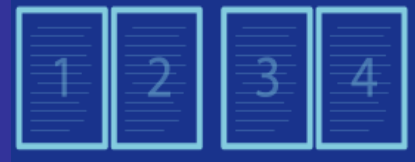




Dual 2-Wire FXO

Foreign Exchange Office



Channel Cards
33242-105
33242-135

USER'S MANUAL



33242-105-MOD
Issue B
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Coastcom

Dual 2-Wire FXO

Foreign Exchange Office

User's Manual

Coastcom's Model 33242-105 Smart Dual 2-Wire Foreign Exchange Office Channel Card (Dual 2-Wire FXO) plugs into Coastcom's D/I Mux III multiplexer shelves and provides access to two 64-kbps Pulse-Code Modular (PCM) channels. It also provides a 2-Wire interface between the D/I Mux III and a wide variety of 2-Wire trunk or line circuits in both toll and subscriber applications.

This manual is intended for use by technical planners as well as operation and installation personnel.

The 33242-105 version of the channel unit operates at a temperature range 0° to 50° Celsius, the 33242-135 operates at a temperature range of -40° to 75° Celsius.

Multiplexer Requirements

Model: D/I Mux III

Software version numbers for Control Units should be:

Common Control Unit (CCU) (30305-108)	8.8 (or above)
Common Control Unit (CCU) (30305-110)	1.9 (or above)
ALPS CCU (30305-109)	9.8 (or above)
Multiplexer Control Unit (MCU) (40305-103)	1.8 (or above)
Advanced Multiplexer Control Unit (AMCU) (40305-104)	1.8 (or above)

Hardware Module

Model: 33242-105,33242-135

Revisions: 33242-105: F (or above)
33242-135: D (or above)

Document Number: 33242-105-MOD

Issue: B

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All equipment specifications subject to change without notice.

REGULATORY INFORMATION

FCC NOTICE

Federal Communications Commission (FCC)

Part 15 Regulation For Telephone Equipment

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

The product described herein complies with the requirements of FCC Rules Part 15, subpart B, for a Class A digital device when tested with shielded cables. Fully shielded cables are available from Coastcom. To ensure compliance with FCC rules regarding interference to radio communications, this equipment must be installed with shielded cables equivalent to those available from Coastcom.

FCC REQUIREMENTS

Note: FCC Part 68 rules require the following information to be included in this publication. Some information may not be relevant to Coastcom equipment.

General Information Regarding The Use Of Customer-Provided Telephone Equipment

FCC regulations and telephone company procedures prohibit connection of customer-provided equipment to telephone company-provided coin service central office implemented systems. Connection to party line service is subject to State tariffs.

If you have any questions about your telephone line, such as how many pieces of equipment you can connect to it, the telephone company will provide this information upon request.

INFORMATION FOR CANADIAN CUSTOMERS

Equipment Attachment Limitations

(Canada Only): CP-01, Part I, Section 10.1

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

Before installing this equipment, 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 maintenance 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 water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

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

CP-01, Part I, Section 10.2

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

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CHAPTER 1. APPLICATIONS

Coastcom's Dual 2-Wire Foreign Exchange Office Channel Card (Dual 2-Wire FXO) plugs into Coastcom's D/I Mux III multiplexer shelves (Common Control Unit {CCU} 6.2 and above). It accesses up to two 64-kilowatts per second (kbps) pulse-code modulation (PCM) channels. It provides 2-wire interfaces between the D/I Mux III common equipment and a variety of 2-wire trunks or line circuits in both toll and subscriber applications.

The Dual 2-Wire FXO has the following features for enhanced network flexibility.

Signalling Mode

The Signalling Mode determines how the detected 2-wire signalling information is converted to the transmitted A and B signalling bits, as well as how the received A and B signalling bits are interpreted to set the output 2-wire signalling state. The following Signalling Modes are available.

1. Loop Start Foreign Exchange Office (FXO).
2. Ground Start Foreign Exchange Office (FXO).
3. Loop Reverse Battery (LRB).
4. Loop Start Universal Voice Grade (UVG).
5. Ground Start UVG.
6. Loop Start FXO to E&M.
7. Ground Start FXO to E&M.
8. A-Bit Loop Start.

Analog Transmit and Receive Transmission Level Points

The transmit (Tx) and receive (Rx) transmission level points (TLPs) are adjustable in 0.1 decibel (dB) steps. The Tx TLP can be set between -4.5 and +1.8 dBm. The Rx TLP can be set between -6.3 and 0.0 decibels relative to one milliwatt (dBm).

Line Build-Out Capacitance

Line Build Out Capacitance (LBOC) is used to compensate for the capacitance that is present between the pair of wires connecting the FXO to the Local Equipment. The LBOC can be set between 0 and 126 nano Farads (nF) in 2 nF increments.

Carrier Group Alarm

A Carrier Group Alarm (CGA) occurs if the system detects a failure of the T1 span, or if the system receives a yellow alarm from over the T1 span. A yellow alarm is usually used to indicate a failure at a remote location affecting service and rendering the system circuits unusable. The CGA protocols are:

- Type 0: Ignore CGA.
- Type 1: E lead immediately idle (On Hook).
- Type 2: E lead immediately busy (Off Hook).
- Type 3: E lead immediately idle followed by busy several seconds later.

Non-Local/Local Switching

The current sink can be set for either locally or non-locally switched applications using the W2 hardware jumper on the card. There is no software command to set non-local/local switching. For locally switched applications, 2-Wire DC impedance is increased to minimize current drain on the office battery.

On-Hook Transmission

On-hook transmission allows voice or data communications during on-hook periods. The Tx voice path is normally blocked during on-hook periods to prevent feedback on the circuit not terminated. For Caller ID applications, enabling on-hook transmission allows the calling party's telephone number to be sent to the called party before the call is answered. In this application, the calling party's number is sent during the on-hook period between rings.

Software Channel Control

Most of the channel settings are software controlled. Hardware jumper settings are in the first list below. Those settings that are configured using the software are in the second listing.

Hardware Settings

- Line impedance 600 Ohms /900 Ohms
- Non-local/Local Switch
- Channel A LS/UVG
- Channel B LS/UVG

Software Settings

- T1 Port (determined by DS0 mapping)
- Card Mode
- Analog Tx and Rx TLPs
- LBOC
- On-Hook Transmission
- CGA Type

Application Flexibility

The following applications illustrate the flexibility of the Dual 2-Wire FXO. Each example explains configuration considerations. For details on the T1 signalling formats used, refer to Appendix A.

Foreign Exchange Circuits

The Dual 2-Wire FXO provides two 600- or 900-ohm, 2-Wire message circuits. In FXO mode, tip ground and ringing information is forwarded to the Foreign Exchange Subscriber (FXS) end. The FXS end provides loop-seizure, dial-pulse and ring-ground information to the Dual FXO channel card which applies the appropriate state to Central Office Equipment.

In FXO mode, the channel card is compatible with standard channel bank signaling for loop start and ground start. Also, the channel card can be provisioned to provide on-hook voice frequency (VF) transmission capability for automated utility meter reading and other on-hook services. When used with a Coastcom Dual 2-Wire FXS (Foreign Exchange Subscriber) channel card on the far end, the unit is compatible with "forward disconnect" by selecting ground-start operation; that is, it can deny battery feed to the subscriber in response to the central office in order to free a permanently seized line. Figure 1 shows typical ground-start and loop-start applications.

Dual 2-Wire FXO Channel Card

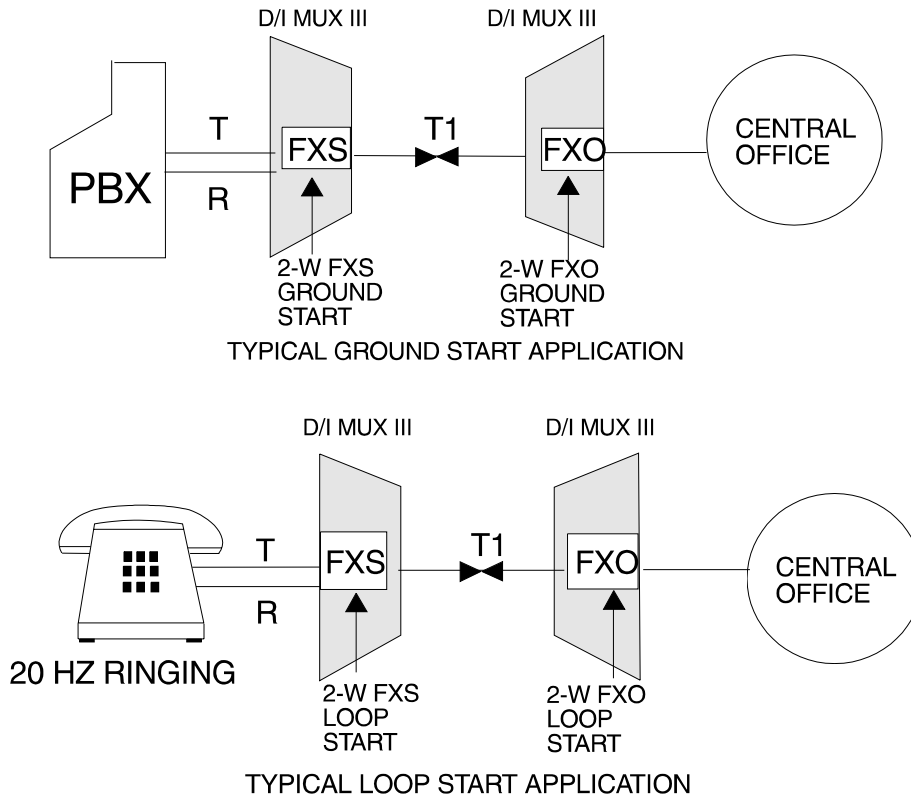


Figure 1. Typical Applications

Universal Voice Grade Subscriber Lines

In Universal Voice Grade (UVG) mode, the channel unit operates with both loop- and ground-start lines without additional provisioning except for the selection of CGA conditioning on tip and ring. It also has the capability to provide reverse battery toward the subscriber for toll diversion. The unit is compatible with "forward disconnect" in either ground-start or loop-start operation. This means it can deny battery feed to the subscriber in response to the central office to free a permanently seized line. On-hook transmission capability can be provisioned for automated meter reading and other on-hook services. This mode complies with Bellcore requirements for channel units that are intended to minimize line-design requirements in Customer Service Area (CSA) loops.

The channel unit will automatically adjust to ground-start or loop-start signalling in UVG operation, but in CGA, the signalling will be determined by the GS/LS selection. The CGA busy state in ground-start mode is the ring lead grounded. There is no hardware switch to select the CGA protocol on powerup; the default powerup setting is Type III.

Direct Inward Dialing

In Loop Reverse Battery (LRB) mode, the channel unit provides the current sink end for loop reverse battery signalling (DID services).

LRB signalling is used to provide Direct Inward Dialing (DID) service. The DID service is used to enable the network to transmit address information to the private branch exchange (PBX) terminal equipment. The DID trunks can be used for terminating calls only. Loop Reverse Battery uses loop open (on hook) and closure (off hook) from the network (central office) toward the terminal (PBX), and battery polarity reversal from the terminal toward the network. A typical call sequence is as follows:

1. At idle, the network sends an on-hook and the terminal a normal battery (tip at ground, ring at negative battery).
2. The network initiates a call by going off-hook.
3. When the terminal is ready to receive address information it reverses the polarity of its battery feed, and then reverts back to normal (a wink).
4. The network out-pulses the address of the extension.
5. The PBX rings the phone of the appropriate extension.
6. If the extension answers, the terminal reverses the polarity of the battery being applied back toward the network.
7. The call is ended either by the network with a loop open or by the terminal with a reversal back to normal towards the network.

Dual 2-Wire FXO Channel Card

The Coastcom Dual 2-Wire FXO and Dual 2-Wire Foreign Exchange Service (FXS) cards provide DID service. Both must be in either LRB or UVG mode. UVG mode passes loop start, ground start and battery reversal signalling and is suitable for DID application when the voice cards at both ends of the T1 span are set for UVG mode. For applications requiring strict compatibility with the DPO/DPT implementation of LRB signalling, select the LRB mode. The LRB mode provides standard LRB/CGA processing as well as standard T1 level signalling. The T1 level A and B signalling used in the Coastcom 2-Wire FXS channel cards is compatible with the AT&T standard DPO/DPT signalling as defined by PUB #43801. See Table 1 for LRB/UVG settings with other card revisions.

Table 1. LRB/UVG Settings With Other Card Revisions

Software Revision	Card's LRB Mode	Card's UVG Mode
FXS Rev A-D FXO Rev A- B	UVG Standard	UVG Standard
FXS Rev E-J FXO Rev C	DPO/DPT Standard	UVG Standard

The FXO card is connected to the customer terminal, and the FXS is connected to the network central office. See Figure 2.

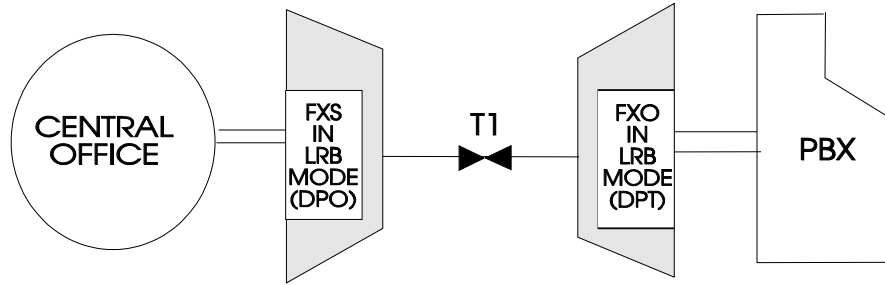


Figure 2. Typical Loop-Reverse Battery Applications

Transmission Only Application

In applications where signalling is not required, one or both of the Dual 2-Wire FXO channels can be configured to ignore the received signalling. The FXO Transmission Only mode supplies a 600- or 900-ohm AC termination and a high impedance (on-hook) DC termination. Battery feed is not required. The transmitted signalling bits can be set to function as desired.

Central Office Access for Private Networks

In this example, a connection is established between a private network that uses E&M signalling (as shown on the right side of Figure 3) and a central office.

If the private network requires that the E lead is active when the FXO detects ringing, but is idle during the completed call, use one of the following solutions:

Dual 2-Wire FXO Channel Card

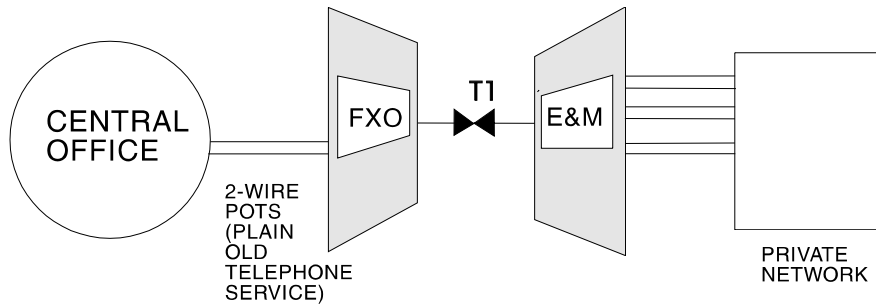


Figure 3. Private Network Application

1. A standard FXO can be used with the 4-Wire Deluxe unit. The 4-Wire is placed in the Loop Start FXO Signalling Format. The signalling conversion is made at the E&M end with Foreign Exchange signalling passing over the T1 span. The E&M or PLR Signalling Type is set as required by the microwave radio, PBX or other private network equipment.
2. A standard E&M unit can be used with the FXO. The FXO is set to A Bit Loop-Start Signalling. The E&M unit is set to normal signalling mode and any Signalling Type. This solution can also be used for private networks that accept a T1 directly, in which case the E&M unit is not required. Refer to Figure 3.

If the private network requires that the E lead is active when the FXO detects ringing and during the completed call, use the following solution: A standard E&M unit with a Coastcom FXO (FXO Rev E or above with Feature Group 6.2 Common Control Unit). The FXO is set to loop start FXO to E&M converter mode, or ground start FXO to E&M converter mode, as required for the central office connection.

CHAPTER 2. INSTALLATION AND SET UP

The following chapter discusses the hardware installation for the Dual 2-Wire FXO Channel Card.

Handling Procedures to Prevent Electrostatic Damage

Precautions should be taken to prevent electrostatic damage to plug-in units. Electrostatic damage can cause semiconductors and other static-sensitive components to fail, resulting in unexplainable test failures and degraded performance. To prevent electrostatic damage, follow this procedure when handling the cards. Put on a grounded wrist strap. The wrist strap should touch the skin and be grounded through a resistor that is approximately one-megaohm to the terminal block screw on the D/I Mux III's backplane.

Remote or Local Provisioning

Most options on the card can be remotely provisioned from a system control terminal. The options include mode of operation, transmit and receive levels, line build-out capacitance (LBOC), Carrier Group Alarm (CGA) type, ground and loop start, direction of operation and on-hook transmission. Impedance and non-local switching must use hardware switches.

When a system-control terminal is not operating, card settings are determined by the hardware-option switches (impedance, ground/loop start, non local/local switching and direction of operation) and the default powerup settings for non-hardware optional features (mode of operation, transmit and receive levels, LBOC, CGA type, and on-hook transmission).

Mounting

The Dual 2-Wire FXO unit is a plug-in channel card (Figure 4) that slides into a D/I Mux III multiplexer shelf. It requires one physical card slot.

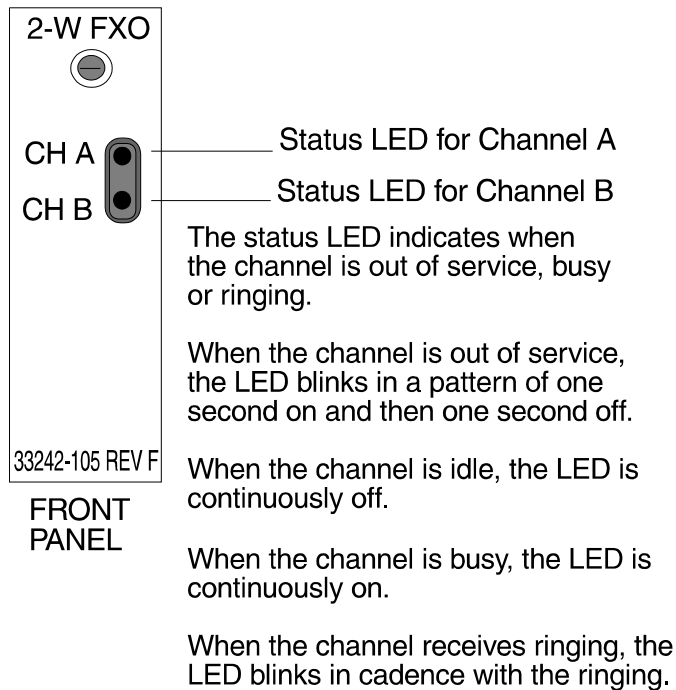


Figure 4. Dual 2-Wire FXO Channel Line Card Front Panel

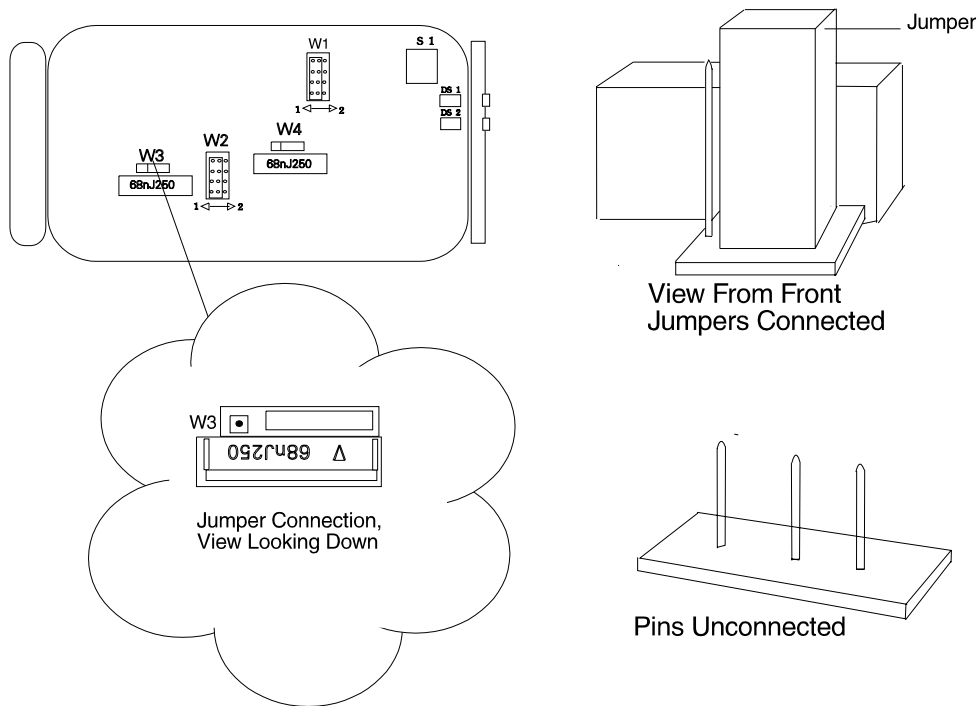
Setting Switches

This section describes the setting of hardware option switches. Configuration and operation of software is discussed in Chapter 3.

W1 has four jumpers ganged together into a jumper block. W2 has five jumpers ganged together into a jumper block. These blocks are positioned over the left two columns of header pins for position 1, or over the right two columns of header pins for position 2. W3 and W4 are single jumpers.

Prior to mounting the card in the shelf, set jumpers W1, W2, W3 and W4 and switch S1 to their appropriate positions for the application.

Jumpers are set by placing them over pins. Figure 5 shows a pin without the jumper, and with one in place. Figure 6 shows a multi-pin jumper, and how the block is placed onto the jumper. Figure 7 shows a front and side view of the Dual 2-Wire FXO Channel Card.



SHOWN LARGER THAN ACTUAL SIZE

Figure 5. Jumper Switches, Set and Unset

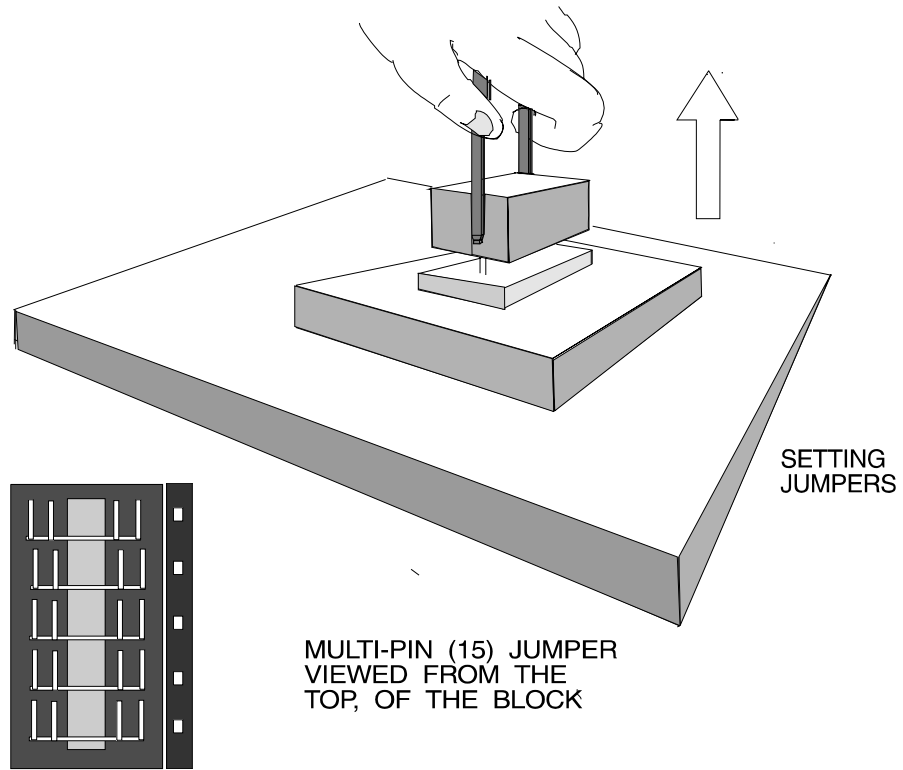


Figure 6. Multi-pin Jumpers and Block

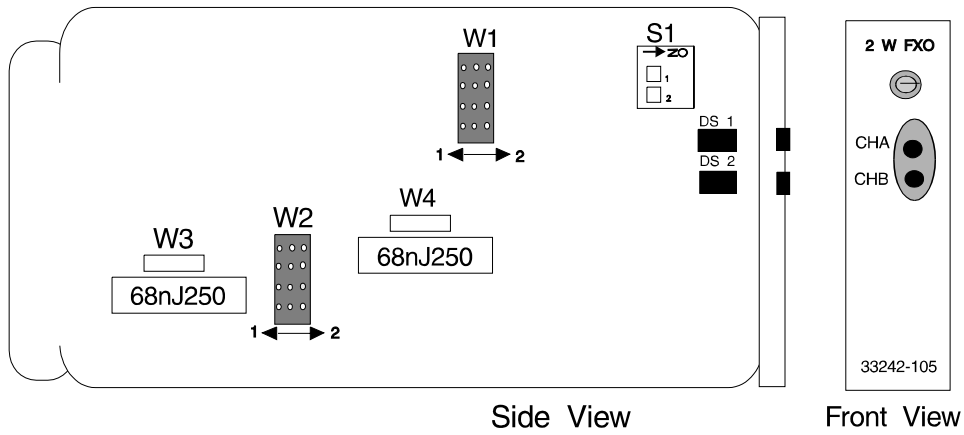


Figure 7. Front and Side View of Dual 2-Wire FXO Channel Card

The 2-Wire impedance can be set to either 600 or 900 ohms on a per-card basis using the W1 hardware jumper. There is no software command to set the impedance. Use W1 to select the two-wire AC impedance for either 600-ohm or 900-ohm operation. See Table 2.

Table 2. W1, W2, W3 and W4 Jumper Settings

JUMPER	POSITION 1	POSITION 2
W1	600 ohm	900 ohm
W2	non-local (remote)	local
W3 (Channel A)	UVG	Loop Start
W4 (Channel B)	UVG	Loop Start

W2 is used to condition both channels for remote or locally switched conditions. In the locally switched position, the DC impedance is increased to reduce the battery feed current from the central office battery. The local position should be used if the wiring resistance is less than 150 ohms.

W3 and W4 configure the 2-Wire interface detectors. For most applications, except some loop-start FXO applications, W3 and W4 must both be in the UVG position. For most loop-start FXO applications, W3 and W4 can be left in the UVG position. However, the tip ground and battery reversal detectors can be disconnected from the tip and ring interface for loop-start applications requiring on-hook resistance greater than 5 megaohms. This is done by placing W3 for channel A and/or W4 for Channel B in the loop-start position.

S1-1 is used to set the default powerup direction of transmission on the T1 side of the system to either T1-1 or T1-2. The switch is "on" when it is moved to the right. See Table 3.

S1-2 is used to set the default powerup mode setting to ground start FXO or loop start FXO. The switch is "on" when it is moved to the right. See Table 2. To select other card modes, use the software configuration described in Chapter 3.

Table 3. Switch Settings

SWITCH	OFF	ON
S1-1	T1-2	T1-1
S1-2	Ground Start FXO	Loop Start FXO

Initial Default Setup

At powerup, in the absence of the System Control Unit override, options are set according to the position of S1 and several fixed internal defaults.

The transmit level defaults to 0 dBm; the receive level defaults to -2 dBm. The line build-out capacitance (LBOC) defaults to 0 nano Farads. The CGA defaults to two-seconds idle followed by busy in ground-start mode, or immediately idle in loop-start mode.

Installing Card In Shelf

Set up and install the channel card according to the following procedure:

1. Place the jumpers in their appropriate positions. Each jumper has two possible positions. Refer to Figure 8 for location of the jumpers on the card. Note that position markers are visible above the jumpers on the printed circuit board.
2. Loosen the captive screw at the top of the front panel on the line card.
3. Pull the top of the front panel forward until it is at a right angle from its former position.
4. Slide the unit as far as it can go into the desired slot in the D/I Mux III shelf.
5. Move the front panel to its upright position so that it is locked into the shelf and tighten the captive screw.
6. Be sure the card is securely seated in the card slot.

Cable Connections

Select a slot position in the D/I Mux III™ shelf and install the 2-Wire FXO card. The 2-Wire FXO channels can be connected using the 25-pin connector on the back of the D/I Mux III shelf. There is a separate dB 25 connector for each card slot. Figure 8 shows the pin assignments.

Connection to the 2-wire channels can also be established using the appropriate pins on the 50-pin tip and ring connector. The pin assignments are shown on Figures 8 and 9.

In order to use the 50-pin connectors, the DATA/VF jumpers on the back of the D/I Mux shelf corresponding to the slot being used must be placed in the VF position.

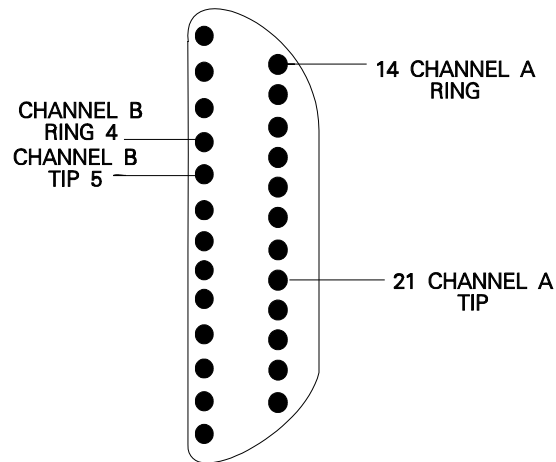
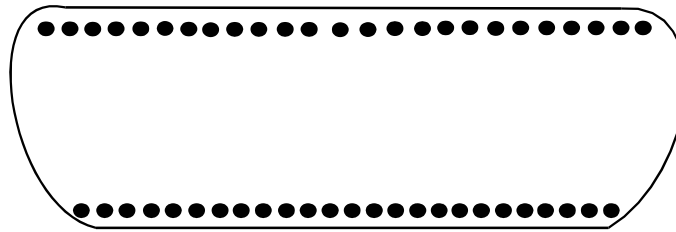


Figure 8. 25-Pin Connector

Dual 2-Wire FXO Channel Card

RING

Slot	1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12
Ch	A A A A A A A A A A A A B B B B B B B B B B B B
Pin #	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25



Pin #	26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
Slot	1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12
Ch	A A A A A A A A A A A B B B B B B B B B B B B

TIP

Figure 9. 50-Pin Tip and Ring Connector for Upper Half of 24-Slot Shelf

These DATA/VF jumpers disconnect the 50-pin VF connector wires when in the DATA position. This enables both the voice and data circuits to be installed in a D/I Mux III shelf with voice connections on 50-pin connectors and data connections on the dB 25-pin with data isolated from the 50-pin voice cables. Table 4 shows the card slot designation on the 50-pin connector.

Table 4. 50-Pin Connector

Card Slot Designation		Channel A Ring	Channel A Tip	Channel B Ring	Channel B Tip
1	13	1	26	13	38
2	14	2	27	14	39
3	15	3	28	15	40
4	16	4	29	16	41
5	17	5	30	17	42
6	18	6	31	18	43
7	19	7	32	19	44
8	20	8	33	20	45
9	21	9	34	21	46
10	22	10	35	22	47
11	23	11	36	23	48
12	24	12	37	24	49
Not Used	Not Used			25	50

Removing Card From Shelf

To remove the card from the shelf, reverse the installation procedure as follows:

1. Loosen the captive screw at the top of the front panel of the line card.
2. Pull the top of the front panel forward until it is at a right angle from its former position.
3. Slide the unit out of the card slot in the D/I Mux III shelf.
4. Move the front panel to its upright position and tighten the captive screw.

Dual 2-Wire FXO Channel Card

CHAPTER 3. SOFTWARE CONFIGURATION

The following procedure enters the necessary data to configure the Dual 2-Wire FXO cards using the system software interface. Refer to the Installation Section for hardware configuration procedures. Software configuration and control is possible only if the Common Control Unit, Model 30305-10X, is part of the D/I Mux III common equipment which contains Feature Group 6.2 or above. The exact channel card setup can vary depending on the Feature Group and revision. The D/I Mux III must be connected to an asynchronous ASCII terminal (or equivalent). Follow the system configuration and initialization procedures detailed in the *D/I Mux III User's Manual* that is available from Coastcom.

The user is given the option to use either the card's switch settings or software command settings on powerup. Hardware and software control cannot be intermixed.

T1-1 And T1-2 Direction

The direction of T1 transmission can be set in either direction (bi-directional operation) on a per-card basis using a software command or hardware switch S1-1. Both Channel A and Channel B pulse code modulation (PCM) DS0s must operate in the same direction. The direction will change automatically to conform to map changes.

Channel Assignments

To assign DS0 transmission channels for the two circuits of the 2-Wire FXO Channel Card enter the Main Menu [M] of the D/I Mux III Multiplexer. Select the Edit Map Matrix [SM] (set map) command to create or edit a map matrix. The circuits must be assigned a transmission channel for operation. After creating a working map and assigning it a map number, select the new map through the Set Working Map [SN] command on the Main Menu.

The following section describes the software configuration process. The commands you enter are shown in **16 point bold type** (←example). A screen example figure follows each procedure description. If you enter a value other than the default, the new value appears in the brackets the next time that parameter is edited. The enter key, indicated by [Enter] in the text, is pressed after each entry to select the default or new values as entered. To make corrections, simply backspace and retype entries.

Display Line Card Configuration

The DD command displays the configuration settings and status information of a specific line card. Perform Steps 1 and 2 to display line card configuration.

1. Enter **DD**. To display the configuration of the 2-Wire FXO, the system prompts you to enter the slot number. See Figure 10.

JDD
Slot Number
[1]

Figure 10. Slot Number Screen

2. Enter the slot number where the card resides. The system displays the current line card configuration. See Figure 11.

```

08:46:37-----[ Slot 2: D2W FXO ]-----12/07/92

Current Channel Status

Ch A: Enabled
Ch B: Enabled
Direction:      T1-1                Loopback:      Not Active
Card Mode:      FXO/Loop Start       CGA:           Type 3
Impedance:      900 ohm              Switched:      Locally

Ch. Label      Tx Level      Rx Level      Bld Out Cap  On Hook Trans.
-----
A               +0.0 dBm     -2.0 dBm     0 nF         Disabled
B               +0.0 dBm     -2.0 dBm     0 nF         Disabled

-----Hardware-----Serial Software
Card  Type    Part Number Rev      Number      Revision
-----
D2W  FXO     33242-105  C                101575-0073  B 12/07/92
-----

```

Figure 11. Line Card Configuration Screen Display

Set Line Card Configuration

The following procedure brings up the screen shown on Figure 12:

1. The **SL** command is used to set the line card operating parameters.
2. Enter the slot number as shown on Figure 12.
3. Enter the labels for the Channel A and Channel B card slots or **[Enter]** for no label. See Figure 12.

```

]SL
Enter Line Card Configuration
Slot Number
[2]
Set D2W FXO Line Card Configuration
Label for Slot 2. Channel A (up to 10 Characters)
[]
Label for Slot 2. Channel B (up to 10 Characters)
[]

```

Figure 12. Set Line Card Configuration

4. Enter **N** or **O** to select the source of configuration settings after power cycle-either NVRAM or manual option switches. If you select **N** NVRAM, progress through the subsequent screens. If you choose **O**, for Option Switches, go to Step 13. See Figure 13.

```

Source of Configuration Settings After A Power Cycle
N) NVRAM
O) Option Switches
[N]

```

Figure 13. Source of Configuration Settings Screen

5. Enter 1-8 to select card mode. See Figure 14.

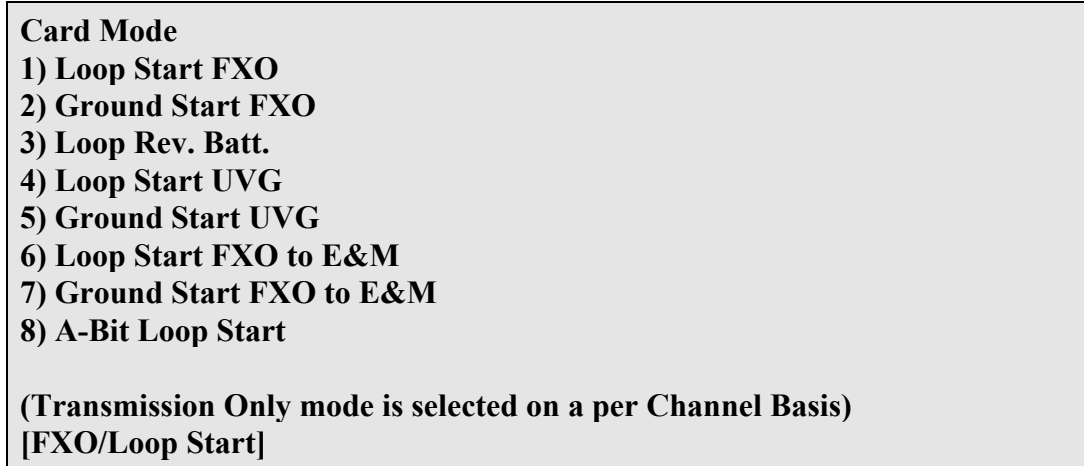


Figure 14. Set Card to Mode

6. Channel A screen appears. Select **1** or **2**. The "Enable Disable" Channel setting is like an On/Off switch. The channel must be enabled for use.
7. Make your Analog Tx, Rx Level and Line Build Out Capacitance selections. See Figure 15.

Channel A
Transmission Only Mode
1) Set TO
2) Clear TO
[Clear]

Enable/Disable Channel
1) Enable When Mapped
2) Disable Permanently
[1] **1**

Analog Tx Level (-4.5..1.8 dBm)
[+0.0]

Analog Rx Level (-6.3...0.0 dBm)
[-2.0]

Line Build Out Cap. (0..126 nF - in 2 nF increm.)
[0]

On-Hook Transmission
1) Enable
2) Disable
[2]

Figure 15. Channel A Screen Selections

9. Channel B screen appears. Channel B offers the same options as Channel A.
10. Make your Analog Tx, Rx Level and Line Build Out Capacitance selections.
11. Select **1** or **2** to Enable or Disable On-Hook transmission. The screen shown on Figure 16 reflects that Channel B has been chosen.

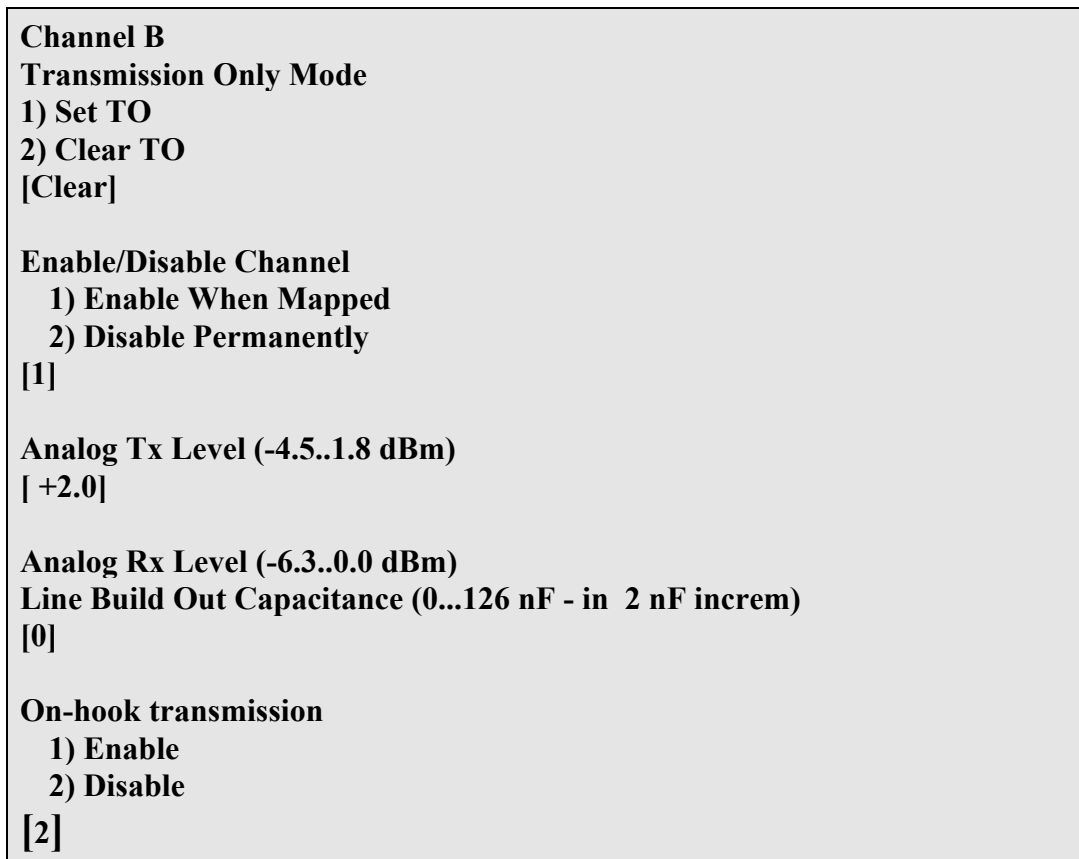


Figure 16. Channel B Screen Selections

The "Enable/Disable Channel" setting is acts like an On/Off switch. The channel must be Enabled for use.

Dual 2-Wire FXO Channel Card

12. Specify CGA type by selecting **0** or **1** or **2** or **3**. The CGA type entered here is used for both Channel A and Channel B. See Figure 17.



CGA Type
0) Ignore CGA
1) Type 1
2) Type 2
3) Type 3
[3]

Apply Changes
Y) Yes
N) No
[Y/N] Y

Figure 17. CGA Type and Apply Changes Screen

13. Select **Y** or **N** to apply changes.

CHAPTER 4. TROUBLESHOOTING

The system control terminal can provide access to the internal self-check capabilities of the channel card. Through the terminal, the operator can request gain-setting status, channel-enable status, card type, card serial number, card revision, firmware revision, and a general health check that reports on the status of various parts accessed by the micro controller.

The individual channels can be looped back for maintenance testing (digital loopback). The channel is looped back toward the T1 side in the digital section of the CODEC.

Line Card Diagnostics

The **OL** command allows access to the line card's maintenance and diagnostic capabilities. (See Figure 18).

```
] OL
Slot Number
[2]
08:47: 22-----[ Operate Slot 2 : D 2W FXO ]-----12/07/92

Current Channel Status
Ch A: Enabled
Ch B: Enabled

1) Disable channels on next idle
2) Disable channels immediately
3) Set/Clear digital loopback
4) Line Build Out Cap. adjustment
5) Report signalling bits status
6) Enable channels
7) Channel A Transmit Override Status
8) Channel B Transmit Override Status

R) Reset card
Q) Quit

Current Channel Status
Ch A: Enabled
Ch B: Enabled
```

Figure 18. Operate Line Card Diagnostics

The following features are offered using the line card diagnostic capabilities:

Disable Channels On Next Idle

This feature allows channels to be removed from service without cutting off calls.

Disable Channels Immediately

This option has the same results as disabling channels using the **SL** command.

Set/Clear Digital Loopback

The Set/Clear digital loopback allows the receive digital voice and signalling data to be transmitted back on the digital span. Voice data is looped back in the CODECs and signalling bits are looped back in the micro controller.

Line Build Out Adjustment for 2-Wire Cards

This feature allows direct access to the LBOC settings for interactive adjustment.

Report Signalling Bit Status

Report signalling bit status allows non-intrusive examination of the transmitted and received signalling bits. The signalling bit status report is static and this command must be given each time a report is required.

If you select 5) Report Signalling Bit Status on the OL screen, the screen shown as Figure 19 will appear.

Current Status Ch A: Enable Ch B: Enabled						

Rx Signalling		Implemented Tx Signalling			Detected	
A bit	B bit	Condition	A bit	B bit	Condition	

Ch A	0	0	Idle	0	0	On Hook
Ch B	0	0	Idle	0	0	On Hook
*Based on signalling bits and card mode						

Figure 19. Report Signalling Screen Status

Enable Channels

This feature has the same result as enabling channels using the SL command. Enabling a channel turns it on for use.

Reset Card

This function performs a software restart of the line card resulting in a momentary interruption of service while the system reconfigures the card.

Transmit Override Status

Enabling **OL** Override suspends normal operation of the channel. The channel can be temporarily set to apply a loop closure, a ring ground, a particular Tx signalling state or to turn the LED on or off. This control is useful for diagnostic purposes. Note that **OL** override commands are cleared if the card is unplugged and replugged into the shelf.

Front Panel Diagnostics

The status LEDs on the front panel gives an indication of the activity and status of the individual channels. See Table 5.

Table 5. LED Indicators

LED STATUS	CHANNEL STATUS
Steady OFF	Idle
Steady ON	Busy
ON/OFF Following Ringing	Ringing
1 Second ON/1 Second OFF	Out of Service

Common Problems

If the unit fails to detect tip ground or reverse battery, verify that the two loop-start/UVG jumpers are in the UVG position.

In FXO Ground Start mode, the FXO will not detect a Tip Ground unless the Tip to Ring voltage is greater than 36 Volts.

For access to the Dual 2-Wire FXO unit through the 50-pin connectors, the Data/VF jumpers must be in the VF position.

Field Repair

Field repair of channel cards is not recommended. Return defective units to Coastcom for prompt repair.

CHAPTER 5. SPECIFICATIONS

Table 5. Specifications (Page 1 of 2)

PARAMETER	PERFORMANCE
Nominal Transmission Levels	
Transmit	-4.5 to 1.8 dBm
Receive	0.0 to +0.6 dBm
Adjustability	0.1 -dB steps
Accuracy	@0.25 dB
Line Build Out Range	0 to 126 in 2 nF steps
Frequency Response (expressed as level in dB with respect to level at 1,000 Hz)	
60	Tx (dB) < -20 Rx (dBm) NA
200	+0.25, -3 +0.25, -2
300 - 3,000	+0.25, -0.5 +0.25, -0.5
3,200	+0.25, -0.75 +0.25, -0.75
3,400	+0.25, -1.5 +0.25, -0.75
4,000	<-14 <-14
2-Wire Impedance	600 ohms or 900 ohms select table
2-Wire Return Loss	
ERL	>28 dB
SRL	>20 dB
4-Wire Return Loss	
ERL	>34 dB
SRL	>20 dB
Longitudinal Balance (measured according to IEEE 455)	
Frequency (Hz)	Balance (dB)
200	58 min
500	58 min
1,000	58 min
3,000	53 min
Idle Channel Noise (end-to-end)	<20 dBmCO
Crosstalk (loss at 200 to 3,400)	>65 dB
Signal to Distortion Input Level (dBm0)	Tx or Rx (dB)
0 to -30	35 min
-40	29 min
-45	25 min

Table 5. Specifications (Page 2 of 2)

PARAMETER	PERFORMANCE
Tracking Error Input Level (dBm0) +3 to -37 -37 to -50	Tx or Rx (dB) 0.25 max 0.5 max
Dial Pulse Distortion	46% to 75% break at the COT when the RT sees 8 to 12 pulses per second when at 58% to 64% break to any loop less than 1,500 ohms
Signalling Types	Loop Start or Ground Start
Maximum Loop Length*	1,300 ohms
Typical Loop Closure Resistance W2 in Position 1 (Non-Local) W2 in Position 2 (Local)	640 ohms 990 ohms
Load Number (LN) W2 in position 1 (Non-Local) W2 in position 2 (Local)	100 100
Operating Environment Temperature Humidity	0° to 50° C 135 -40° to 75° C 0 to 95% non condensing
Typical Operating Current + 5 Volt Supply -5 Volt Supply +12 Volt Supply -12 Volt Supply	100 m A 18 m A 3 m A 2 m A

* When W2 is set to "Non-local", the line card meets the AT&T Digital Channel Bank requirements for FXO cards as outlined in Technical Reference 43801. When W2 is set to "Local", the channel card meets the requirements outlined in Bellcore Technical Reference TR-TSY-000057.

APPENDIX A

SIGNALLING TABLES

Table A-1. Foreign Exchange Office End Ground and Loop Start Modes

Table A-2. Universal Voice Grade Mode for the Central Office End

Table A-3. Dial Pulse Terminating (DPT) Signalling in Loop
Reverse Battery Mode

Table A-4. Loop Start FXO to E&M

Table A-5. Ground Start FXO to E&M Mode

Table A-6. Loop Start FXO Utilizing the A-Bit Signalling Channel

FXO SIGNALLING

Table A-1. Foreign Exchange Office End Ground and Loop Start Modes

FOREIGN EXCHANGE OFFICE END (FXO)					
GROUND START MODE					
VF INPUT TO FXO	TRANSMIT ^a		RECEIVE ^a		FXO VF OUTPUT
	A	B	A	B	
No Tip Ground	1				
Tip Ground	0				
No Ringing		1			
Ringing		0			
			0		Loop Open
			1		Loop Closure
				1	No Ring Ground
				0	Ring-Ground
LOOP START MODE					
VF INPUT TO FXO	TRANSMIT ^a		RECEIVE ^a		FXO VF OUTPUT
	A	B	A	B	
No Ringing	0	1			
Ringing	0	0			
			0	^b	Loop Open
			1	^b	Loop Closure

^a = Signalling Channel States in the DS-1 Signal

^b = Designates either 1 or 0

Blanks indicate no effect.

UVG SIGNALLING

Table A-2. Universal Voice Grade Mode for the Central Office End

UNIVERSAL VOICE GRADE OFFICE END (UVG) GROUND START MODE					
VF INPUT TO FXO	Transmit ^a		Receive ^a		FXO VF OUTPUT
	A	B	A	B	
No Tip Ground	1	1			
Tip Ground	0	1			
Reverse Battery	1	0			
Ringing	0	0			
			0		Loop Open
			1		Loop Closure
				1	No Ring Ground
				0	Ring Ground

^a = Signalling Channel States in the DS-1 Signal
Blanks Indicate No Effect

DPT SIGNALLING

Signalling in Loop Reverse Battery Mode

Table A-3. Dial Pulse Terminating (DPT)

DIAL PULSE TERMINATING (DPT)					
VF INPUT TO FXO	Transmit ^a		Receive ^a		DPT OUTPUT
	A	B	A	B	
Normal Battery	0	0			
Reverse Battery	1	1			
			0	^b	Loop Open
			1	^b	Loop Closure

^a = Signalling Channel States in the DS-1 Signal
^b = Designates either 1 or 0

LS FXO to E&M

Table A-4. Loop-Start FXO to E&M Mode

LOOP START FXO TO E&M					
VF INPUT TO FXO	TRANSMIT ^a		RECEIVE ^a		FXO VF OUTPUT
	A	B	A	B	
No Ringing	0	0	0#	b	Loop Open#
	1	1	1#	b	Loop Closed#
Ringling	1	1			
			0	b	Loop Open
			1	b	Loop Closed

CGA Idle State: Loop Open

CGA Busy State: Loop Closed

^a = Signalling Channel States in the DS-1 Signal

^b = Designates either 1 or 0

= Indicates Qualifier

GS FXO to E&M

Table A-5. Ground Start FXO to E&M Mode

GROUND START FXO TO E&M					
VF INPUT TO FXO	TRANSMIT ^a		RECEIVE ^a		FXO VF OUTPUT
	A	B	A	B	
No Tip GND No Ringing	0	0			
Tip GND	1	1			
Ringling	1	1			
			0	b	Loop Open No Ring GND
No Tip GND No Ringing#	0#	0#	1	b	Ring GND
Tip GND#	1#	1#	1	b	Loop Closed
Ringling#	1#	1#	1	b	Loop Closed

CGA Idle State: Loop Open

CGA Busy State: Ring GND

^a = Signalling Channel States in the DS-1 Signal

^b = Designates either 1 or 0

= Indicates Information is Qualifier

A-Bit Loop-Start Signalling

Table A-6. Loop Start FXO Utilizing the A-Bit Signalling Channel

A-BIT LOOP START MODE					
VF INPUT TO FXO	TRANSMIT ^a		RECEIVE ^a		FXO VF OUTPUT
	A	B	A	B	
No Ringing	0	0			
Ringing	1	1			
			0	b	Loop Open
			1	b	Loop Closed

CGA Idle State: Loop Open

CGA Busy State: Ring GND

^a = Signalling Channel States in the DS-1 Signal

^b = Designates either 1 or 0

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