



TSU 120

PART NUMBER 1200129L1

USER MANUAL



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

1. This equipment complies with Part 68 of the FCC rules. The required label is affixed to the bottom of the chassis.
2. An FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant. See Installation Instructions for details.
3. If your telephone equipment TSU 120 causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice isn't practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.
4. Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If they do, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.
5. If you experience trouble with this equipment TSU 120, please contact ADTRAN at (205) 971-8000 for repair/ warranty information. The telephone company may ask you to disconnect this equipment from the network until the problem has been corrected, or until you are sure the equipment is not malfunctioning.
6. This unit contains no user-serviceable parts.
7. The following information may be required when applying to your local telephone company for leased line facilities.

Service Type	Digital Interface Code	Facility Code	Service Order Code	Network Jacks
1.544 Mbps Digital Interface SF	04DU9-BN		6.0F	RJ-48C
1.544 Mbps Digital Interface SF with B8ZS	04DU9-DN		6.0F	RJ-48C
1.544 Mbps Digital Interface ESF	04DU9-1KN		6.0F	RJ-48C
1.544 Mbps Digital Interface ESF with B8ZS	04DU9-1SN		6.0F	RJ-48C

**FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE STATEMENT:**

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

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



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

AFFIDAVIT REQUIREMENTS FOR CONNECTION TO DIGITAL SERVICES

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

**AFFIDAVIT FOR CONNECTION OF CUSTOMER PREMISES
EQUIPMENT TO 1.544 MBPS AND/OR SUBRATE DIGITAL SERVICES**

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

State of _____

County of _____

I, _____ (name), _____

(business address), _____ (telephone number) being

duly sworn, state:

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

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

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

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

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

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

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

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

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

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

_____ Signature

_____ Title

_____ Date

Transcribed and sworn to before me

This _____ day of _____, 199____

Notary Public

My commission expires:

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Chapter 1

Introduction

TSU 120 OVERVIEW

A functional description of the T1 multiplexers, a description of the TSU 120 rear panel, and a summary of the features of the TSU 120 is provided in this section. The unit is shown in Figure 1-1.

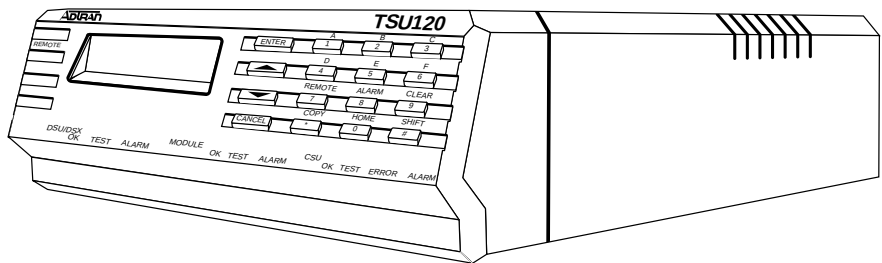


Figure 1-1
Front View of the TSU 120

Functional Description

The ADTRAN TSU 120 is one of several T1 multiplexers that offers complete flexibility for connection of various data sources to T1 or FT1 facilities. This family of TSU multiplexers includes the TSU, TSU 100, TSU 120, and the TSU 600.

TSU

The TSU is a T1 CSU/DSU with a single Nx56/64 serial port.

TSU 100

The TSU 100 is the same as the TSU with the added feature of a slot in the rear panel to house an option module. Each module offers up to four additional data ports.

TSU 120

The TSU 120 is the same as the TSU 100 with the addition of a DSX-1 PBX interface to the base of the unit.

TSU 600

The TSU 600 is the same as the TSU with the added feature of six slots in the rear panel to house up to six option modules. Each module offers up to four additional data ports for a total of 24 possible data ports.

The TSU 120 serves as the link between user data sources such as local area network (LAN) bridges and routers, computers, CAD systems, teleconferencing equipment, and PBXs. Through the use of multiple data ports, the TSU 120 can simultaneously connect one or more of these devices to a T1 circuit. The amount of bandwidth allocated to each port is custom programmable. The bandwidth allocation can be changed manually or set to automatically change at predetermined times to use the available bandwidth most advantageously. Changes in the configuration are accomplished without disrupting data flow in channels that are not being re-configured. The unique architecture and the availability of the option modules provides a path for growth to accommodate future requirements.

Identification of Rear Panel Layout

The configuration of the rear panel of the TSU 120 is shown in Figure 1-2.

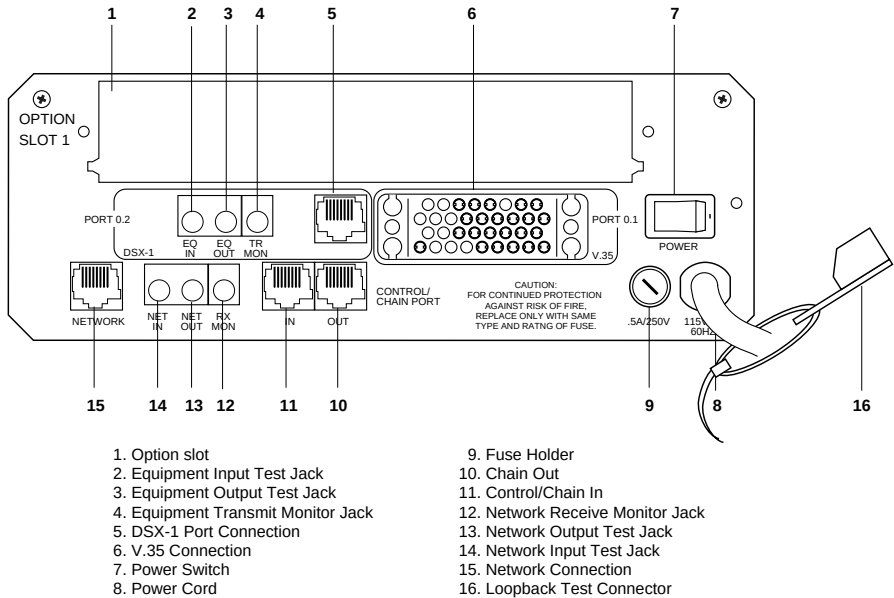


Figure 1-2
TSU 120 Rear Panel

The items called out on the TSU 120 rear panel in Figure 1-2 are defined in the following list:

Option Slot	Receptacle for option cards
Equipment Input Test Jack	Input test jack for the terminal equipment
Equipment Output Test Jack	Output test jack for the terminal equipment
Equipment Transmit Monitor Jack	Monitor jack for the transmit equipment output

DSX-1 Port Connection	RJ-45 connector for the DSX-1 port (terminal equipment)
V.35 Connection	High-speed V.35 digital data interface
Power Switch	Used to turn power on or off
Power Cord	Input of permanent power cord
Fuse Holder	Placement of .5 A / 250 V fuse
Chain Out	Connect to other TSU for control
Control/Chain In	Control input
Network Receive Monitor Jack	Monitor test jack for the incoming T1
Network Output Test Jack	Output test jack for T1 interface
Network Input Test Jack	Input test jack for T1 interface
Network Connection	Used to connect to the T1 network
Loopback Test Connector	T1 loopback connector for troubleshooting T1 installations

Features of the TSU 120

The TSU 120 offers the following features:

- A DS1 network interface, a DSX-1 PBX interface, and an Nx56/64 DTE serial interface port
- An inband communication channel requiring only 8 K of bandwidth from a single DS0
- A slot to house option modules with up to four additional data ports including voice
- Allows mix of port types to meet the data interface requirements
- Easy configuration capabilities using simple menus displayed in a liquid crystal display (LCD) window operated by a front panel keypad
- Two programmable configuration maps that define the bandwidth allocation between data ports
- Data drop and insert, as well as full drop and insert
- Flash memory for software updates
- Timing is selectable from the network, from the DSX-1 interface, from the Nx56/64 DTE port, internally, or from a secondary interface
- QRSS; 511 test patterns
- Extensive self test and monitoring provides assurance of proper operation
- Manageable by ADTRAN T-Watch or SNMP (with ADVISOR)
- A terminal mode for configuration using a VT-100 type terminal

Interfaces

The TSU 120 base unit is equipped with a slot in the rear panel to house option modules which provide a variety of additional data ports. See Figure 1-3.

The base unit is equipped with the following five interfaces:

- Network DSI interface per AT&T 61402
- DSX-1 (PBX)
- Nx56/64 serial V.35 high-speed interface
- Control input (RS-232)/Chain port input
- Chain port output

The option modules which are designed to slide into the rear panel option slot can have up to four interfaces. The following modules are currently available:

- DSX-1 (PBX)
- Nx56/64 - single or dual
- Voice (FXS/FXO/4E&M/4T0) - 2 channels/4 channels
- Office Channel Unit Data Port (OCU DP) - single or dual
- Full drop and insert
- Dial backup

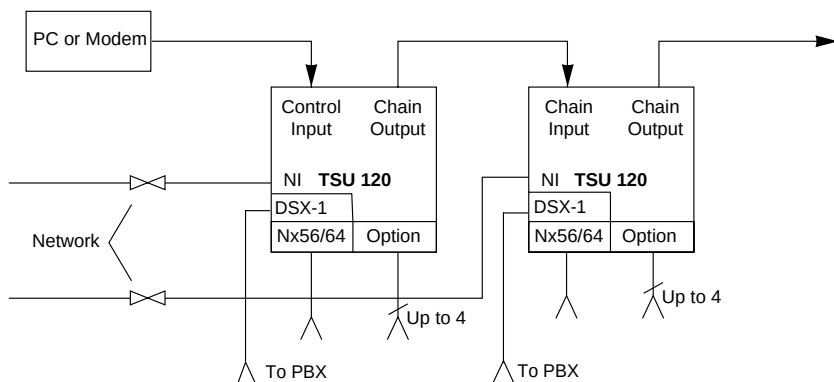


Figure 1-3
TSU 120 Interfaces

TSU 120 INTERFACES

The Network Interface (NI) port complies with the applicable ANSI and AT&T standards.

Network Interface

The NI provides the following functions:

- AMI or B8ZS coding
- Automatic or manual line build out
- D4 or ESF framing
- Network performance monitoring and reporting
- Test loopbacks with QRSS generation and checking
- Extensive self test

DSX-1 (PBX) Interface

The DSX-1 interface provides the following functions:

- DSX-1 per ANSI T1.102
- AMI or B8ZS coding
- D4 or ESF framing (independent of network interface)
- Adjustable line length up to 655 feet
- Test loopback
- Extensive self test

Nx56/64 Serial Interface

The Nx56/64 serial interface provides the following functions:

- Data rates: Nx56k or Nx64k, where N = 1 to 24 (DS0s)
- Inverted data (inverted HDLC)
- A V.35 interface
- Standard V.35 Winchester connector
- Elastic stores for tail circuit applications
- Test loopbacks with 511 pattern generation and check
- Extensive self test

Control Port Input

The control port input provides the following functions:

- RS-232 input from a PC or a modem for control of the TSU 120
- Chain input from another TSU 120
- Up to 9600 baud operation
- Acts as input for PC control or as input for a chained connection
- Input for flash memory software downloads

Chain Port Output

The chain port output provides the following functions:

- RS-232 output to chain control to other TSUs
- Up to 9600 baud operation
- Automatic setup; no user input required

OPTION PORTS

The option ports vary depending on the option modules installed.

Secondary Interfaces (SI)

The secondary interface is an additional interface to a DS1, a DSX1 facility, or some other network service, and it offers a source of timing. The type of interface depends on the option module installed. The interface includes the following:

- **DSX1** An additional DSX-1 interface can be added for data or voice applications.
- **Full Drop and Insert** Permits the dropping of data and insertion of new data into the same DS0 time slot. This SI module includes a long-haul DS1 interface.

Other Data Interfaces

Additional data interfaces can be installed in the option slot, and include the following:

- **Nx56/64 Serial Interface** This module is the same as the base Nx interface but offers single or dual V.35 ports.
- **Voice Interface**
- **OCU DP** Interfaces to DDS or 4-wire Switched 56.

Dial Backup

Permits a dial up circuit to backup some or all of the T1 bandwidth. Operates with an external DCE.

FOUR METHODS OF CONTROL

Front Panel

The front panel provides complete and easy control of all items that can be configured through menu guided options. The front panel LCD also displays the status of operation and performance reports for the unit. A complete discussion of the operation of the front panel and all the menu options is found in the chapter, *Operations*.

ADTRAN PC Program

T-Watch is the ADTRAN PC control program. It provides complete control over the configuration of the TSU 120 using a graphical interface. The T-Watch program displays the same status and performance data as the front panel LCD. This data is displayed in the form of tables and graphs.

The T-Watch program has the following capabilities:

- Interfaces with a modem which permits dialing into a remote TSU 120 location to configure the unit or read the status or performance of the unit
- Receives traps from the TSU 120 network alarm

SNMP

The ADTRAN TSU 120 supports the Simple Network Management Protocol (SNMP) through an ADTRAN proxy agent. The proxy agent runs on a PC and can interface to the TSU 120 directly or through a modem, in the same manner as the T-Watch PC program.

Terminal Mode

The TSU 120 provides the front panel menus to a VT-100 type terminal. This mode can be used to configure and monitor the unit. This mode can be initiated by typing **control + PTT** on the terminal once it is connected to the **Control In** port.

TSU 120 CLOCK SOURCES

The TSU 120 is operable from various clock sources, permitting it to perform properly in many different applications. The network interface clocking options are set by using the clocking options set by using the Network (NI) Configuration menu options. The following clock source options are available:

- Network
- Base DSX-1
- DTE Timed
- Internal Timing
- Secondary Timed
- Normal (CSU)



NOTE

The clock option selected always designates the clock source for transmission. Clocking necessary for receiving data is always recovered from incoming data.

Network Timed

The network is the source of timing. The received data clocking is looped back to the network where it is used to determine the transmission timing. This option is also referred to as *looped timed* as the transmission clock is derived from the received clock. See Figure 1-4.

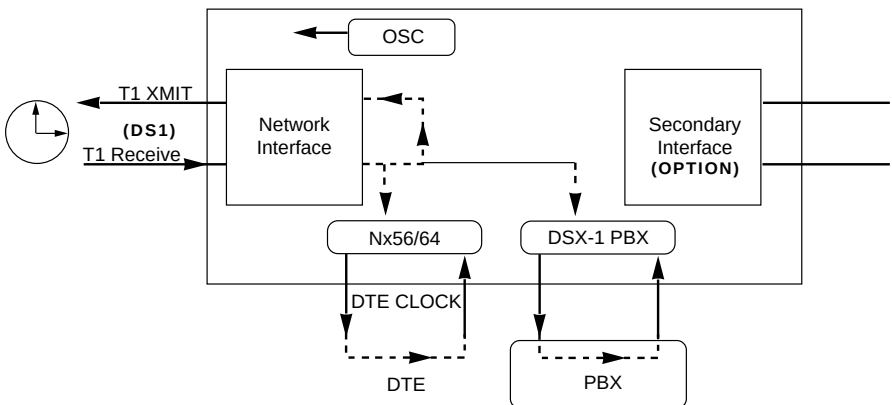


Figure 1-4
Network Timed Clock Source

DSX-1 Timed

The PBX is the source of timing. The TSU 120 uses the clock derived by the Base DSX-1 interface for transmission timing (see Figure 1-5).



The Base DSX-1 source timing is restricted from use when a secondary interface is used at the same time.

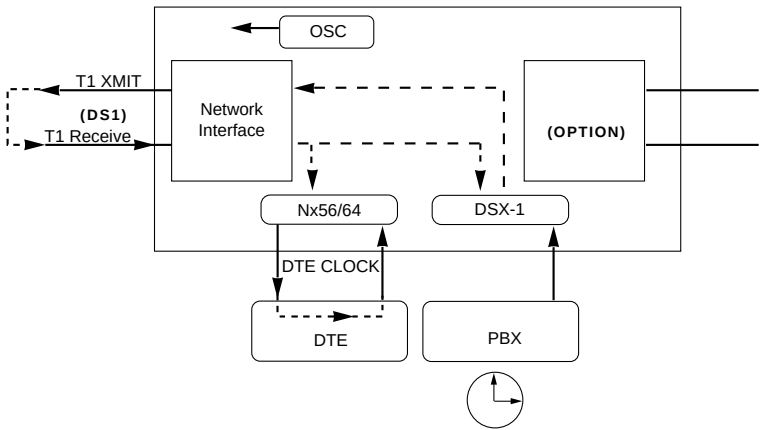


Figure 1-5
DSX-1 Timed Clock Source

DTE Timed

The DTE is the source of timing. The TSU 120 uses the incoming DTE clock to determine the transmission timing. This is typically used in applications where it is necessary to have the DTE as the primary clock source, (such as limited distance line drivers). See Figure 1-6.



The DTE source timing is restricted from use when a secondary interface is used at the same time.

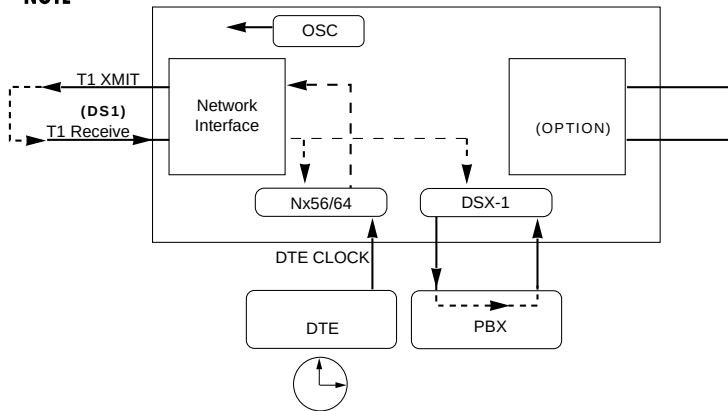


Figure 1-6
DTE Clock Source

Internal Timing

The TSU 120 is the source of timing. The TSU 120 is configured to use its own internal oscillator as the source of timing. Applications include private line driver circuits where one end is set to network and the other to internal. See Figure 1-7.



NOTE

The internal source timing is restricted from use when a secondary interface is also used.

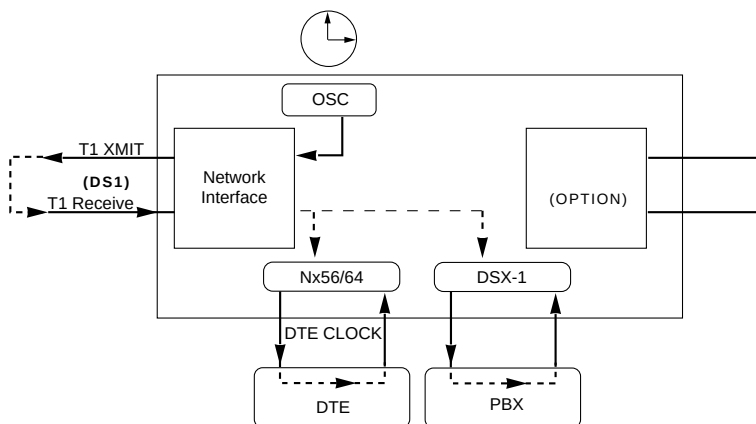


Figure 1-7
Internal Clock Source

Normal (CSU) Timing

The typical timing option arrangement is shown in Figure 1-8. The PBX is looped timed sending data to the TSU 120 which is actually synchronous to the received data. The Network Interface (NI) is the actual source of all timings. This timing option is the same as that typically used for CSUs. This is the preferred mode for use with a PBX application.

This timing mode works equally well when the PBX is the source of timing. In that configuration the network would not be providing timing.

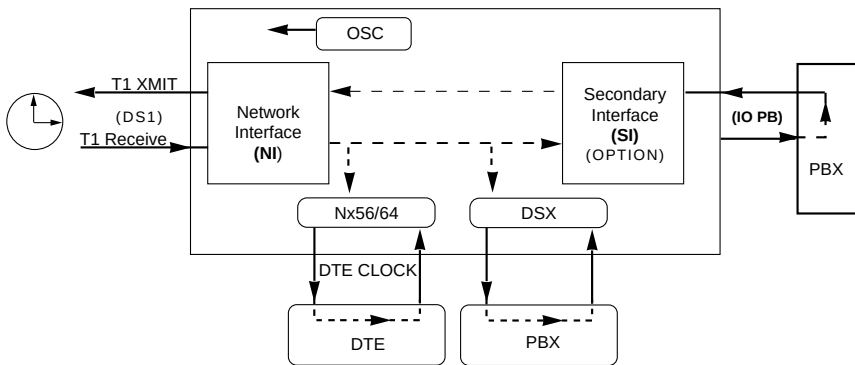


Figure 1-8
Normal (CSU)



NOTE

The network interface and secondary interface clocking options are set by using the Network (NI) Configuration menu options.

TSU 120 TESTING

The TSU 120 offers three forms of testing:

- Self test
- Loopback tests (local and remote)
- Pattern generation and check

Self Tests

The self test checks the integrity of the internal operation of the electronic components by performing memory tests and by sending and verifying data test patterns through all internal interfaces. Although actual user data cannot be passed during these tests, the self test can be run with the network and DTE interfaces in place and will not disturb any external interface.

The memory portion of the self test automatically executes upon power up. A full self test can be commanded from a front panel menu or from T-Watch.

In addition to the specified self tests, background tests are also run on various parts of the internal electronics. These run during normal operation to confirm continued correct functioning. The background tests include:

- Monitoring the phase locked loop for lock
- Sending test data through a parallel path which is looped back and verified
- The standard background network performance monitoring, as required by ANSI T1.403 and AT&T 54016 specifications for which the results are stored

Loopback Tests

A number of different loopbacks can be invoked locally from the front panel, by T-Watch commands, or remotely by using special in-band codes (AT&T D4 network loop up and loop down codes; V.54 loop up / loop down codes for the Nx56/64 serial interface).

Additionally, the loopbacks can be remotely controlled by out-of-band commands through the T1 ESF FDL or from T-Watch through a modem connection.

Classes of Loopbacks



There are two classes of loopbacks: network interface and DTE interface.

Network Interface Loopbacks

Network interface loopbacks (see Figure 1-9) affect the entire T1 data stream. There are two types of network loopbacks, line loopback and payload loopback.

Line loopback loops all of the received data back toward the network. The transmitted data is the identical line code that was received, including any bipolar violations or framing errors.

Payload loopback is similar to line loopback, except that the framing is extracted from the received data and then regenerated for the transmitted data.

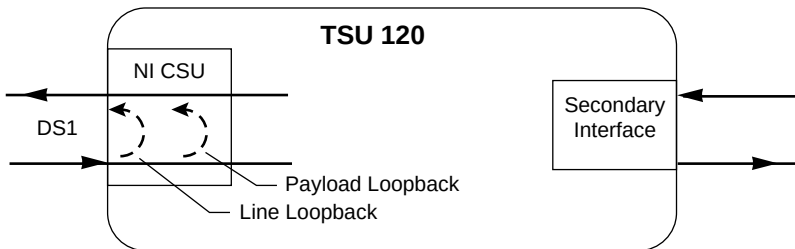


Figure 1-9
Network Loopback Tests

DTE Interface Loopbacks

DTE interface loopbacks affect only that portion of the data stream programmed to that particular interface port. The Nx56/64 serial interface offers two loopbacks, a DTE loopback and a port loopback. See Figures 1-10 and 1-11.

DTE loopback loops all data from the DTE back towards the DTE. This loopback occurs just past the interface circuit allowing a verification of the operation of the DTE to TSU 120. This loopback may be initiated by using front panel or T-Watch commands. The DTE (or external test equipment) must provide anytest pattern to check the DTE interface. See Figure 1-10.



The TSU 120 also activates a port loopback when the DTE loopback is asserted.

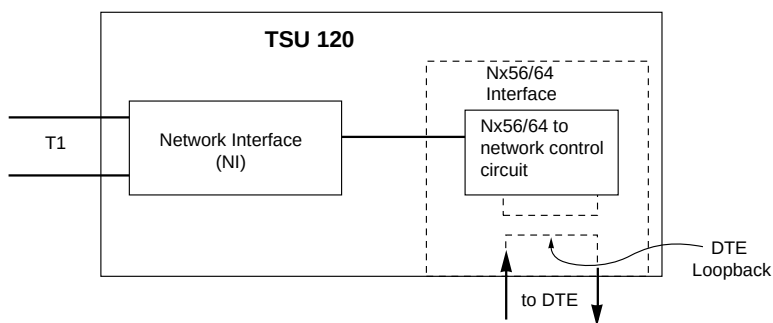


Figure 1-10
DTE Interface Loopback

Port loopback loops that portion of the network bandwidth programmed for a port back toward the network. This loopback occurs within the port electronics, but before the DTE interface. See Figure 1-11. The port loopback also automatically activates the DTE loopback looping the DTE data back on itself. The port loopback is activated by command from the front panel or from the T-Watch program. The port loopback at the far end can be activated by command from the front panel or from T-Watch.

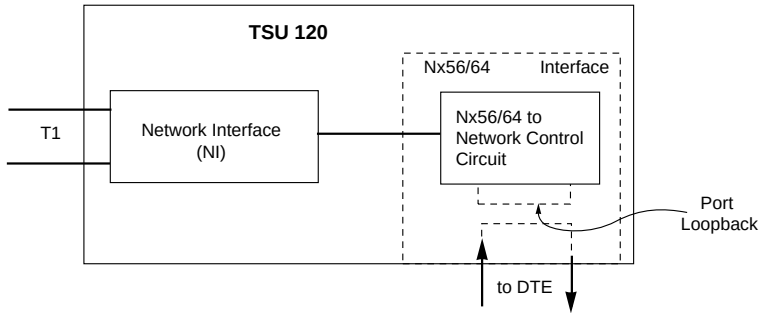


Figure 1-11
Port Interface Loopback

DSX-1 Interface Loopbacks

Line Loopbacks

On the DSX-1 interface, the line loopback causes data received at the DSX-1 to be looped back toward the PBX achieving a local loopback.

Port Loopback

The port loopback is internal and loops all data mapped to the DSX-1 back toward the network interface on the controller. The loopback, when used in conjunction with an external bit error rate tester (BERT) to drive the network interface, exercises the entire data path from the network interface (NI) controller, through the DSX-1 interface, and back out the network interface controller. See Figure 1-12.

To deactivate the loopback, select None under the 0.2 DSX-1 submenu.

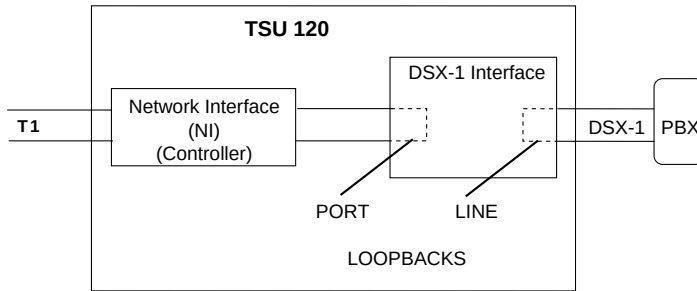


Figure 1-12
Diagram of Loopbacks

Pattern Generation

The TSU 120 offers two available test Patterns: QRSS and 511.

QRSS Pattern

The QRSS pattern is commonly used to simulate real data in T1 interfaces. This pattern can be assigned to appear in all DS0s or only in TST DS0s. When QRSS is set in all DS0s and one of the network loopbacks previously described is activated at the far end, a total end-to-end integrity check can be run without the need for any external test equipment. When QRSS is assigned to TST DS0s, an integrity check of the link can be run along with normal data flow. The TST DS0s are user assigned as part of the DS0 Map.

511 Pattern

The 511 pattern is generated and checked by the Nx56/64 serial interface. It only appears in the DS0s assigned to the Nx56/64 port which is generating the pattern. When used in conjunction with the port loopback at the far end as previously described, an end-to-end integrity check can be made on the DTE ports.

Chapter 2

Installation

UNPACK, INSPECT, POWER CONNECTION

Carefully inspect the TSU 120 for any shipping damages. If damage is suspected, file a claim immediately with the carrier and then contact ADTRAN Customer Service. If possible, keep the original shipping container for use in shipping the TSU 120 back for repair or for verification of damage during shipment.

Shipped by ADTRAN

The following items are included in the ADTRAN shipment:

- The TSU 120 unit
- A line interface cable: an eight-position modular to eight-position modular
- The user manual

Provided by Customer

The following items must be supplied by the customer:

- DTE cable(s)
- Cables for any expansion modules to be used with the TSU 120

Power Connection

Each TSU 120 unit is equipped with a captive eight-foot power cord, terminated by a three-prong plug which connects to a grounded power receptacle.

Power to the TSU 120 must be from a grounded 115 VAC, 60 Hz source.

WARRANTY AND CUSTOMER SERVICE

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

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

For Service, RMA requests, or more information, contact ADTRAN Customer Service listed on the last page of this manual.

GROUNDING INSTRUCTIONS (UL 1459)

Grounding instruction information from the Underwriters' Laboratory *UL 1459 Standard for Safety: Telephone Equipment*, of September 20, 1993, is provided in this section.

An equipment grounding conductor that is not smaller in size than the ungrounded branch-circuit supply conductors is to be installed as part of the circuit that supplies the product or system. Bare, covered, or insulated grounding conductors are acceptable. Individually covered or insulated equipment grounding conductors shall have a continuous outer finish that is either green, or green with one or more yellow stripes. The equipment grounding conductor is to be connected to ground at the service equipment.

The attachment-plug receptacles in the vicinity of the product or system are all to be of a grounding type, and the equipment grounding conductors serving these receptacles are to be connected to earth ground at the service equipment.

A supplementary equipment grounding conductor shall be installed between the product or system and ground that is in addition to the equipment grounding conductor in the power supply cord.

The supplementary equipment grounding conductor shall not be smaller in size than the ungrounded branch-circuit supply conductors. The supplementary equipment grounding conductor shall be connected to the product at the terminal provided, and shall be connected to ground in a manner that will retain the ground connection when the product is unplugged from the receptacle. The connection to ground of the supplementary equipment grounding conductor shall be in compliance with the rules for terminating bonding jumpers at Part K or Article 250 of the National Electrical Code, ANSI/NFPA 70. Termination of

the supplementary equipment grounding conductor is permitted to be made to building steel, to a metal electrical raceway system, or to any grounded item that is permanently and reliably connected to the electrical service equipment ground.

Bare, covered, or insulated grounding conductors are acceptable. A covered or insulated grounding conductor shall have a continuous outer finish that is either green, or green with one or more yellow stripes.

WIRING

Network

The rear panel of the TSU 120 has an eight-position modular jack labeled **NETWORK**. This connector is used for connecting to the network. See Table 2-A for the pinout for the network connector.

Connections

The network connections are as follows:

Connector type (USOC) RJ-48C
Part number AMP# 555164-2

Table 2-A
Network Pinout

PIN	NAME	DESCRIPTION
1	R1 RXDATA-RING	Receive data from the network
2	T1 RXDATA-TIP	Receive data from the network
3	UNUSED	
4	R TXDATA-RING	Send data toward the network
5	T TXDATA-TIP	Send data toward the network
6,7,8	UNUSED	

Control In/Chain In

This is used as an RS-232 port for connection to a computer or modem (Control In) or to another TSU 120 (Chain In). See Table 2-B for the pinout for the control/chain in connector.

Connections

The chain in connections are as follows:

Connector type RJ-48

Part number AMP# 555164-2

Table 2-B
Control In/Chain In Pinout

PIN	NAME	DESCRIPTION
1	GND	Ground - Connected to unit chassis
2	RTS	Request to send - Flow control
3	RXDATA	Data received by the TSU 100
4	UNUSED	
5	TXDATA	Data ransmitted by the TSU 100
6,7	UNUSED	
8	CTS	Clear to send - Flow control

Chain Out

This is used to connect to another TSU 120 Chain In connector. See Table 2-C for the pinout for the chain out connector.

Connections

The chain out connections are as follows:

Connector type RJ-48
Part number AMP# 555164-2

Table 2-C
Chain Out Pinout

PIN	NAME	DESCRIPTION
1	GND	Ground - Connected to unit chassis connected to GND of next unit (Pin 1).
2	UNUSED	
3	TX DATA	Data transmitted to chained units by the TSU 100. Connected to RX DATA of the next unit (Chain in Pin 3).
4	UNUSED	
5	RX DATA	Data received from chained units by the TSU 100. Connected to TX DATA of the next unit (Chain in Pin 5).
6,7,8	UNUSED	

Nx56/64 DTE (V.35)

See Table 2-D for the V.35 pinout Nx56/64 DTE pinout.

Connections

The DTE interface pinout is as follows:

Connector type V.35
Part number AMP# 92-4883-3-1

Table 2-D
V.35 Pinout - Nx56/64 DTE

PIN	NAME	DESCRIPTION
A	101	Protective ground (PG)
B	102	Signal ground (SG)
C	105	Request to send (RTS) from DTE
D	106	Clear to send (CTS) to DTE
E	107	Data set ready (DSR) to DTE
F	109	Received line signal detector (DCD) to DTE
L, J	-	Local loopback (LL)*
N, BB	-	Remote loopback (RL)*
R	104	Received data (RD-A) to DTE
T	104	Received data (RD-B) to DTE
V	115	RX clock (RC-A) to DTE
X	115	RX clock (RC-B) to DTE
P	103	Transmitted data (TD-A) from DTE
S	103	Transmitted data (TD-B) from DTE
Y	114	TX clock (TC-A)
AA	114	TX clock (TC-B)
U	113	External TX clock (ETC-A) from DTE
W	113	External TX clock (ETC-B) from DTE
NN, K	-	Test mode (TM) to DTE

*Ignored by TSU

Base DSX-1 (PBX)

The DSX-1 has an RJ-48C connector as defined in Table 2-E.

Table 2-E
Pinout Connectors for Eight-Position Modular Jack Interface

PIN	NAME	DESCRIPTION
1	R1 TXDATA-RING	Send data towards the DTE (PBX)
2	T1 TXDATA-TIP	Send data towards the DTE (PBX)
3	UNUSED	-
4	R RXDATA-RING	Receive data from the DTE (PBX)
5	T RXDAT-TIP	Receive data from the DTE (PBX)
6,7,8	UNUSED	-

POWER UP TESTING AND INITIALIZATION

When shipped from the factory, the TSU 120 is set to factory default conditions. At the first application of power, the unit automatically executes a memory self test. A full self test can be run from the front panel, and a pass code and unit ID may be set using the UTIL menu.

Self Test

Upon a power-up, the LCD displays Memory Test Now Testing and the Test LEDs are illuminated. When the self test is completed with no failures detected, the OK LED lights up and the LCD momentarily displays All Tests Passed. If a failure is detected a list of failures is displayed in the LCD window. The full self test procedure (invoked from the front panel or T-Watch) consists of the following steps:

1. Board level tests. Each of the TSU 120 board contains an on-board processor which executes a series of tests checking the circuitry on the board.
 - a. RAM tests; EPROM checksum
 - b. DS0 map tests
 - c. On-board data path. Sending a known test pattern through an on-board loop.
2. Unit level tests.
 - a. Front panel LED verification
 - b. Phase locked loop verification
 - c. Board-to-board interface test. A test pattern is sent from the controller through a loopback on all other boards and checked on the controller. This verifies the data path, clocks, and control signals.

Set User Passcode

The TSU 120 is designed to operate with or without the use of a passcode.



NOTE

The passcode should be a number easily remembered. Once entered, the passcode is required to access any operation other than viewing.

To Establish a Passcode

Select Set Passcode (item 3) under the UTIL menu. At the New Passcode prompt, use numbers from the front panel of the keyboard to enter a unique number up to four digits.

After pressing **Enter** a verification prompt is displayed. Respond to the verification prompt by repeating the same passcode number.

If the two entries match, the unit accepts the passcode. If they do not match, the unit returns to the new passcode entry field for another attempt.



NOTE

If the unit is to be remotely accessed using T-Watch, a passcode must be entered. When managing a number of units, the passcode can be the same for all.

Special Feature

For added security protection the unit is equipped with an automatic time out for operation with the passcode. After ten minutes of inactivity, the unit reverts to limited access operation. To make changes in the configuration, the passcode must be reentered. See the section *Passcode* in the *Operation* chapter for further information concerning passcode use, and both limited and editing access.



NOTE

If the passcode number is lost, contact ADTRAN Customer Service for assistance.

No Passcode Desired

At the new New Passcode prompt (in the Set Passcode menu), press **Enter** without any numerical entry. The system nullifies the need to enter a passcode for subsequent use and proceeds to the Unit ID prompt.

Set Unit Identification Number

The Unit ID sets the unit to respond to remote control (controlled by a device other than the front panel). If no Unit ID is recorded it is not possible to operate from any remote control device, including the local PC.

To Set the Unit Identification

In the Unit ID menu (item 4) under the UTIL menu, enter any value between 2 and 250. The number 1 is reserved for the PC.

Pressing **Enter** records the Unit ID number and establishes its availability for operation by remote control. The unit proceeds to the **Set Control Port** prompt.

No Unit ID Desired

Without entering any numbers at the Unit ID menu, press **Enter**. Pressing **Enter** with no Unit ID recorded establishes the unit as not able to be operated by remote control.

Set Control Port

The TSU can be configured from the control port only when a unit ID number has been entered. (It can be configured from the faceplate whether a unit ID number has been entered or not.)

If the control port is to be used, the control port baud rate must also be selected.

Possible uses of the control port are control in and chain in.

Control In (PC)

The unit can be controlled from an external PC connected directly or through a modem to the Control In port. When using Control In, the selection of the Control Port baud rate from 9600 (factory default), 1200, 2400, or 4800 must be made using the unit configuration menu.

Unless locked out externally, the front panel can also control the unit.

Chain In

TSU 120s can be linked together to form a chain. Figure 2-1 provides an example of a chain-in arrangement with a PC or a modem. The first TSU 120 in the chain receives controlling input from the PC or modem.

Subsequent TSU 120s in the chain are in a position to intake information from another TSU 120. This intake of information from another TSU 120 in the chain is identified as Chain In. The baud rate for the chained units must be the same as on the first unit.

Unless locked out externally, the front panel can also control the unit.

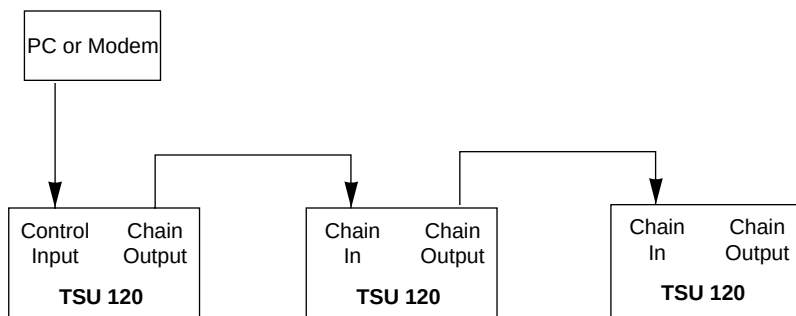


Figure 2-1
Example of Chain In

At this point, the Unit Initialization procedure is concluded. If the unit is to be configured remotely, there are no additional items necessary to complete prior to executing remote configuration.



The Passcode, the Unit ID, and the Control Port settings are stored in a nonvolatile memory. This assures they are operable for subsequent power-up sequences.

Normal Power-Up Procedure

After the unit has been put into operation with the initial power-up and initialization, the subsequent power-up procedure includes only the Power-Up Self Test followed by the request for a Passcode (password) if this option was selected during initialization.

Use the number keys to enter the previously recorded passcode followed by pressing **Enter**.

Correct Passcode

When a correct passcode is entered, the message Access Granted is displayed and the unit grants full access privileges. Press any key to proceed to the opening menu.

Incorrect Passcode

When an incorrect passcode is entered, the message Incorrect is displayed. Press any key to return to the passcode prompt.

No Passcode

When no passcode is entered the message Limited Access is displayed and the unit grants limited access to the menu system for viewing only. Pressing any key proceeds to the Main menu. No changes are allowed until the correct passcode is entered.

The passcode can also be entered using the Utility menu option.

Chapter 3

Operation

OPERATION

The TSU 120 can be configured and controlled by two different methods: by front panel operation or by the optional control software called T-Watch.

Identification of Front Panel Layout

The TSU 120 front panel is used to both monitor operation and control the configuration of the unit. The display panels and operation keys on the TSU 120 front panel are identified in Figure 3-1.

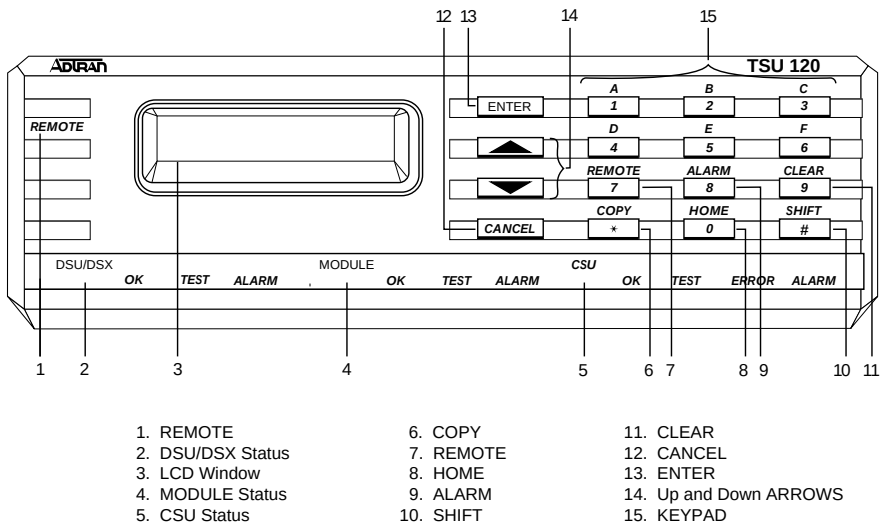


Figure 3-1
TSU 120 Front Panel Layout

The display panels and operation keys called out in Figure 3-1 are described in the sections that follow.

Display Panels

Remote

When illuminated, this panel indicates that the TSU 120 is accessed remotely by the PC program.

DSU/DSX Status

The TSU 120 basic unit is equipped with an Nx56/64 serial interface port and a DSX-1 (PBX) interface. The DSU/DSX status LEDs display the operational condition of these two base ports.

- **OK** (green)
Indicates the operation is in the normal mode and no alarms have been detected.
- **Test** (yellow)
Indicates the interface is operating in a test mode. This includes a self test or a test loopback. When lighted, this LED also indicates that normal data flow is not occurring.
- **Alarm** (red)
Indicates an alarm condition has been detected. When the alarm condition is no longer valid, the OK LED activates (turns **ON**). To view an alarm condition, select the active alarm menu item or select Alarm by pressing **shift + 8**. If the alarm conditions have been corrected, the alarm which caused the activation of the Alarm LED can be viewed under the Unit History menu.

LCD Window

A 2x16 character backlit LCD window displays menu items used in the configuration of the unit. It also displays alarm and status information.

Module Status

Operates the same as the DSU status LEDs except they indicate the status of the data ports on the module plugged into the option slot.

CSU Status

Indicates the status of the network interface located in the unit base. These LEDs show the same indication as the DSU and Module, with the addition of the Error LED. The Error LED indicates an error such as BPV, XSOs, or CRC error.

Operation Keys**Copy**

Used in the DS0 mapping menu operations to copy the last data entered into the current DS0. This key operates without pressing the **Shift** key.

Remote

Reserved for future use.

Home

Used to return home to the Main menu from any menu location. This is the same as pressing **Cancel** multiple times until the Main menu screen is reached.

Alarm

Used as quick access to the active alarm display menus. This can be activated while any other menu item is in use. When the Alarm menu is exited, the unit returns to the location of the same menu that was active when Alarm was selected.

Shift

When pressed and held, causes the shift functions (identified above the keys) to be activated.

Clear

Used in various menus to clear data / result fields.

Cancel

Cancels the last operation or exits the current menu level to the next higher level. If a value on a menu was selected but not entered, **Cancel** terminates the function and restores the previous setting.

Enter

Activates menu selections. Enters data value selections into the system.

Up and Down Arrows

Moves cursor through the menus or scrolls through data selector lists.

Keypad

These nine keys have dual functions. The first function is indicated by the lettering on the key itself. This is a standard phone keypad. The second function is a shifted function accessed by pressing and holding **shift key + #** along with another key. The shift function is indicated by the lettering above the keys.

A,B,C,D,E,F

Used as needed to extend the menu selection fields.

2

Used to inject errors when a test pattern is running.

General Menu Operation

The TSU 120 uses a multilevel menu structure containing both menu items and data fields. All menu operations and data are displayed in the LCD window. The menu items are numbered and can be viewed by scrolling with the **Up** and **Down Arrows**.

- **Data Field**

A menu item followed by a **colon (:)** identifies a data field that can be edited.

- **Display Field**

A menu field followed by an **equal symbol (=)** identifies a field used for value display and is not available for editing.

- **Arrows**

Menus that display small **Up** or **Down Arrows** in the lower right corner indicate there are more menu items than are viewable on a two-line LCD. The additional menu items are accessed with the **Up** or **Down Arrows**. Undisplayed menu items are also available by using the appropriate menu number.

Select and Activate a Menu Item

Place the cursor on the desired menu item by pressing the number corresponding to the menu item or highlighting the menu item with the **Up** and **Down Arrow**. In this example place the cursor on 2)CONFIG. Then press **Enter** or the number a second time. See Figure 3-2.

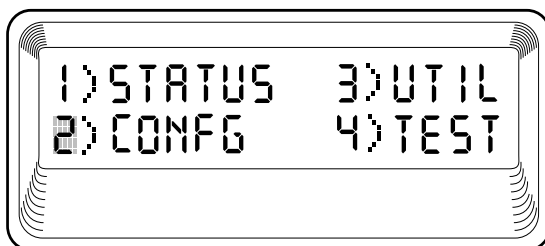


Figure 3-2
Select a Menu Item

The unit responds by displaying the first two menu items (in this example, on the Configuration menu), with the cursor on the first menu item. An **Up** or **Down Arrow** shown in the lower right corner of the LCD indicates additional menu options in that direction. See Figure 3-3.

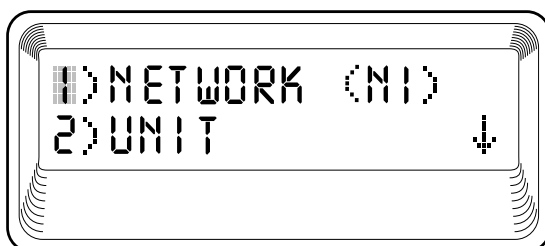


Figure 3-3
Sample Menu

Set the Data Field

Data fields preceded by a colon (:) can be edited. See Figure 3-4.

With the cursor positioned on the menu item number, press **Enter**. The cursor moves to the data field, (to the right of the menu item name).

Using the arrows, scroll to scan the available value settings. The value settings display one-at-a-time in the data field position. When the desired value is displayed in the data field position, press **Enter** to set

that value. When the value is set, the cursor moves back to the menu item position indicating the operation is complete.

Another menu field may be selected, or press **Cancel** to return to the menu.

Pressing **Cancel** prior to pressing **Enter** voids any data changes. The original data value is restored and the cursor returns to the menu field.

Display Only Data Fields

Data fields preceded by an equal (=) symbol cannot be edited. See Figure 3-4.

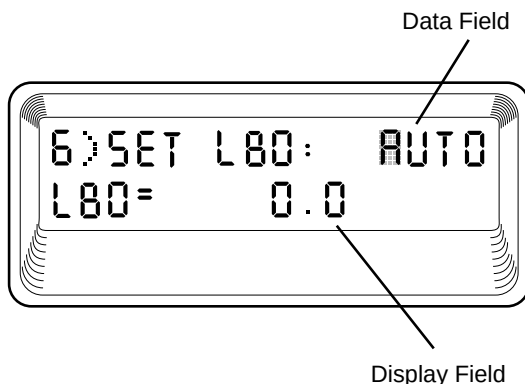


Figure 3-4
Display and Data Fields

Pressing **Enter** moves the cursor to the data field. Use arrows to select AUTO and press **Enter**. The unit automatically sets the Line Build Out. The display field shows the value actually set. The equal symbol after LBO in the second line indicates the information that follows is displayed data and cannot be edited.

Exit Any Menu Field Operation or Display

Press **Cancel** as many times as required to return to the desired menu level or press **Home** to return to the Main menu.

Data Port Identification

When configuring the unit, menu selections will sometimes include options from data port menus. Selection of data ports is necessary because the TSU 120 uses a Slot.Port method to identify which data port the menu item is referencing. For example, the base unit is slot zero (0). Anything in the option slot is referenced as Slot 1. If a module containing an OCU DP option card with an Nx56/64 interface is installed in the option slot, it would be designated as:

OCU DP=1.1

Where slot=1 and port =1.

The OCU DP is located in option slot 1 and is the first port in that slot.

Nx56/64=1.2

Where slot=1 and port=2.

The Nx is located in Slot 1 and is the second port in that slot.

MENU STRUCTURE

The TSU 120 uses a form of hierarchical menus to access all features. The topmost or Main menu level (see Figure 3-5) leads to submenus which are grouped by functionality. All menu operations are displayed in the LCD window as illustrated in Figure 3-6.



The menu structure diagram, shown in Figure 3-5, is a limited overview. A detailed description of each menu item, presented in menu order, immediately follows. A complete menu diagram is shown in the appendix, TSU 120 Menu Tree.

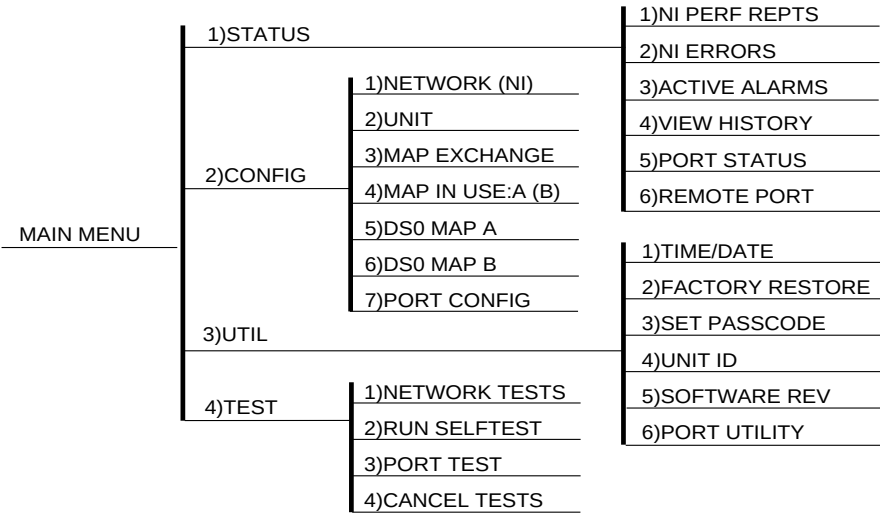


Figure 3-5
Menu Tree: The Four Opening Menus

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the direction of scrolling to use to view additional menu items. At every level of the menu pressing **Cancel** repeatedly returns the system to the Main menu.

The opening menu display as seen in Figure 3-6 is the access point to all other operations. There are four main menu items: Status, Configuration, Utility, and Test. Each Main menu item has several functions and submenus to identify and access specific parameters. In the discussions that follow, each Main menu contains a complete menu diagram to identify the location of each operation.

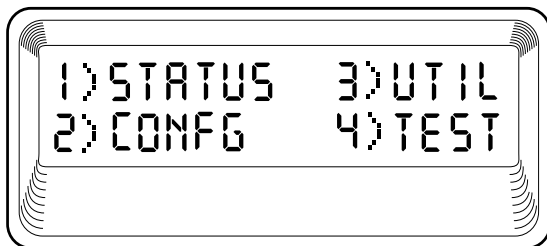


Figure 3-6
Display of Opening Main Menus

Opening Menu Functions

Status

The Status menu provides the ability to view the status of the TSU 120 operation. This menu includes the following items:

Network Interface Performance Reports (NI PERF RPTS)

Use this menu item to display the user's data on the NI Perf Rpts in compliance with ANSI T1.403 and AT&T Document TR54016.

Network Interface (NI) Errors

NI Errors indicates which errors are being detected at the network interface.

Active Alarms

This menu item displays current alarms which are currently reported by the TSU 120.

View History

This menu item displays date and time history of up to 20 status changes of the unit.

Port Status

Port Status is used for viewing the signals being monitored on the data ports.

Remote Port

Shows status of incoming commands on the chain in port.

Configuration (CONFIG)

The Configuration menu is used to set the TSU 120 operational configuration. This menu includes the following items:

Network (NI)

This item is selected to set all of the parameters associated with the network interface located in the base unit.

Unit

Unit is used to set the TSU 120 control port baud rate and to set up the dial out function for network alarm traps.

Map Exchange (Map XCHANG)

This item sets up and activates an automatic DS0 map switch based on time of day.

Map In Use

This item is used to display and manually switch the DS0 map being used.

DS0 Map: A (B)

Selects DS0 Map (A or B) to designate which DS0s are assigned to which data port.

Port Configuration (Port Config)

This menu is used to configure the parameters associated with any data port in the unit.

Utility (UTIL)

The Utility menu is used to view and to set system parameters. This menu includes the following items:

Time/Date

Displays and can be used to set the time and date.

Factory Restore

Restores the factory default settings to all unit parameters. See the appendix, *System Configuration Chart*, for defaults.

Set Passcode

Allows a passcode to be added, changed, or deleted.

Unit ID

Displays and can be used to set the unit ID.

Software Revision (Software REV)

Displays the current software revision level loaded into the base unit controller. This information is required when requesting assistance from ADTRAN Technical Support or when updates are needed.

Port Utility (Port UTIL)

Displays current software information for each port installed in the unit. This information is required when requesting assistance from ADTRAN Technical Support or when updates are needed.

Test



NOTE

The execution of tests will disrupt some normal operations. See individual menu items concerning tests before executing any.

The Test menu is used to initiate different types of tests of the unit and to view test results. Test results are displayed in the LCD window. The menu contains the following items:

Network Tests

Network Tests control the activation of loopbacks and the initiation of data test patterns.

Run Self Test

Run Self Test executes a full internal self test.

Port Test

Port Test is used to test specific data ports.

Cancel Tests

Cancel Tests deactivates all tests.

DETAILED MENU OPERATION

Status

The Status menu branch provides the ability to view the status of the TSU 120 operation. See Figure 3-7.

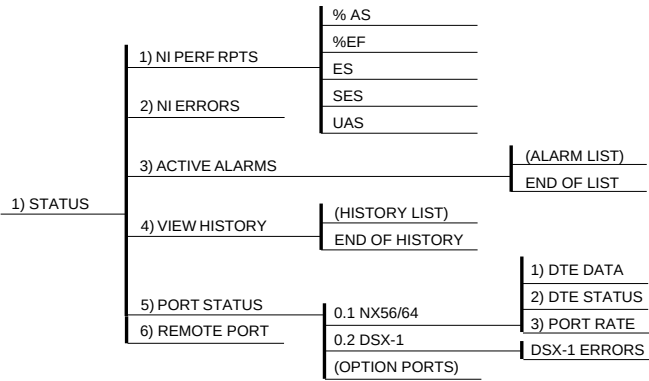


Figure 3-7
Status Menu Tree

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the direction of scrolling to use to view additional menu items. At every level of the menu pressing **Cancel** returns the system to the previous menu level. Pressing **Cancel** repeatedly returns the system to the Main menu.

Network Performance Reports (NI PERF RPTS)

The Network Interface Performance Reports display the user copy of the performance data. The TSU 120 maintains this performance data on the network in compliance with ANSI T1.403 and AT&T document TR54016. The data displayed is data accumulated over the last 15 minutes and over the last 24 hours. This data is available only when configured for the ESF network format.

With the cursor on Main menu item 1)STATUS, activate the menu with **Enter** or number **1**. The unit displays the first two Status menu items with the cursor on 1)NI PERF RPTS.

Activate the selection with **Enter** or number **1**. The unit displays the first of five items in the Network Interface Performance report. See Figure 3-8. The equal symbol on the right of the item indicates a non-editable field follows.

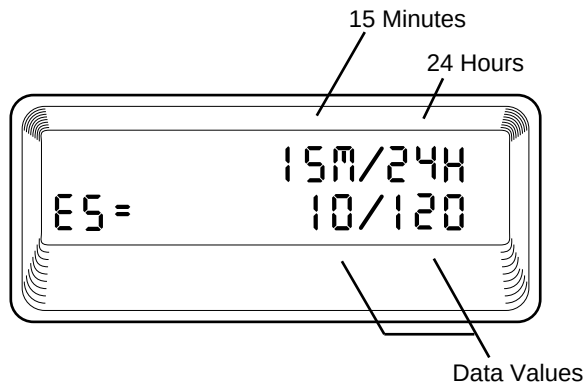


Figure 3-8
Network Interface Performance Report

Scroll keys are used to access the complete display of the following report fields:

%AS	percent of available seconds
%EF	percent of error free seconds

- ES** number of errored seconds (one or more errors per second)
- SES** number of severely errored seconds (more than 320 errors per second)
- UAS:** number of unavailable seconds (10 or more consecutive seconds)

If insufficient time has passed to collect data or the network format is configured as D4, NA is displayed. Continue with standard operating procedures to exit the display.

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



Since only the user's copy of performance data is cleared by the TSU 120, the data displayed here might be different from the data sent to the network as PRM data.

Network Interface Errors (NI ERRORS)

The NI Errors menu is used to view the type of errors detected by the Network Interface (NI). A blinking CSU error LED indicates that network errors are detected.

With the cursor on Main menu item 1)STATUS, activate the menu with **Enter** or number **1**. The unit displays the first two Status menu items with the cursor on 1)NI PERF RPTS.

With the arrows or number **2**, select 2)NI ERRORS. Activate the selection with **Enter** or number **2**. The unit displays an asterisk (*) above an error type as in Figure 3-9.

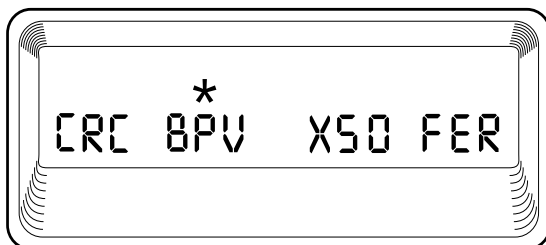


Figure 3-9
Network Interface Error Type

The asterisk (*) above an item indicates the type of error detected. The error types are the following:

- CRC** CRC-6 bit errors based on the FDL. This is valid only in ESF mode
- BPV** Bipolar violations
- XS0** Excess zeros
- FER** Framing errors

Active Alarms

This menu item displays a list of current alarms reported by either the base controller or any of the ports. If no alarms are current, using this menu item displays No Active Alarms.

This display includes two lines of text. The top line is the alarm source. The bottom line is the alarm message. A list of alarm messages is found in the appendix, *TSU 120 System Messages*.

With the cursor on Main menu item 1)STATUS, activate the menu with **Enter** or number **1**. The unit displays the first two Status menu items with the cursor on 1)NI PERF RPTS.

With the **Arrows** or number **3**, select 3)Alarms. Activate the selection with **Enter** or number **3**. The unit begins the display of alarm messages and their identified source. See Figure 3-10. Continue with standard operating procedures to exit the display.

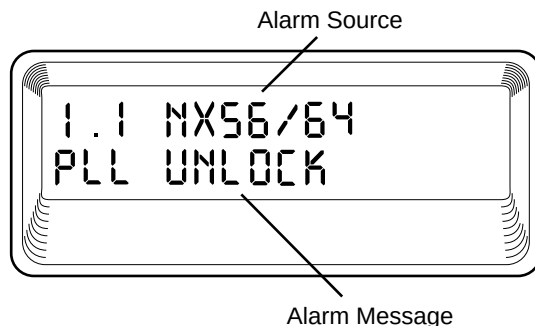


Figure 3-10
Display of Alarm Messages

In addition to normal menu operation, entry to this menu item is gained by using the Alarm function (**shift + 8**) on the keypad. The presence of an alarm is indicated by one or more of the Alarm LEDs being illuminated. Pressing **Cancel** returns to the menu item

which was viewed when Alarm (**shift + 8**) was initiated.

View History

This menu item is used to both view and clear the accumulated status changes of the unit.

View History displays a history of 20 status changes in the unit, including the date, time, and type of change. The unit also records for viewing the date and time an alarm became active and when it became inactive, as well as the date and time of test activation and deactivation.

To clear the View History display press **Clear (shift + 9)** with the View History menu active.

Port Status

Port Status is used to view the signals monitored on the data ports. For example, the Nx56/64 interface monitors the RTS, CTS, TD, and RD, along with other signal lines. When a port is selected, the LCD indicates if the signal is present.

With the cursor on Main menu item 1)STATUS, activate the menu with **Enter** or number **1**. The unit displays the first two Status menu items with the cursor on
1)NI PERF RPTS.

With the **Arrows** or number **5**, select 5)PORT STATUS. Activate the selection with **Enter** or number **5**. The unit begins the display of available ports.

The base Nx interface offers the status screens listed in this section. When using other option cards, refer to the appropriate separate manual for a definition of any status screens offered.

Port Status of Nx56/64

The Port Status of Nx56/64 is examined as an example of how to use this item.

Operations

To determine the Port Status of Nx56/64, select
0.1 Nx56/64.

0.1 Nx56/64 Menu Items

DTE DATA / CK

An asterisk (*) indicates an active status of the following lines.

TXD	Transmit data from the DTE
RXD	Receive data toward the DTE
ETC	External Transmit Clock from DTE
LCK	Lock Status of the phase locked loop

DTE Status

An asterisk (*) indicates an active status of the following lines:

RTS	Request To Send from DTE
CTS	Clear To Send to DTE
DCD	Data Carrier Detect to DTE
DSR	Data Set Ready to DTE

Port Rate

The Port Rate displays the current setting of the Nx port.

Continue with standard operating procedures to exit the displays.

0.2 DSX-1 Menu Items: DSX-1 Errors

CRC

As asterisk is displayed under the CRC if there are CRC errors in extended superframe format (ESF) mode. If the DSX-1 plug-on board is configured for D4 Frame format, the LCD displays n/a.

BPV

An asterisk is displayed under the BPV if the DSX-1 plug-on board is detecting bipolar violations.

SLIP

An asterisk is displayed under the SLIP if the DSX-1 plug-on board is detecting frame slips. This is caused by multiple clock sources in the application.

FER

An asterisk is displayed under the FER if the DSX-1 plug-on board is detecting frame bit synchronization errors.

Remote Port

Selecting Remote Port status allows viewing of the status of activity on the Control In remote port. This is useful for troubleshooting communication sessions, as well as verifying cabling.

With the cursor on Main menu item 1)STATUS, activate the menu with **Enter** or number **1**. The unit displays the first two status menu items with the cursor on 1).

With the **Arrows** or number **6**, select 6)REMOTE PORT. Activate the selection with **Enter** or number **6**. The unit shows the following parameters (an asterisk indicates the presence of the parameter):

RX	Characters received at remote port
ID	Unit ID received at remote port
CRC	Correct CRC received
PC	Correct passcode received
TX	Characters transmitted from the remote port

Configuration (CONFIG)

The Configuration menu is used to set the TSU 120 operational configuration, including all network interface parameters and the allocation of the DS0s and the port parameters. See Figure 3-11.

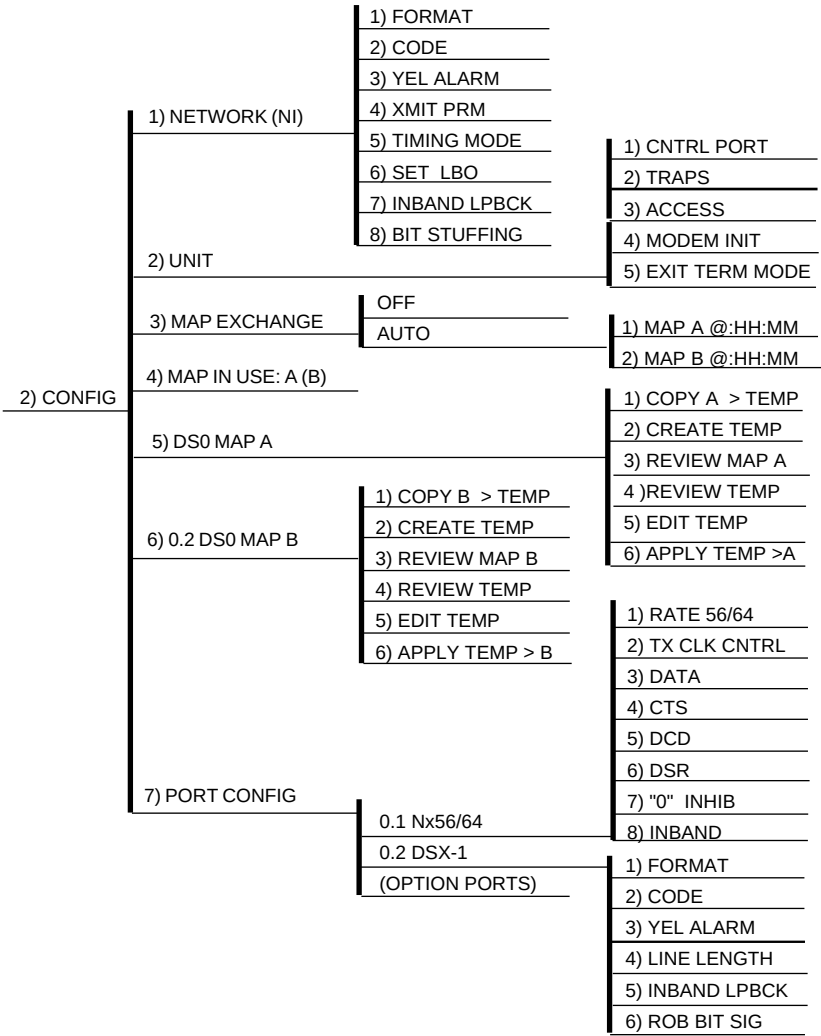


Figure 3-11
Configuration Menu Tree

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the direction of scrolling to use to view additional menu items. At every level of the menu pressing **Cancel** returns the system to the previous menu level. Pressing **Cancel** repeatedly returns the system to the Main menu.

Network (NI)

This menu item accesses the configuration of parameters associated with the network interface in the base unit. There are eight menu items that include setting the format, the line build out (LBO), and the timing mode. Menu items do not include setting the parameters which may be necessary for a secondary interface (DSX-1 Passthru, etc.), except for timing.

Operation

Follow standard operating procedure to access the Network (NI) menu items.

With the cursor on 1)NETWORK (NI), activate the menu with **Enter** or number **1**. The unit displays the first two configuration menu items. The **Down Arrow** indicates there are additional menu item selections available.

Continue with standard operating procedures to edit the network interface parameters.

Network (NI) Menu Items

The menu items available are:

FORMAT

Sets the frame format for the NI.

Choices: D4, ESF

D4 is equivalent to superframe format (SF).

CODE

Sets the line code for the NI.

Choices: AMI, B8ZS



NOTE

YEL ALARM

Enables and disables the transmitting of yellow alarms.

Choices: ENA, DISA

XMIT PRM

Enables and disables the sending of PRM data on the facility data link (FDL). The PRM data continues to be collected even if XMIT PRM is disabled (possible only with ESF Format).

Choices: Off, On

TIMING MODE

Selects the clock source for transmission toward the network from the NI.

Choices: Network, Base DTE, Base DSX-1, Internal, Secondary (SI), and Normal (CSU)

**NOTE**

Base DTE, Base DSX-1, and Internal are available only if no secondary interface is installed.

SET LBO

Selects the line build out for the network interface. In AUTO mode, the TSU 120 sets the LBO based on the strength of the receive signal and displays the selected value.

Choices: 0 dB, 7.5 dB, 15 dB, 22 dB, Auto

INBAND LPBCK

Sets unit to accept or reject the in-band loop up and loop down codes as defined in ANSI T1.403. This is a line loopback.

Choices: Accept, Reject

BIT STUFFING

When enabled, bit stuffing causes the TSU 120 to monitor for ones (1s) density violations and insert a one (1) when needed to maintain ones at 12.5 %.

Choices: Enable, Disable

Unit

The Unit menu is used to change the baud rate of the Control In port and the setup of the Dial Out port.

Operation

Follow standard operating procedure to access the Unit menu.

With the cursor on 2)UNIT, activate the menu with **Enter** or number **2**. The unit displays the first two menu items.

Continue with standard operating procedure to select the baud rate, set modem flow control, set up the number used for alarm dial out, and exit the menu.

Unit Menu Items

The menu items are:

CTL PORT

- Sets the baud rate for communication with the PC or modem.
- Available rates are 1200, 2400, 9600, 19200, and 38400.

TRAPS

- Enables or disables the transmission of trap messages.

ACCESS

- Sets the method of connection for trap messages from the TSU 120 to T-Watch/SNMP.
- Options:
 - Direct - Used if connected directly to the PC.
 - Dial - Used when connection is through a modem. The dial string is entered from T-Watch/SNMP.

MODEM INIT

Allows the user to choose an industry standard or a custom initialization string for a modem connected to the control port.

EXIT TERM MODE

Take the unit out of terminal mode.

Map Exchange (Map Xchng)

The Map Exchange menu is used to enable and set the automatic time-of-day map switch. The unit provides selection of the hour, minute, and seconds for the map switching to take place.

Operation

Follow standard operating procedures to access the Auto Map Changing menu item.

With the cursor on 3)MAP XCHNG, press **Enter**. The cursor moves to the select position over Auto or Off, whichever is displayed or currently active. See Figure 3-12.

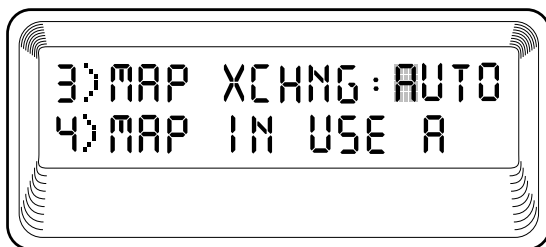


Figure 3-12
Map Exchange Selection Display

Map Exchange (Map Xchng) Menu Items

The menu items are:

OFF

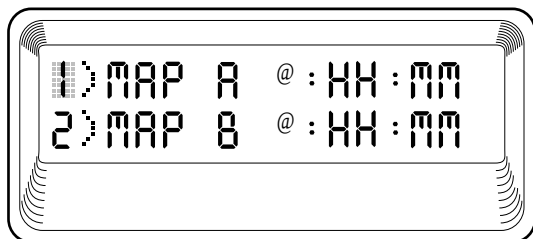
This indicates the map in use does not change (disabled).

AUTO

This indicates that the map in use will change at a user selected time of day.

Scroll to select Auto to enable or Off to disable the Automatic Map Change feature and press **Enter** to activate the selection.

When Auto is selected the unit displays the screens to set times for switching. See Figure 3-13.

**Figure 3-13***Selection Times for Map Exchange*

With the cursor on 1)Map A, press **Enter** to activate the selection fields for hour and minute. The cursor first moves to the hour position. Type in numbers and press **Enter**. The selected hour is entered and the cursor moves to the minute position. Set minutes by the same method as used to set the hours; seconds are defaulted to zero (0).

If a number is mistakenly entered, pressing **Cancel** interrupts the editing process. The procedure can be restarted to accept correct entries.

When using one digit numbers, the number appears in the first of two spaces. Upon pressing **Enter**, the system moves the single number to the second space and fills the first with a zero.

After editing Map A, press **Enter** to record the Map A settings and activate the selection fields for Map B. Use the same operation to edit switching time for Map B.

After settings for both Maps A and B are completed, press **Cancel** to return to 3)MAP XCHNG.

Continue with standard operating procedures.



When ESF is used with an FDL channel between units, the units automatically coordinate the automatic map switch by sending a map switch command from end-to-end over the FDL.

Map In Use

This menu item is used to control the DS0 map used by the TSU 120 and to display the map in current use.

Operation

Follow standard operating procedure to access the Map In Use menu item. Notice the current Map In Use is displayed. If no change is desired, proceed to another menu selection.

To manually change the Map In Use, place the cursor on the menu selection 4)MAP IN USE and press **Enter**. The cursor moves to the select position over A or B. Scroll to select A or B. This effects a manual change of the Map In Use from A to B or vise versa.

DS0 Map A and DS0 Map B

The DS0 maps designate which DS0s are assigned to which port. See Figure 3-14. There are three maps, DS0 Map A, DS0 Map B, and the Temporary (Temp) map.

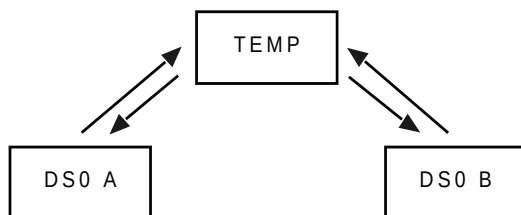


Figure 3-14
DS0 Map Designations

DS0 A and DS0 B are the current maps used by the TSU 120. The Temp map is used to generate a map before putting it into use.



DS0 A can be copied to DS0 B by copying the DS0 A map into the TEMP map and then applying (writing) the TEMP into DS0 B.

Operation

The operation of DS0 Map A and Map B is identical. With the cursor on 5)DS0 MAP A, press **Enter** or number **5**. The unit displays the first two DS0 Map A menu items with the cursor on 1)COPY A> TEMP.

DS0 Map A and Map B Menu Items

The menu items are:

COPY A >TEMP

This copies the current map (A or B) into a TEMP map area. This permits modification without disturbing the existing map. When the modifications are completed the TEMP map is written to current MAP A (B) by selecting **Apply**.

CREATE TEMP

This creates a map by defining a port or Idle for all DS0s. Any or all of the DS0s can also be designated for Passthru if a secondary interface capable of Passthru is present. When 2)CREATE TEMP is selected, all DS0s are set to Idle, and those in use are set to the proper port.

A sample selection follows:

DS0: 01 to 24

PASSTHRU: Y for Yes

N for No

PORT: IDLE, TST, 0.1 NX56/64(+ other Ports)



NOTE

TST is used to designate which DS0s are used for QRSS testing when activated under the 4)TEST Menu. When not used for testing, the TST designation is identical to IDLE.

With the cursor on 2)CREATE TEMP, press **Enter**. The unit displays the selection screen with the cursor positioned on the first selection DS0 number. See Figure 3-15.

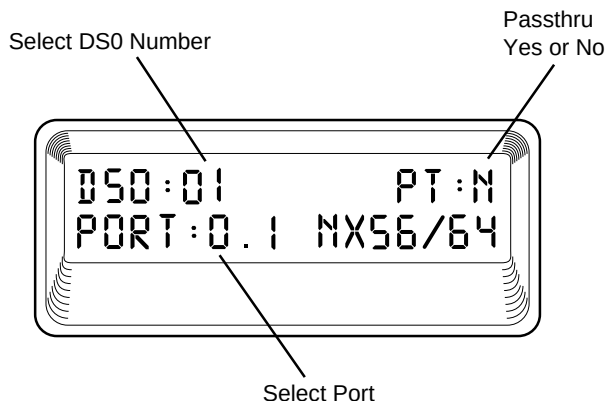


Figure 3-15
CREATE TEMP Selection Screen

Use either the scroll method or numbers to enter the DS0 number (do not mix the use of the keys). Pressing **Enter** completes the selection and moves the cursor to the next field, Passthru. Scroll to change, **Y** for Yes or **N** for No. Press **Enter** to complete the selection and move the cursor to the next field, PORT.

Scroll to select the port which is dependent on the installed option card. Press **Enter** to complete the selection and move the cursor to the next field, DS0.



*With the cursor on the DS0 field, the DS0 number can be incremented or decremented by scrolling. If **Copy** is pressed, the contents of the last DS0 entered are placed in the new DS0 number.*

When all entries are complete, **Cancel** moves the cursor to the last of the menu choices, 6)APPLY. Either apply the newly created DS0 map or press **Cancel** to return to the DS0 Map A (B) menu choices.

REVIEW MAP A (B)

Permits a quick review of the number of DS0s assigned to each port and the number of unassigned DS0s (Idle or TST) as defined in the currently applied Map A (B).

With the cursor on 3)REVIEW press **Enter** or number **3** to display the first of the assigned ports with the quantity of DS0s. See Figure 3-16. Use scroll to move through the displays.

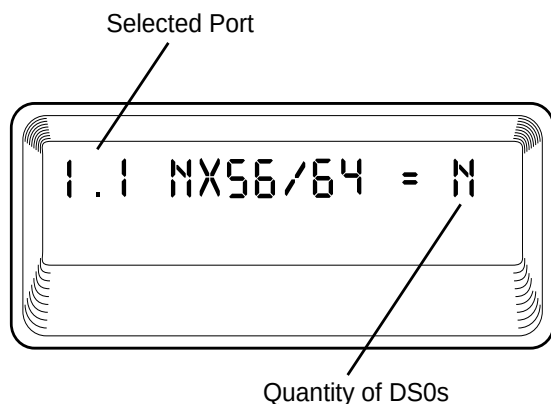


Figure 3-16

Selected Port and Quantity of DS0s

Continue with standard operation procedures to exit the menu.

REVIEW TEMP

This menu item is operated the same for the TEMP map as is 3)REVIEW MAP A or MAP B.

EDIT TEMP

The map in the TEMP file can be edited to whatever configuration is desired. If Map A had been copied into the TEMP file, then after editing, the TEMP file could be applied to MAP A or MAP B.

With the cursor on 5)EDIT TEMP, press **Enter** to display the selection screen with the cursor on the first DS0 number. The menu displays are identical to 2)CREATE TEMP with the exception that the existing values (for Passthru and Port Select) are displayed.

Complete the editing of the scratch file the same as for 2)CREATE TEMP.

APPLY TEMP > A

Writes the TEMP map into Map A. Apply is usually the last step in updating a map and is accessed automatically at the end of editing or creating a temporary map. It can be bypassed at this time by selecting another menu choice.

**NOTE**

Selecting Apply will disrupt normal data flow while the current map is overwritten with the new map. This will not cause a switch of the executing map; i.e., if Map A were modified while Map B was executing, selecting Apply will rewrite Map A but will not switch execution from Map B to Map A.

Access 6)APPLY TEMP > A by following standard operating procedures or by completing a scratch map. Press **Enter** or number **6**. The unit displays DISRUPT DATA: YES or NO.

Scroll to select **Yes** or **No**.

- Yes** The display shows MAP APPLIED.
- No** The system returns to menu item 6)APPLY.

When the desired selection is displayed, press **Enter** to activate the selection, followed by **Cancel** to return to menu operation.

Port Configuration (Port Config)

Port Configuration is used to select and configure the parameters associated with any data port in the unit. For example, parameters for the DSX-1 (PBX) interface are set through this menu. The items that can be set depend on which option module is installed. The Base Nx port is always present. The list of option ports will vary with the configuration.

The TSU 120 is designed so that any additional ports developed in the future will contain the appropriate menu selections to provide access via this menu item.



The Config menus for options ports are described in separate sections of the manual supplied with the option card.

Operation

Follow standard operating procedure to access 7)PORT CONFIG.

With the cursor on the number 7, press **Enter** or the number 7. Only the bottom line of the LCD changes to display 0.1 Nx56/64. The Nx56/64 interface located on the base is always present. See Figure 3-17.

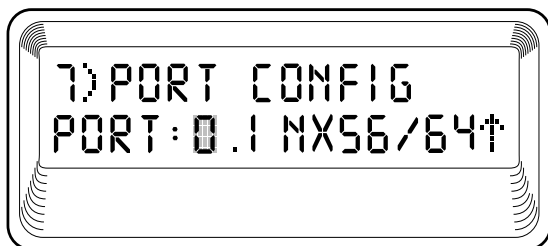


Figure 3-17
Port Configuration

Scroll to display the data port to be configured and press **Enter** to select. The unit displays the first of six menu items for the Nx56/64.

0.1 Nx56/64 Port Configuration (Port Config) Menu Items

The menu items are:

RATE 56/64

This sets the base rate of the interface. The actual data rate depends on the number of DS0s assigned to the Nx port. The DTE data rate vs. the number of DS0s is provided in the appendix, *DTE Data Rate Chart*.

Choices: 56K or 64K

TX CLK

Controls the clock used by the TSU 120 to accept the transmit (TX) data from the DTE. Normally this is set to Internal. If the interface cable is long, causing a phase shift in the data, the clock can be selected as INT/INV (Internal/Inverted). This switches the phase of the clock which should compensate for a long cable. If the DTE provides a clock with TX data, the clock selection is set to External. The TSU 120 will depend on an externally supplied clock to accept the TX data.

Choices: Internal, Int-Inv, or External

DATA

Used to control the inverting of the DTE data. This inversion can be useful when operating with an HDLC protocol. Often used as a means to insure ones (1s) density.

Choices: Normal or Invert



NOTE

If Invert is selected, zero (0) inhibit should also be selected to prevent an open DTE input from placing zeros on the network.

CTS

Used to control characteristics of CTS.

Choices: Normal, (see Table 3-A) or Force On

DCD

Data Carrier Detect. Indicates to the DTE when a valid signal is being received at the Network Interface.

Choices: Normal (see Table 3-A) or Force On

DSR

Data Set Ready. This signal indicates to the DTE when the DCE is turned on and ready for operations.

Choices: Normal (see Table 3-A) or Force On

0 INHIB

The Nx interface will detect an uninterrupted string of zeros (0s) being transmitted toward the network, and if 0s are transmitted for >1 second, the TSU 120 will force 1s.

Choices: On or Off

INBAND

The Nx56/64 port is capable of providing an inband communications channel (for T-Watch and SNMP) between units. This is accomplished by using 8 kbps of the first DS0 assigned to that particular Nx56/64 port. If in 56 K mode, no data bandwidth will be used. Inband must also be enabled at the destination port.

Choices: On or Off

Table 3-A
Normal Mode of Operation

RTS	V.54 Loopback	511 TST ON	Self Test Active	Netwk Test Active	No DS0 Mapped	Network Alarm
CTS	Follows	OFF	OFF	OFF	OFF	OFF
DCD	—	—	OFF	—	OFF	OFF
DSR	—	OFF	OFF	OFF	OFF	—

Where "—" = don't care

Force On = On under all conditions

This table indicates conditions which cause the Port Control Signals to be deactivated.

0.2 DSX-1 Port Configuration (Port Config) Menu Items

The menu items are:

Format

Format sets the frame format for the base DSX-1 interface.

Choices: D4, ESF

Code

Code sets the line code for the base DSX-1 interface.

Choices: AMI B8ZS

Yellow Alarm

YEL Alarm enables and disables the transmitting of yellow alarms.

Choices: ENA, DISA

Line Length (ft)

Line Length provides selection of the proper output level for the base DSX-1 based on the length of the interface cable.

In-band Loopback (INBAND LPBACK)

In-band Loopback sets the base DSX-1 to accept or reject in-band loopup or loopdown codes (per ANSI T1.403 specification) which may be sent to the card over the DSX-1 interface. This loopback is a line loopback.

Robbed Bit Signaling

This menu option is used to enable / disable robbed-bit signaling. Whenever the base DSX-1 interface is connected to terminal equipment (i.e., PBX / SW56) for voice or dialed data services, this option should be enabled. The only exception is when the terminal equipment is using a form of common channel signaling (i.e., PRI).

UTILITY (UTIL)

The utility menu tree is used to view and to set system parameters (see Figure 3-18). This includes setting the time and date and resetting all parameters to factory values or to re-initiate the unit. This menu is also used to view the unit software revision and the unit ID setting.

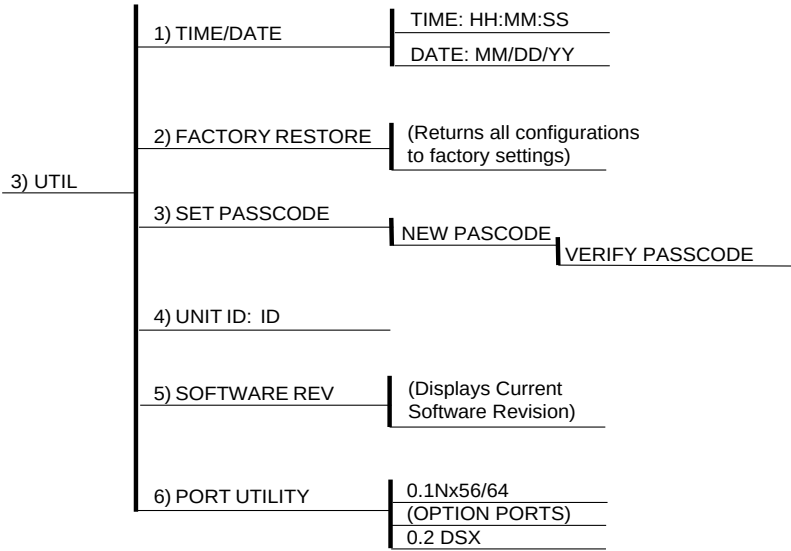


Figure 3-18
Utility Menu Tree

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the scrolling direction to view additional menu items. At every level of the menu, press **Cancel** to return the system to the previous menu level. Pressing **Cancel** repeatedly returns the system to the Main menu.

Time/Date

This menu option is used to view or to edit the current time and date. The time and date are maintained during power off conditions.

Operation

Follow standard operating procedure to access the 3)UTIL menu items.

With the cursor on 1)TIME/DATE, activate the menu with **Enter** or number **1**. The unit displays the current time and date with the cursor on the T in Time.

Use **Enter** to move to the first entry position and numbers to set the desired hour and minutes. Always use **Enter** to record the numbers and move to the next position. The **Up** and **Down Arrow** keys can also move the cursor to different fields to edit.

The Date is set using the same keystroke pattern used to set Time.

To exit the TIME/DATE setting, press **Cancel**. The unit returns to the opening of TIME/DATE setting with the cursor on the 2 of 2)TIME/DATE. Any settings completed with an **Enter** keystroke have been recorded. Any settings not completed by an **Enter** keystroke are not recorded.

Summary for Editing Time/Date

Pressing **Enter** after any numeric change always records the entry and moves to the next editing position. Moving to a different field to edit is also possible by pressing **Enter** at the editing position without making any change, or by using the **Up** and **Down Arrow** keys. Pressing **Cancel** at any time can be used to end the editing process.

Factory Restore

This menu item is used to restore the factory default setting for all unit parameters. It will restore all parameters, including configured DS0 maps, to the factory settings. Factory defaults are listed in the appendix, *System Configuration Charts*.

Operation

Follow standard operating procedure to access the 3)UTIL menu items.

With the cursor on 3) FACTORY RESTORE, press **Enter**. The unit returns to the opening Main menu with all edited parameters and configurations deleted. All factory preset defaults are restored.

Set Passcode

Enter Passcode from Other Menus

The appearance of the Passcode prompt may make an unexpected appearance from other menu operations. This happens only when the unit is operating in the limited access mode, i.e., without an active passcode. The limited access mode may become active even if a passcode was entered as it does when there is no activity for ten minutes.

The unexpected appearance of the PASSCODE prompt occurs, for example, while operating in a limited access mode and attempting to change the Data Rate, (2)CONFIG, 2)UNIT, 1)CNTRL PORT, 1)DATA RATE. Use the number keys to enter the correct passcode and press **Enter**. The unit displays **Access Granted**.

Pressing any key after entering a passcode causes the unit to return to the previous active menu. In this case it returns to 2)CONFIG, 2)UNIT, 1)CNTRL PORT, 1)DATA RATE to permit changing the data rate.

Change/Set a Passcode

The passcode can be changed or set at any time or eliminated altogether through the Utility menu item 3)SET PASSCODE. This procedure requires the current passcode (if one is established) for operation.

Follow standard operating procedures to access the 3)UTIL menu items. With the cursor on 3)SET PASSCODE, activate the menu with **Enter** of number **3**. The unit displays the prompt for the new passcode.

The passcode can only be entered by using numbers. After entering the desired passcode, press **Enter**.

Set a null passcode at the 3)SET PASSCODE menu by pressing **Enter** without any numbers. This sets a null passcode and grants unlimited access.

Unit ID: ID

This menu is used to access the current Unit ID setting. Viewing is available in limited access mode. Editing or changing the Unit ID requires the use of a password as in editing mode. Unit Identification numbers must be between 2 and 250. If an out of range number is entered, the unit assumes the upper limit number of 250.

Operation

Follow standard operating procedures to access the 3)UTIL menu items.

With the cursor on 5)UNIT ID, press **Enter** to display the Unit Identification number prompt.

Use **Enter** to active the menu and numbers to enter the unit number of three digits between 2 and 250.

Press **Enter** to complete the selection and return the cursor to 5)UNIT ID for another menu selection.

Software Revision (Software Rev)

This menu provides access to the display of the current software revision level loaded into the base unit controller. This information is required when requesting assistance from ADTRAN Customer Service or when updates are needed.

Operation

Follow standard operating procedures to access the 3)UTIL menu items.

With the cursor on 6)SOFTWARE REV, press **Enter** to display the current software revision level.

Use **Cancel** to exit.

Port Utility

This menu provides access to the display of the current software information for each port installed in the unit. This information is required when requesting assistance from ADTRAN customer service or when updates are needed.

Operation

Follow standard operating procedures to access the 3)UTIL menu items.

With the cursor on 7)PORT, press **Enter** to display the first available port.

Scroll through the available ports to display the desired port name. Press **Enter** to access the displayed port name and the software version installed.

Use **Cancel** to exit.

TEST

The Test menu is used to initiate different types of tests of the unit and to view test results. Test results are displayed in the LCD window. The Test menu contains four items (see Figure 3-19).



NOTE

The execution of tests will disrupt some of the normal operation. See individual menu items concerning tests before executing.

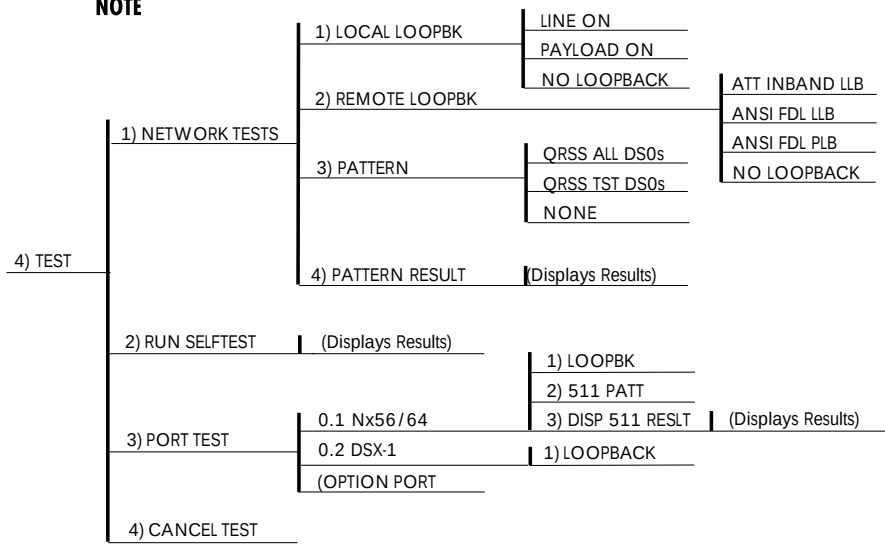


Figure 3-19
Test Menu Tree

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the scrolling direction to view additional menu items. At every level of the menu pressing **Cancel** returns the system to the previous menu level. Pressing **Cancel** repeatedly returns the system to the Main menu.

Network Tests

Network tests are used to control the activation of loopbacks and the initiation of data test patterns. See Figure 3-5 for the list of tests.

Network tests are run on the Network Interface (NI). Three different test configurations can be selected to determine the type of loopback and the pattern to run. Test results are displayed in the LCD window.



NOTE Operation

The execution of Network Tests will disrupt normal data flow unless only TST DS0s are selected for testing.

Follow standard operating procedures to access the Network Tests menu items.

With the cursor on Main menu item 4)TEST, press **Enter** or number **4**. The unit displays the first two Test menu items with the cursor on 1)NETWORK TESTS. The **Down Arrow** indicates there are additional menu item selections available.

Press **Enter** to display the first of three menu choices. The cursor is on 1)LOCAL LOOPBCK.

Network Tests Menu Items

The menu items are:

LOCAL LOOPBCK

There are three available choices for setting the local loopback:

Line On	Activates the line loopback
Payload On	Activates the payload loopback
No Loopback	Deactivates the loopback

Scroll to select a setting and record it by pressing **Enter**. The unit returns the display of 1)LOCAL LOOPBCK and 2)REMOTE LOOPBCK.

REMOTE LOOPBCK

This activates the same loopbacks as Local Loopback but at the far end. It uses either the in-band loop-up code as specified by ANSI T1.403 for line loopback (ATT In-Band LLB), or the FDL as specified in ANSI T1.403 for payload and line loopback codes. The following options are available:

ATT In-Band LLB	Activates the line loopback using inband code
ANSI FDL LLB	Initiates the transmission of an FDL payload loop-up code toward the far end
ANSI FDL LLB	Initiates the transmission of an FDL line loop-up code toward the far end
No Loopback	Deactivates the loopback



Remote Loopback cannot be used with Fractional T1 since the full T1 stream including the FDL is not transported to the far end.

Scroll to select a setting and record it by pressing **Enter**. The unit returns the cursor to 2)LOCAL LOOPBCK.

Scroll to select 1)Local Loopback or 3)Pattern.

After a Remote Loopback option is selected, the TSU 120 verifies that the far end is actually in a loopback by checking for the receipt of a code looped back from the far end. Once the Remote Loopback type is selected, the LCD displays the loopback progress by displaying Looping until loopback is verified.

PATTERN

This sets the pattern for the test and initiates the transmission of the pattern. The test is terminated by selecting None. The following patterns are available:

QRSS All DS0s	Generates a QRSS test pattern and inserts the pattern into all DS0s
QRSS TST DS0s	Inserts a QRSS pattern in those DS0s mapped as TST in the currently active map (A or B)
None	Terminates pattern generation



QRSS always runs at 64K/DS0.

Use the up and down scroll to select, for example, QRSS ALL DS0. Press **Enter** to record the selection. The TSU 120 starts to generate a QRSS test pattern and inserts the pattern into all DS0s.

To end the test, select None.

PATTERN RESULT

Displays the results of the test currently active. See Figure 3-20. Leaving and returning to this menu item does not interrupt the test.



Code (version K or later): Pressing 2 injects errors into the test pattern. These errors are detected by the device performing the pattern check.

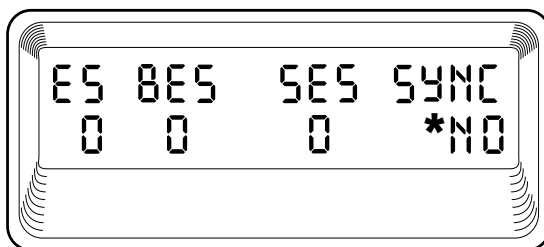


Figure 3-20
Pattern Results Display

ES	The number of errored seconds with one or more errors per second.
SES	The number of severely errored seconds with more than 320 errors per second.
SES	The number of seconds with more than 320 bit errors
SYNC	Indicates if pattern sync is, (yes) or is not, (no) valid. The asterisk () indicates if pattern sync has been lost since the start of testing.

Results can be cleared by pressing **Clear (shift + 9)**.

The results are accumulated until the test pattern is set to **None** or **Clear'd**.



The use of TST DS0s for testing can be very useful, particularly in Fractional T1 applications. An end to end test can be run on the Fractional DS0s by 1) setting for Map B the TST in the same DS0 as used by Map A to receive data from the 0.1 Nx56/64 port, and 2) by looping the far end using a V.54 loopback code on the 0.1 Nx56/64 port. In addition, a single DS0 could be used for continuous testing while other DS0s are passing normal data. This will also provide an end-to-end check on the entire link. Set each end-to-send QRSS in TST DS0s (using 1 DS0) and occasionally view the results on the Pattern Result menu selection.

Run Selftest

This menu selection is used to execute a full internal self test. The results of the self tests are displayed in the LCD. Upon invoking the command the LCD displays System Self-Test and the Test LEDs are illuminated. Test failures are displayed in the LCD window. The self test consists of the following steps:

1. Board level tests. Each of the TSU 120 boards contain an on-board processor which executes a series of tests checking the circuitry on the board.
 - a. RAM tests; EPROM checksum
 - b. DS0 map tests
 - c. On-board data path; sending a known test pattern through an on-board loop
2. Unit level tests.
 - a. Front panel LED verification.
 - b. Phase Locked Loop verification.
 - c. Board-to-board interface test. A test pattern is sent from the controller through a loopback on all other boards and checked on the controller. This verifies the data path, clocks, and control signals.

If a failure is detected, note the failure number prior to contacting ADTRAN Technical Support.



NOTE **Operation**

The execution of Self Test disrupts normal data flow and prevents remote communication until the Self Test is completed.

Follow standard operating procedure to access the 4)TEST menu item.

With the cursor on 2)RUN SELFTEST, press **Enter** or number **2**. The unit runs through a changing display in the LCD showing the test outcome.

Press **Cancel** to exit.

Port Tests

The Port Tests menu is used to activate testing of specific data ports. It controls the activation of loopbacks and the initiation of data test patterns. Test results are displayed in the LCD window.



NOTE

The execution of Port Tests will disrupt normal data flow in the port being tested.

Operation

Follow standard operating procedures to access the 4)TEST menu item.

With the cursor on 3)PORT TESTS, press **Enter** or number **3**. The unit displays the available ports.

Port Test Menu Items for 0.1 Nx56/64

0.1 Nx56/64 is the base Nx interface. It offers the following test functions:

LOOPBK

This initiates a loopback. The following options are available:

- | | |
|----------------|---|
| PRT/LCL | The Nx port activates both a Local loopback (back toward the DTE) and a Port loopback when either is invoked. |
| REMOTE | The remote loopback causes a V.54 code to be sent to the far end. The Nx at the far end activates a PRT/LCL loopback upon detection of the V.54 code. |
| OFF | The loop is deactivated. |



NOTE

The TSU 120 checks the remote loopback activation by detecting a proper response from the remote end. While waiting for the response, the display shows Looping. If successful, the display changes to Looped Up. If unsuccessful, the display shows Failed.

511 PATT

Activates the generation of the 511 test pattern.

- | | |
|------------|--|
| ON | The pattern check circuitry is enabled and a test started. The test is ended by selecting OFF. |
| OFF | The pattern generation and check is disabled. |

DIS 511 RESLT

Displays the results of the 511 test indicated in the 511 option. The results are in the form of the number of errored seconds. The error count can be cleared by pressing the **Clear** key (**shift+9**).

Port Test Menu Items for 0.2 DSX-1

Loopback

Loopback activates the loopback function on the base DSX-1 interface. The available loopbacks are a Port Loopback (towards the NI) and a Line Loopback (towards the PBX or other terminal equipment).

Cancel Tests

Use this menu selection to deactivate all active tests, including tests on option modules.

Chapter 4

Example Operations

This chapter provides examples of how to configure the system for a variety of operations.

VOICE AND DATA MIX

The following is an example of the use of a TSU 120 to mix voice data from a PBX with data from a customer's DTE, possibly a LAN bridge (see Figure 4-1). This example assumes that B8ZS service is not available end- to-end and therefore must use 56K (672K rate) for the data and run AMI on the network. In addition, the format on the network is ESF while the PBX is D4.

The configuration charts shown here are filled in for the example. The appendix, *System Configuration Charts*, contains the same configuration charts with the selections not filled in.

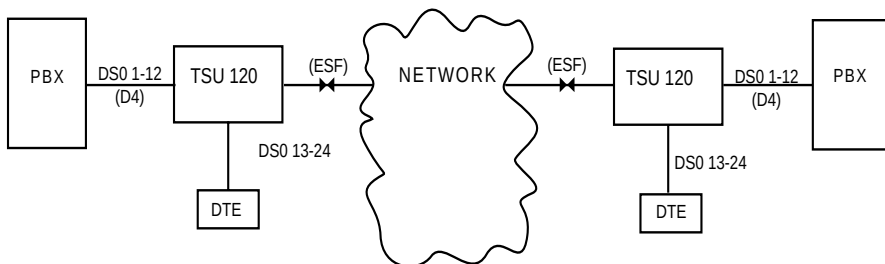


Figure 4-1
Example of Voice and Data Mix

STEPS TO SET UP VOICE AND DATA MIX

The five steps required to set up voice and data mix are presented in this section along with tables that provide examples of the required information.

Prior to Step 1

Complete the configuration chart. The configuration charts from the appendix, *System Configuration Charts*, can be copied and filled out to use as a reference or guide prior to actually setting any configuration.

Step 1. Configure the Network

Table 4-A provides configuration information for the network interface.

Table 4-A
Configuration for Network Interface

MENU ITEM	SELECTION USED	SELECTIONS AVAILABLE
1)FORMAT	ESF	D4, ESF
2)CODE	AMI	AMI, B8ZS
3)YEL ALARM	ENA	ENA, DIS
4)XMIT PRM	OFF	ON, OFF
5)TIMING MODE	NETWORK	NETWORK (NI), INTERNAL, BASE DTE, BASE DSX, NORMAL (CSU)
6)INBAND LOOPBK	ACCEPT	ACCEPT, REJECT
7)LINE BUILD OUT	AUTO	0 dB; -7.5 dB; -15 dB; -22 dB; AUTO
8)BIT STUFFING	ENABLE	DISABLE, ENABLE

Step 2. Configure DTE Port: (0.1 Nx56/64)

Table 4-B provides configuration information for DTE ports.

Table 4-B
Configuration for DTE Port

MENU ITEM	SELECTION USED	SELECTIONS AVAILABLE
1)RATE 56/64	56K	56K, 64K
2)TX CLK CNTRL	INTERNAL	INTERNAL, INTERNAL & INVERTED, EXTERNAL
3)DATA	NORM	NORMAL, INVERT
4)CTS	FORCED ON	NORMAL, FORCE ON
5)DCD	FORCED ON	NORMAL, FORCE ON
6)DSR	FORCED ON	NORMAL, FORCE ON
7) "0" INHIB	ON	ON, OFF
8) INBAND	OFF	ON, OFF

Step 3. Select the number of DS0s/Port: 12

The number of DS0s/Port is based on the Data Rate Table in the appendix, *Configure DTE Port: (0.1 Nx56/64)*.

Step 4: Complete the DS0 Map Configuration

Table 4-C provides information for configuring DS0 maps.

Table 4-C
Configuration for DS0 Map

DSO #	ASSIGN TO	PASSTHRU	DSO #	ASSIGN TO	PASSTHRU
1	0.2 DSX-1	NO	13	0.1 Nx56/64	NO
2	0.2 DSX-1	NO	14	0.1 Nx56/64	NO
3	0.2 DSX-1	NO	15	0.1 Nx56/64	NO
4	0.2 DSX-1	NO	16	0.1 Nx56/64	NO
5	0.2 DSX-1	NO	17	0.1 Nx56/64	NO
6	0.2 DSX-1	NO	18	0.1 Nx56/64	NO
7	0.2 DSX-1	NO	19	0.1 Nx56/64	NO
8	0.2 DSX-1	NO	20	0.1 Nx56/64	NO
9	0.2 DSX-1	NO	21	0.1 Nx56/64	NO
10	0.2 DSX-1	NO	22	0.1 Nx56/64	NO
11	0.2 DSX-1	NO	23	0.1 Nx56/64	NO
12	0.2 DSX-1	NO	24	0.1 Nx56/64	NO

Step 5: Complete a Configuration Table for the Base

DSX-1 Port

Table 4-D provides information for configuring the DSX-1 (PBX) interface.

Table 4-D
Configuration for DSX-1 PBX Passthru

MENU ITEM	SELECTION USED	SELECTIONS AVAILABLE
1)FORMAT	D4	D4, ESF
2)CODE	AMI	AMI, B8ZS
3)YEL ALARM	ENA	ENA, DIS
4)LINE LENGTH	400Ft.	1-110: 110-220: 220-330: 330-440: 440-550: 550-655: >655
5)INBAND LOOPBACK	ACCEPT	ACCEPT, REJECT
6)ROB BIT SIG	ON	ON, OFF

Step 6: Activate Configuration Menu

From the Main menu select the Configuration menu. The unit displays the first two Configuration menu items: Network (NI) (network interface) and Unit (see Figure 4-2).

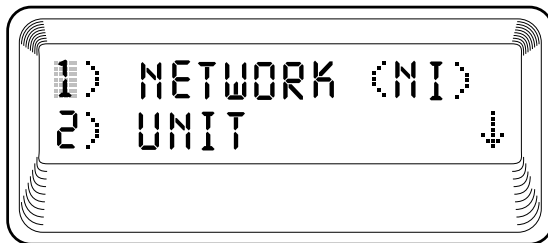


Figure 4-2
First Two Configuration Menu Items

CONFIGURING THE NETWORK INTERFACE

Place the cursor on 1)NETWORK (NI) with the number **1** or by scrolling. Activate the Network Interface Configuration menu with **Enter** or the number **1** again.

The unit displays the first two Network (NI) menu items (see Figure 4-3).

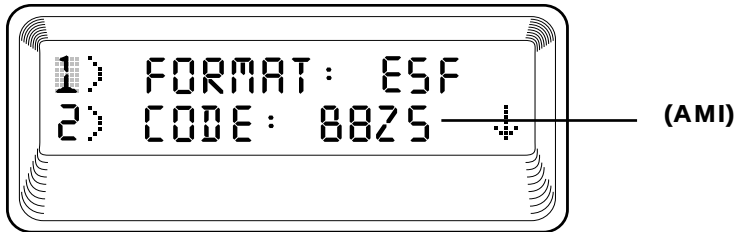


Figure 4-3

First Two Network (NI) Configuration Menu Items

The Code (Item 2) is incorrectly set. To make changes, scroll down or use number **2** to select the CODE menu item. Press **Enter** to move the cursor to the data field (B8ZS), to the right of 2)CODE.



Pressing 2 again will not move the cursor into the data field. This helps prevent inadvertent activation of menu actions.

Scroll down to display AMI and press **Enter** to set the line code to AMI (changed from B8ZS). The cursor moves back to 2)CODE menu position.

Scroll to examine the other Network (NI) items.

Since no other items need to be changed, press **Cancel** to exit the Network (NI) menu. The display returns to the first two Network (NI) menu items (see Figure 4-4).

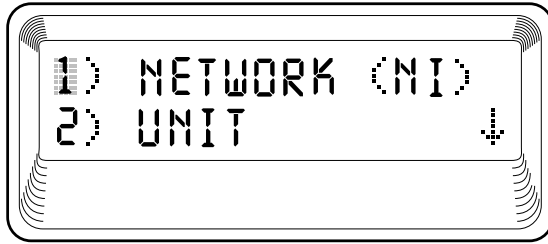


Figure 4-4
First Two Network (NI) Menu Items

CONFIGURING THE DS0 MAP

From the first menu position scroll down or use number **5** to select the DS0 MAP A configuration. Press number **5** again or **Enter** to enter the DS0 MAP A Configuration menu (see Figure 4-5).

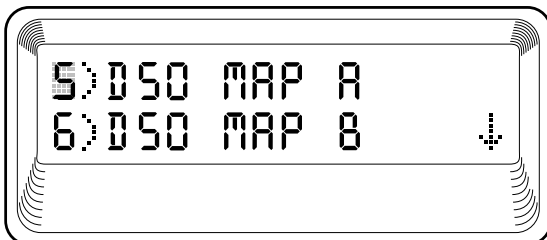


Figure 4-5

DS0 Map A and Map B Configuration Menu Items

Scroll down or press number **2** to place the cursor on 2)CREATE TEMP menu item. Press **Enter** to activate the Create Map menu which opens a display from which a DS0 number can be selected (see Figure 4-6).

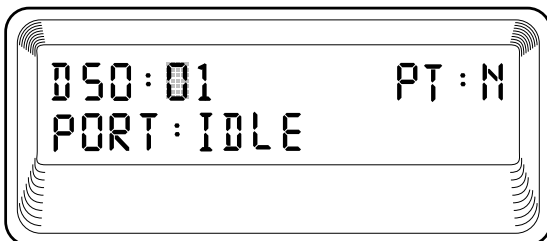


Figure 4-6

Create Map Menu with Displayed DS0 Number

If the DS0 number displayed is the desired number, press **Enter** to select it for an entry.

Display the correct numbers by entering numbers or by scrolling. Press **Enter** to record the displayed DS0 for an entry and advance the cursor to the Passthru selection field. Press **Enter** again to advance to the PORT selection field.

Scroll down to advance through the Port list until the 0.2 DSX-1 Port name is displayed (see Figure 4-7). Press **Enter** to select and move the cursor back to the DS0 # field.

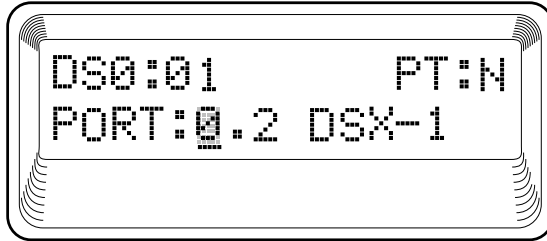


Figure 4-7
Display of DS0 Port Name

Another DS0 may be selected by incrementing the DS0 number using the **Up Arrow** key or, for this example, typing number **2**.



*Since the data for this DS0 is identical to the previous DS0 just entered, it can be duplicated using **Copy**. The PT and PORT data fields are set to the same value as was last entered.*

This operation (changing the DS0 number and copying) can be repeated for DS0s 3 through 12 which, according to the configuration chart, are all identical.

At DS0 13 the data values changes can be set with the same operational procedures as used for DS0 #1. DS0 13 PT field is set for N and the PORT is 0.1 Nx56/64.

At DS0 14-24, the setting of the data is accomplished by using the same incrementing and copy technique.

When all DS0 settings are complete press **Cancel** to exit Create menu.

TEMPORARY MAP

The TSU 120 is now holding the newly created DS0 Map A in a file as a temporary map. It can be reviewed or edited through the DS0 Map A menu.

Review

To Review the Temporary file, follow standard operating procedures to access the first two menu items of 5)DS0 MAP A (see Figure 4-8).

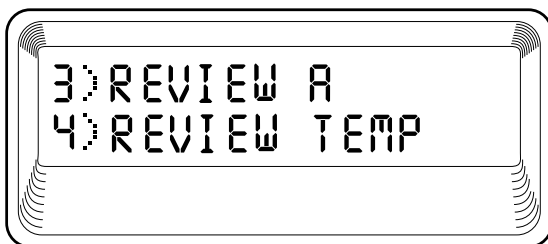


Figure 4-8

First Screen for Choosing to Review Temporary Files



NOTE

Throughout this review example, it is assumed that DS0 17 was inadvertently skipped.

Upon activating the 5)DS0 Map A menu, the fourth menu item must be accessed. Select Review Temp by pressing number **4** or by using the scroll to place the cursor on 4)REVIEW TEMP. Press **Enter** to activate the Review function. The unit begins the display with the number of DS0s set for Idle (see Figure 4-9).

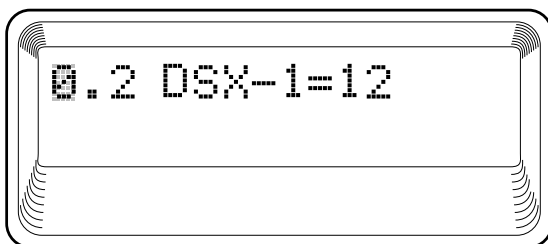


Figure 4-9

A Review Screen

Edit

The Review reflects that one of the DS0s is still programmed as Idle, and since the 0.1 Nx56/64 port has one less DS0, the error must be somewhere between DS0 13 and 24.

The map that was just created is still a Temp Map, and must be edited as such.

Return to the DS0 MAP A configuration items by using **Cancel**. Use number **5** or scroll down to move the cursor to 5)EDIT TEMP (see Figure 4-10). Press **Enter** to display the settings for DS0 #1 that have just been entered. The cursor is on the DS0 # field.

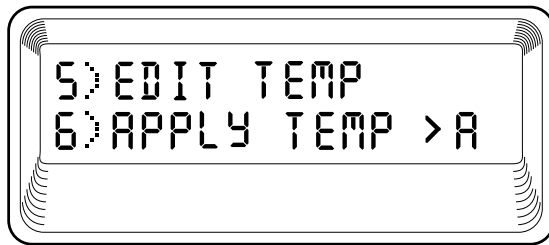


Figure 4-10
Window Showing Edit Temp Option

Since the error is between DS0 13 and 24, use number **1** and **3** to set the DS0 at number 13. Press **Enter** to display the contents of DS0 #13.

Scroll up to increment through the DS0s, reviewing each for accuracy. The display of DS0 17 will identify the error (see Figure 4-11).

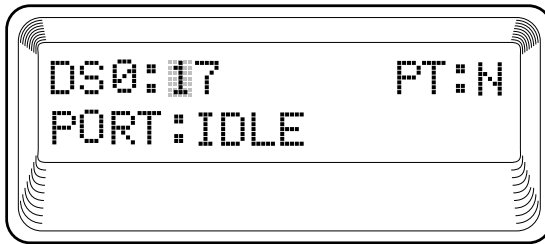


Figure 4-11
Window Showing the Error

To correct the setting press **Enter** twice to advance the cursor to the Port data field. Use scrolling to display the correct Port and **Enter** to record the selection.

The Temporary Map can be reviewed as many times as necessary. When all corrections are completed use **Cancel** to exit the Edit Temp menu. The unit returns to the DS0 Map A menu listing with the cursor on 6)APPLY TEMP >A. Press **Enter** to activate Apply.

Since applying a map will disrupt data flow, the unit verifies that such an interruption at this time is acceptable by displaying a disrupt data prompt (see Figure 4-12). No indicates data flow will not be disrupted.

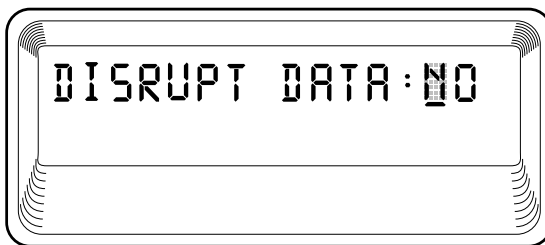


Figure 4-12
Screen Verifying Interruption of Data Flow is OK

Scroll to select Yes, and press **Enter** to confirm Apply. The unit displays Map Applied as the map just created is written into Map A and will be used to pass data.



NOTE

*The entire map can be cleared by first selecting **CREATE**, which has all DS0s set to **PSTRU=N** and **PORT=IDLE**, and then select **APPLY** to write the Idle map into the Current map.*

Use **Cancel** to exit DS0 Map A and return to the Config menu.

Configuring the Ports

Scroll down or use the number **7** to move the cursor to 7)PORT CONFIG. Press **Enter** to activate the Port Configuration menu item (see Figure 4-13).

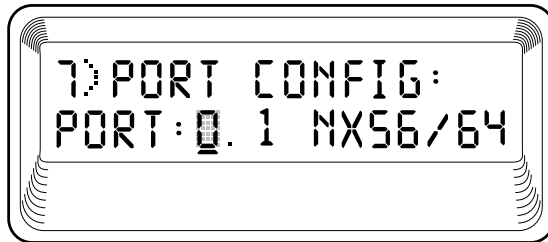


Figure 4-13

Window Showing Port Configuration Option

Press **Enter** to enter the Base Nx Configuration menu (see Figure 4-14).

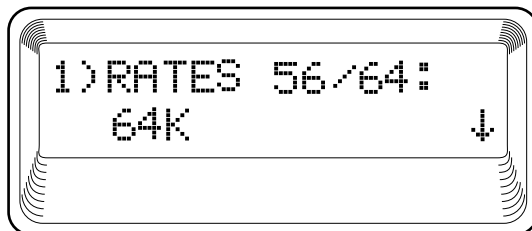


Figure 4-14

*Screen Used To Change Mode
(First Selection in the Base Nx Configuration Menu)*

Using the same operational methods as before, select item 2)RATE to change from 64K mode to 56K mode.

Scroll to continue viewing the remainder of the menu selections, comparing all the settings against the configuration chart.

Cancel returns to the PORT menu. Scroll to change the port designation to 0.2 DSX-1.

Enter the DSX-1 Configuration menu.

The TSU 120 is now completely configured and capable of passing data from the PBX and the DTE. Prior to actually using the configuration to pass voice and data, it is recommended that tests be run on the circuit.

TESTING EXAMPLE

If the example operations in the preceding pages were followed, the TSU 120 is completely configured and capable of passing data from the PBX and the DTE. Prior to actually using the configuration to pass voice and data, it is recommended to run tests on the circuit.

Testing consists of sending a test pattern from end-to-end and checking for errors in the pattern. There are two types of tests used to accomplish this.

- Send the pattern from one end and loopback the far end.
- Send the pattern from both ends and check at both ends.

Far End Looped Back Test

Two types of tests can be executed with the far end looped. The first is a check of the network and the network interfaces at both ends (QRSS). The second is a check of the DTE port.

Network Interface Test

The Network Interface Test can only be run when a full T1 is available (i.e., this cannot be used over Fractional T1).

At the Main menu place the cursor on 4)TEST with the number 4 or by scrolling. To activate the menu, again press number **4** or **Enter**.

The unit displays the first two Test menu items with the cursor on 1)NETWORK TESTS (see Figure 4-15). To activate, press number **1** or **Enter**.

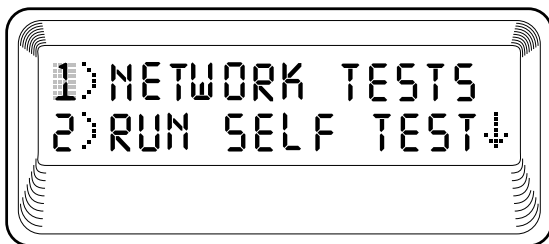


Figure 4-15
Test Menu One

The unit begins a display of the menu items. The selections available for each of the four screens (see Figure 4-16) are selected by scrolling.

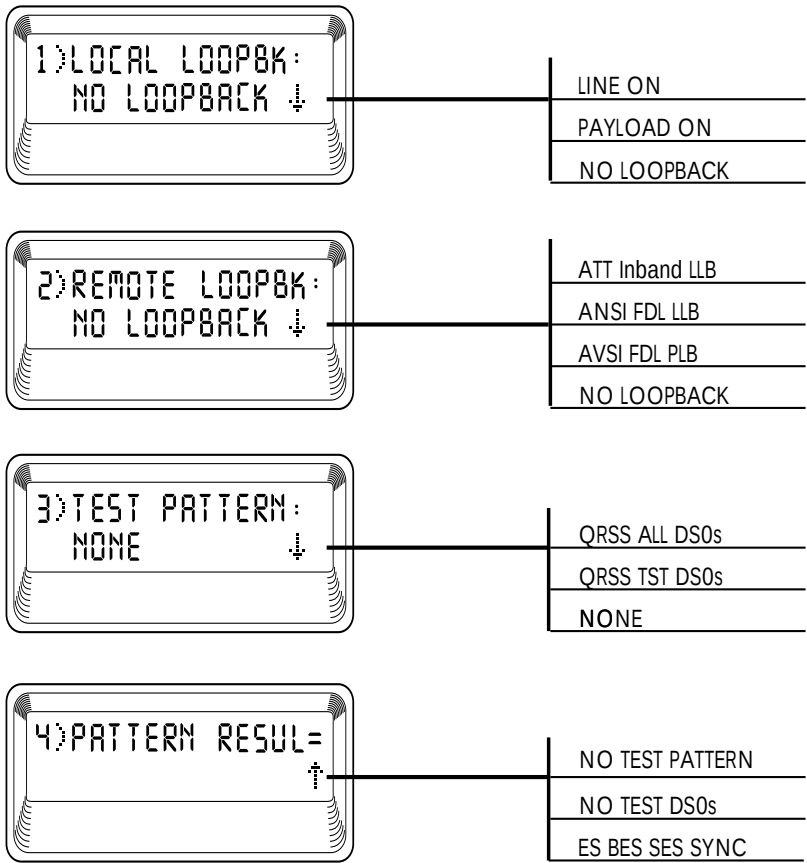


Figure 4-16
The Four Test Menu Windows

With the cursor on 1)REMOTELOOPBK, **Enter** activates the menu. Scroll to select a setting for PAYLOAD in the data field. When selected, press **Enter** to activate.

This initiates the transmission of a loop-up code toward the far end (see Figure 4-17).

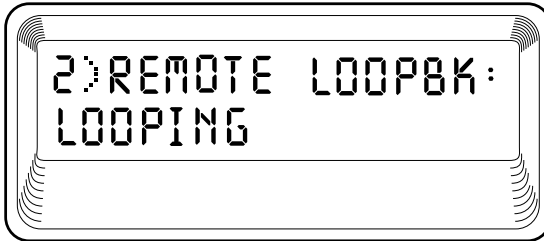


Figure 4-17
Screen that Appears During Loopback Verification

The TSU 120 verifies that the far end has gone into loopback by verifying the receipt of the code at the originating end. While waiting for loopback verification, the TSU displays Looping.

When completed, scroll or use number **3** to select 3)PATTERN. Use **Enter** key to activate the Pattern menu. For Remote Loopback, scroll to select QRSS All DS0s and **Enter** to activate the selection (see Figure 4-18).



Figure 4-18
Test Pattern Screen for QRSS all DS0s

The TSU 120 begins to automatically check for synchronization and bit errors.

The results of this check are shown under menu item 4)PATTERN RESULTS (see Figure 19).

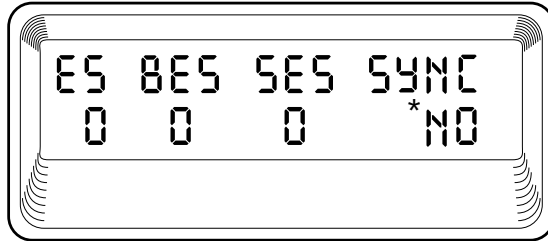


Figure 4-19

Window Displaying Test Pattern Results

The Test Pattern Results are explained in the following discussion :

ES	The number of errored seconds with one or more errors per second.
BES	The number of severely errored seconds with more than 320 errors per second.
SES	The number of seconds with more than 320 bit errors.
*	The pattern sync has been lost.
No (Yes)	Current pattern sync status. Indicates if pattern sync is (Yes) , or is not (No) , valid.



NOTE

Pressing the 2 key injects errors.



NOTE

Clear the results with the **Clear** key (**shift + 9**).

If not in pattern sync, the TSU does not accumulate errored seconds.

When through viewing the results, Cancel returns the unit to menu item 3)TEST PATTERN. Select None to terminate the test and the QRSS pattern generation. The far end will still be in loopback until the network REMOTE LOOPBK is set to None under menu item 2)REMOTE LOOPBK.

Test the Nx56/64 Interface

The Nx56/64 interface is tested by essentially the same method as the Remote Loopback is tested.

From the 4)TEST Main menu scroll or use number **3** to select 3)PORT TEST. **Enter** activates the PORT TEST menu. Scroll to select the Port to test and **Enter** to activate. (For this example the 0.1 Nx56/64 is used.)

The unit displays a menu with the cursor on 1)LOOPBK. Scroll to select Remote and **Enter** to activate. The display shows Looping while sending a V.54 loop-up code to the far end and waiting for a loop-up verification.

If no verification is received after five seconds, the display reads Failed.

Upon receiving verification of proper loopup, start the 511 pattern by selecting 511 PATTERN using menu item 2)511 PATT:ON.

The results (which are shown under menu item 4)PATTERN RESULTS) are a display of a count of the number of seconds with error since the test was initiated and pattern sync was achieved. The **Clear** key (**shift + 9**) is used to clear errored seconds count.



For the 511 pattern, the TSU 120 provides a count of the number of seconds which contained errors, not an actual error count.

Test Termination

Select 511 Pattern Off and deactivate the Remote Loopback by selecting **Off** for the Loopbk menu item number **1**.

Appendix A

TSU 120 Menu Tree

This Appendix contains the complete menu tree for the TSU 120.

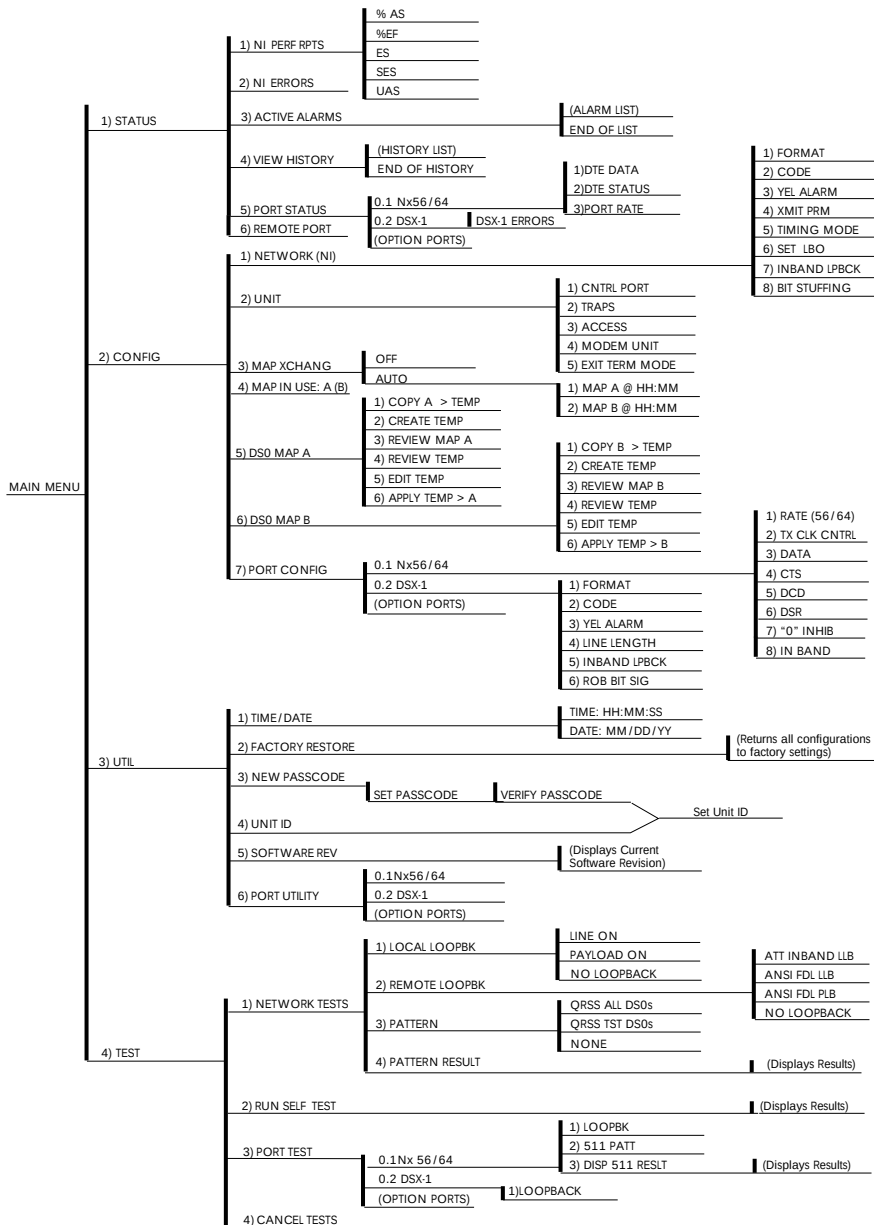


Figure A-1
TSU 120 Complete Menu Tree Diagram

Appendix B

DTE Data Rate Table

This chapter contains the DTE data rate chart.

Table B-A
DTE Data Rate Vs. DS0s

# OF DS0s (N)	DTE RATE=56K	DTE RATE=64K
N=1	56K	64K
N=2	112K	128K
N=3	168K	192K
N=4	224K	256K
N=5	280K	320K
N=6	336K	384K
N=7	392K	448K
N=8	448K	512K
N=9	504K	576K
N=10	560K	640K
N=11	616K	704K
N=12	672K	768K
N=13	728K	832K
N=14	784K	896K
N=15	840K	960K
N=16	896K	1024K
N=17	952K	1088K
N=18	1008K	1152K
N=19	1064K	1216K
N=20	1120K	1280K
N=21	1176K	1344K
N=22	1232K	1408K
N=23	1288K	1472K
N=24	1344K	1536K

Appendix C

System Configurations Chart

This appendix contains tables to support the chapter, *Example Operations*. Five steps/tables are provided to aid in configuring the system.

Step 1: Configure Network.

Table C-A
Control Pin Connection Configuration Chart for Network Interface

MENU ITEM	SELECTION USED	SELECTIONS AVAILABLE
1)FORMAT		D4, ESF*
2)CODE		AMI, B8ZS*
3)YEL ALARM		ENABLE*, DISABLE
4)XMIT PRM		ON, OFF*
5)TIMING MODE		NETWK* (NI), INTERNAL, BASE DTE, BASE DSX-1, SECONDARY INTERFACE, NORMAL
6)LINE BUILD OUT		0 dB*, 7.5 dB, -15 dB, -22.5 dB, AUTO
7)INBAND LOOPBK		ACCEPT*, REJECT
8)BIT STUFFING		DISA*, ENA
*= Factory Default		

Step 2: Configure DTE PORT: (0.1 Nx56/64).

Table C-B
Configuration Chart for DTE Port

MENU ITEM	SELECTION USED	SELECTIONS AVAILABLE
1)RATE 56/64		56K, 64K*
2)TX CLK CNTRL		INTERNAL*, INTERNAL & INVERTED, EXTERNAL
3)DATA		NORMAL*, INVERT
4)CTS		NORMAL*, FORCE ON
5)DCD		NORMAL*, FORCE ON
6)DSR		NORMAL*, FORCE ON
7)"0" INHIB		ON, OFF*
8)INBAND		ON, OFF*
*=Factory Default		

Step 3: Select number of DS0s/PORT.

Based on Data Rate Table in the appendix, *DTE Data Rate Chart*.

Step 4: DS0 Map A Configuration.**Table C-C**
DS0 Map A Configuration

DSO #	ASSIGN TO	PASSTHRU?	DSO #	ASSIGN TO	PASSTHRU?
1			13		
2			14		
3			15		
4			16		
5			17		
6			18		
7			19		
8			20		
9			21		
10			22		
11			23		
12			24		

Step 5: DS0 Map B Configuration.**Table C-D**
DS0 Map B Configuration

DSO #	ASSIGN TO	PASSTHRU?	DSO #	ASSIGN TO	PASSTHRU?
1			13		
2			14		
3			15		
4			16		
5			17		
6			18		
7			19		
8			20		
9			21		
10			22		
11			23		
12			24		

Appendix D

TSU 120 System Messages

This appendix lists and defines the alarm and status messages that appear on the TSU screen.

ALARM MESSAGES

Network Interface (NI)

The following messages indicate an alarm condition on the network interface:

Red Alarm	NI unable to frame align with incoming signal
Yellow Alarm	Remote alarm indication (RAI) being received from far end
Blue Alarm	Unframed all ones (1s) (AIS) being received at NI
Loss of Signal	No signal detected at NI

Nx56/64 Interface

The following messages indicate an alarm condition on the Nx56/64 card:

Clock Slip	Difference in frequency of the data clock at the network and DTE
PLL Alarm	Unable to achieve Phase Locked Loop on the clock provided by the network interface
Zeros Alarm	All zeros (0s) data being sent toward the network interface
FIFO Alarm	Error in propagation of data through the FIFOS
No EXT Clock	No external transmit clock at DTE (only appears if EXT CLK is selected)Status Messages

DSX-1 (PBX) Interface

The following messages indicate the status of the DSX-1 (PBX) interface:

Frame Slip Indicates a Frame Slip has occurred on the DSX-1 interface; this is present in Alarm History only

Line Loop Up Line loopback activated

Port Loop Up Port loopback activated

Loopdown Loopback has been deactivated

STATUS MESSAGES

Network Interface (NI)

The following messages indicate the status of the network interface:

Payload On	Payload loopback activated
Line On	Loopback off
Loopback Off	All loopbacks deactivated
Factory Restore	Factory setting restored
Power On	Unit powered on
Self Test	Internal self test performed

Nx56/64 Interface

The following messages indicate the status of the Nx56/64 card:

Loop Up	Data is looped at both the network interface and DTE interface of the card
Remote Loop Up	Sending V.54 pattern in an attempt to loop up a remote device
511 Pattern On	Sending 511 pattern towards the network interface
Loop Down	Data is no longer looped back at the network interface or DTE interface
511 Pattern Off	No longer sending 511 pattern towards the network interface

DSX-1 (PBX) Interface

The following messages indicate the status of the DSX-1 (PBX) interface:

Frame Slip	Indicates a Frame Slip has occurred on the DSX-1 interface; this is present in Alarm History only
Line Loop Up	Line loopback activated
Port Loop Up	Port loopback activated
Loopdown	Loopback has been deactivated

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