

FXS+ DUAL VOICE OPTION MODULE

Part Number 1200080L1 Part Number 1200080L1#HS

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FXS+ DUAL VOICE PLUG-ON BOARD

Part Number 1200082L1 Part Number 1200082L1#HS

USER MANUAL

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Table of Contents

Chapter 1. Introduction	1
FXS+ Dual Voice Overview	1
Functional Description	2
Features	2
FXS+ Option Module Specifications	4
Physical Description	
Chapter 2. Installation	7
Unpack and Inspect	
Shipped by ADTRAN	
Provided by Customer	
Installing the FXS+ Dual Voice Option Module	8
Determine Revision Level of TSU 100 / TSU 600	8
Modules With Hot Replaceable Label on Back Panel	8
Modules Without Hot Replaceable Label on Back Panel	9
Placement of the Option Module	9
Power Connection	
Wiring	10
Power Up Testing and Initialization	11
Successful Self Test	11
Failed Self Test	11
Operation Alarms	11
Configuration of TX Level (TLP)	11
Warranty and Customer Service	12
Chapter 3. Operation	13
Overview	13
Menu Structure	13
Menu Operation	13
FXS+ Menu Items	15
Port Status	15
(2-WSTATUS) 2-Wire Status	16
(VIEW SIG BITS) View Signaling Bits	16
Port Configuration (PORT CONFIG)	17
Port Configuration Menu Items and Their Choices	18
Mode	18
RX LVL (TLP) (Receive Level / Transmit Level Point)	19
TX LVL (TLP) (Transmit Level / Transmit Level Point)	19
Fault Resp (Fault Response)	20
Tandm Options (Tandem Options)	20

Port Configuration Menu Items/Parameters Summary	. 21
PORT UTIL (Port Utility)	
Port Test	
1 kHz Tone	.23
VIEW SIG BITS (View Signaling Bits)	. 24
SET TX SIGNAL (Set Transmit Signal)	
SET 2-W OUTPUT (Set 2-Wire Output)	
TSU Features Used With FXS+ Options	
Factory Restore	
Run Self Test	
Appendix A. FXS+Failure Messages	. 27
Failure Messages At Power-Up	. 27
FXS+ Alarm Messages	. 21
Appendix B. Signaling States	29
Signaling States vs. Mode of Operation	. 29
List of Figures	
Figure 1-1 FXS+ Dual Voice Option Module	
Figure 2-1 Installing Option Module	8
Figure 3-1 TSU 100 Main Menu	
Figure 3-2 Port Status Submenus	
Figure 3-3 2-Wire Status Display	
Figure 3-4 View Signaling Bits Display	
Figure 3-5 Port Configuration Submenus	
Figure 3-6 Port Utility Submenus	22
Figure 3-7 Port Test Submenus	
Figure 3-8 View Signaling Bits Display	24
Tables	
Table 2-A 2-Wire Voice Pinout Connection	
Table 3-A Port Configuration Parameters	
Table 3-B Port Test Parameters	
Table B-A PLAR Mode	
Table B-B Tandem Mode	
Table B-C FXS+ Mode (Loop-Start)	
Table B-D FXS+ Mode (Ground Start)	. 32

Chapter 1 Introduction

FXS+ DUAL VOICE OVERVIEW

The FXS+ Dual Voice (FXS+) option module is one of the option modules available for use with the ADTRAN TSU 100/600. The FXS+ module provides two 2-wire voice-grade interfaces serving as the source of linecurrent and ringing voltage to a telephone or station interface. The FXS+ may serve as the station-side of a foreign exchange fxs/fxo application.

When used with an ADTRAN FXO+, analog messagewaiting functions may be extended over the T-span to an analog message-waiting telephone. The FXS+ card provides the necessary voltages to light the messagewaiting light.

The FXS+ may also be paired with another FXS+ to provide a hot-line or private line automatic ringdown (PLAR) function to a remote location at the far end of the T-span. When the FXS+ is used in the Tandem mode, it can be set to accept phone service directly from a toll switch (e.g., 1-800 services, Megacom®) using E & M signaling on the T-span. It may also be used to provide trunk services to a PBX from a local switch. The FXS+ is intended for use in applications where the 2-wire port wiring remains on premises. Signaling and interfaces comply with portions of EIA/TIA-464-A, T1.401, and AT&T Pub. 41458 and Pub. 43801.

The FXS+ option module also accepts the FXS+ plug-on board to provide up to four FXS+ functional ports per option slot used.

Functional Description

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

Features

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

- Each 2-wire port operates at 64 kbps (1 DS0)
- Supports loop resistances to 1200Ω
- Menu configurable TX and RX levels
- FXS, PLAR, and Tandem operating modes
- Ground Start or Loop Start signaling
- Supports analog message-waiting light when used with ADTRANFXO+
- Wink or Immediate Supervision in Tandem mode
- Integral ringback and dial tone generation
- Integral 20 Hz ring generator
- Extensive testing capabilities
 - Rx and Tx signal bit monitoring
 - Busy & Ringing 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 FXS+ plug-on board provides the TSU 100/600 with four voice ports in one option slot
- Selectable response during carrier failure
- Full V.34 modem connect capability (28.8 kbps) for #HS model
- Provides FXS forward disconnect capability
- *Hot* replaceable (#HS model)

FXS+ Option Module Specifications

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

Voice Channels	2 (4 with plug-on module installed)
Transmission Levels	TX: +3 to -5 dB TLP, 1 dB steps RX: 0 to -8 dB TLP, 1 dB steps
Frequency Response	300 - 3400 Hz (± 1.0 dB)
2-wire Impedance	$600 \ \Omega + 2.15 \ \mu F$
2-wire ERL	>30 dB
2-wire SRL	>20 dB
THL ERL	>30 dB
THL SRL	>20 dB
Longitudinal Bal	>52 dB
RX Idle Channel Noise	
TX Idle Channel Noise	<20 dBrnc
Loop Current Loop Range	25 mA (constant current) 0 - 1200 Ω
Operating Temperature	0° - 45°C, 95% humidity, non-condensing
Connector	RJ-45
Ring Generator	20 Hz 60 Vrms 2.5 RE
Tests	Power-on circuit test Signal bits monitoring and setting 1 kHz test tone generation Setable 2-wire port output state

Physical Description

The FXS+ is an option module which plugs into the option slot in the rear of the TSU 100; see Figure 1-1.

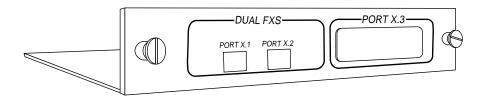


Figure 1-1 *FXS+ Dual Voice Option Module*

The FXS+ rear panel includes a plastic plug over a cutout for additional connectors. This allows a plug-on board to be added to the FXS+ module. The PORT X.3 indication is linked to the port numbering philosophy of the TSU 100 product family. The X represents the slot number, and the .3 indicates the port number. For the TSU 100 application, there is only one option slot. Therefore the port designations for the two FXS 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 will appear in the front panel LCD menu displays.

Chapter 2 Installation

UNPACK AND INSPECT

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

Shipped by ADTRAN

The following items are included in the ADTRAN shipment:

- FXS+ Dual Voice option module
- User Manual (to be inserted into main TSU 100/600 User Manual)

Provided by Customer

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

INSTALLING THE FXS+ DUAL VOICE OPTION MODULE

Determine Revision Level of TSU 100 / TSU 600

FXS+ Dual Voice Module (Software Revision K and above) can only be fully supported in TSU 100 units of Software Revision L (and later) and TSU 600 units of Software Revision F (and later). To determine the software revision in the TSU, follow these steps:

- 1. Power the TSU On.
- 2. Using the front panel keypad, select Main menu item 3 (UTIL) which gives you the Utility menu.
- 3. From the Utility menu, select menu item 5 (Software Revision).
- 4. The unit will display the revision of the operating software.

If the card is to be installed in a TSU 100 or TSU 600 with an earlier software revision, ADTRAN recommends that the TSU first be upgraded to the most recent revision to ensure proper operation with the FXS+. For assistance with software revision upgrades, please contact ADTRAN Technical Support at 1-800-726-8663.



Before installing the module, check the back panel for the presence or absence of a Hot Replaceable label on the back panel

Modules With Hot Replaceable Label on Back Panel

For ease of replacement, power to the TSU 100/600 may be On when installing or removing the FXS+ Dual Voice option module *with* a Hot Replaceable label on the back panel.

Modules Without Hot Replaceable Label on Back Panel

Power to the TSU 100/600 must be *Off* when installing or removing the FXS+ Dual Voice option module *without* a Hot Replaceable label on the back panel.

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 TSU 100/600 rear panel.
- 2. Slide option module into the rear panel until it is positioned firmly against the front of the TSU100/600.
- 3. Fasten thumbscrews at both edges of the option module.

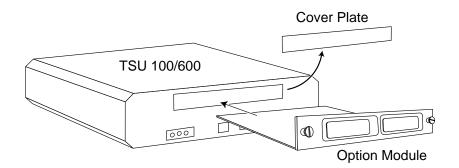


Figure 2-1 *Installing Option Module*

Power Connection

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

Wiring

The FXS+ Dual Voice option module offers two connectors for an analog voice interface. The connector is universal and accepts 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:

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, 6, 7, 8	Unused	-	

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

RJ-11	Tip Ring	pin 4 pin 3
RJ-45	Tip Ring	pin 5 pin 4

POWER UP TESTING AND INITIALIZATION

The FXS+ option module executes an abbreviated self test during the power up sequence, as described in the TSU 100/600 manual. No initialization input is required. Any previously configured setting for the FXS+ is restored automatically upon power up.

Successful Self Test

The green OK LED, located with the Module LEDs on the front panel, illuminates when a successful self test is completed and the configuration is successfully restored. See the section *Front Panel Operation* in the *TSU* 100/600 *User Manual*.

Failed Self Test

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

Operation Alarms

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

Configuration of TX Level (TLP)

For any installation where the analog channel (DS0) terminates within the Public Switched Telephone Network, the TX LVL should be set to +3 dBm. For point-to-point applications where the channel terminates in other customer equipment, any TX LVL may be used.



A +3 *dBm* TLP setting attenuates the analog signal by 3 *dB*.

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 found at the end of this manual.

Chapter 3 Operation

OVERVIEW

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

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

Menu Structure

When an option module is installed in the TSU 100/600, the unit adds it to the list of available options under the Port menu items. These menu items are shown in bold italics 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 FXS+ option module, scroll through the list to display X.1 FXS+ and press **Enter**. Once the option module is selected, the FXS+ menus appear as a subset of, and operate the same as, menus for the TSU 100/600. With the cursor on one of the TSU 100/600 four main menu choices press **Enter** or a menu number to display the first two submenu items.

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

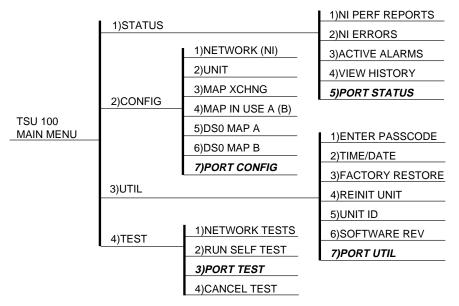


Figure 3-1 TSU 100 Main Menu

FXS+ MENU ITEMS

The FXS+ menus are accessed from, and operated the
same as, menus for the TSU 100/600. The FXS+ items
are submenu choices of the TSU 100/600 four main
menus, as shown in Figure 3-1. For information on
Factory Restore and Run Self Test see TSU Features Used
<i>With FXS</i> + <i>Options</i> in this chapter.

The FXS+ menu items are discussed in the following pages. These items are:

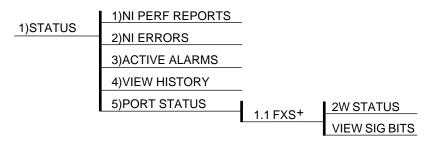
- Port Status
- Port Configuration
- Port Utility
- Port Test

Port Status

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

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

- 2W STATUS (2-Wire Status)
- VIEW SIG BITS (View Signaling Bits)



Port Status Submenus

2W STATUS (2-Wire Status)

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



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 circuit from the ring-generator on the FXS+ option module.

Message Waiting (MW)

An asterisk is present if the card is in the messagewaiting mode and is receiving commands from the far end FXO+ to turn on the message-waiting light

VIEW SIG BITS (View Signaling Bits)

View Sig Bits is used to view the status of the RX and TX signaling bits in the DS-1 stream. See Figure 3-4. The status of both the A and B bits is displayed.

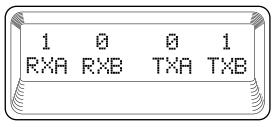


Figure 3-4 View Signaling Bits Display

PORT CONFIG (Port Configuration)

Port Configuration, a submenu of TSU 100/600 main menu item Configuration, is used to configure the FXS+ option module. The following submenu items are used to configure the parameters:

- MODE
- RX LVL (TLP)
- TX LVL (TLP)
- FAULT RESP
- TANDMOPTIONS
 - Supervision
 - Dial Tone
 - Loop Rev Bat
 - Ring Back

When Port Configuration is displayed, place the cursor on it and press **Enter** to activate. Scroll to display the port to be configured and activate with **Enter**. See Figure 3-5.

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

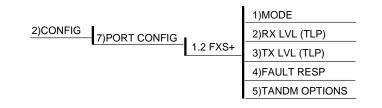


Figure 3-5 *Port Configuration Submenus*

Port Configuration Menu Items and Their Choices

Mode

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

• FXS_LS

This mode sets the port to use FXS loop-start type signaling on the T-Span and loop-start supervision on the analog 2-wire interface. This mode supports farend disconnect by removing tip-ground during the call if signaled to do so over the T-span. When used with an ADTRAN FXO+, this feature allows line-current drop-outs to be passed on to equipment connected to the FXS+ 2-wire port. Ringing cadence will follow that provided over the T-span or detected by the FXO port at the far-end.

• FXS_LSMW

This mode operates as FXS-LS but with the additional feature of being able to illuminate the message-waiting light on a message-waiting telephone if used in conjunction with an ADTRAN FXO+ on the far end. This feature requires the T-span to be operated on ESF framing. When any port uses this mode in a slot, ringing is scheduled to a common two second on, four second off cadence, for all ports in that slot.

• FXS_GS

This mode set the port to use FXS ground start on the T-span and ground-start supervision on the analog 2-wire interface. Ground start operation is often used with trunk interfaces to PBX and key systems to prevent glare conditions. Ringing cadence will follow that provided over the T-span or detected by the FXO port at the far-end.

• TANDEM_LS

This mode sets the port to use E&M signaling on the T-Span and loop-start supervision on the analog 2-wire interface. When using this mode, line-current drop-out for 500 ms is provided when a call terminates and the far-end hangs up. This may be useful for voice-mail or modem systems that need far-end disconnect supervision. This mode also requires other options to be selected. These options are: supervision, dial tone, loop reverse battery, and ringback. These options are described in detail elsewhere. Ringing cadence for incoming calls is two seconds on, four seconds off.

• TANDEM_GS

This mode sets the port to use E&M signaling on the T-Span and ground start supervision on the analog 2-wire interface. Ground-start operation is often used with trunk interfaces to PBX and key systems to prevent glare conditions. Appropriate TANDEM options must be chosen in this mode as described for TANDEM_LS. Ringing cadence for incoming calls is two seconds on, four seconds off.

• PLAR

This mode sets the port to use PLAR signaling on the T-span and loop-start supervision on the analog 2-wire interface. This mode is used to provide a point-to-point *hot* line, so that when one telephone is lifted off-hook, the telephone at the other end rings until it is also picked up. When both ends are off-hook, a direct point-to-point connection is established. Ringing cadence is two seconds on, four seconds off.

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

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

Choice range:

• -8Bm to 0dBm, in 1dB steps

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

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

Choice range:

• +3 dBm to -5 dBm, in 1dB steps

Fault Resp (Fault Response)

Fault Resp is used to set the 2-wire response to a carrier alarm. For a network alarm, the ground start 2-wire trunk would appear busy if Fault Resp is set to seized. If set to normal, no seizure of a ground start trunk occurs.

Choices include:

- Normal
- Seized

Tandm Options (Tandem Options)

Some options are valid only when operating in the tandem mode. These options are provided below.

Supervision

Supervision sets the supervision method used when the card is configured to operate in the Tandem mode.

Choices include:

- Immediate
- Wink
- Dial Tone

Dial Tone is used to enable or disable the on-board dial tone generation when the FXS+ is operating in the tandem mode. When the on-board dial tone generation is enabled, the dial tone will turn off after a five second time-out.

Choices include:

- Enabled
- Disabled
- Loop Reverse Battery

This option causes the polarity of tip and ring to be reversed when the far-end answers and the FXS+ card is set to TANDEM_LS mode. This provides answer supervision to the 2-wire port.

Choices include:

- Enabled
- Disabled

Ringback

This option generates ringback tone towards the T-span when enabled and the FXS+ card is in one of the Tamden modes. This may be needed on some cases when the network does not provide ringback tone.

- Choices include:
- Enabled
- Disabled.

Port Configuration Menu Items/Parameters Summary

Table 3-A provides a summary of the Port Configuration menu items and their parameters.

Table 3-A

Port Configuration Parameters

MENU ITEM	PARAMETER CHOICES			
MODE	FXS_LS FXS_LSMW, FXS_GS TANDEM_LS, TANDEM_GS, PLAR			
RX LVL (TLP)	-8 dBm to 0 dBm, 1 dB steps *(-6 dBm)			
TX LVL (TLP)	+3 dBm to -5 dBm, 1 dB steps *(+1 dBm)			
FAULT RESP	*Normal, Seized			
Supervision	*Immediate, Wink			
Dial Tone	Enable, *Disabled			
Loop Rev Bat	*Disabled, Enabled			
Ringback	*Disabled, Enabled			
*Factory Defaul	t			

PORT UTIL (Port Utility)

Port Utility, a submenu of the TSU 100/600 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 Customer Service 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.

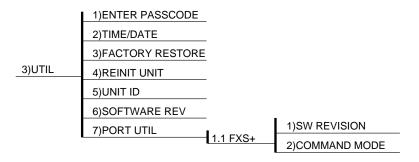


Figure 3-6 *Port Utility Submenus*

Display 1.1 FXS+ (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 FXS+ 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 100/600 Main menu item Test, activates tests of the selected data ports. Selecting the FXS+ displays tests available for this option module. See Figure 3-7 and Table 3-B.

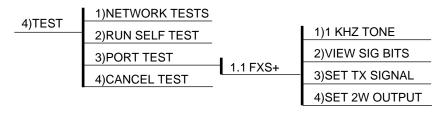


Figure 3-7

Port Test Submenus

When Port Test is displayed, place the cursor on it and press **Enter** to display the first available port. Scroll to select 1.1 FXS+ and press **Enter** to activate the following submenu items:

- 1 kHz Tone
- View Sig Bits
- Set TX Signal
- Set 2W Output

These items are discussed in the following pages.

1 kHz Tone

This test injects a 1 kHz 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. When 1 kHz Tone is enabled, ringback and dial tone for other channels on the slot are suspended.

Choices include:

- Off
- Near
- 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 DS-1 stream. See Figure 3-8. The status of both the A and B bits is displayed.

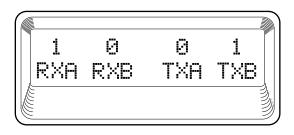


Figure 3-8 *View Signaling Bits Display*

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

MENUITEM	PARAMETER CHOICES					
1 kHz Tone	Off, Near, Far					
View Sig Bits	Display only					
Set TX Signal	Off, A=0 B=0, A= B=0, A= B=1, A=1 B=1					
Set 2W Output	Off, Disabled, Tip Open, Active, Ringing					

TSU FEATURES USED WITH FXS+ OPTIONS

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

Factory Restore

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

When Factory Restore is displayed, place the cursor on it and press **Enter**. The unit is restored to preset factory defaults and returns to the main TSU 100/600 menu. The factory default for port configuration parameters is shown in Table 3-A.

Run Self Test

Run Self Test, a submenu of the TSU 100/600 Main menu item Test, executes both the FXS+ internal test and the TSU 100/600 internal test. The results of the self test are displayed in the LCD. See the *TSU* 100/600 *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.

Appendix A FXS+ Failure Messages

FAILURE MESSAGES AT POWER-UP

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

E01 - EPROM CS	EPROM checksum error
E02 - RAM ERR	Static RAM error
E03 - RNG FQ HI	Ring generator frequency too high
E04 - RNG FQ LO	Ring generator frequency too low
E05 - NO RING	No ringing from ring generator
E06 - TEST FAIL	Self test could not finish
E07 - RINGING	Ringing detected incorrectly
E10-SIGNALING	Failure of signal bit transmission

FXS+ ALARM MESSAGES

No alarms are specified for the FXS+ Dual Voice option module.

Appendix B Signaling States

SIGNALING STATES VS. MODE OF OPERATION

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

Ground start signaling is not used in PLAR mode. See Table B-A.

FXS+ 2W Input	RXA	RXB	ТХА	тхв	FXS+ 2WOutput
Loop Open	Х	Х	1	1	-
Loop Closed	Х	Х	0	0	-
Loop Open	1	1	1	1	No Ringing
Loop Open	0	Х	1	1	Ringing
Loop Closed	0	Х	0	0	NoRinging

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 Table B-A PLAR Mode Ground start signaling provides its own tip ground in response to ring ground in the Tandem Mode. See Table B-B.

Table B-B

Tandem Mode

FXS+ 2WInput	RXA	RXB	ТХА	ТХВ	FXS+ 2WOutput	Switch to FXS+ Condition
Outgoing call f	from FXS	+)				
Loop Open	0	Х	0	0	_	Idle
Loop Closed	0	Х	1	1	_	Idle
Loop Closed	1	Х	1	1	DialTone	Wink
Loop Closed	0	Х	1	1		Wink Done
Loop Closed	1	Х	1	1		Answer Far End
(Incoming call to	oFXS+)					
Loop Open	0	Х	0	0	-	Idle
Loop Closed	1	Х	0	0	Ringing	Far end off hook
Loop Closed	1	Х	1	1	Answers	Far end off hook

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

Table B-C

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

				FX	XS+ Mode (Loop-Start
FXS 2W Input	RX A	RX B	TXA	TXB	FXS+ 2W Output
(Outgoing call fror	nFXS+)				
Loop Open	Х	1	0	1	No Ringing (Idle)
Loop Closed	Х	1	1	1	NoRinging
(Incoming call to F	XS+)				
Loop Open	Х	0	0	1	Ringing
Loop Closed	Х	0	1	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 = phone on-hook

Loop Closed = phone off-hook

Table B-D

FXS+*Mode* (*Ground Start*)

FXS+ 2W Input	RX A	RX B	ΤΧΑ	ТХ В	FXS+ 2W Output
(Outgoing call fr	om FXS+)				
No Ring Gnd	,				
or					
Loop Open	1	1	0	1	Idle
Ring Gnd	1	1	0	0	No Tip Gnd
Ring Gnd					
or					
Loop Closed	0	1	1	1	Tip Gnd
Loop Open	0	0	0	1	Tip Gnd & No Ringing
Loop Closed	0	0	1	1	Tip Gnd & Ringing
(Incoming call to	FXS+)				
(IDLE)	1	Х	-	-	No Tip Gnd & No Ringing
	0	1	-	-	Tip Gnd & No Ringing
Loop Open	0	0	0	1	Tip Gnd & Ringing
Loop Closed	0	0	1	1	Tip Gnd & 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

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 (800) 726-8663

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 information regarding equipment currently in house or possible fees associated with repair, contact RMA directly at the following number:

RMA Department (205) 971-8722

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

ADTRAN, Inc. RMA Department 901 Explorer Boulevard P. O. Box 070020 Huntsville, Alabama 35807

RMA # _____

NOTICE

ThisFXS+module(Software Revision Land later)includes far-end disconnectand analog message-waiting features when used with an ADTRANFX0+ module. The configuration menustructure has been modified to accommodate these new features. If T -W atch is used to configure this card, version 3.0 or later is needed. If you do not have version 3.0 or later you may upgrade your older revision to the latest by downloading the T -W atch upgrade fr om the ADTRAN world-wide website, http://www .adtran.com. (Select Suppor t & Ser vices screen, then select Software Update).

If T-Flash is used to upgrade the TSU 100/600, use version 1.1 or later . If T -Flash 1.0 is used, it will be necessar y to execute *Cancel All Tests* from the T est menuwhen T -Flash has completed its upgrade.

This addendum suppor ts the FXS+ Dual Voice Module & FXS+ Dual Voice Plug-On Board User Manual, PN 61200.080L1-1C.

61200.080L1-10B November 1995