ADTRAN

FXO+ DUAL VOICE OPTION MODULE
Part Number 1200103L2
&
FXO+ DUAL VOICE PLUG-ON BOARD
Part Number 1200104L2

USER MANUAL

ADTRAN

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.

NOTE

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

FEDERAL COMMUNICATIONS COMMISSION (FCC) INFORMATION

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. If your telephone equipment (FXO+) 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 is not practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.

3. 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.

4. If you experience trouble with this equipment (FXO+), please contact ADTRAN Customer Service for repair / warranty information (see the end of this manual). 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.

5. This unit contains no user serviceable parts.

6. The following information may be required when applying to your local telephone company for switched line facilities:

Service	REN/SOC	FIC	USOC
Loop Start	0.3B / 9.0F	02LS2	RJ11C
Ground Start	0.1A / 9.0F	02GS2	RJ11C

7. The REN and FCC registration number are indicated on the label. The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

8. On the circuit board of this equipment is a label that contains, along with other information, the FCC registration number and ringer equivalence number (REN) for the equipment requested. Provide this information to your telephone company.

9. The equipment may not be used on public coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

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 voice band 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 toa 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:

_____

CANADIAN EQUIPMENT LIMITATIONS

NOTE

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

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

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

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

NOTE

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection author-ity, or an electrician, as appropriate.

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

The ringer equivalence number (REN) assigned to each terminal adapter is used to determine the total number of devices that may be connected to each circuit. The sum of the RENs from all devices in the circuit should not exceed a total of 5.0.

Table of Contents

Chapter 1
Introduction

FXO+ DUAL VOICE OVERVIEW

The FXO+ Dual Voice (FXO+) option module is one of the option modules available for use with the ADTRAN TSU 100/120/600. The FXO+ module provides two 2-wire voice-grade interfaces serving as the loop termination for central office line current and ringing voltage.

The FXO+ module emulates a telephone or station interface. It responds to signaling from the digital signal, level 1 (DS1) stream by providing loop closure or ring ground to the 2-wire interface. The condition of tip-ground and ringing on the 2-wire interface is converted to signaling out the DS1 stream. The FXO+ may serve as the office side of a foreign exchange FXO/FXS application. The FXO+ may be used with the ADTRAN FXS+ to implement message-waiting with analog message-waiting phones that need -150 VDC to light the message lamp. The FXO+ module features on-hook data transmission for passing Caller ID data from the 2-wire interface to the DS1 stream. When the FXO+ is used in the dial pulse terminate (DPT) mode with E&M signaling on the DS1 stream, it extends the central office side of an analog direct inward dial (DID) trunk to the customer premises. The FXO+ may be used to connect to the station side of a private branch exchange (PBX). Signaling and interfaces comply with portions of EIA/TIA-464-A

and AT&T Pub. 43801, and FCC Part 68. The FXO+ option module also accepts the FXO+ plug-on board to provide up to four FXO+ functional ports per option slot used, as well as accepting other plug-on modules.

The FXO+ plug-on module may be plugged onto any existing TSU option module.

Functional Description

The FXO+ is designed to fit in the option slot of the TSU 100/120/600 and is subject to its operation and control. The FXO+ is configured from the front panel of the TSU 100/120/600 or by an external personal computer (PC) program (T-Watch). The internal menus for its configuration are a part of the FXO+ module and are automatically installed when the FXO+ is plugged into the unit.

Features

The FXO+ Dual Voice option module has the following features:

- Each 2-wire port operates at 64 kbps
- Menu configurable transmit (TX) and receive (RX) levels (transmit level points - TLPs)
- FXO, FXO message waiting, and DPT operating modes
- Passes Caller ID data from the 2-wire interface to the T1
- Ground Start or Loop Start 2-Wire Supervision
- Extensive testing capabilities:
  - RX and TX signal bit monitoring
  - Busy, ringing, message-waiting, and status monitoring
  - Integral 1 kHz tone generation sends test tone towards near or far end
  - Manual control of TX A and B signal bits
  - Manual control of 2-wire interface supervision output
- Adding the FXO+ plug-on board provides the TSU

100/120/600 with four voice ports in one option slot
- Selectable 2-Wire output for carrier failure
- Full V.34 modem compatible
- Detects and forwards far-end disconnect signals to ADTRAN FXS+ in FXS mode.

FXO+ Option Module Specifications

The FXO+ Dual Voice option module conforms to the following specifications:

Voice Channels	Two (four with plug-on module installed)
Transmission Levels	TX: +8 to 0 dB TLP, 1 dB steps RX: 0 to -8 dB TLP, 1 dB steps
Frequency Response	300 to 3400 Hz (+/- 1.0 dB)
2-wire Impedance	600 Ω + 2.15 μF
2-wire ERL	≥20 dB
2-wire SRL	≥15 dB
THL ERL	>25 dB
THL SRL	≥20 dB
Longitudinal Bal	>52 dB
RX Idle Channel Noise	<15 dBrnc
TX Idle Channel Noise	<20 dBrnc
Operating Temperature	0° to 45°C, relative humidity, non-condensing
Connector	RJ-45
Tests	Power-on circuit test Signal Bits Monitoring and Setting 1 kHz test tone generation Settable 2-wire port output state

Physical Description

The FXO+ is an option module which plugs into the option slot in the rear of the main unit; see Figure 1-1.
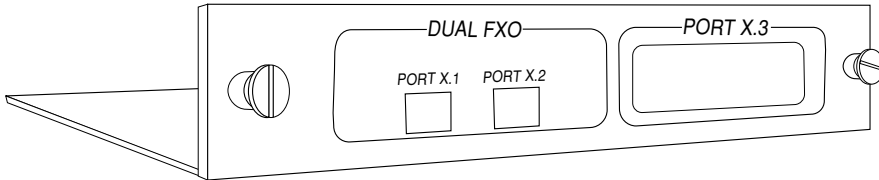
Figure 1-1
FXO+ Dual Voice Option Module

The FXO+ rear panel includes a plastic plug over a cutout for additional connectors. This allows a plug-on board to be added to the FXO+ module. The PORT X.Y indication is linked to the port numbering philosophy of the TSU 100 product family. The *X* represents the slot number, and the *.Y* indicates the port number. For the TSU 100 application, there is only one option slot. Therefore the port designations for the two FXO voice ports will be 1.1 and 1.2. If added, the plug-on board port designation would be 1.3 and 1.4. These port numbers appear in the front panel liquid crystal display (LCD) menu displays.

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 one of the numbers at the end of this manual.

Chapter 2
Installation

UNPACK AND INSPECT

Carefully inspect the FXO+ Dual Voice option module for any shipping damages. If damage is suspected, file a claim immediately with the carrier and then contact ADTRAN Technical Support. If possible, keep the original shipping container for use in shipping the FXO+ module back for repair or for verification of damage during shipment.

Shipped by ADTRAN

The following items are included in the ADTRAN shipment:

- FXO+ Dual Voice option module
- User Manual (to be inserted into main TSU 100/ 120/600 user manual)

Provided by Customer

The customer must provide a cable for connection to the station.

INSTALLING THE FXO+ DUAL VOICE OPTION MODULE

For ease of replacement, power to the TSU 100/120/600 may be *on* when installing or removing the FXO+ Dual Voice option module.

NOTE

For use in Canada, regulatory compliance requires that the Transmit Level/Transmit Level Point, TX LVL (TLP), of the FXO+ Dual Voice option module be set to a value between +3dB and +8dB inclusive, and that the TSU 100/120/600 be password protected to prevent unauthorized alteration of the level.

See the chapter Operations *for information on setting the Transmit Level/Transmit Level Point, TX LVL (TLP). See the TSU 100/120/600 user manual for information about password protecting the unit.*

Placement of the Option Module

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

1. Remove cover plate from the unit rear panel.
2. Slide option module into the rear panel until it is positioned firmly against the front of the unit.
3. Fasten thumbscrews at both edges of the option module.
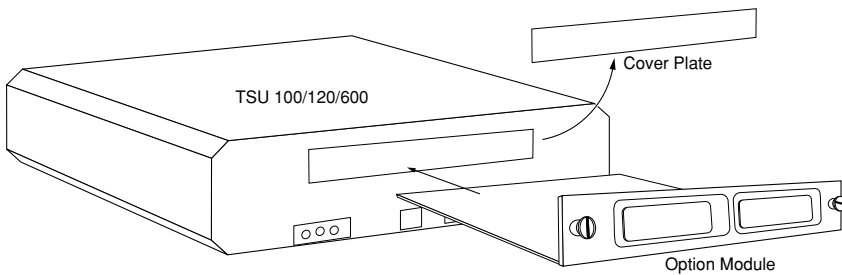
Figure 2-1
Installing Option Module

Power Connection

Each FXO+ module derives power from the base TSU 100/120/600 unit. Power to the TSU 100/120/600 is supplied by a captive eight-foot power cord.

Wiring

The FXO+ Dual Voice option module offers two connectors for an analog voice interface. The connectors are universal and accept either an RJ-45 (8-pin) or an RJ-11 (6-pin modular plug). The pinout is given in Table 2-A.

The required wiring connection is as follows:

Connector Type (USOC)   RJ-45
Part number   AMP # 555164-1

Table 2-A
2-Wire Voice Pinout Connection

PIN	NAME	DESCRIPTION
5	TIP	Tip lead of 2-wire interface
4	RING	Ring lead of 2-wire interface
1, 2, 3, 4, 5, 6, 7, 8	UNUSED	-

Pins used to mate with the FXO+ connector are as follows:

RJ-11   **Tip**   pin 4
           Ring   pin 3

RJ-45   **Tip**   pin 5
           Ring   pin 4

POWER UP TESTING AND INITIALIZATION

The FXO+ option module executes a partial self test during the power up sequence, as described in the TSU 100/120/600 manual. A full self test can be activated from the Test menu. No initialization input is required. Any previously configured setting for the FXO+ is restored automatically upon power up.

Successful Self Test

The green **OK** LED, located with the Module LEDs on the front panel, turns *on* when a successful self test is completed and the configuration is successfully restored. See the chapter *Operation* in the main user manual.

Failed Self Test

If the FXO+ module fails one or more of the self tests, a message is displayed in the LCD during power up. See the TSU 100/120/600 user manual. Specific failures of the FXO+ module are identified in the appendix *FXO+ Failure Messages* in this manual.

Operation Alarms

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

Chapter 3
Operation

OVERVIEW

The FXO+ module is controlled as part of the TSU 100/120/600 using the same methods as described in the user manual.

See the TSU 100/120/600 user manual for descriptions of front panel indicators and buttons.

Menu Structure

When an option module is installed in the TSU 100/120/600, the unit adds it to the list of available options under the Port menu items. These menu items are shaded in the limited overview of the TSU 100 menu shown in Figure 3-1. (The appendix of the TSU 100 user manual contains a complete menu diagram.)

Menu Operation

An option module must be selected from the listing in one of the Port menu options before any option module menus are applicable. With the cursor on one of the Port menu items, press **Enter** to display a list of the currently installed option modules. To activate menus for the FXO+ option module, scroll through the list to display X.1 FXO+ and press **Enter.** (The *X* represents the slot number, and *.1* identifies the port number.)

Once the option module is selected, the FXO+ menus appear as a subset of, and operate the same as, menus for the main unit. Use the up and down **Arrows** to place the cursor on the desired item and press **Enter** to display the first two submenu choices.

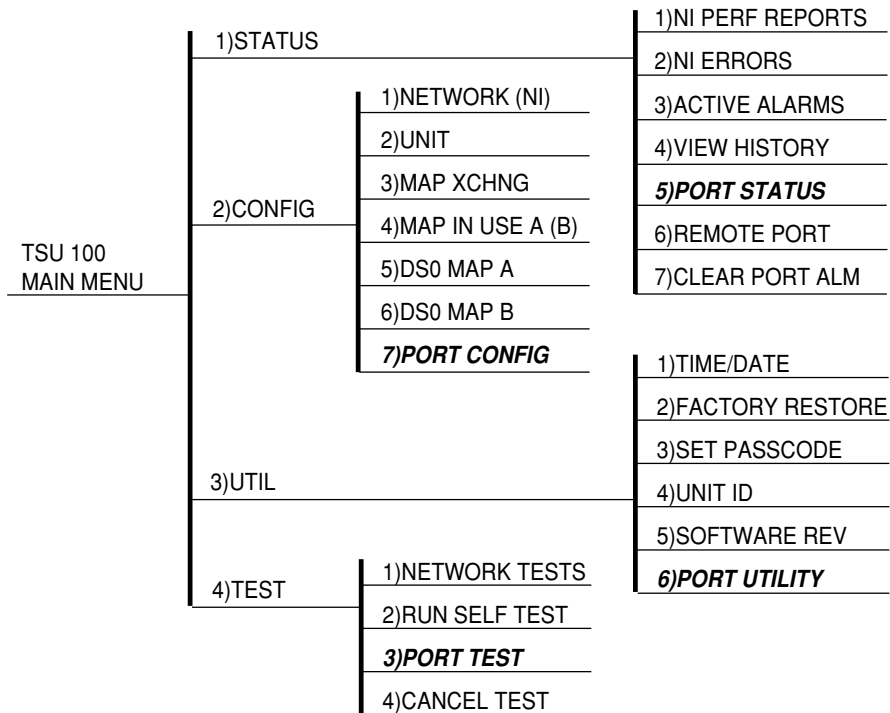| TSU 100 MAIN MENU			
1)STATUS		1)NI PERF REPORTS	
		2)NI ERRORS	
2)CONFIG	1)NETWORK (NI)	3)ACTIVE ALARMS	
	2)UNIT	4)VIEW HISTORY	
	3)MAP XCHNG	*5)PORT STATUS*	
	4)MAP IN USE A (B)	6)REMOTE PORT	
	5)DS0 MAP A	7)CLEAR PORT ALM	
	6)DS0 MAP B		
	7)PORT CONFIG	1)TIME/DATE	
		2)FACTORY RESTORE	
		3)SET PASSCODE	
3)UTIL		4)UNIT ID	
		5)SOFTWARE REV	
4)TEST	1)NETWORK TESTS	*6)PORT UTILITY*	
	2)RUN SELF TEST		
	3)PORT TEST		
	4)CANCEL TEST		

Figure 3-1
TSU 100 Main Menu

FXO+ MENU ITEMS

The FXO+ menus are accessed from, and operate the same as, menus for the TSU 100/120/600. The FXO+ items are submenu choices of those four Main menus, as shown in Figure 3-1. For information on Factory Restore and Run Self Test see *TSU Features Used With FXO+ Options* in this chapter.

The FXO+ menu items:

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

Port Status

Port Status, a submenu of TSU 100/120/600 Main menu item Status, displays active status information about the FXO+ interface.

When Port Status is displayed, place the cursor on it and press **Enter** to display the first available port. Scroll to select 1.1 FXO+ and press **Enter** to activate either of the submenus shown in Figure 3-2.
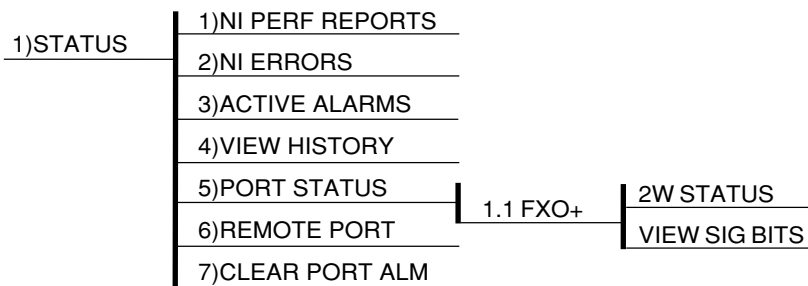

Figure 3-2
Port Status Submenus

2-Wire Status

There are three information fields, Busy, Ringing, and Message-Waiting (MW). See Figure 3-3. An asterisk (*) indicates an item is active.

```
    ✳
BUSY RINGING MW
```
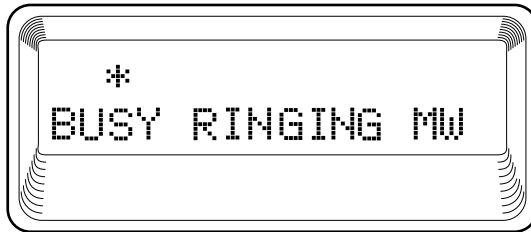
Figure 3-3
2-Wire Status Display

Busy
An asterisk is present if loop current is flowing through the 2-wire circuit.

Ringing
An asterisk is present if ringing voltage is being applied to the 2-wire input.

MW (Message-Waiting)
An asterisk is present if 150 VDC message-waiting voltage is applied between tip and ring.

View Signaling Bits

View Sig Bits is used to view the status of the RX and TX signaling bits in the DS1 stream. See Figure 3-4. The status of both the A and B bits is displayed.

```
  1    0      0    1
RXA RXB    TXA TXB
```

Figure 3-4
View Signaling Bits Display

Port Config (Port Configuration)

Port Configuration, a submenu of TSU 100/120/600 main menu item Configuration, is used to configure the FXO+ option module. The submenu items shown in Figure 3-5 are used to configure the parameters.

```
2)CONFIG ┐                               ┌ 1)MODE
         └ 7)PORT CONFIG ┐               ├ 2)RX LVL (TLP)
                         └ 1.2 FXO+      ├ 3)TX LVL (TLP)
                                         └ 4)FAULT RESP
```
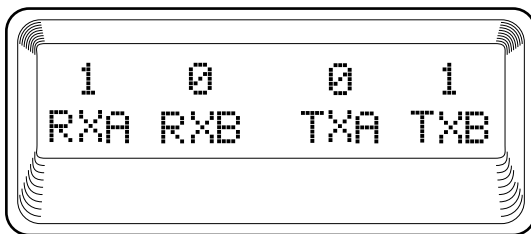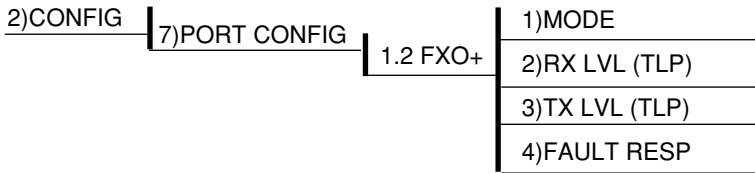
Figure 3-5
Port Configuration Submenus

The unit displays the first of seven submenu items. Table 3-A identifies the available selections for Port Configuration. Continue with standard operating procedures.

Table 3-A
Port Configuration Parameters

MENU ITEM	PARAMETER CHOICES
MODE	FXS-LS, FXO-GS, FXO-LSMW, DPT
RX LVL (TLP)	–8 dB –> 0 dB, 1 dB steps *(–3 dB)
TX LVL (TLP)	0 dB –>+8 dB, 1 dB steps *(+3 dB)
FAULT RESP	*Normal, Seized
*Factory Default	

Mode

Mode sets the type of 2-wire to T1 signaling used. Choices include:

FXO_LS (FXO loop-start)
This mode detects the presence of ringing voltage on a 2W analog line with battery. The status of this ringing signal is passed on out the T-span. The FXO+ also provides loop-closure in response to signaling being received on the T-span. The FXO interface *looks* like a telephone to the analog line that it terminates. Line-current dropout is also detected at the end of a call (disconnect supervision) and is passed to the far-end FXS card.

FXO_GS (FXO ground-start)
This mode is used when interfacing to or extending ground start analog central office trunks. Ringing voltage and tip-ground is detected by this card and passed out the T-span. Incoming signaling on the T-span will determine if ring ground or loop closure is asserted on the 2W interface. Ground start lines are often used with PBX and key systems to reduce the possibility of incoming and outgoing calls on a trunk.

FXO_LSMW (FXO loop-start message waiting; used in ESF framing only)
This mode is the same as FXO_LS with the exception that 150-volt message-waiting voltage is detected and that information is passed out the T-span to the far-end FXS+ card. Message waiting operation allows an analog message-waiting telephone to be placed at a remote location and connected through T-span.

DPT (dial-pulse terminate)
This mode allows analog DID (direct inward dial) trunk interfaces on a PBX to be interfaced to a T-span. In the DPT mode, the FXO+ card detects battery polarity reversal and passes this information out the T-span. The FXO+ responds to signaling on the T-span by opening or closing the loop. These functions allow incoming calls on the T-span using E&M signaling to be terminated on an analog port using loop-reverse battery signaling.

RX LVL (TLP) (Receive Level/Transmit Level Point)

RX LVL (TLP) sets the RX direction transmission level points (TLP). The TLP is indicated in dB and the relative loudness is indicated by a bar graph display. Settings change immediately as the bar graph is scrolled.

Choice range: −8 dB –> 0 dB, in 1 dB steps.

TX LVL (TLP) (Transmit Level/Transmit Level Point)

TX LVL (TLP) sets the TX direction transmission level points (TLPs). The TLP is indicated in dB and the relative loudness is indicated by a bar graph display. Settings change immediately as the bar graph is scrolled.

Choice range: +0 dB –> −8 dB, in 1 dB steps.

Fault Resp (Fault Response)

Fault Response, Normal or Seized, determines the 2-wire output during a carrier alarm. For a network alarm, the 2-wire trunk would appear busy if set for seized. If set for Normal, no seizure occurs.

Choices: Normal and Seized.

Port Utility

Port Utility, a submenu of the TSU 100/120/600 main menu item Utilities (UTIL) displays the 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.

When Port Utility is displayed, place the cursor on it and press **Enter** to display the first available port. See Figure 3-6.

```
                      1)TIME/DATE
                      2)FACTORY RESTORE
                      3)SET PASSCODE
    3)UTIL            4)UNIT ID
                      5)SOFTWARE REV
                      6)PORT UTILITY                     1)SW REVISION
                                       1.1 FXO+          2)CMD MODE
```
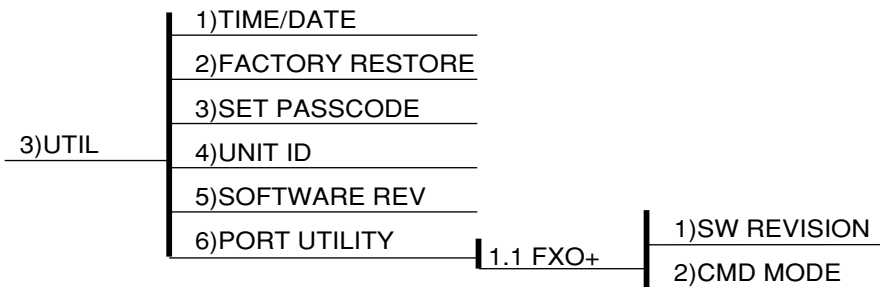
Figure 3-6
Port Utility Submenus

Display 1.1 FXO+ (scroll to display if necessary), and press **Enter.** The unit displays the option module name and the software version installed.

The submenu Port Utility contains a second option, 2)CMD Mode, for the FXO+ module. This option is reserved for factory use only.

Press **Cancel** to exit or select another port.

Port Test

Port Test, a submenu of the TSU 100/120/600 Main menu item Test, activates tests of the selected data ports. Selecting the FXO+ displays tests available for this option module. See Figure 3-7.
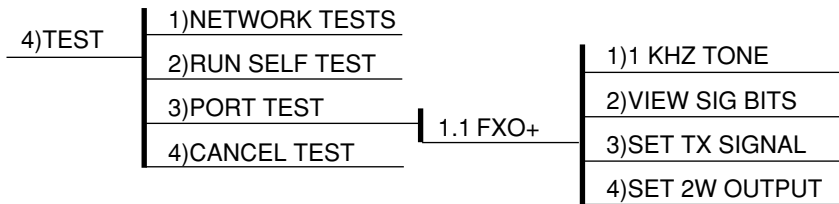

Figure 3-7
Port Test Submenus

1 kHz Tone

This test injects a 1004 Hz sine wave either toward the far end (TX DIRECTION toward the T1 network) or toward the near end (the 2-wire interface on the option module). This tone may be used for testing or relative level measurements.

Choices: Off, Near, and Far.

VIEW SIG BITS (View Signaling Bits)

View Sig Bits is used to view the status of the RX and TX signaling bits in the DS1 stream. See Figure 3-8. The status of both the A and B bits is displayed.

```
  1      0       0      1
RXA RXB   TXA TXB
```
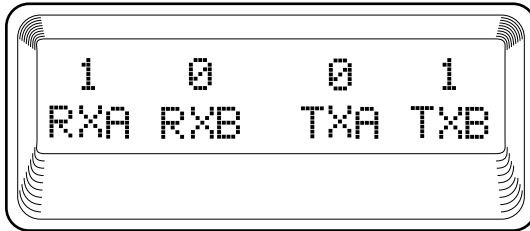
Figure 3-8
View Signaling Bits Display

SET TX SIGNAL (Set Transmit Signal)

Set TX Signal allows the A and B signal bits in the TX direction to be forced to a desired state for test.

SET 2-W OUTPUT (Set 2-Wire Output)

Set 2W Output allows the 2-wire voice interface output to be forced to a desired state for test.

Table 3-B
Port Test Parameters

MENU ITEM	PARAMETER CHOICES
1 kHz Tone	Off, Near, Far
View Sig Bits	Display only
Set TX Signal	Off, A=0 B=0, A=1 B=0, A=0 B=1, A=1 B=1
Set 2W Output	Off, Loop Open, Loop Closed, Ring Ground

TSU FEATURES USED WITH FXO+ OPTIONS

In addition to the FXO+ menu items, two additional menu items of the TSU 100/120/600 may be operated in conjunction with the FXO+ option module. These are Factory Restore and Run Self Test.

Factory Restore

Factory Restore, a submenu of the TSU 100/120/600 Main menu item UTIL (Utilities), restores the factory installed default setting for all FXO+ option module parameters.

When Factory Restore is displayed, place the cursor on it and press **Enter.** The unit is restored to preset factory defaults and returns to the Main menu. The factory default for port configuration parameters is shown in Table 3-A.

Run Self Test

Run Self Test, a submenu of the TSU 100/120/600 Main menu item Test, executes both the FXO+ internal test and the TSU 100/120/600 internal test. The results of the self test are displayed in the LCD. See the TSU 100/120/600 user manual for additional information on Self Test.

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

Product Support Information

Presales Inquiries and Applications Support
Please contact your local distributor, ADTRAN
Applications Engineering, or ADTRAN Sales:

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

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

Technical Support	(888) 4ADTRAN

Repair and Return
If ADTRAN Technical Support determines that a
repair is needed, Technical Support will coordinate
with the Return Material Authorization (RMA)
department to issue an RMA number. For informa-
tion regarding equipment currently in house or
possible fees associated with repair, contact RMA
directly at the following number:

RMA Department	(205) 963-8722

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

ADTRAN, Inc.
RMA Department
901 Explorer Boulevard
Huntsville, Alabama 35806

RMA # _____

Appendix A
FXO+ Option Card Menu Tree

The menu tree for the FXO+ Option Card is provided in Figure A-1.

1)Port Status	1)2W Status (Busy Ringing)
	2)View Sig Bits (RXA RXB TXA TXB)
2)Port Config	1)MODE: FXO_LS, FXO_GS, FXO_LSMW, DPT
	2)RX LVL (TLP): -8 dBM to 0 dBM
	3)TX LVL (TLP): 0 dBM to +8 dBM
	4)FAULT RESP: NORMAL, SEIZED
3)Port Utility	1)SW Revision
	2)Command Mode : 0
4)Port Test	1)1 KHZ Tone: OFF, NEAR, FAR
	2)View Sig Bits (RXA RXB TXA TXB)
	3)Set TX Signal: OFF, AB=00, AB=01, AB=10, AB=11
	4)Set 2W Output: OFF, LOOP OPEN, LOOP CLOSED, RING GROUND

Figure A-1
FXO+ Option Card Menu Tree

Appendix B
FXO+ Failure Messages

FAILURE MESSAGES AT POWER-UP

The following messages indicate a probable component failure on the FXO+ Module:

E01 - EPROM CS   EPROM checksum error

E02 - RAM ERR   Static RAM error

E03 - TIP GND   Tip ground detection circuits

E04 - RINGING   Ringing detection circuits

E06 - TEST FAIL   Self test could not finish

E10 - SIGNALING   Failure of signal bit transmission

Appendix C
Signaling States

SIGNALING STATES VERSUS MODE OF OPERATION

The three tables in this appendix describe the signaling states for the FXO card and the DS-1 PCM stream.

Table C-A
FXO+ Loop Start Mode

FXO+ 2W OUTPUT	RXA	RXB	TXA	TXB	FXO+ 2W Output
Outgoing call from 2W port					
Loop Open	0	X	0	1	No ringing (idle)
Loop Open	0	X	0	0	Ringing
Loop Closed	1	X	0	1	No ringing
Incoming call to 2W port					
Loop Open	0	X	0	1	No ringing (idle)
Loop Closed	1	X	0	1	No ringing

The A and B signal bit states on the DS-1 signal are as follows:

0 = logic 0 is the DS-1 stream
1 = logic 1 is the DS-1 stream
X = value is not significant
Loop Open = telephone on-hook
Loop Closed = telephone off-hook

Table C-B

FXO+ Ground Start Mode

FXO+ 2W OUTPUT	RX A	RX B	TXA	TX B	FXO+ 2W INPUT
Outgoing call from 2W port					
Loop open, no ring ground	0	1	1	1	No tip ground, no ringing (idle)
Loop open, no ring ground	0	1	0	1	Tip ground, no ringing
Loop closed, no ring ground	1	1	0	1	Tip ground, no ringing
Loop closed, no ring ground	1	1	0	0	Tip ground, no ringing
Incoming call to 2W port					
Loop open, no ring ground	0	1	1	1	No tip ground, no ringing (idle)
Loop open, ring ground	0	0	1	1	No tip ground, no ringing
Loop open, ring ground	0	0	0	1	Tip ground, no ringing
Loop closed, no ring ground	1	1	0	1	Tip ground, no ringing

The A and B signal bit states on the DS-1 signal are as follows:

0 = logic 0 is the DS-1 stream
1 = logic 1 is the DS-1 stream
X = value is not significant
Loop Open = phone on-hook
Loop Closed = phone off-hook

See Tables C-B and C-C for descriptions of FXO mode for signaling states.

FXS+					FXO+
2W OUTPUT	RX A	RX B	TX A	TXB	2W Output
Outgoing call from 2W port					
Loop Open	0	X	0	0	Normal battery (idle)
Loop Closed	1	X	0	0	Normal battery
Loop Open	1	X	1	1	Reverse battery (wink)
Loop Open	0/1	X	0	0	Normal battery
Loop Closed	1	X	1	1	Reverse battery (answer)

The A and B signal bit states on the DS-1 signal are as follows:

0 = logic 0 is the DS-1 stream
1 = logic 1 is the DS-1 stream
X = value is not significant
Loop Open = telephone on-hook
Loop Closed = telephone off-hook