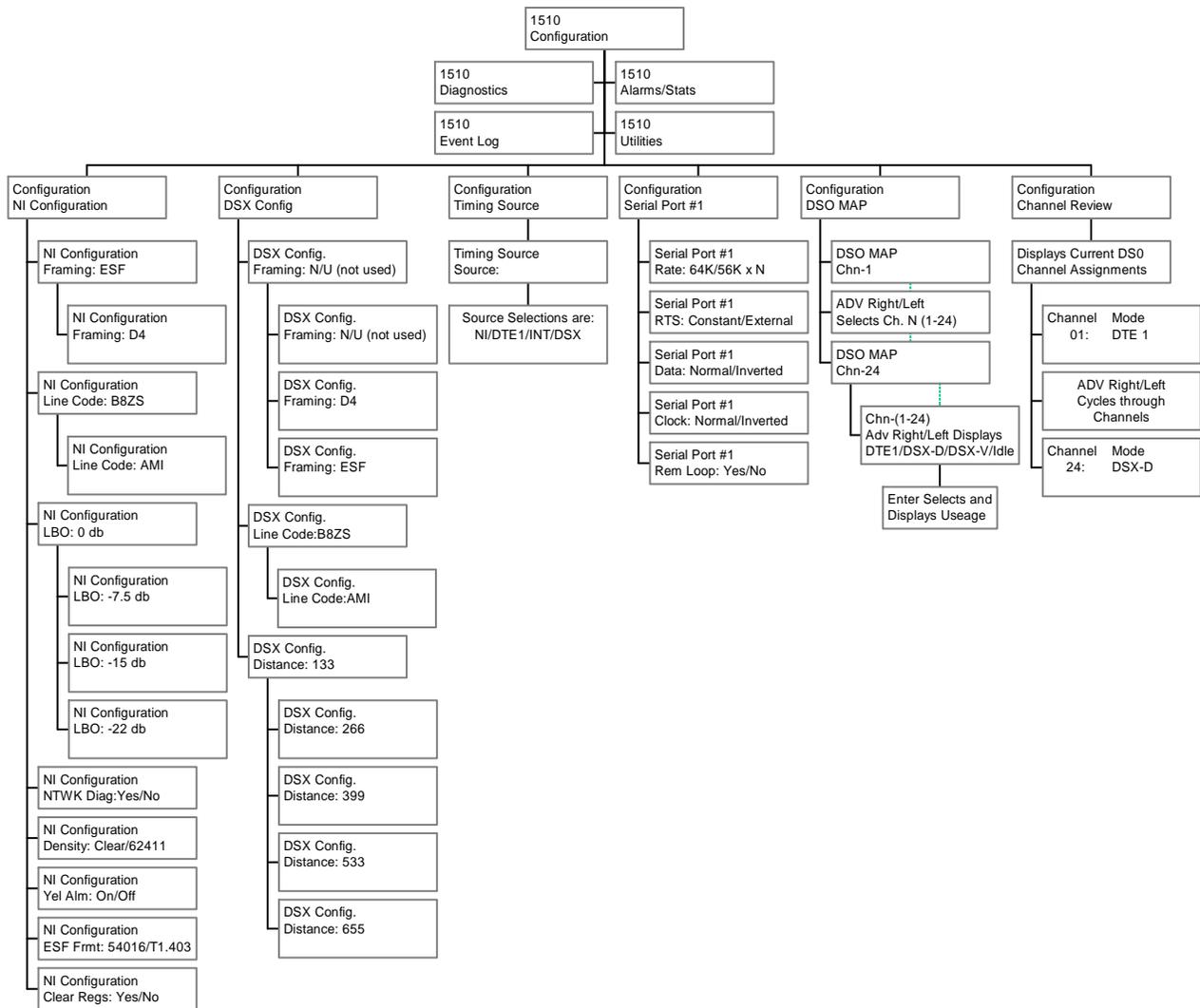
PRBS (Pseudo-Random Bit Sequence) is defined in CCITT G.732, and consists of a 15-stage shift register that generates every combination of 15-bit words, and repeats every 32,767 bits.

The pattern is generated in a 15-stage register whose 14th and 15th stage outputs are added in a modulo-two addition stage, and the result fed back to the input of the first stage.

This test pattern can be used in conjunction with a local loopback to test the local 1510 T1/FT1 CSU/DSU's integrity. It can also be used in conjunction with remote loopback to test a remote 1510 T1/FT1 CSU/DSU and its associated E1 network line quality.

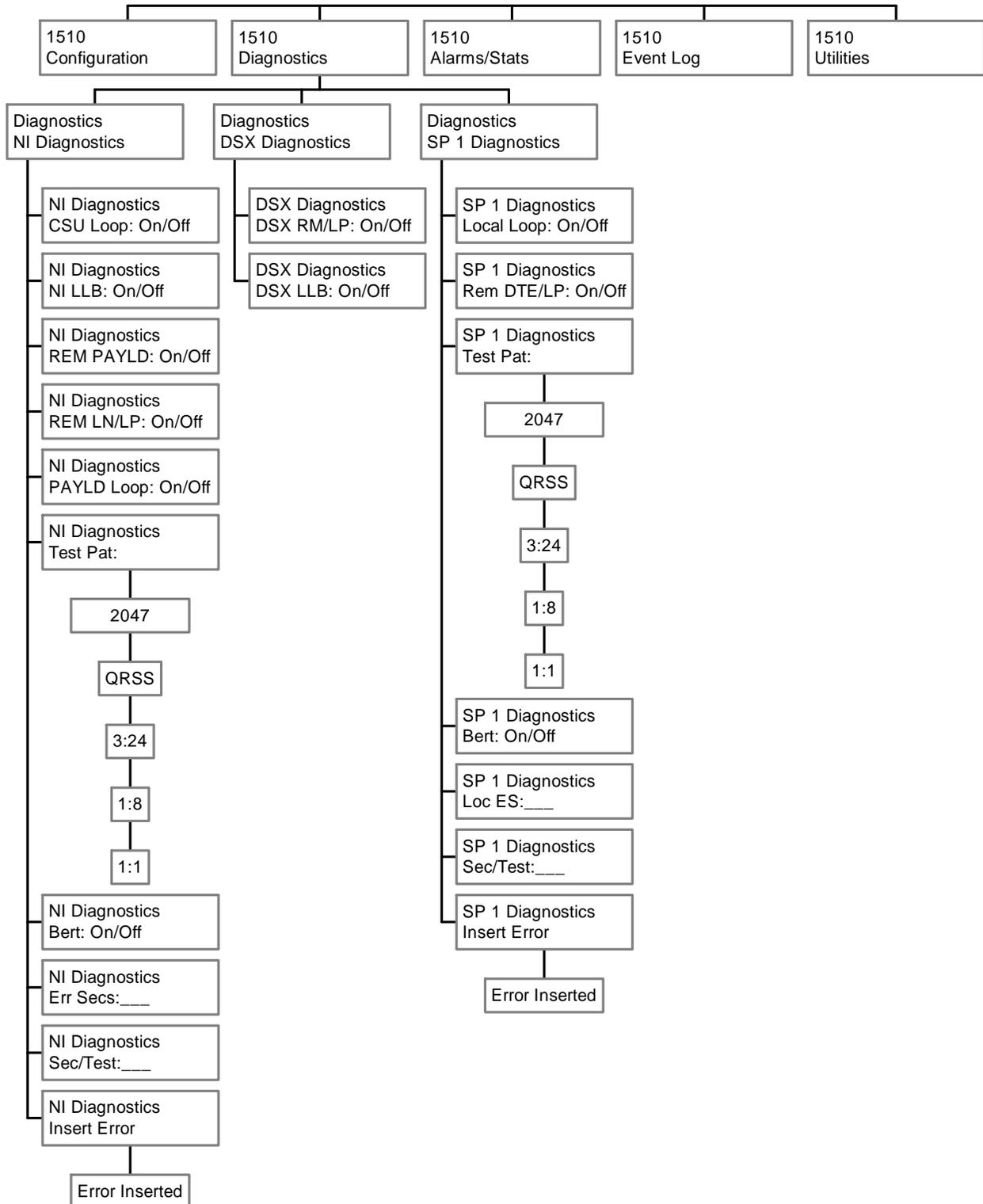
APPENDIX B: Menu Tree

1510 Configuration Menu Tree



Appendix B: Menu Tree

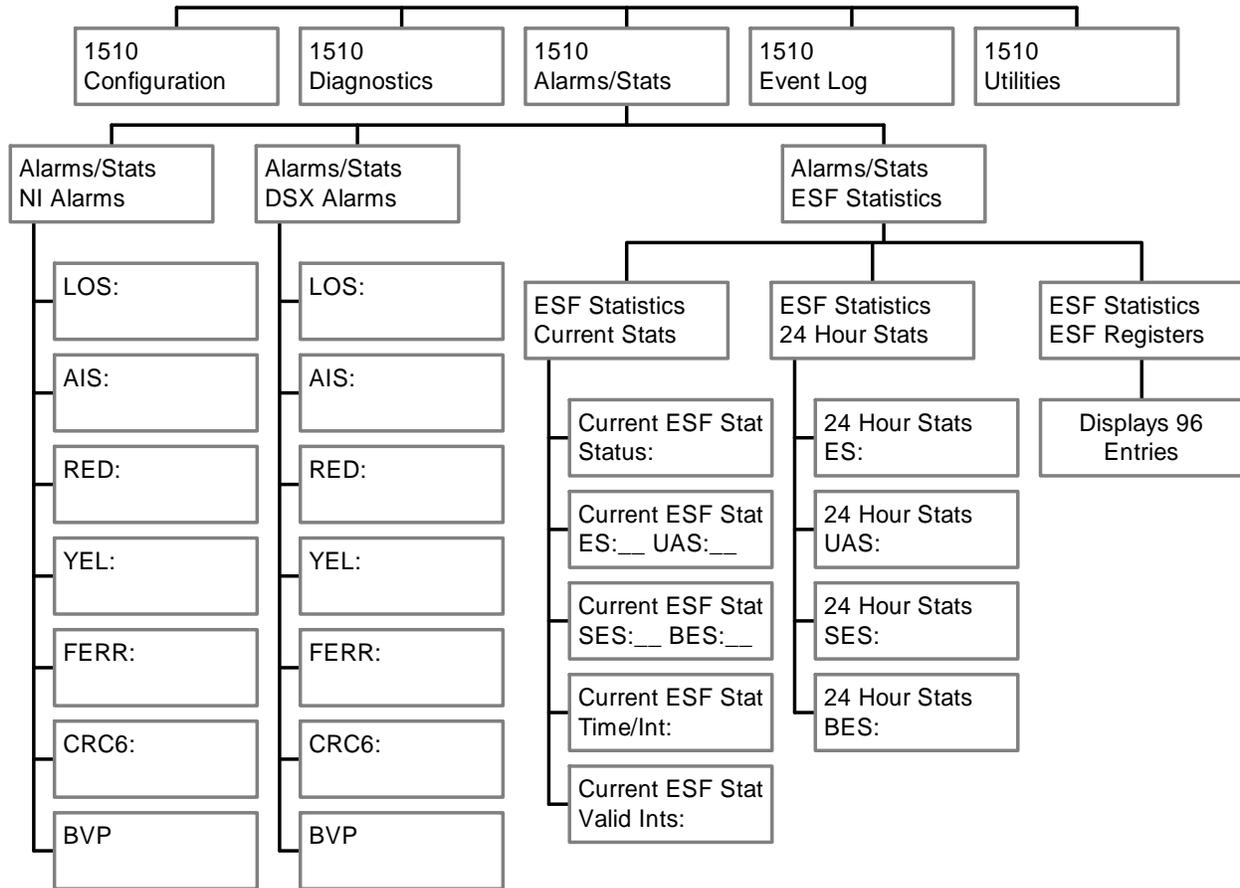
1510 Diagnostics Menu Tree



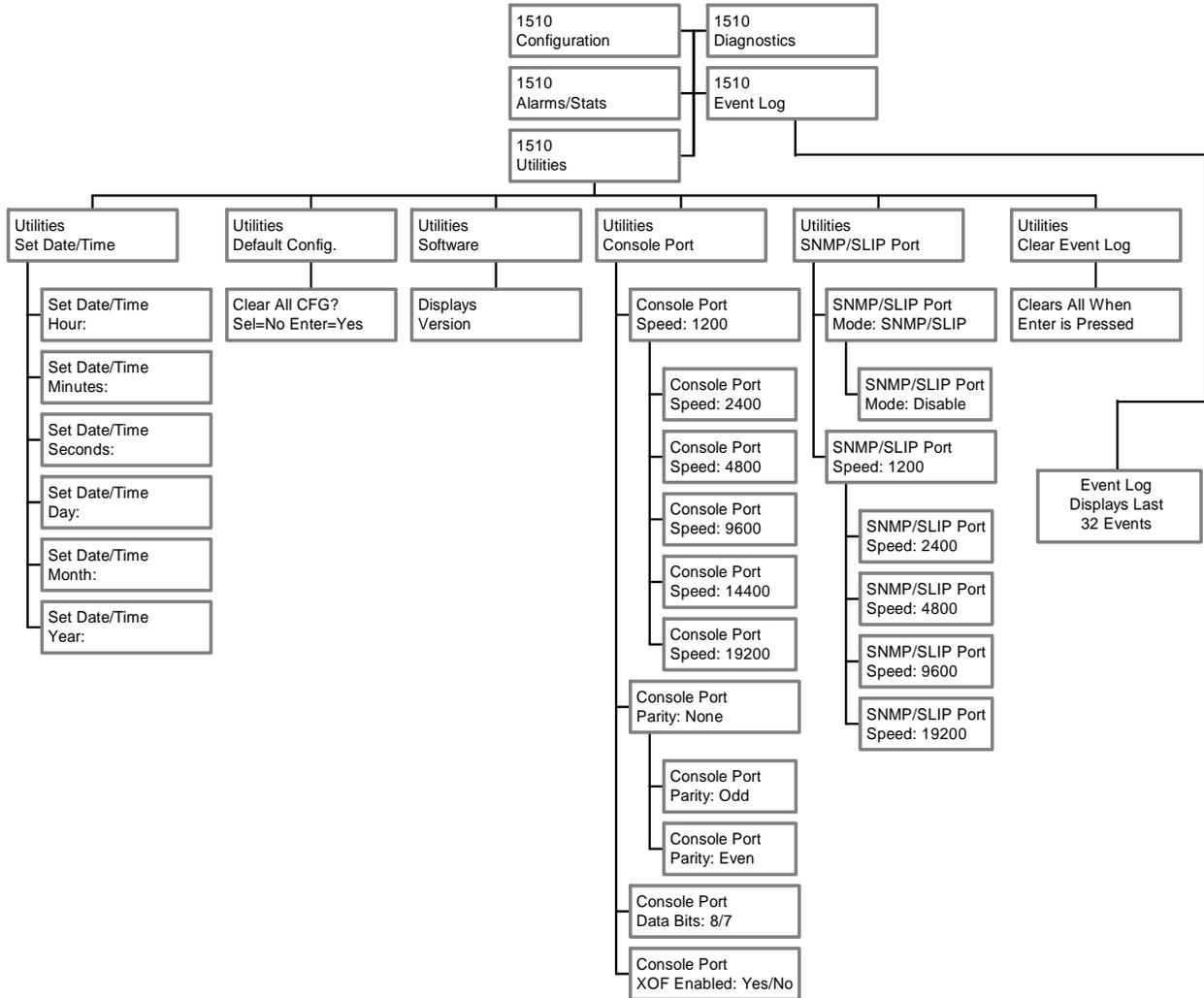
Appendix B: Menu Tree

1510 Alarms/Stats

Menu Tree



1510 Event Log and Utilities Menu Tree



APPENDIX C: Glossary of Abbreviations

A

AIS Alarm Indication Signal
AMI Alternate Mark Inverting
ANSI American National Standards Institute

B

BPV Bipolar Violation

C

CSU Channel Service Unit
CTS Clear to Send

D

D&I Drop and Insert
DACS Digital Access Cross-Connect System
DSR Data Set Ready
DSU Data Service Unit
DTE Data Terminal Equipment
DTR Data Terminal Ready

H

HDB3 High Density bipolar of order 3

L

LAN Local Area Network
LLB Line Loopback
LOFS Loss of Frame Sync
LOS Loss of Signal

N

NI Network Interface

O

OOF Out of Frame

P

PBX Private Branch Exchanges
PLB Payload Loopback
PLL Phase Lock Loop
PRBS Pseudo-Random Bit Sequence

R

RAI Remote Alarm Indicator
RTC Real Time Clock
RTS Request to Send

S

SNMP Simplified Network Management Protocol

T

TE Terminal Equipment
TTM Terminal Timing Mode

W

WAN Wide Area Network