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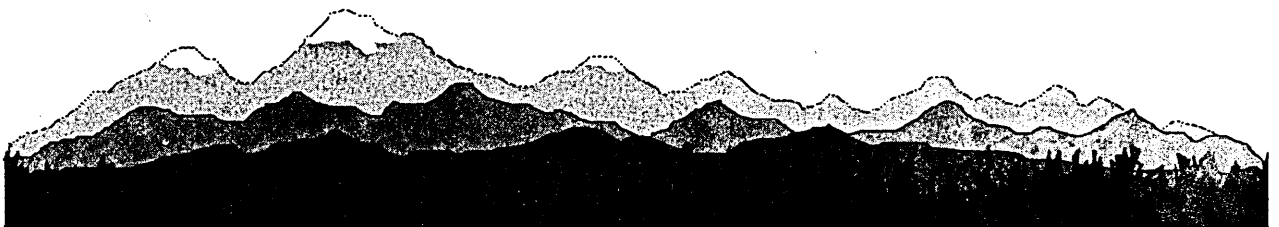
# Solbourne Computer

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**Xylogics 781 Serial Multiplexer  
Board Installation Guide**

**Preliminary for Beta Distribution**



Solbourne Computer, Inc.    303-772-3400  
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Longmont, Colorado 80501

*For Solbourne support call: 1-800-447-2861*

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**Part Number: 103181-AA**

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### **Canadian Department of Communications**

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## Preface

The Xylogics 781 Serial Multiplexer Board and accessories make up a Serial Multiplexer kit for Solbourne systems. This kit can be used with any Solbourne system that includes a VMEbus card cage to connect up to 64 serial devices to one Solbourne system. This manual describes how to configure and install the Xylogics 781 Serial Multiplexer Board and accessories.

The guide is divided into five sections, as follows:

**Section 1 - Introduction**

This section provides an overview of the Xylogics 781 Board.

**Section 2 - Unpacking the Xylogics 781 Multiplexer Board**

This section describes how to unpack the Xylogics Board and the kit.

**Section 3 - Xylogics 781 Serial Multiplexer Board Jumpers**

This section describes how to set jumpers on the Xylogics 781 Board.

**Section 4 - Xylogics 781 Board Interconnection Hardware**

This section describes the connectivity hardware used to interconnect the board to other equipment.

**Section 5 - Installing the Xylogics 781 Board**

This section gives step-by-step instructions for installing the Xylogics 781 Board in a Series4 or Series5/600.

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# Section 1: Introduction

## 1.1 Introduction

This document covers the installation of one or more the Xylogics 781 Serial Multiplexer Boards in any Solbourne system that includes a VMEbus cardcage. Up to 16 asynchronous serial ports are available on each Xylogics 781 Board. Up to four boards (depending on VMEbus slot availability in the host system) can be installed, providing up to 64 serial ports per system.

## 1.2 Connectivity

Serial devices that can connect to the Solbourne system via a 781 Board include printers, modems, and terminals. Physical connectivity to any specific device may not be provided by the interconnect hardware delivered with the Xylogics Board; however, most physical connections can be made using readily available converters. Electrical connectivity between the Solbourne system and any specific device may or may not be provided as shipped. Detailed specifications on the 50-pin telco and 8-pin RJ-45 pinouts available in the Solbourne Xylogics 781 Board kit are given in Section 4, Xylogics 781 Board Interconnection Hardware. Using this specification, it is possible to convert the electrical interface provided to one that is compatible with virtually any RS-232-A serial device.

**★ ★ ★ CAUTION ★ ★ ★**

**Always use electrostatic protection when handling circuit boards; failure to do so could cause destruction of electrical circuits on the board.**

## 1.3 Features of the Xylogics Serial Multiplexer

The Xylogics 781 Multiplexer has the following features:

- Up to 16 asynchronous, serial devices can be connected per board
- Up to four boards per Solbourne system
- Direct Memory Access (DMA) transfer rate of up to 10 Mbytes/sec
- Sustained asynchronous communication rates of up to 9600 baud when using all 16 channels



Figure 1-1 shows the Xylogics 781 Serial Multiplexer Board

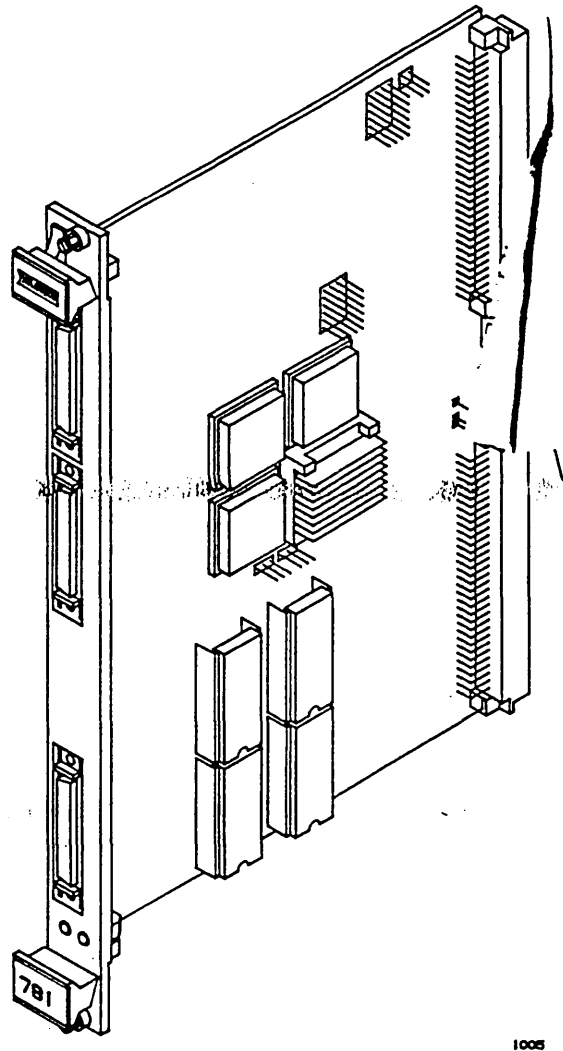


Figure 1-1. Xylogics 781 Serial Multiplexer Board

#### 1.4 Return Authorization

Depending on your circumstances, you may have received the Xylogics 781 Board kit as an exchange for one or more parts in your system. If this is the case, please read this section closely.

Whenever exchanges occur, each returning assembly requires the issuance of a Return Material Authorization (RMA) number, which authorizes the return. Without an RMA, you may not be credited for the return, and would therefore be liable for the full purchase price of the replaced part(s).

Most of the time, an RMA has already been issued for the return of parts. If one has been issued, the RMA number is written on the exterior of the shipping package in which your replacement part was shipped. Be sure to ship returned parts in the shipping package provided.

If you are shipping more than one return part to us, use the additional shipping packages provided.

If no RMA number is written on the shipping package, call Solbourne Support at 1-800-447-2861 for an RMA number. Once you've received an RMA number, write it into the dotted blue rectangle located in the lower right corner on the outside of the package.

Be sure to return the correct part. Boards have descriptions screened onto the upper edge of the circuit board (as you face the component side of the board). Mass storage devices have identification labels attached to one side of the drive. If you have any questions regarding the identification of a part to be returned, call Solbourne for assistance.

## Section 2: Unpacking the Xylogics 781 Multiplexer Board

### 2.1 Introduction

This section shows how to unpack the Xylogics 781 Multiplexer Board.

### 2.2 Contents of Xylogics 781 Multiplexer Board Installation Kit

The installation kit contains the following:

- A Xylogics 781 Serial Multiplexer Board
- Three cables terminated with a 50-pin female telco connector.
- Three 50-pin telco-to-8-pin-RJ-45 converters (harmonicas)
- Disposable electrostatic wrist strap
- Installation Guide
- Any appropriate patch tape against the current OS/MP release (as needed) and release notes for this tape, when a tape is shipped
- Release Notes for the Xylogics kit

### 2.3 Unpacking the Xylogics 781 Serial Multiplexer Board

Take the Xylogics Serial Multiplexer Board container to the location where it will be installed in a host system, and follow these steps:

1. At the installation location, inspect the shipping container for signs of damage. If you find external damage, do not proceed with the installation. Contact the carrier immediately.
2. Open the container and find the electrostatic strap. Place this strap on your wrist on one end and attach to the other to the host system chassis.
3. Remove the foam inner pack.
4. Remove the board from the inner pack and remove the plastic protective bag. Retain plastic bag for use during configuration.
5. Inspect the board and other components for any obvious signs of damage.
6. If you find no damage, proceed to the next section where you will find instructions for configuring the Xylogics 781 Board.

If you have any problems installing or using the Xylogics 781 Board, call the Solbourne toll free support number 1-800-447-2861.

## Section 3: Xylogics 781 Serial Multiplexer Board Jumpers

### 3.1 Introduction

This section describes Xylogics 781 Board jumper settings. The user sets the VMEbus address and crystal speed of each Xylogics 781 Board by jumpers on the board. Other jumpers on the board are factory-set, but should be verified.

**★ ★ ★ CAUTION ★ ★ ★**

**An electrostatic grounding wrist strap should be worn when handling the Xylogics 781 Board. It should be connected to the host Solbourne system chassis to provide a ground.**

### 3.2 Xylogics 781 Board Jumper Settings

Address jumpers can be set to the following levels:

- 0x0620 for board 0
- 0x0640 for board 1
- 0x0660 for board 2
- 0x0680 for board 3

It is arbitrary which board is set to which level. However, it is recommended that they be positioned in the VMEbus cardcage in the same order as their VMEbus addresses. This helps you remember the address level of each board and the corresponding device number used by the OS/MP.

Figure 3-1 shows the location and default setting for jumpers on the Xylogics 781 Board.

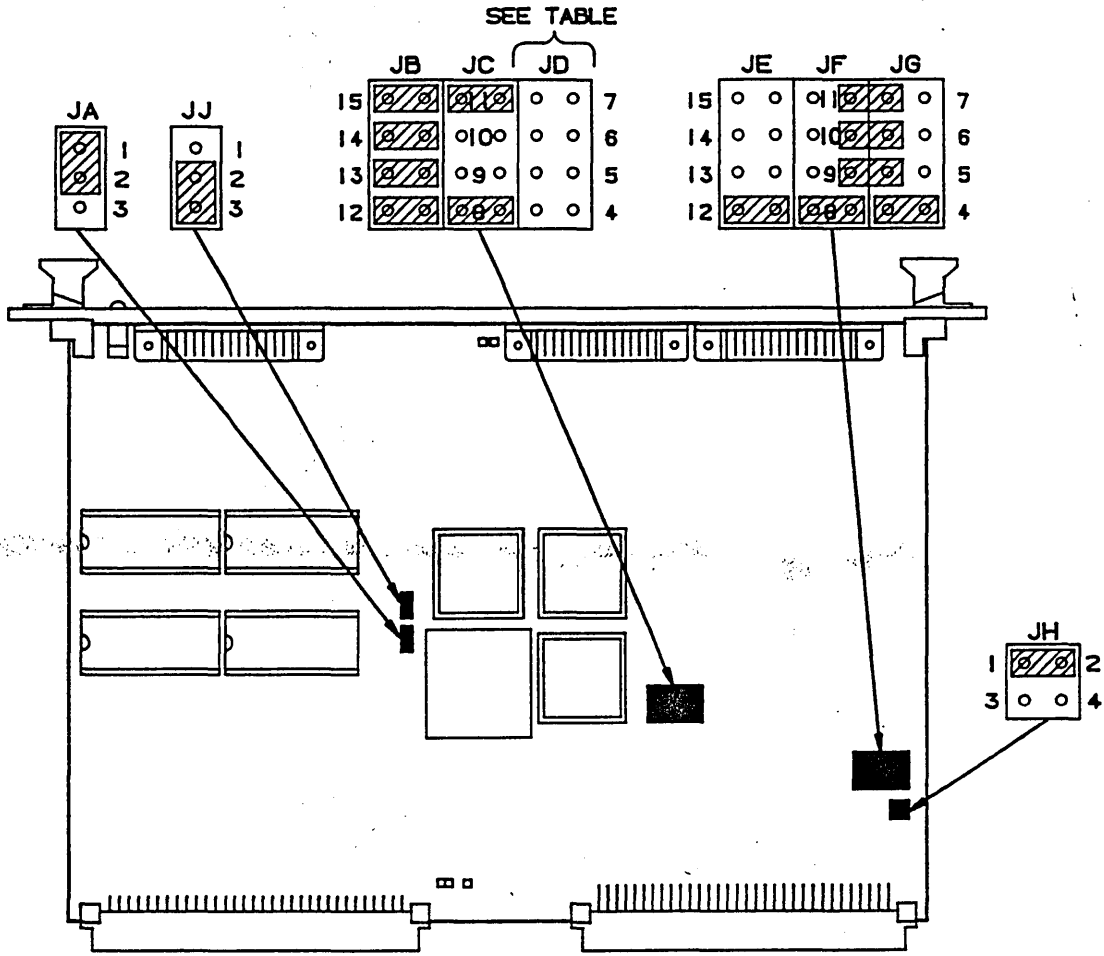


Figure 3-1. Xylogics 781 Serial Multiplexer Board Default Jumper Settings

Table 3-1 identifies the meanings of the jumpers and by whom they should be set. Those set by the factory should be checked before installing the board.

**Table 3-1. Jumper Meanings**

Jumper Name	Purpose	Set by Whom
JA	Crystal speed selection	User
JB	VMEbus address	Solbourne factory
JC	VMEbus address	Solbourne factory
JD	VMEbus address	User
JE	Bus Request/grant	Solbourne factory
JF	Bus request/grant	Solbourne factory
JG	Bus request/grant	Solbourne factory
JH	Diagnostics	User
JJ	ROM size	Solbourne factory

Table 3-2 shows the settings on jumpers JA and JH that are required to change the board's crystal speed.

**Table 3-2. Line Rate Per Jumper Positions**

Line Rate	Jumper Positions
1	JA: jumper pin 1 to 2 JH: jumper pin 1 to 2
2	JA: jumper pin 2 to 3 JH: no jumper between 1 and 2

Table 3-3 shows the baud rate selections available with different line rate settings.

Table 3-3. Available Baud Rates for Jumpered Line Rate

JA Pins 1-2 in	JA Pins 2-3 in
JH Pins 1-2 in	JH Pins 1-2 out
<b>Baud Rates Available</b>	
100	50
150	75
220	110
269	134.5 (not used)
300	150
600	300
1200	600
2400	1200
3600	1800
4000	2000
4800	2400
7200	3600
9600	4800
14400	7200
19200	9600
38400	19200

Table 3-4 shows the settings on jumper JD that are required to change the board's VMEbus address.

Table 3-4. Setting Jumper JD for VMEbus Addresses

Board Number	Address	Pin 4	Pin 5	Pin 6	Pin 7
0	0x0620	in	out	in	in
1	0x0640	in	in	out	in
2	0x0660	in	out	out	in
3	0x0680	in	in	in	out

## Section 4: Xylogics 781 Board Interconnection Hardware

### 4.1 Introduction

The Xylogics 781 Serial Multiplexer Board is shipped with interconnection hardware that provides connectivity to a wide variety of serial devices. This section describes the hardware shipped along with the Xylogics 781 Board.

Along with the Xylogics Board, the kit contains:

- Three 50-pin cables
- Three 50-pin to 8-pin converters (harmonicas) with one 50-pin receptacle and six female RJ-45 8-pin receptacles on each

These two sets of connectors provide up to 16 RJ-45 connections for each Xylogics Board; RJ-45 receptacles five and six on the third connector and harmonica are not wired.



Figure 4-1 shows the interconnection hardware supplied with the kit.

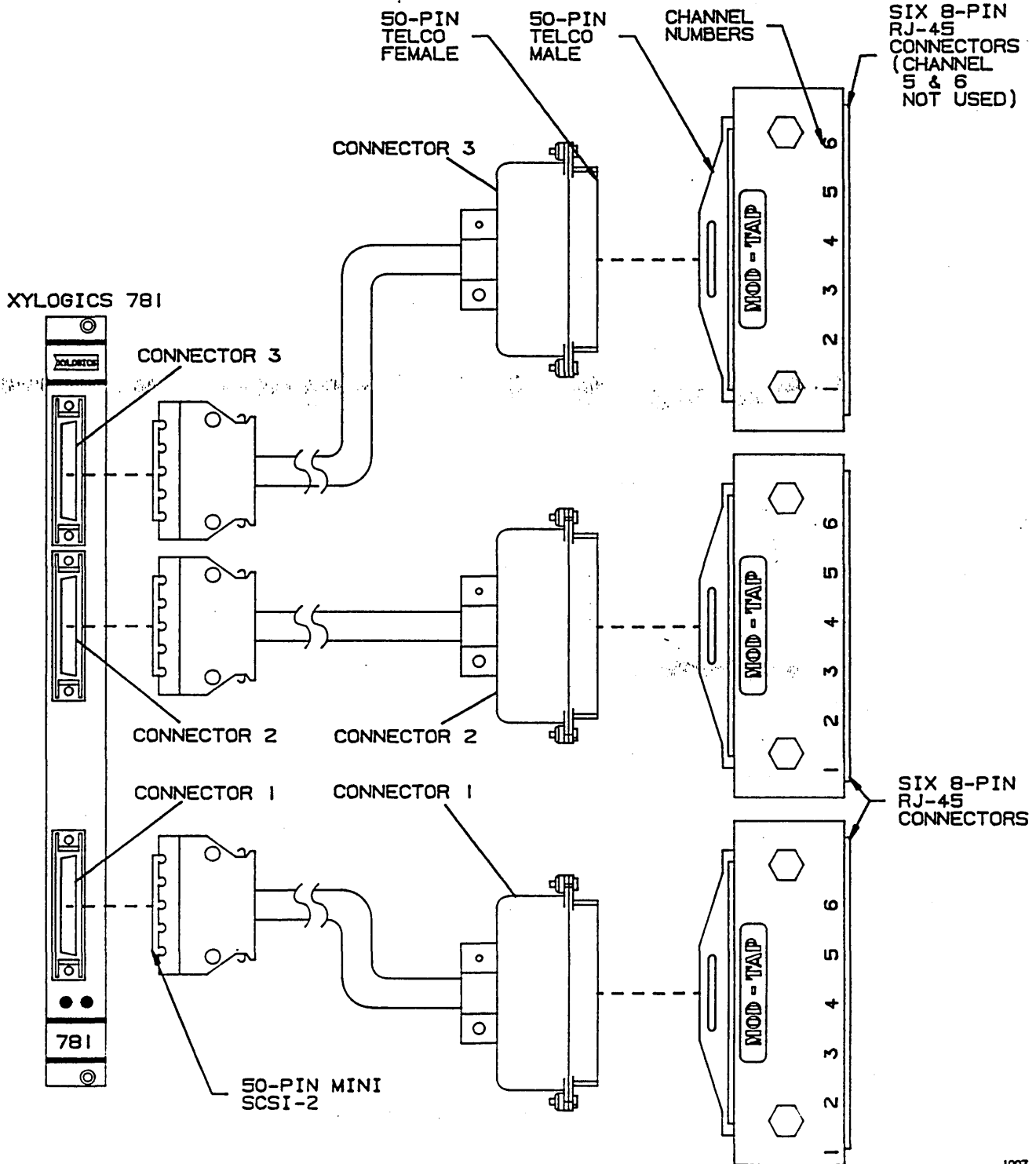


Figure 4-1. Interconnection Hardware

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### 4.2 Pin Numbering in the 50-Pin Telco Connector

Figure 4-2 shows the pin numbering of the 50-pin telco connectors at the ends of the Solbourne-supplied cables.

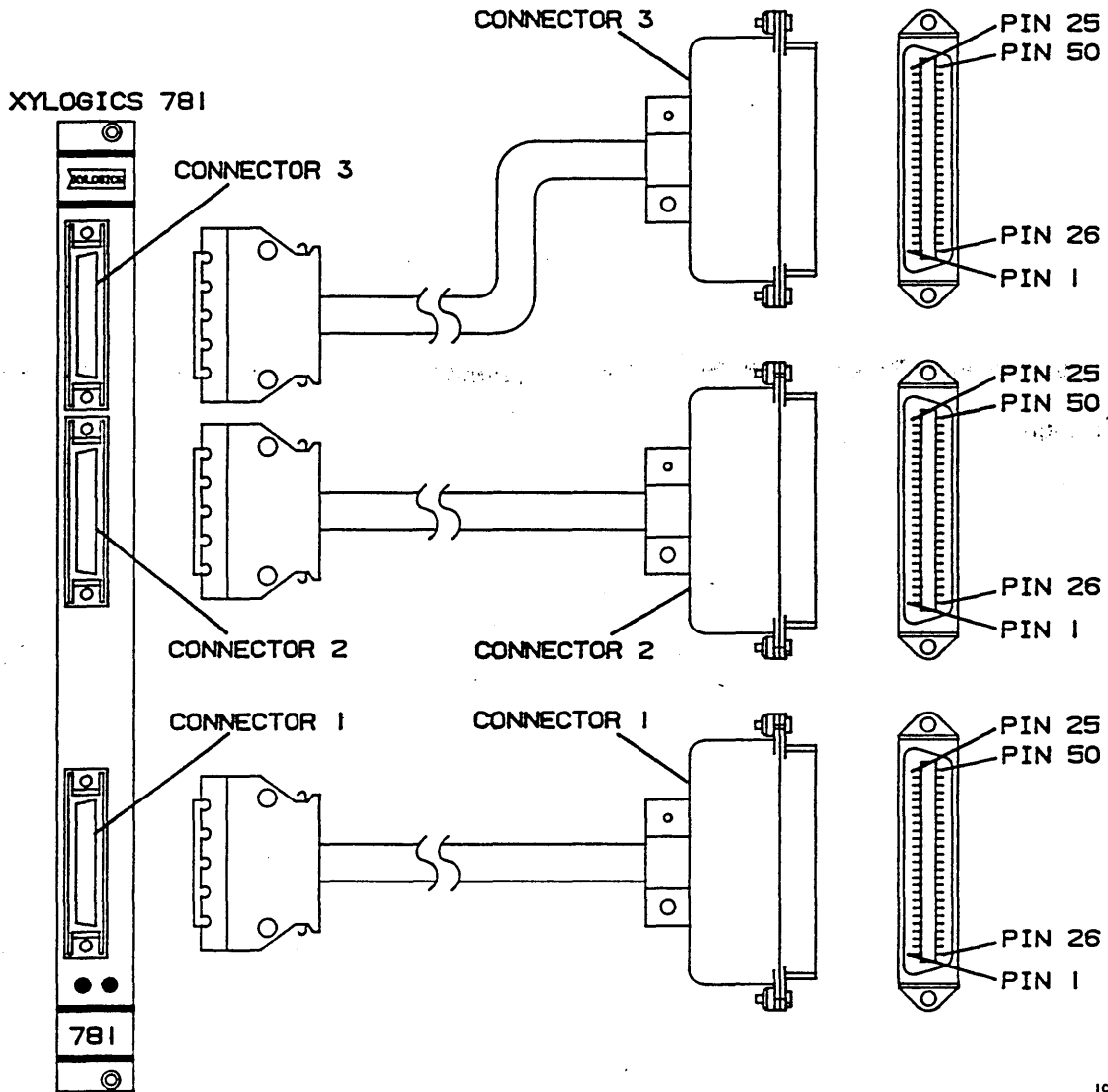


Figure 4-2. Telco Pin Numbers

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### 4.3 RS-232-A Signals

The following RS-232-A signals are available in the Solbourne Serial Multiplexer:

Table 4-1. RS-232-A Signal Names

Signal	Abbreviation
Transmitted Data	TXD
Received Data	RXD
Request to Send	RTS
Clear to Send	CTS
Data Set Ready	DSR
Data Terminal Ready	DTR
Data Carrier Detect	DCD
Ground	GND

Standard RS-232-A signals are available at two points in the system: on each 50-pin telco connector and on the RJ-45 connectors. The format of these signals is described in this section.

### 4.4 50-Pin Telco Pinouts

Pinouts provided by the 50-pin telco connector apply to the three connectors on the Xylogics 781 Board, to the 50-pin connectors on the cables supplied in the Xylogics 781 Board kit, and to the 50-pin side of the 6 x RJ-45 harmonicas supplied with the kit.

Table 4-2 shows the 50-pin telco connector pinouts and the RJ-45 channel to which each pin is connected.

Table 4-2. 50-Pin Telco Connector Pinout

Pin	Signal	Channel	Pin	Signal	Channel
1	DCD	1	26	RXT	1
2	GND	1	27	TXD	1
3	DSR	1	28	DTR	1
4	RTS	1	29	CTS	1
5	DCD	2	30	RXT	2
6	GND	2	31	TXD	2
7	DSR	2	32	DTR	2
8	RTS	2	33	CTS	2
9	DCD	3	34	RXD	3
10	GND	3	35	TXD	3
11	DSR	3	36	DTR	3
12	RTS	3	37	CTS	3
13	DCD	4	38	RXT	4
14	GND	4	39	TXD	4
15	DSR	4	40	DTR	4
16	RTS	4	41	CTS	4
17	DCD	5	42	RXD	5
18	GND	5	43	TXD	5
19	DSR	5	44	DTR	5
20	RTS	5	45	CTS	5
21	DCD	6	46	RXD	6
22	GND	6	47	TXD	6
23	DSR	6	48	CTR	6
24	RTS	6	49	CTS	6
25	N/C <sup>1</sup>	None	50	N/C	None

<sup>1</sup> N/C means not connected. On Connector 3 pins 17-25 and 42-50 are not connected

Table 4-3 shows the mapping of the telco-connector pins and signals into the 16 channels available on each Xylogics 781 Board.

Table 4-3. 50-Pin Telco Pin-out By Channel

Channel 1		Channel 2		Channel 3	
Signal	Pin <sup>2</sup>	Signal	Pin	Signal	Pin
DCD	1	DCD	5	DCD	9
GND	2	GND	6	GND	10
DSR	3	DSR	7	DSR	11
RTS	4	RTS	8	RTS	12
RXD	26	RXD	30	RXD	34
TXD	27	TXD	31	TXD	35
DTR	28	DTR	32	DTR	36
CTS	29	CTS	33	CTS	37
Channel 4		Channel 5		Channel 6	
Signal	Pin	Signal	Pin	Signal	Pin
DCD	13	DCD	17	DCD	21
GND	14	GND	18	GND	22
DSR	15	DSR	18	DSR	23
RTS	16	RTS	20	RTS	24
RXD	38	RXD	42	RXD	46
TXD	39	TXD	43	TXD	47
DTR	40	DTR	44	DTR	48
CTS	41	CTS	45	CTS	49

#### 4.5 RJ-45 Pinouts

Each 8-pin RJ-45 connector provides RS-232-A signals. Figure 4-3 shows the pinouts of the RJ-45 connector on the Mod-Tap 6 x RJ-45 harmonicas supplied by Solbourne. The Mod-Tap part number is 22-388-10.

<sup>2</sup> Pins 25 and 50 not used on connectors 1 and 2; 17-25, 42-50 not used on connector 3.

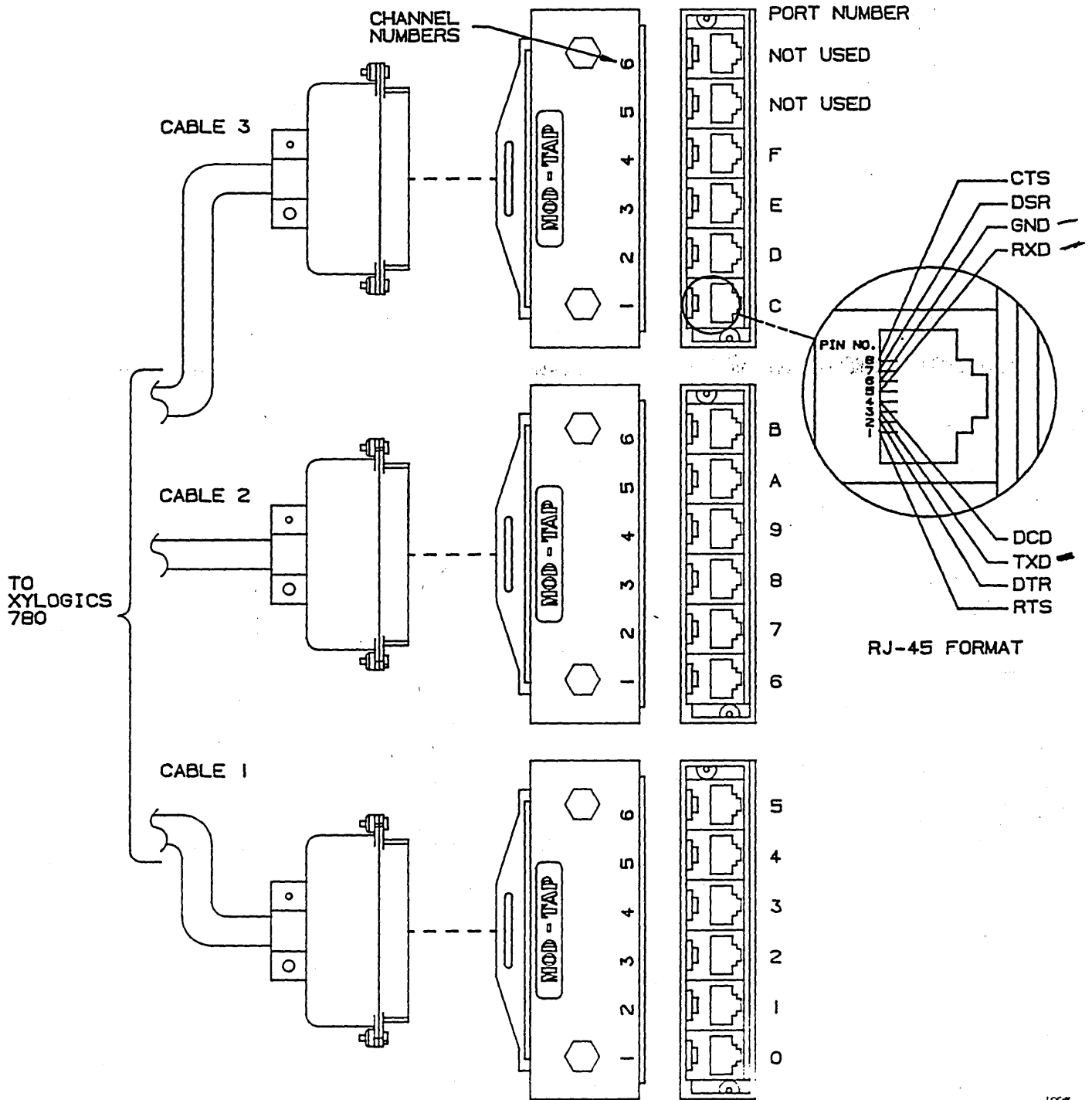


Figure 4-3. Mod-Tap Harmonica Design and Pinouts

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#### **4.6 Additional Physical and Electrical Connections**

Most devices and systems a customer desires to interconnect via the Xylogics 781 Serial Multiplexer can be connected using a variety of connectivity hardware. For most converters and connectors, a good source is:

**Mod-Tap System  
P.O. Box 706  
285 Ayer Road  
Harvard, MA 01451-0706  
(508) 722-5630**

## Section 5: Installing the Xylogics 781 Board

### 5.1 Introduction

Xylogics 781 Multiplexer Boards are installed in the VMEbus cage in a Series4 or Series5/600 workstation or server. Up to four boards can be installed in a single workstation.

**★ ★ ★ CAUTION ★ ★ ★**

An electrostatic grounding wrist strap should be worn when handling the Xylogics 781 Serial Multiplexer Board. It should be connected to the host Solbourne system chassis to provide a ground.

### 5.2 Installation Steps

This section provides step-by-step installation procedures for one or more Xylogics 781 Boards placed in a Series4 or Series5/600. Follow these steps:

**☆ ☆ ☆ WARNING ☆ ☆ ☆**

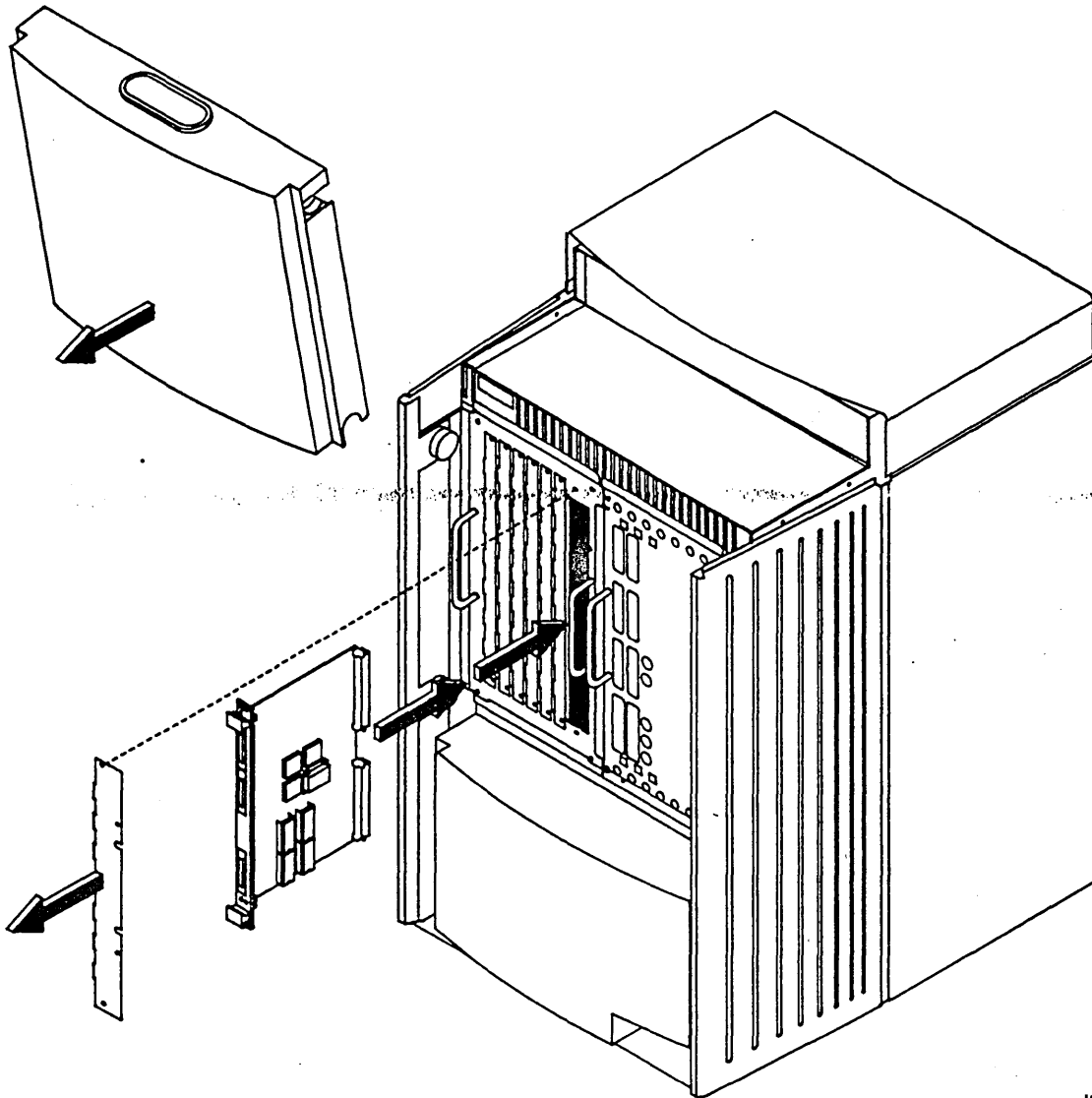
Always disconnect power before working on any computer equipment. Failure to do so can expose you to dangerous electrical shocks.

1. Shutdown the system using the following sequence of commands:

```
% su
Password: 
# /etc/shutdown -h now
ROM>
```

2. Power off the Series4 or Series5/600 unit.
3. Unplug the power cord from the wall outlet.
4. Attach one end of the electrostatic wrist strap to your wrist and the other to the chassis of the Series4 or Series5/600.
5. Remove back cable cover and the cover plate for the VMEbus slot or slots the 781 Board will be installed in. Figure 5-1 shows the disassembly required.





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Figure 5-1. VMEbus Access in the Series4 or Series5/600

6. Get the first Xylogics 781 Board and slide it into the rightmost available VMEbus slot. Connector number three is should be towards the top of the machine.

Figure 5-2 shows the correct orientation.

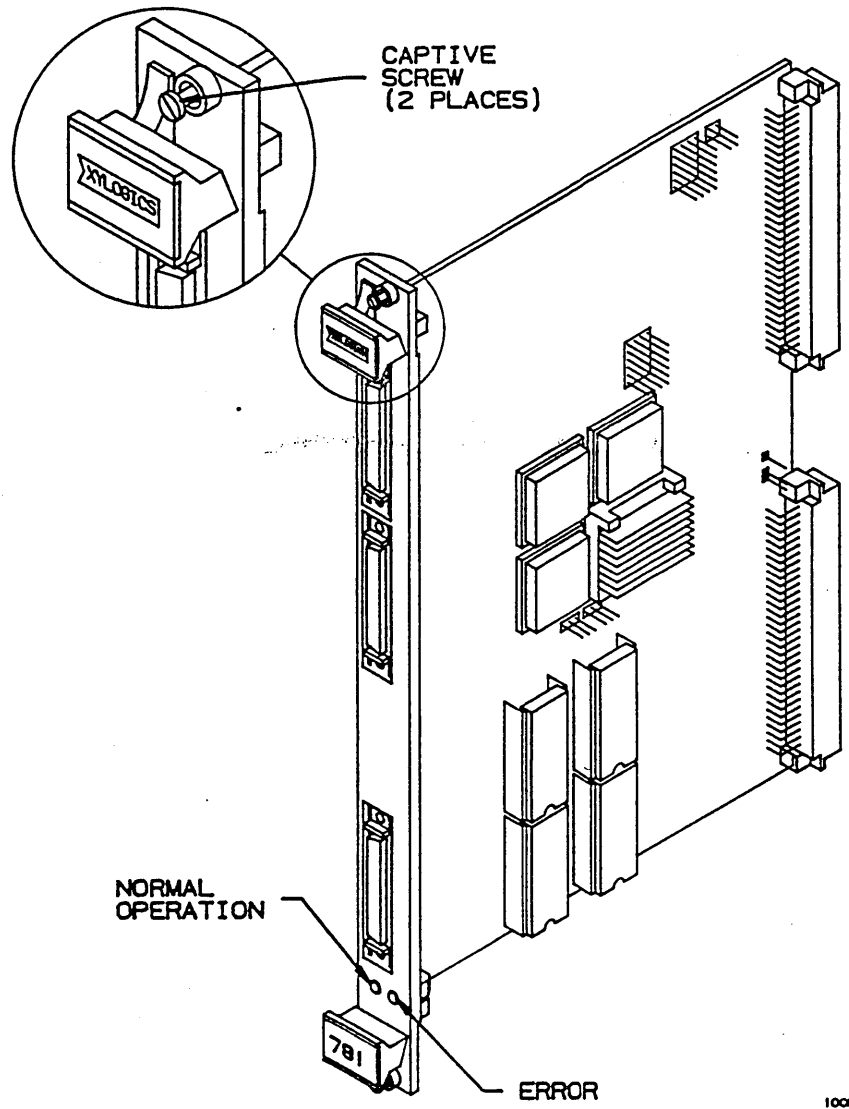


Figure 5-2. Orientation of the Xylogics 781 Board

7. Assure that the board is well seated. Screw into place. Repeat Steps 6 and 7 for all boards being installed.
8. Attach 50-pin cables and RJ-45 harmonicas as needed. Be sure the velcro strap on the harmonica is wrapped tightly around the remote end of the cable connector.
9. Reassemble the slot and card cage covers on the Series4 or Series5/600. Replace the cable cover.
10. Replace the wall plug and power up the system. The LEDs identified in Figure 5-2 indicate normal operation of the board and error conditions on the board. The xp(4s) man page can help you interpret error codes.

11. Install the patch tape that accompanied the Xylogics 781 Board. See the *Solbourne Release Notes for the OS/MP 4.0a Patch*.

### 5.3 Software Considerations

You may have to make modifications to the xp device section of the config file. Each xp device in the file has four hexadecimal flags set, as a default, to 0xffff. Each digit controls four of the possible 16 ports associated with one Xylogics 781 Board. If the flag is on, the port has software carrier detect. If the flag is off, the port has the software carrier detect turned off, meaning that the port is configured with hardware carrier detect.

Section 11 of *System and Network Administration* (Solbourne part number 101481) contains an explanation of hardware and software carrier detect. Tables 5-1 and 5-2 explain the flags that appear in each xp device in the xpconf.c file. Table 5-1 relates the ports available on each device to the digits of the flag.

Table 5-1. Port Mapping to Flag Digits

Ports	C-F	8-B	4-7	0-3
Flag Digits 0x	X	X	X	X

Table 5-2 gives the ports that are hardware and software carrier detect for all possible combinations of flag settings.

Table 5-2. Flag Settings for Hardware/Software Carrier Detect

Port Number 0-3	Hexadecimal Number in Flag	Meaning
0 0 0 0	0	Ports 0-1 hardware carrier detect
0 0 0 1	1	Port 0 software, ports 1-3 hardware
0 0 1 0	2	Port 1 software, ports 1,2,3 hardware
0 0 1 1	3	Port 0,1 software; ports 2,3 hardware
0 1 0 0	4	Port 2 software; ports 0,1,3 hardware
0 1 0 1	5	Ports 0,2 software; ports 1,3 hardware
0 1 1 0	6	Ports 1,2 software; ports 0,3 hardware
0 1 1 1	7	Ports 0,1,2 software; port 3 hardware
1 0 0 0	8	Port 3 software; ports 0-2 software
1 0 0 1	9	Ports 3,0 software; ports 1,2 hardware
1 0 1 0	A	Ports 3,1, software; ports 0,2 hardware
1 0 1 1	B	Ports 0,1,3 software; port 2 hardware
1 1 0 0	C	Ports 3,2 software; ports 0,1 hardware
1 1 0 1	D	Port 3,2,0 software; port 1 hardware
1 1 1 0	E	Ports 1-3 software; port 0 hardware
1 1 1 1	F	Ports 0-3 software carrier detect
Port Number 4-7	Hexadecimal Number in Flag	Meaning
0 0 0 0	0	Ports 4-7 hardware carrier detect
0 0 0 1	1	Port 4 software, ports 5-7 hardware
0 0 1 0	2	Port 5 software, ports 4,6,7 hardware
0 0 1 1	3	Port 4,5 software; ports 6,7 hardware
0 1 0 0	4	Port 6 software; ports 4,5,7 hardware
0 1 0 1	5	Ports 4,6 software; ports 5,7 hardware
0 1 1 0	6	Ports 5,6 software; ports 4,7 hardware
0 1 1 1	7	Ports 4,5,6 software; port 7 hardware
1 0 0 0	8	Port 7 software; ports 4-6 software
1 0 0 1	9	Ports 7,4 software; ports 5,6 hardware
1 0 1 0	A	Ports 7,5, software; ports 4,6 hardware
1 0 1 1	B	Ports 4,5,7 software; port 6 hardware
1 1 0 0	C	Ports 7,6 software; ports 4,5 hardware
1 1 0 1	D	Port 7,6,4 software; port 5 hardware
1 1 1 0	E	Ports 5-7 software; port 4 hardware
1 1 1 1	F	Ports 4-7 software carrier detect
<i>Continued on following page</i>		

Table 5-2. Flag Settings for Hardware/Software Carrier Detect (continued)

Port Number				Hexadecimal	Meaning
8-B				Number in Flag	
0	0	0	0	0	Ports 8-9 hardware carrier detect
0	0	0	1	1	Port 8 software, ports 9-B hardware
0	0	1	0	2	Port 9 software, ports 8,10,B hardware
0	0	1	1	3	Port 8,9 software; ports 10,B hardware
0	1	0	0	4	Port A software; ports 8,9,B hardware
0	1	0	1	5	Ports 8,A software; ports 9,B hardware
0	1	1	0	6	Ports 9,A software; ports 8,B hardware
0	1	1	1	7	Ports 8,9,A software; port B hardware
1	0	0	0	8	Port B software; ports 8-A software
1	0	0	1	9	Ports B,8 software; ports 9,A hardware
1	0	1	0	A	Ports B,9, software; ports 8,A hardware
1	0	1	1	B	Ports 8,9,B software; port A hardware
1	1	0	0	C	Ports B,A software; ports 8,9 hardware
1	1	0	1	D	Port B,A,8 software; port 9 hardware
1	1	1	0	E	Ports 9-B software; port 8 hardware
1	1	1	1	F	Ports 8-B software carrier detect
Port Number				Hexadecimal	Meaning
C-F				Number in Flag	
0	0	0	0	0	Ports C-F hardware carrier detect
0	0	0	1	1	Port C software, ports D-F hardware
0	0	1	0	2	Port D software, ports C,E,F hardware
0	0	1	1	3	Port C,D software; ports E,F hardware
0	1	0	0	4	Port E software; ports C,D,F hardware
0	1	0	1	5	Ports C,E software; ports D,F hardware
0	1	1	0	6	Ports D,E software; ports C,F hardware
0	1	1	1	7	Ports C,D,E software; port F hardware
1	0	0	0	8	Port F software; ports C-E software
1	0	0	1	9	Ports F,C software; ports D,E hardware
1	0	1	0	A	Ports F,D, software; ports C,E hardware
1	0	1	1	B	Ports C,D,F software; port E hardware
1	1	0	0	C	Ports F,E software; ports C,D hardware
1	1	0	1	D	Port F,1E,C software; port D hardware
1	1	1	0	E	Ports D-F software; port C hardware
1	1	1	1	F	Ports C-F software carrier detect

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