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RACAL INSTRUMENTS
1260-45
SWITCH MODULE

PUBLICATION NO. 980673-008

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2. Product model number
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FOR YOUR SAFETY

Before undertaking any troubleshooting, maintenance or exploratory procedure, read carefully the **WARNINGS** and **CAUTION** notices.



This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.



If this instrument is to be powered from the AC line (mains) through an autotransformer, ensure the common connector is connected to the neutral (earth pole) of the power supply.



Before operating the unit, ensure the conductor (green wire) is connected to the ground (earth) conductor of the power outlet. Do not use a two-conductor extension cord or a three-prong/two-prong adapter. This will defeat the protective feature of the third conductor in the power cord.



Maintenance and calibration procedures sometimes call for operation of the unit with power applied and protective covers removed. Read the procedures and heed warnings to avoid “live” circuit points.

Before operating this instrument:

1. Ensure the proper fuse is in place for the power source to operate.

2. Ensure all other devices connected to or in proximity to this instrument are properly grounded or connected to the protective third-wire earth ground.

If the instrument:

- fails to operate satisfactorily
- shows visible damage
- has been stored under unfavorable conditions
- has sustained stress

Do not operate until, performance is checked by qualified personnel.

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Racal Instruments

EC Declaration of Conformity

We

Racal Instruments Inc.
4 Goodyear Street
Irvine, CA 92718

declare under sole responsibility that the

1260-45A CRIMP Signal Matrix module, P/N 407052-001
1260-45A IDC Signal Matrix module, P/N 407052-101
1260-45B IDC Signal Matrix module, P/N 407052-102
1260-45B CRIMP Signal Matrix module, P/N 407052-002
1260-45C CRIMP Signal Matrix module, P/N 407052-003
1260-45C IDC Signal Matrix module, P/N 407052-103

They conform to the following Product Specifications:

Safety: EN61010-1:1993+A2:1995

EMC: EN61326:1997+A1:1998

Supplementary Information:

The above specifications are met when the product is installed in a Racal Instruments certified mainframe with faceplates installed over all unused slots, as applicable

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC (modified by 93/68/EEC).

Irvine, CA, May 14, 2002 Karen L Gross
Engineering Director

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NOTE FOR SYSTEMS WITH 1260-OPT 01T

The “Module-Specific Syntax” section of this manual shows the command syntax for the 1260-01S Smart Card. If you are using the newer 1260-01T Smart Card, the commands will NOT work as shown.

Consult the 1260-01T Manual for a description of the commands which may be used with the 1260-01T Smart Card.

The channel numbers described in this manual are valid for the 1260-01T. The channel numbers continue to be used for the 1260-01T.

The syntax of the commands which use channel numbers has changed for those cards controlled by the 1260-01T.

The new syntax used to close a channel is:

CLOSE (@ <module address> (<channel>))

For example, with for a relay module whose <module address> is set to 7, closing <channel> 0 is performed with the command:

CLOSE (@ 7 (0))

Using the older 1260-01S, the command would be (as shown in this manual):

CLOSE 7.0

Many other command syntax differences exist. Please consult chapter 2 of the 1260-01T manual for a description of the commands which are available for the 1260-01T.

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Control Information for the 1260-45 (A, B, and C)

The following information describes the control-register-to-relay-channel mapping for a 1260-45 Relay Module. This information may be used to control a 1260-45 when using a 1260-01T in the register-based mode of operation.

The relays used on this module are latching relays. They stay closed even if power is removed. However, guard relays isolate the matrix from the edge connector when power is removed.

A variety of control registers are used to control the matrix relays. These control registers are accessible by writing to memory locations in the A24 address space. The A24 address of each control register is based on three items:

- the A24 Offset assigned to the 1260-01T by the Resource Manager
- the Module Address assigned to the relay module with DIP Switch SW-1
- which control register to write to (Control Register 0 through 5)

The "A24 Base Address" of the 1260-45 module can be computed by:

(A24 Address Assigned to 1260-01T) + (Module Address x 400_{16}) + 1

For example, suppose the following setup:

A24 Address Assigned to 1260-01T by Resource Manager = 204 000_{16}
Module Address of 1260-45 = 7

Then the "A24 Base Address" for the 1260-45 Module would be:

204 000_{16} + (7 x 400_{16}) + 1 =
204 000_{16} + $1C00_{16}$ + 1 =
205 $C01_{16}$

Control Registers are located at offsets from the "A24 Base Address" of the module. Control Registers are located only at odd addresses. The following Control Registers are implemented by the 1260-45:

Designator	Offset from A24 Base Addr	Description
CROWADDR1	0	Holds Row to Close, Channels 0000 thru 1315
CROWADDR2	2	Holds Row to Close, Channels 2000 thru 3315
OROWADDR1	4	Holds Row to Open, Channels 0000 thru 1315
OROWADDR2	6	Holds Row to Open, Channels 0000 thru 3315
CWADDR1	8	Write Address for columns 0 thru 7 of selected row
CWADDR2	A (hexadecimal)	Write Address for columns 8 thru 15 of selected row
GRDADDR	C (hexadecimal)	Control Address for Guard Relays

NOTE: When using VISA functions, such as viIn8() and viOut8(), the base A24 offset of the 1260-01T is already included by VISA. Therefore, when using a function such as viOut8() to write the value A7 (hex) to CWADDR1 in the example above, do **NOT** include the A24 in the function call:

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Thus, the following function call may be used to write the value C6 to Control Register CWADDR1 of a 1260-45 at module address 7:

```
viOut8( hdl, 0x1C09,  0xA7 );
```

Relays are operated in parallel, up to all 16 in a column at one time. Relays are selected for operation by writing to the CWADDR1 and CWADDR2 Control Registers before writing to CROWADDR1 or CROWADDR2 (for closing relays) or OROWADDR1 or OROWADDR2 (for opening relays).

The CWADDR1 and CWADDR2 together form a 16-bit control register which defines which of the 16-relays in the selected row will be operated. This is shown in the table below:

Control Register Bit	Controls Column of Selected Row	Bit Weight
CWADDR1, bit 0	0	0x01
CWADDR1, bit 1	1	0x02
CWADDR1, bit 2	2	0x04
CWADDR1, bit 3	3	0x08
CWADDR1, bit 4	4	0x10
CWADDR1, bit 5	5	0x20
CWADDR1, bit 6	6	0x40
CWADDR1, bit 7	7	0x80
CWADDR2, bit 0	8	0x01
CWADDR2, bit 1	9	0x02
CWADDR2, bit 2	10	0x04
CWADDR2, bit 3	11	0x08
CWADDR2, bit 4	12	0x10
CWADDR2, bit 5	13	0x20
CWADDR2, bit 6	14	0x40
CWADDR2, bit 7	15	0x80

The following procedure may be used to open the relays in a selected row:

1) Determine which OROWADDR Control Register that will be used. For Channels 0000 through 1315, use OROWADDR1; for Channels 2000 through 3315, use OROWADDR2.

2) Determine which columns of the row are to be opened. Form the control values for CWADDR1 and CWADDR2 by OR-ing the bit weights for the desired relays. For example, if columns 0, 3, 12, and 13 are to be opened, the value 9_{16} would be used for CWADDR1 and 30_{16} would be used for CWADDR2. Write the calculated values to CWADDR1 and CWADDR2 (using ViOut8() or equivalent)

3) Write one of the following control values to OROWADDR1 or OROWADDR2, depending on which row you wish to operate.

    1. 1 : to open relays in row 0
    2. 2 : to open relays in row 1
    3. 4 : to open relays in row 2
    4. 8 : to open relays in row 3

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4) Wait 4 milliseconds

5) Write the value 0 to OROWADDR1 or OROWADDR2

The following procedure may be used to close the relays in a selected row:

1) Determine which CROWADDR Control Register that will be used. For Channels 0000 through 1315, use CROWADDR1; for Channels 2000 through 3315, use CROWADDR2.

2) Determine which columns of the row are to be closed. Form the control values for CWADDR1 and CWADDR2 by OR-ing the bit weights for the desired relays. For example, if columns 1, 2, 5, 10, and 15 are to be closed, the value 26_{16} would be used for CWADDR1 and 84_{16} would be used for CWADDR2. Write the calculated values to CWADDR1 and CWADDR2 (using ViOut8() or equivalent)

3) Write one of the following control values to CROWADDR1 or CROWADDR2, depending on which row you wish to operate.

    1. 1 : to close relays in row 0
    2. 2 : to close relays in row 1
    3. 4 : to close relays in row 2
    4. 8 : to close relays in row 3

4) Wait 4 milliseconds

5) Write the value 0 to CROWADDR1 or CROWADDR2

Example:

Close Channel 2312, or matrix group 2, row 3, column 12:

1) Write 0 to CWADDR1
2) Write 10_{16} to CWADDR2 (this selects column 12)
3) Write 8 to CROWADDR1 (this selects row 3)
4) Wait 4 milliseconds
5) Write 0 to CROWADDR1

In addition to the matrix, there are guard relays which isolate the matrix from the edge connector when the VXI chassis is powered down. When the chassis is powered up, the firmware on the 1260-01T will ensure that the guard relays are closed AFTER the firmware has opened all relays within the matrix. However, if direct manipulation of the guard relays is desired, the value 3 may be written to the control register GRDADDR to close the guard relays. The value 0 may be written to open all guard relays.

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Chapter 1

MODULE SPECIFICATION

General

The 1260-45 Signal Matrix Module is a quad 4 x 16 matrix. It switches two lines per channel, and has the capability of being configured as either four 4 x 16, two 4 x 32, or two 8 x 16 matrices. The configuration is determined at the time of ordering, and is set in the factory. The user connector pinouts have been designed to also allow external configuration by the user, with a minor degradation in high-frequency response. The extent of the degradation is dependent upon the user's cabling, but should be negligible in most applications. The performance specifications given below are for a single 4 x 16 array

1260-45 Module Specifications

Factory Configurations:

1260-45A	Quad 4 x 16
1260-45B	Dual 4 x 32
1260-45C	Dual 8 x 16

Additional 1260-45A Configurations Via External Cabling:

Single 4 x 64	Single 8 x 32	Single 16 x 16
Dual 4 x 32	Dual 8 x 16	

Dual 4 x 16 and a Single 4 x 32
Dual 4 x 16 and a Single 8 x 16
Single 4 x 32 and a Single 8 x 16
Single 4 x 16 and a Single 4 x 48
Single 4 x 16 and a Single 12 x 16

Additional 1260-45B Configurations Via External Cabling:

Single 4 x 64	Single 8 x 32

Additional 1260-45C Configurations Via External Cabling:

Single 8 x 32	Single 16 x 16

Larger matrices can be configured by interconnecting multiple modules. For more information, see enclosed Application Note SWI002.

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Maximum Switchable Voltage	
(Terminal-Terminal or Terminal-Chassis)	300 VDC, 300 VAC
Maximum Switchable Power	
Per Channel	30W, 62.5 VA (Resistive Load)
Path Resistance	
Worst Case	< 1.6Ω
End of Life	< 2.5Ω
Isolation Hi-Lo	> 100 MΩ
Capacitance	
Open Channel	<100 pF
Channel-Chassis	<200 pF
Hi-Lo	<200 pF
Minimum Bandwidth 50Ω Termination	25 MHz (4 x 16) 25 MHz (4 x 32) 20 MHz (4 x 64) 10 MHz (16 x 16)
Insertion Loss, 50Ω Termination	< 1 dB to 100 kHz < 1.5 dB to 1 MHz
Crosstalk, 50Ω Termination (4X16)	< -50 dB to 100 kHz -50 dB to 1 MHz
Cooling	
Airflow	4.0 litres/sec.
Backpressure	0.5mm H_20
Power (I_{pm})	
+5V	.4A (2.8A Option 01 installed)
+24V	0.16A
Weight	3.07 lbs. (1.38kg) 3.35 lbs. (1.51kg) w/ Opt 01
User Connector	64-Pin (2 rows) IDC Quick Disconnect*

* A crimp connector kit is also available for this module (P/N 407051-001). A strain relief option can be ordered separately for this crimp connector kit, P/N 407207.

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Chapter 2

INSTALLATION INSTRUCTIONS

Unpacking and Inspection



1. Remove the 1260-45 module and inspect it for damage. If any damage is apparent, inform the carrier immediately. Retain shipping carton and packing material for the carrier's inspection.

2. Verify that the pieces in the package you received contain the correct 1260-45 module option and the 1260-45 Users Manual. Notify EADS North America Defense Test and Services, Inc. if the module appears damaged in any way. Do not attempt to install a damaged module into a VXI chassis.

3. The 1260-45 module is shipped in an anti-static bag to prevent electrostatic damage to the module. Do not remove the module from the anti-static bag unless it is in a static-controlled area.

Reshipment Instructions

1. Use the original packing when returning the switching module to EADS North America Defense Test and Services, Inc. for calibration or servicing. The original shipping carton and the instrument's plastic foam will provide the necessary support for safe reshipment.

2. If the original packing material is unavailable, wrap the switching module in an ESD Shielding bag and use plastic spray foam to surround and protect the instrument.

3. Reship in either the original or a new shipping carton.

Option 01 Installation

Installation of the Option 01 into the 1260-45 is described in the Installation section of the 1260 Series VXI Switching Cards Manual.

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Module Installation

Installation of the 1260-45 Switching Module into a VXI mainframe, including the setting of DIP switches, is described in the Installation section of the 1260 Series VXI Switching Cards Manual, Publication No. 986673. The ID byte DIP switch, SW1, should be set as follows:

1260-45A:	6=OFF 5=OFF
1260-45B:	6=OFF 5=ON
1260-45C:	6=ON 5=OFF

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Chapter 3

MODULE SPECIFIC SYNTAX

Module Specific Command Syntax

This section contains the command syntax information that is unique to the 1260-45. A more detailed explanation of the individual commands is contained in the 1260 Series VXI Switching Cards Manual, Publication No. 980673.

The Module Specific Syntax for the 1260-45 is required in the use of the OPEN and CLOSE commands. It will also appear in data output by the 1260 Series Master in response to the PDATAOUT command.

Syntax

The Module Specific Syntax for the 1260-45 Quad 4 x 16 Signal Matrix module is as follows:

<mod addr>.<grp no><row no><col no>

where <mod addr> is the switch card address.

NOTE:

The <mod addr> used here is <u>not</u> the VXIbus defined logical address of the 1260 Series Master. It is peculiar to the 1260 Series and describes the switching module in relation to the 1260 Master. This address corresponds to the binary value of the switch setting of SW1 on the switching module PCB.

<grp no> is a reference to the matrix containing the relay to be switched. It is a single digit number between 0 and 3.

<row no> is the matrix row to be connected. It is a single digit number between 0 and 3.

<col no> is the matrix column to be connected. It is a two digit number between 00 and 15.

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Refer to **Figures 3-1, 3-2**, and **Table 3-1** for group numbers, row numbers, column numbers, and connector pins for this module.

If more than one connection is to be made or broken with contiguous rows or columns, the following format is supported:

<mod addr>.<row no.><col no.>-<row no.><col no.>

Multiple paths and path groups can be specified on a single command line by separating the path designators by commas. Command lines terminate at the end of the line.

EXAMPLE:

OPEN 3.0115,0200-0205,1200-1209,1213,2300,3315

All configurations respond to the same sets of values for <grp no>, <row no>, and <col no>.

PDATAOUT Command

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays. The syntax used is:

PDATAOUT <mod addr>[;<mod addr>][;<mod addr>]....

The response to the PDATAOUT command is as follows:

<header>
<mod addr>. <grp no><row no><col no>[,...]
<grp no><row no><col no>[,...]
<mod addr>.END

where <header> is as follows:

1260-45A: <mod addr>. 1260-45A Quad 4x16 SIGNAL MATRIX MODULE

1260-45B: <mod addr>. 1260-45B Dual 4x32 SIGNAL MATRIX MODULE

1260-45C: <mod addr>. 1260-45C Dual 8x16 SIGNAL MATRIX MODULE

Note the actual <header> sent is determined by the setting of the ID Byte DIP switches on the module, and is independent of any external user configuration cables.

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PSETUP Command

The PSETUP command causes the specified module to transmit its sequence mode. The supported sequence modes are IMM (Immediate), BBM (Break-Before-Make), and MBB (Make-Before-Break). The syntax used is:

PSETUP <mod addr>[;<mod addr>][;<mod addr>]....

The response to the PSETUP command is as follows:

<header>
<mod addr>.<seq mode>
<mod addr>.END

where <seq mode> is IMM, BBM, or MBB, and
where <header> is as follows:

1260-45A: <mod addr>. 1260-45A Quad 4x16 SIGNAL MATRIX MODULE

1260-45B: <mod addr>. 1260-45B Dual 4x32 SIGNAL MATRIX MODULE

1260-45C: <mod addr>. 1260-45C Dual 4x32 SIGNAL MATRIX MODULE

Note the actual <header> sent is determined by the setting of the ID Byte DIP switches on the module, and is independent of any external user configuration cables.

The 1260-45 supports most standard 1260 features. These include Confidence Mode, Equate/Exclude/Scan Lists commands, and the STORE/RECALL commands.

Connector Pin Configuration

Refer to **Figure 3-1** for pin configurations of the front panel connectors J200 to J203. J200 to J203 is Part Number 602005. The part numbers for the mating connectors and discrete wire connectors are shown below. The actual pinouts are given in **Table 3-1** and **Figure 3-2**.

Mating Connectors

602004	Connector Body
602004-001	Strain Relief
602004-002	Pull Tabs

Crimp (Discrete Wire Connectors)

602159-064	Body
602159-900	Pins

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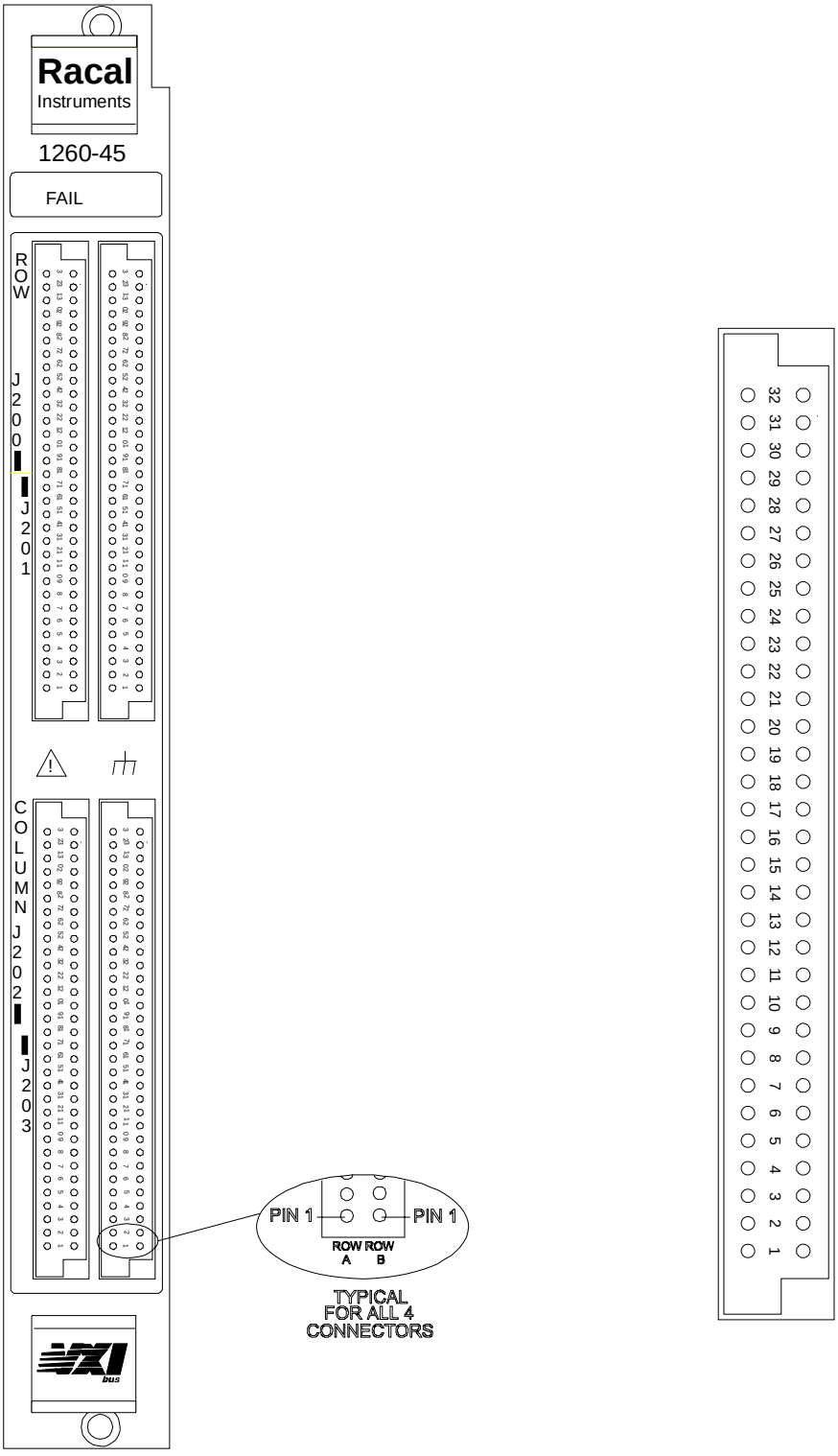


Figure 3-1, 1260-45 User Connector Pin Configuration

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Table 3-1, 1260-45 Pin Assignments

Grp	Row	Hi Pin	Lo Pin	Col	Hi Pin	Lo Pin
0	0	J200-A18	J200-B18	0	J202-A32	J202-B32
	1	J200-A22	J200-B22	1	J202-A30	J202-B30
	2	J200-A26	J200-B26	2	J202-A28	J202-B28
	3	J200-A30	J200-B30	3	J202-A26	J202-B26
				4	J202-A24	J202-B24
				5	J202-A22	J202-B22
				6	J202-A20	J202-B20
				7	J202-A18	J202-B18
				8	J202-A16	J202-B16
				9	J202-A14	J202-B14
				10	J202-A12	J202-B12
				11	J202-A10	J202-B10
				12	J202-A8	J202-B8
				13	J202-A6	J202-B6
				14	J202-A4	J202-B4
				15	J202-A2	J202-B2
Grp	**Row**	**Hi Pin**	**Lo Pin**	**Col**	**Hi Pin**	**Lo Pin**
1	0	J200-A20	J200-B20	0	J202-A31	J202-B31
	1	J200-A24	J200-B24	1	J202-A29	J202-B29
	2	J200-A28	J200-B28	2	J202-A27	J202-B27
	3	J200-A32	J200-B32	3	J202-A25	J202-B25
				4	J202-A23	J202-B23
				5	J202-A21	J202-B21
				6	J202-A19	J202-B19
				7	J202-A17	J202-B17
				8	J202-A15	J202-B15
				9	J202-A13	J202-B13
				10	J202-A11	J202-B11
				11	J202-A9	J202-B9
				12	J202-A7	J202-B7
				13	J202-A5	J202-B5
				14	J202-A3	J202-B3
				15	J202-A1	J202-B1

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Table 3-1, 1260-45 Pin Assignments (continued)

Grp	Row	Hi Pin	Lo Pin	Col	Hi Pin	Lo Pin
2	0	J201-A18	J201-B18	0	J203-A32	J203-B32
	1	J201-A22	J201-B22	1	J203-A30	J203-B30
	2	J201-A26	J201-B26	2	J203-A28	J203-B28
	3	J201-A30	J201-B30	3	J203-A26	J203-B26
				4	J203-A24	J203-B24
				5	J203-A22	J203-B22
				6	J203-A20	J203-B20
				7	J203-A18	J203-B18
				8	J203-A16	J203-B16
				9	J203-A14	J203-B14
				10	J203-A12	J203-B12
				11	J203-A10	J203-B10
				12	J203-A8	J203-B8
				13	J203-A6	J203-B6
				14	J203-A4	J203-B4
				15	J203-A2	J203-B2
Grp	**Row**	**Hi Pin**	**Lo Pin**	**Col**	**Hi Pin**	**Lo Pin**
3	0	J201-A20	J201-B20	0	J203-A31	J203-B31
	1	J201-A24	J201-B24	1	J203-A29	J203-B29
	2	J201-A28	J201-B28	2	J203-A27	J203-B27
	3	J201-A32	J201-B32	3	J203-A25	J203-B25
				4	J203-A23	J203-B23
				5	J203-A21	J203-B21
				6	J203-A19	J203-B19
				7	J203-A17	J203-B17
				8	J203-A15	J203-B15
				9	J203-A13	J203-B13
				10	J203-A11	J203-B11
				11	J203-A9	J203-B9
				12	J203-A7	J203-B7
				13	J203-A5	J203-B5
				14	J203-A3	J203-B3
				15	J203-A1	J203-B1

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Chassis Ground:

J200	A1-A4, A19, A21, A23, A25, A27, A29, A31 B1-B4, B19, B21, B23, B25, B27, B29, B31
J201	A1-A4, A19, A21, A23, A25, A27, A29, A31 B1-B4, B19, B21, B23, B25, B27, B29, B31

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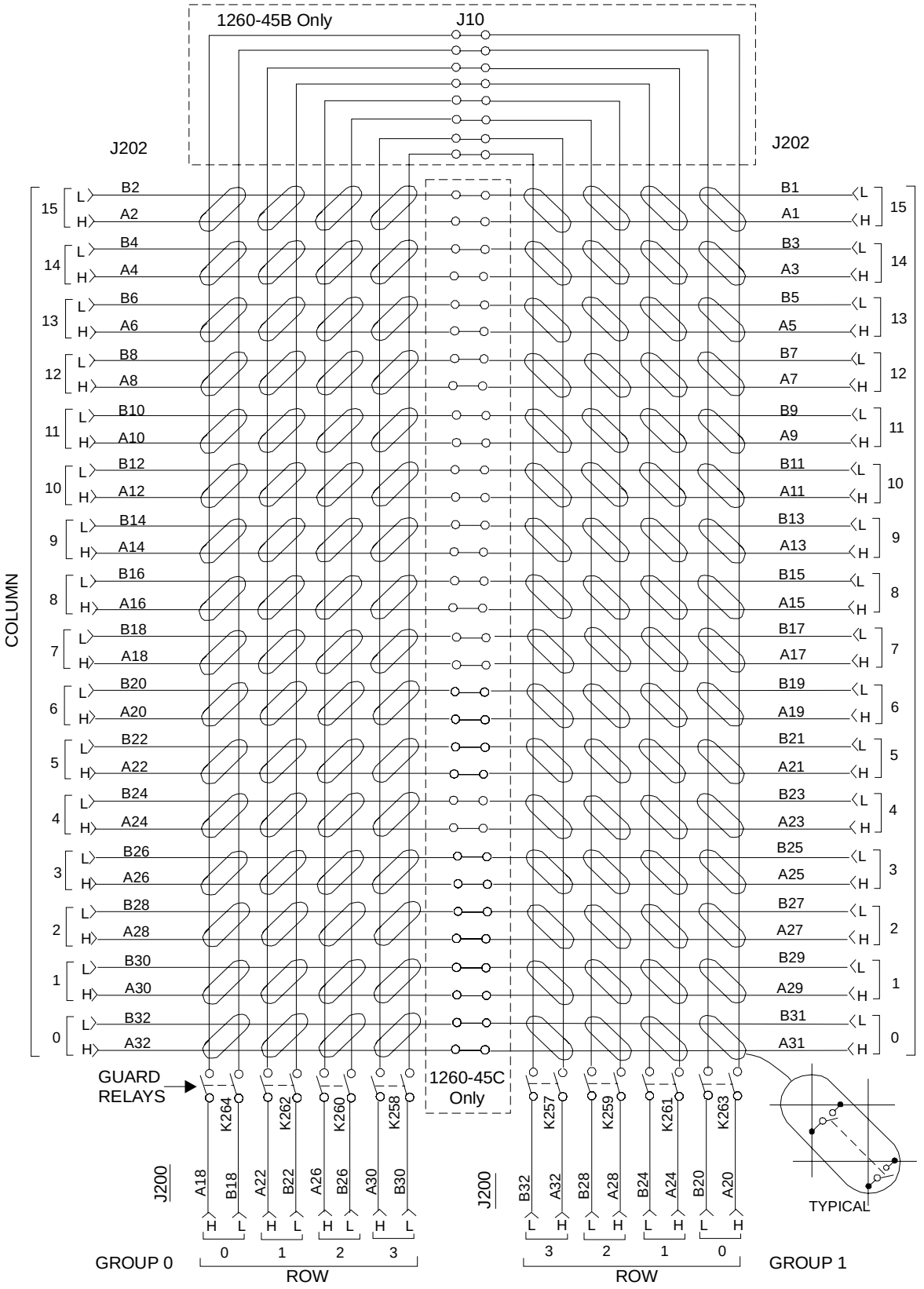


Figure 3-2a, 1260-45 Matrix Pinouts

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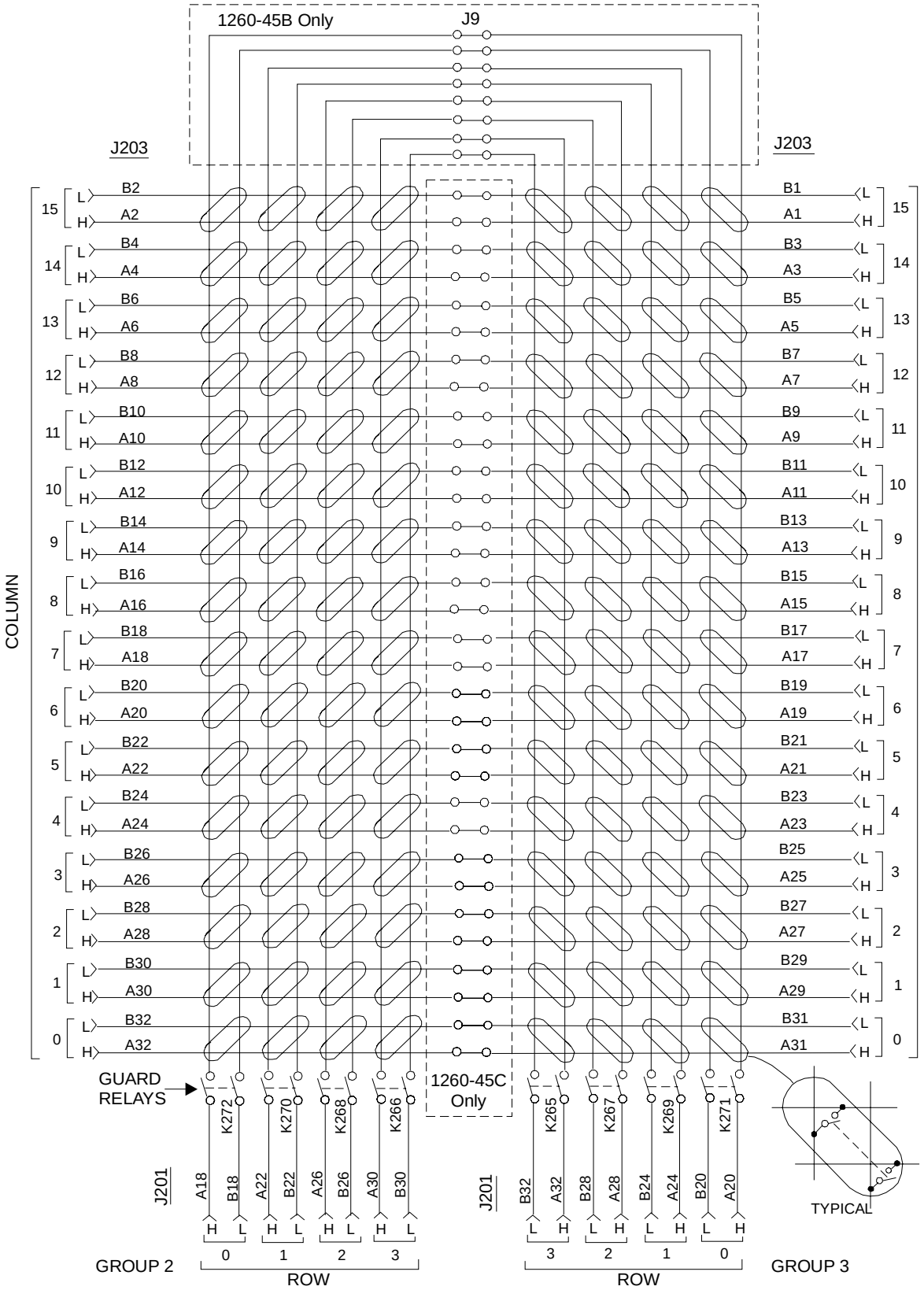


Figure 3-2b, 1260-45 Matrix Pinouts

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Expansion and Configuration

Internally, the 1260-45 consists of two PCBAs with identical, dual 4 x 16 matrices. Each PCB assembly can be configured, via internal push-on jumpers, to connect the Rows and Columns of the two matrices. If Row 0 of the first matrix is connected to Row 0 of the second matrix, Row 1 of the first is connected to Row 1 of the second, etc., the PCB assembly becomes a 4 x 32 matrix. The difference between the 1260-45A and the 1260-45B is the -45B module is shipped with these jumpers installed on both PCB assemblies at the factory. Similarly, if Column 0 of the first matrix is connected to Column 0 of the second matrix, etc., the PCB assembly becomes an 8 x 16 matrix. The 1260-45C has the columns of the two PCB assemblies connected in this fashion when shipped from the factory. (Refer to **Figure 3-2**. The jumpers are designated J7 and J8 for the columns, and J9 and J10 for the rows).

The 1260-45 module can also be configured externally. The P/N 407058, shown in **Figure 3-3**, is included in the ship kit of each module for this purpose. Connector 3 is the regular user interface. The mate to this connector can be a discrete wire connector or a ribbon cable, depending upon user preferences. Connectors 1 and 2 are connected in parallel across the ribbon cable. When these are inserted into J200 and J201, the result is a dual 4 x 32 array.

Unlike the 1260-45B configuration, the interconnected matrices are on different PCBAs inside the module. This ribbon cable can then be extended to adjacent 1260-45 modules in the VXI mainframe to yield dual 4 x 64, dual 4 x 96, etc. matrices. The dual arrays can be connected together using either the internal jumpers in a 1260-45B module, jumpers in the user cabling, or a "configuration" connector across the ribbon cable. The mate to the configuration connector should be a discrete wire, loopback connector; i.e., it connects Group 0 Row 0 to Group 2 Row 0, Group 1 Row 1 to Group 1 Row 2, etc. This loopback "configuration" connector would allow a single 1260-45A to become a 4 x 64 matrix.

Columns can be connected in the same fashion to yield a single 16 x 16 matrix per module. **Table 3-2** shows some common configurations. Refer to Application Note SWI002 for more information on the 1260-45 configurations.

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Table 3-2, Common 1260-45 Configurations

Configuration	Start With	Cabling Used
4 x 64	1260-45B	Rows with Loopback
8 x 32	1260-45B	Columns with Loopback
16 x 16	1260-45C	Columns with Loopback
8 x 64	4 x 64 2 modules	Columns with Loopback Between Modules (LBBM)
16 x 32	8 x 32 2 modules	Columns with Loopback Between Modules (LBBM)

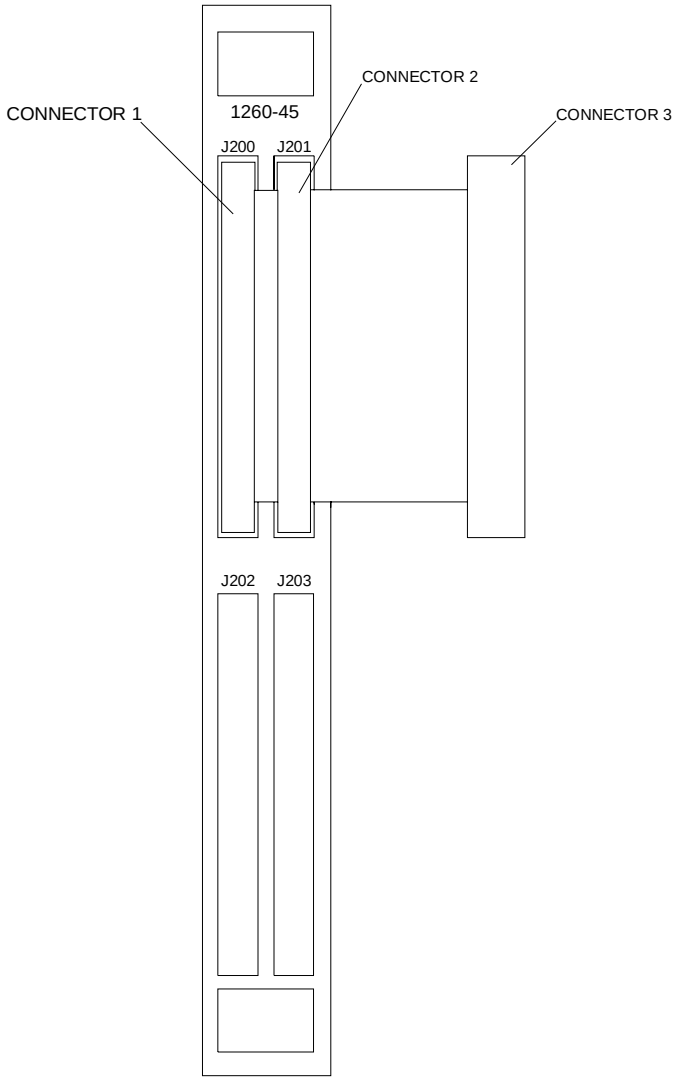


Figure 3-3, Sample Expansion/Configuration Cable

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Chapter 4
OPERATION

Theory of Operation

The 1260-45 consists of two PCBAs. The larger PCBA, 405043, contains the VXI LBus interface, as well as half of the relay matrix and all of the relay drive electronics. The smaller PCBA, 405044, contains the other half of the relay matrix. The boards are connected by a ribbon cable which connects the relay coils to the drive electronics. The relay signal lines are not passed between the two PCB assemblies inside the module. The VXI interface is described in the Theory of Operation section of the 1260 Series VXI Switching Cards Manual.

There is no connection between the relay and coil signal lines. They both are arranged into two 4 x 16 matrices on each board. There are two coils and the associated circuitry for each relay; one to set the relay, and one to reset it. The latching-type relays' coils are only energized when their state is to be changed.

Several features have been incorporated into the card to reduce the time necessary to update the state of the relays on the card. First, relay coils have been grouped into sets of 16. This reduces the amount of backplane overhead associated with communicating an update from the -01 CPU to the individual switch module. Second, the software in the -01 keeps track of the state of the relays. Commands are only sent to the card for the relays that change, rather than for the entire array. This minimizes the volume of data that must be sent to the card via the serial, local bus interface.

All of the rows have non-latching relays in series with the signal line inputs. This causes the row lines to be opened upon power fail. Upon power up, these relays remain open until after the -01 CPU has reset each relay. When the power-up sequence is completed, these "guard" relays are closed and the card functions normally. The guard relays are transparent, and are not accessible, to the user.

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Relay Drive Circuitry

The quantity of drivers is reduced, and the MTBF improved by arranging the relay coils into matrices. As shown in **Figure 4-1**, one end of each relay is connected to a source driver, and the other end is connected to a sink driver. The relay is not actuated unless the relay coil's source and sink drivers are both turned on.

The diodes in series with the relay coils have two functions. The first function is to protect the driver ICs by clamping the flyback voltages. The second function is to block "trap door" paths through the array which might cause non-specified relays to actuate.

Circuitry is also included to test for hardware faults in the coil/diode circuitry. Both opens and shorts can be detected. The basic technique is to measure the voltage applied to the sink driver when the source driver is ON or OFF. Referring to **Figure 4-1**, assume the relay coil on K1 between pins 1 and 5 is actuated. This means all drivers are OFF except for U1 Pin 18 and U2 Pin 18. Under normal conditions, this will cause the voltage on U3A Pin 4 to be below the reference threshold. At the same time, the voltage on U3B Pin 6 will be higher than the reference threshold because its sink driver is OFF, eliminating the IR voltage drop across Pin 1 and 5 of K2. If either that coil or CR3 are open, there will be no pull-up voltage, and the voltage on U3B Pin 6 will be lower than the reference threshold causing the software to detect a fault. If the coil between Pins 1 and 5 of K1 is shorted, the voltage on U3A Pin 4 will be above the threshold which will also be detected as a fault. If CR4 is shorted, the voltage on U3B Pin 6 will basically be the result of the voltage divider formed by K2 Pins 1-5, K2 Pins 10-6, and K1 Pins 10-6. The threshold voltage has been chosen so this resulting voltage is below it. A fault condition will then be detected.

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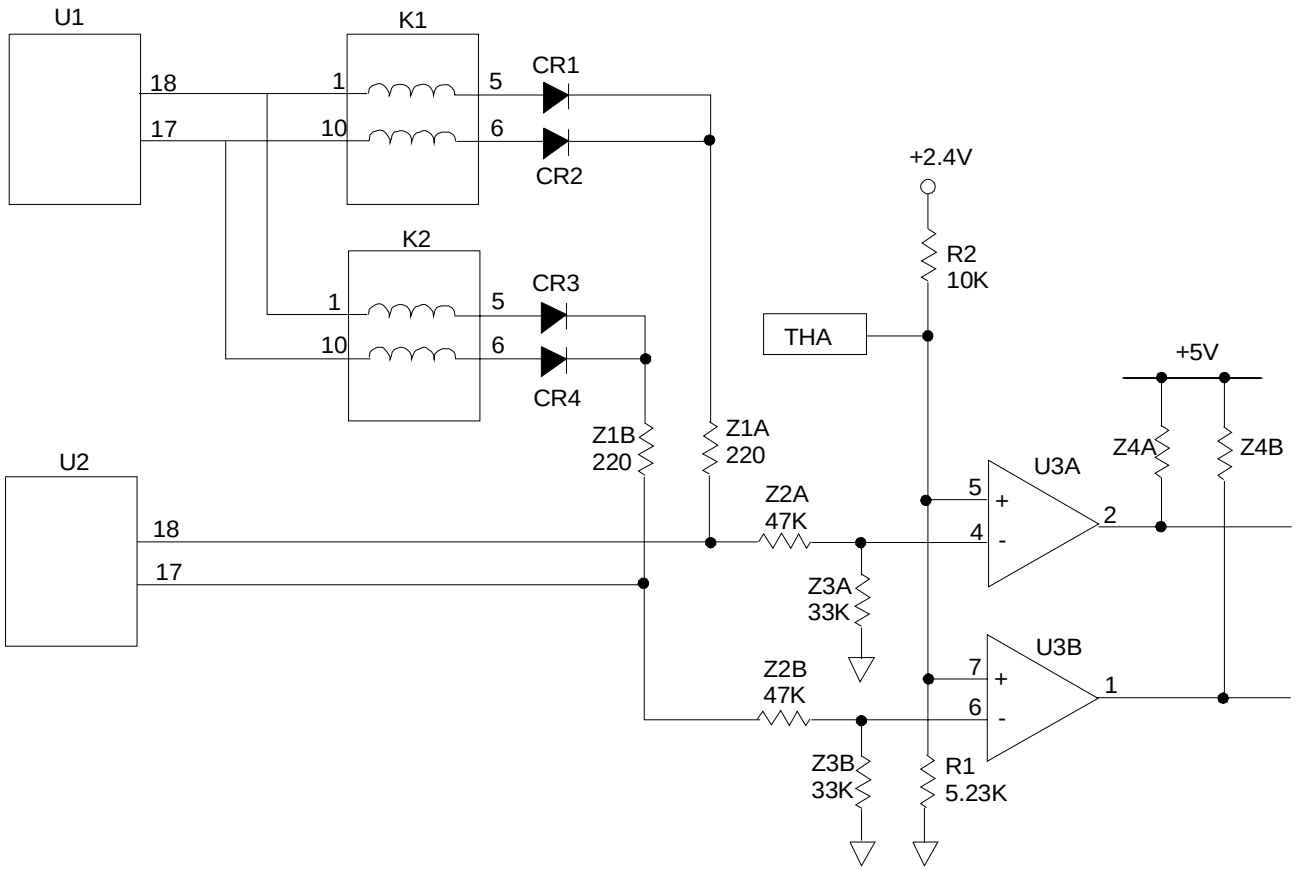


Figure 4-1, Relay Drive Circuitry

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Chapter 5
OPTIONAL HARNESS ASSEMBLIES

The following harness assemblies are used to connect 1260-45 to Freedom Series Test Receiver Interfaces.

Each harness documentation consists of an assembly drawing, parts list, system wire list and wire list.

407286	Virginia Panel, Inc. Series VP90 Interface Harness
407287	TTI Testron, Inc. Interface Harness (TTI Receiver must be above chassis)

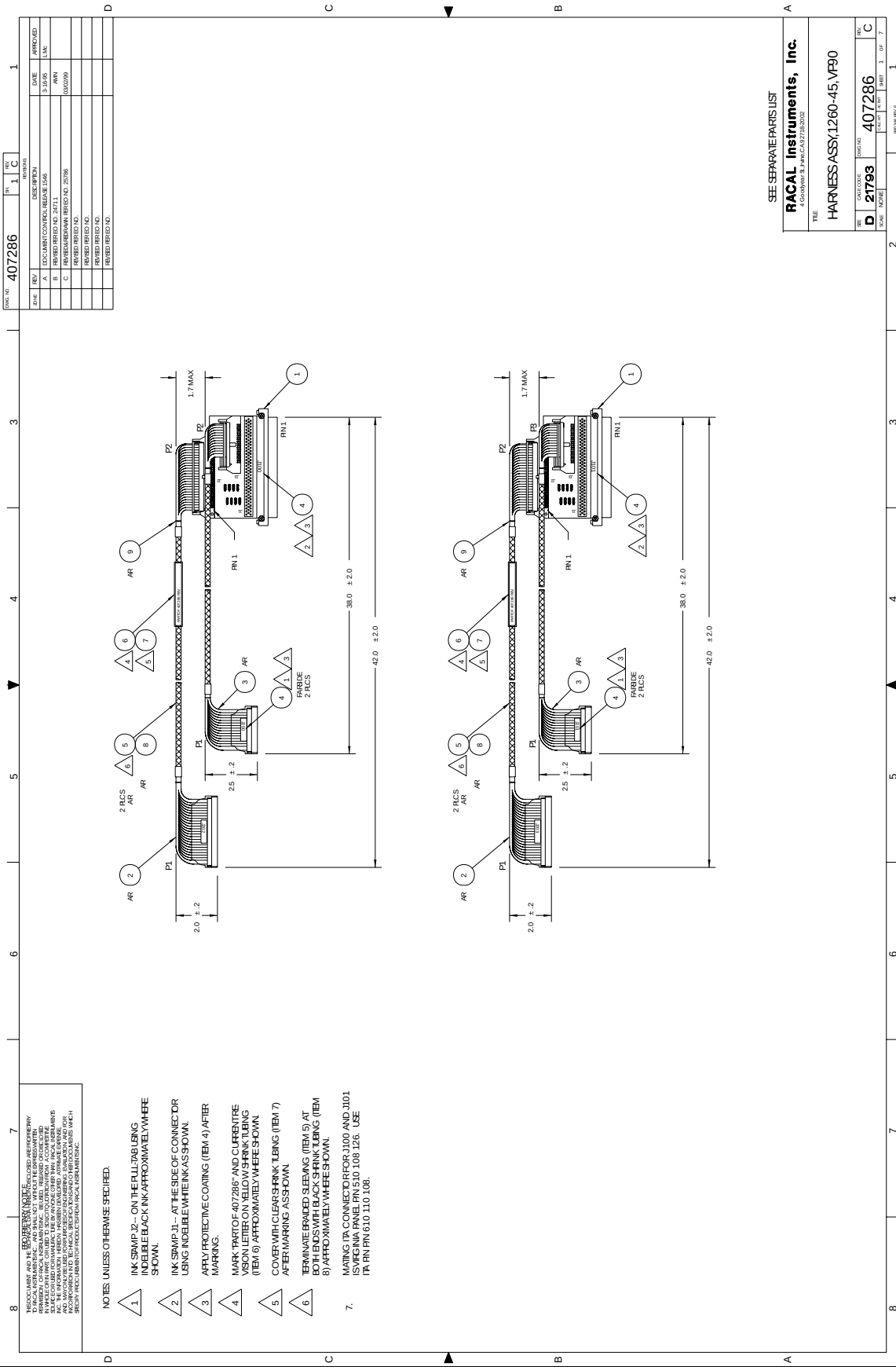
For more information on Racal Instruments complete line of Test Receiver Interface solutions, contact your Sales Representative.

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Assembly 407286 HARNESS ASSY, 1260-45, VP90 Date 3/03/99 Revision C

#	Component	Description	U/M	Qty Reqd	Ref
1	405085	PCB ASSY, VP90 INTFC, 96CONTCT	EA	2.00000	J100, J101
2	407259	CABLE ASSY, IDC, 64COND, VP90	EA	2.00000	J202, J203
3	407356	CABLE ASSY, IDC, 32COND, VP90	EA	2.00000	J200, J201
4	910541	POLYURETHANE CONFORMAL COAT	EA	.00001	
5	GRP-I10-1/2	TBGWOV-POY. 250ID-BLACK	FT	.00001	
6	M23053/5-109-4	TBGSRK-POF. 750ID-YELLOW	FT	.00001	
7	500104	TBGSRK-POF. 750ID-CLEAR	FT	.00001	
8	500017	TBGSRK-POF. 500ID-BLACK	FT	.00001	
9	500005	TIE CORD NYLON	FT	.00001	

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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
	BLK AA (J100)	Uxx-SLOT yy (J200,J202)	CABLE	407286		SYSTEM WIRE LIST
	BLK AA (J101)	Uxx-SLOT yy (J201,J203)	CABLE	407286		

This system wirelist serves as a template for incorporating this harness assembly into the overall system wirelist. It does not in any way affect the fabrication of this harness assembly.

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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
1	J100-1	J200-A17	BLU	407356	41.5"	ROW 00 AH RTN
2	J100-34	J200-A18	GRN	407356	41.5"	ROW 00 AH
3	J100-66	J200-A19	YEL	407356	41.5"	ROW 04 AH RTN
4	J100-3	J200-A20	ORN	407356	41.5"	ROW 04 AH
5	J100-36	J200-A21	RED	407356	41.5"	ROW 01 AH RTN
6	J100-68	J200-A22	BRN	407356	41.5"	ROW 01 AH
7	J100-5	J200-A23	BLK	407356	41.5"	ROW 05 AH RTN
8	J100-38	J200-A24	WHT	407356	41.5"	ROW 05 AH
9	J100-70	J200-A25	GRY	407356	41.5"	ROW 02 AH RTN
10	J100-7	J200-A26	VIO	407356	41.5"	ROW 02 AH
11	J100-40	J200-A27	BLU	407356	41.5"	ROW 06 AH RTN
12	J100-72	J200-A28	GRN	407356	41.5"	ROW 06 AH
13	J100-9	J200-A29	YEL	407356	41.5"	ROW 03 AH RTN
14	J100-42	J200-A30	ORN	407356	41.5"	ROW 03 AH
15	J100-74	J200-A31	RED	407356	41.5"	ROW 07 AH RTN
16	J100-11	J200-A32	BRN	407356	41.5"	ROW 07 AH
17	J100-33	J200-B17	TAN	407356	41.5"	ROW 00 BL RTN
18	J100-65	J200-B18	TAN	407356	41.5"	ROW 00 BL
19	J100-2	J200-B19	TAN	407356	41.5"	ROW 04 BL RTN
20	J100-35	J200-B20	TAN	407356	41.5"	ROW 04 BL
21	J100-67	J200-B21	TAN	407356	41.5"	ROW 01 BL RTN
22	J100-4	J200-B22	TAN	407356	41.5"	ROW 01 BL
23	J100-37	J200-B23	TAN	407356	41.5"	ROW 05 BL RTN
24	J100-69	J200-B24	TAN	407356	41.5"	ROW 05 BL
25	J100-6	J200-B25	TAN	407356	41.5"	ROW 02 BL RTN
26	J100-39	J200-B26	TAN	407356	41.5"	ROW 02 BL
27	J100-71	J200-B27	TAN	407356	41.5"	ROW 06 BL RTN
28	J100-8	J200-B28	TAN	407356	41.5"	ROW 06 BL
29	J100-41	J200-B29	TAN	407356	41.5"	ROW 03 BL RTN
30	J100-73	J200-B30	TAN	407356	41.5"	ROW 03 BL
31	J100-10	J200-B31	TAN	407356	41.5"	ROW 07 BL RTN
32	J100-43	J200-B32	TAN	407356	41.5"	ROW 07 BL
33	J101-1	J201-A17	BLU	407356	41.5"	ROW 08 AH RTN
34	J101-34	J201-A18	GRN	407356	41.5"	ROW 08 AH
35	J101-66	J201-A19	YEL	407356	41.5"	ROW 12 AH RTN
36	J101-3	J201-A20	ORN	407356	41.5"	ROW 12 AH
37	J101-36	J201-A21	RED	407356	41.5"	ROW 09 AH RTN
38	J101-68	J201-A22	BRN	407356	41.5"	ROW 09 AH
39	J101-5	J201-A23	BLK	407356	41.5"	ROW 13 AH RTN
40	J101-38	J201-A24	WHT	407356	41.5"	ROW 13 AH
41	J101-70	J201-A25	GRY	407356	41.5"	ROW 10 AH RTN
42	J101-7	J201-A26	VIO	407356	41.5"	ROW 10 AH
43	J101-40	J201-A27	BLU	407356	41.5"	ROW 14 AH RTN
44	J101-72	J201-A28	GRN	407356	41.5"	ROW 14 AH
45	J101-9	J201-A29	YEL	407356	41.5"	ROW 11 AH RTN
46	J101-42	J201-A30	ORN	407356	41.5"	ROW 11 AH

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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
47	J101-74	J201-A31	RED	407356	41.5"	ROW 15 AH RTN
48	J101-11	J201-A32	BRN	407356	41.5"	ROW 15 AH
49	J101-33	J201-B17	TAN	407356	41.5"	ROW 08 BL RTN
50	J101-65	J201-B18	TAN	407356	41.5"	ROW 08 BL
51	J101-2	J201-B19	TAN	407356	41.5"	ROW 12 BL RTN
52	J101-35	J201-B20	TAN	407356	41.5"	ROW 12 BL
53	J101-67	J201-B21	TAN	407356	41.5"	ROW 09 BL RTN
54	J101-4	J201-B22	TAN	407356	41.5"	ROW 09 BL
55	J101-37	J201-B23	TAN	407356	41.5"	ROW 13 BL RTN
56	J101-69	J201-B24	TAN	407356	41.5"	ROW 13 BL
57	J101-6	J201-B25	TAN	407356	41.5"	ROW 10 BL RTN
58	J101-39	J201-B26	TAN	407356	41.5"	ROW 10 BL
59	J101-71	J201-B27	TAN	407356	41.5"	ROW 14 BL RTN
60	J101-8	J201-B28	TAN	407356	41.5"	ROW 14 BL
61	J101-41	J201-B29	TAN	407356	41.5"	ROW 11 BL RTN
62	J101-73	J201-B30	TAN	407356	41.5"	ROW 11 BL
63	J101-10	J201-B31	TAN	407356	41.5"	ROW 15 BL RTN
64	J101-43	J201-B32	TAN	407356	41.5"	ROW 15 BL
65	J100-44	J202-A1	RED	407259	41.5"	COL 31 A
66	J100-76	J202-A2	BRN	407259	41.5"	COL 15 A
67	J100-13	J202-A3	BLK	407259	41.5"	COL 30 A
68	J100-46	J202-A4	WHT	407259	41.5"	COL 14 A
69	J100-78	J202-A5	GRY	407259	41.5"	COL 29 A
70	J100-15	J202-A6	VIO	407259	41.5"	COL 13 A
71	J100-48	J202-A7	BLU	407259	41.5"	COL 28 A
72	J100-80	J202-A8	GRN	407259	41.5"	COL 12 A
73	J100-17	J202-A9	YEL	407259	41.5"	COL 27 A
74	J100-50	J202-A10	ORN	407259	41.5"	COL 11 A
75	J100-82	J202-A11	RED	407259	41.5"	COL 26 A
76	J100-19	J202-A12	BRN	407259	41.5"	COL 10 A
77	J100-52	J202-A13	BLK	407259	41.5"	COL 25 A
78	J100-84	J202-A14	WHT	407259	41.5"	COL 09 A
79	J100-21	J202-A15	GRY	407259	41.5"	COL 24 A
80	J100-54	J202-A16	VIO	407259	41.5"	COL 08 A
81	J100-86	J202-A17	BLU	407259	41.5"	COL 23 A
82	J100-23	J202-A18	GRN	407259	41.5"	COL 07 A
83	J100-56	J202-A19	YEL	407259	41.5"	COL 22 A
84	J100-88	J202-A20	ORN	407259	41.5"	COL 06 A
85	J100-25	J202-A21	RED	407259	41.5"	COL 21 A
86	J100-58	J202-A22	BRN	407259	41.5"	COL 05 A
87	J100-90	J202-A23	BLK	407259	41.5"	COL 20 A
88	J100-27	J202-A24	WHT	407259	41.5"	COL 04 A
89	J100-60	J202-A25	GRY	407259	41.5"	COL 19 A
90	J100-92	J202-A26	VIO	407259	41.5"	COL 03 A
91	J100-29	J202-A27	BLU	407259	41.5"	COL 18 A
92	J100-62	J202-A28	GRN	407259	41.5"	COL 02 A

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WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
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94	J100-31	J202-A30	ORN	407259	41.5"	COL 01 A
95	J100-64	J202-A31	RED	407259	41.5"	COL 16 A
96	J100-96	J202-A32	BRN	407259	41.5"	COL 00 A
97	J100-75	J202-B1	TAN	407259	41.5"	COL 31 B
98	J100-12	J202-B2	TAN	407259	41.5"	COL 15 B
99	J100-45	J202-B3	TAN	407259	41.5"	COL 30 B
100	J100-77	J202-B4	TAN	407259	41.5"	COL 14 B
101	J100-14	J202-B5	TAN	407259	41.5"	COL 29 B
102	J100-47	J202-B6	TAN	407259	41.5"	COL 13 B
103	J100-79	J202-B7	TAN	407259	41.5"	COL 28 B
104	J100-16	J202-B8	TAN	407259	41.5"	COL 12 B
105	J100-49	J202-B9	TAN	407259	41.5"	COL 27 B
106	J100-81	J202-B10	TAN	407259	41.5"	COL 11 B
107	J100-18	J202-B11	TAN	407259	41.5"	COL 26 B
108	J100-51	J202-B12	TAN	407259	41.5"	COL 10 B
109	J100-83	J202-B13	TAN	407259	41.5"	COL 25 B
110	J100-20	J202-B14	TAN	407259	41.5"	COL 09 B
111	J100-53	J202-B15	TAN	407259	41.5"	COL 24 B
112	J100-85	J202-B16	TAN	407259	41.5"	COL 08 B
113	J100-22	J202-B17	TAN	407259	41.5"	COL 23 B
114	J100-55	J202-B18	TAN	407259	41.5"	COL 07 B
115	J100-87	J202-B19	TAN	407259	41.5"	COL 22 B
116	J100-24	J202-B20	TAN	407259	41.5"	COL 06 B
117	J100-57	J202-B21	TAN	407259	41.5"	COL 21 B
118	J100-89	J202-B22	TAN	407259	41.5"	COL 05 B
119	J100-26	J202-B23	TAN	407259	41.5"	COL 20 B
120	J100-59	J202-B24	TAN	407259	41.5"	COL 04 B
121	J100-91	J202-B25	TAN	407259	41.5"	COL 19 B
122	J100-28	J202-B26	TAN	407259	41.5"	COL 03 B
123	J100-61	J202-B27	TAN	407259	41.5"	COL 18 B
124	J100-93	J202-B28	TAN	407259	41.5"	COL 02 B
125	J100-30	J202-B29	TAN	407259	41.5"	COL 17 B
126	J100-63	J202-B30	TAN	407259	41.5"	COL 01 B
127	J100-95	J202-B31	TAN	407259	41.5"	COL 16 B
128	J100-32	J202-B32	TAN	407259	41.5"	COL 00 B
129	J101-44	J203-A1	RED	407259	41.5"	COL 63 A
130	J101-76	J203-A2	BRN	407259	41.5"	COL 47 A
131	J101-13	J203-A3	BLK	407259	41.5"	COL 62 A
132	J101-46	J203-A4	WHT	407259	41.5"	COL 46 A
133	J101-78	J203-A5	GRY	407259	41.5"	COL 61 A
134	J101-15	J203-A6	VIO	407259	41.5"	COL 45 A
135	J101-48	J203-A7	BLU	407259	41.5"	COL 60 A
136	J101-80	J203-A8	GRN	407259	41.5"	COL 44 A
137	J101-17	J203-A9	YEL	407259	41.5"	COL 59 A
138	J101-50	J203-A10	ORN	407259	41.5"	COL 43 A

RACAL Instruments, Inc., 4 Goodyear St., Irvine, CA 92718

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HARNESS ASSEMBLY, 1260-45, VP90	A	21793	407286	C
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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
139	J101-82	J203-A11	RED	407259	41.5"	COL 58 A
140	J101-19	J203-A12	BRN	407259	41.5"	COL 42 A
141	J101-52	J203-A13	BLK	407259	41.5"	COL 57 A
142	J101-84	J203-A14	WHT	407259	41.5"	COL 41 A
143	J101-21	J203-A15	GRY	407259	41.5"	COL 56 A
144	J101-54	J203-A16	VIO	407259	41.5"	COL 40 A
145	J101-86	J203-A17	BLU	407259	41.5"	COL 55 A
146	J101-23	J203-A18	GRN	407259	41.5"	COL 39 A
147	J101-56	J203-A19	YEL	407259	41.5"	COL 54 A
148	J101-88	J203-A20	ORN	407259	41.5"	COL 38 A
149	J101-25	J203-A21	RED	407259	41.5"	COL 53 A
150	J101-58	J203-A22	BRN	407259	41.5"	COL 37 A
151	J101-90	J203-A23	BLK	407259	41.5"	COL 52 A
152	J101-27	J203-A24	WHT	407259	41.5"	COL 36 A
153	J101-60	J203-A25	GRY	407259	41.5"	COL 51 A
154	J101-92	J203-A26	VIO	407259	41.5"	COL 35 A
155	J101-29	J203-A27	BLU	407259	41.5"	COL 50 A
156	J101-62	J203-A28	GRN	407259	41.5"	COL 34 A
157	J101-94	J203-A29	YEL	407259	41.5"	COL 49 A
158	J101-31	J203-A30	ORN	407259	41.5"	COL 33 A
159	J101-64	J203-A31	RED	407259	41.5"	COL 48 A
160	J101-96	J203-A32	BRN	407259	41.5"	COL 32 A
161	J101-75	J203-B1	TAN	407259	41.5"	COL 63 B
162	J101-12	J203-B2	TAN	407259	41.5"	COL 47 B
163	J101-45	J203-B3	TAN	407259	41.5"	COL 62 B
164	J101-77	J203-B4	TAN	407259	41.5"	COL 46 B
165	J101-14	J203-B5	TAN	407259	41.5"	COL 61 B
166	J101-47	J203-B6	TAN	407259	41.5"	COL 45 B
167	J101-79	J203-B7	TAN	407259	41.5"	COL 60 B
168	J101-16	J203-B8	TAN	407259	41.5"	COL 44 B
169	J101-49	J203-B9	TAN	407259	41.5"	COL 59 B
170	J101-81	J203-B10	TAN	407259	41.5"	COL 43 B
171	J101-18	J203-B11	TAN	407259	41.5"	COL 58 B
172	J101-51	J203-B12	TAN	407259	41.5"	COL 42 B
173	J101-83	J203-B13	TAN	407259	41.5"	COL 57 B
174	J101-20	J203-B14	TAN	407259	41.5"	COL 41 B
175	J101-53	J203-B15	TAN	407259	41.5"	COL 56 B
176	J101-85	J203-B16	TAN	407259	41.5"	COL 40 B
177	J101-22	J203-B17	TAN	407259	41.5"	COL 55 B
178	J101-55	J203-B18	TAN	407259	41.5"	COL 39 B
179	J101-87	J203-B19	TAN	407259	41.5"	COL 54 B
180	J101-24	J203-B20	TAN	407259	41.5"	COL 38 B
181	J101-57	J203-B21	TAN	407259	41.5"	COL 53 B
182	J101-89	J203-B22	TAN	407259	41.5"	COL 37 B
183	J101-26	J203-B23	TAN	407259	41.5"	COL 52 B
184	J101-59	J203-B24	TAN	407259	41.5"	COL 36 B
185	J101-91	J203-B25	TAN	407259	41.5"	COL 51 B
186	J101-28	J203-B26	TAN	407259	41.5"	COL 35 B

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RACAL Instruments, Inc., 4 Goodyear St., Irvine, CA 92718

DOCUMENT TITLE	SIZE	CODE NO.	DOCUMENT NO.	REV
HARNESS ASSEMBLY, 1260-45, VP90	A	21793	407286	C
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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
187	J101-61	J203-B27	TAN	407259	41.5"	COL 50 B
188	J101-93	J203-B28	TAN	407259	41.5"	COL 34 B
189	J101-30	J203-B29	TAN	407259	41.5"	COL 49 B
190	J101-63	J203-B30	TAN	407259	41.5"	COL 33 B
191	J101-95	J203-B31	TAN	407259	41.5"	COL 48 B
192	J101-32	J203-B32	TAN	407259	41.5"	COL 32 B

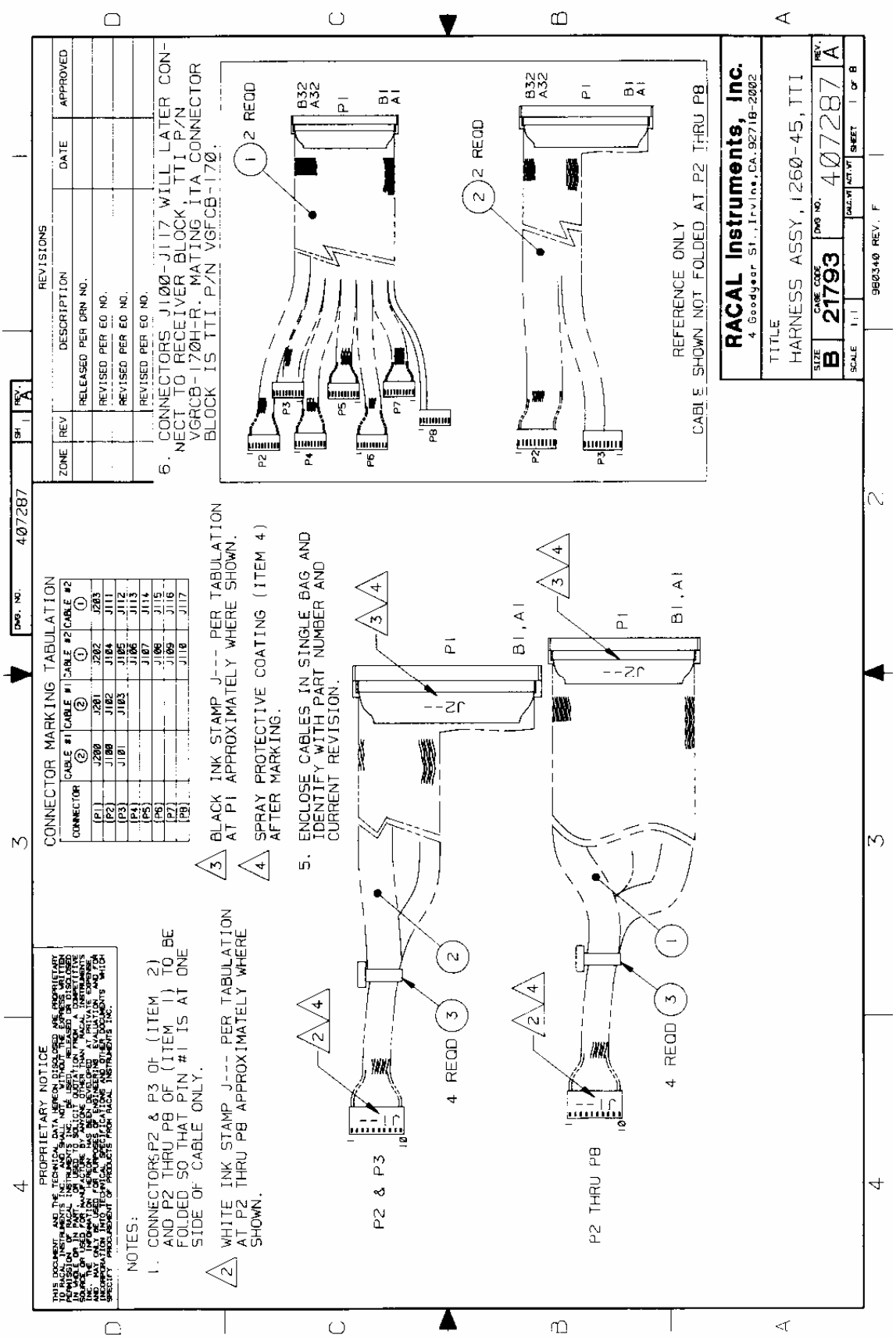
DOC. NO. 407286

RACAL Instruments, Inc., 4 Goodyear St., Irvine, CA 92718

DOCUMENT TITLE	SIZE	CODE NO.	DOCUMENT NO.	REV
HARNESS ASSEMBLY, 1260-45, VP90	A	21793	407286	C
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ENGINEERING PARTS LIST

ITEM	BIN	PART NO.	DESCRIPTION	QTY	REFERENCE
1		407260	CABLE ASSY, IDC, 64-COND, TTI	2	
2		407357	CABLE ASSY, IDC, 16-COND, TTI	2	
3		610772	TIE-CA-LKG-.062-.750	A/R	
4		910541	POLYURETHANE CONF. COAT	A/R	

DOC. NO. 407287

RACAL Instruments, Inc., 4 Goodyear St., Irvine, CA 92718

DOCUMENT TITLE	SIZE	CODE NO.	DOCUMENT NO.	REV
HARNESS ASSEMBLY, 1260-45, TTI	A	21793	407287	A
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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
	BLK AAx RW 01 (J100)	Uxx-SLOT yy (J200)	CABLE	407287		SYSTEM WIRE LIST
	BLK AAx RW 02 (J101)	Uxx-SLOT yy (J200)	CABLE	407287		
	BLK AAx RW 03 (J102)	Uxx-SLOT yy (J201)	CABLE	407287		
	BLK AAx RW 04 (J103)	Uxx-SLOT yy (J201)	CABLE	407287		
	BLK AAx RW 05 (J104)	Uxx-SLOT yy (J202)	CABLE	407287		
	BLK AAx RW 06 (J105)	Uxx-SLOT yy (J202)	CABLE	407287		
	BLK AAx RW 07 (J106)	Uxx-SLOT yy (J202)	CABLE	407287		
	BLK AAx RW 08 (J107)	Uxx-SLOT yy (J202)	CABLE	407287		
	BLK AAx RW 09 (J108)	Uxx-SLOT yy (J202)	CABLE	407287		
	BLK AAx RW 10 (J109)	Uxx-SLOT yy (J202)	CABLE	407287		
	BLK AAx RW 11 (J110)	Uxx-SLOT yy (J202)	CABLE	407287		
	BLK AAx RW 12 (J111)	Uxx-SLOT yy (J203)	CABLE	407287		
	BLK AAx RW 13 (J112)	Uxx-SLOT yy (J203)	CABLE	407287		
	BLK AAx RW 14 (J113)	Uxx-SLOT yy (J203)	CABLE	407287		
	BLK AAx RW 15 (J114)	Uxx-SLOT yy (J203)	CABLE	407287		
	BLK AAx RW 16 (J115)	Uxx-SLOT yy (J203)	CABLE	407287		
	BLK AAx RW 17 (J116)	Uxx-SLOT yy (J203)	CABLE	407287		
	BLK AAx RW 18 (J117)	Uxx-SLOT yy (J203)	CABLE	407287		

This system wirelist serves as a template for incorporating this harness assembly into the overall system wirelist. It does not in any way affect the fabrication of this harness assembly.

DOC. NO. 407287

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DOCUMENT TITLE	SIZE	CODE NO.	DOCUMENT NO.	REV
HARNESS ASSY, 1260-45, TTI	A	21793	407287	A
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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
1	J101-6	J200-A18	GRN	407357	41.5"	ROW 00 AH
2	J101-8	J200-A20	ORN	407357	41.5"	ROW 04 AH
3	J101-10	J200-A22	BRN	407357	41.5"	ROW 01 AH
4	J100-9	J200-A24	WHT	407357	41.5"	ROW 05 AH
5	J100-7	J200-A26	VIO	407357	41.5"	ROW 02 AH
6	J100-5	J200-A28	GRN	407357	41.5"	ROW 06 AH
7	J100-3	J200-A30	ORN	407357	41.5"	ROW 03 AH
8	J100-1	J200-A32	BRN	407357	41.5"	ROW 07 AH
9	J101-5	J200-B18	TAN	407357	41.5"	ROW 00 BL
10	J101-7	J200-B20	TAN	407357	41.5"	ROW 04 BL
11	J101-9	J200-B22	TAN	407357	41.5"	ROW 01 BL
12	J100-10	J200-B24	TAN	407357	41.5"	ROW 05 BL
13	J100-8	J200-B26	TAN	407357	41.5"	ROW 02 BL
14	J100-6	J200-B28	TAN	407357	41.5"	ROW 06 BL
15	J100-4	J200-B30	TAN	407357	41.5"	ROW 03 BL
16	J100-2	J200-B32	TAN	407357	41.5"	ROW 07 BL
17	J103-6	J201-A18	GRN	407357	41.5"	ROW 08 AH
18	J103-8	J201-A20	ORN	407357	41.5"	ROW 12 AH
19	J103-10	J201-A22	BRN	407357	41.5"	ROW 09 AH
20	J102-9	J201-A24	WHT	407357	41.5"	ROW 13 AH
21	J102-7	J201-A26	VIO	407357	41.5"	ROW 10 AH
22	J102-5	J201-A28	GRN	407357	41.5"	ROW 14 AH
23	J102-3	J201-A30	ORN	407357	41.5"	ROW 11 AH
24	J102-1	J201-A32	BRN	407357	41.5"	ROW 15 AH
25	J103-5	J201-B18	TAN	407357	41.5"	ROW 08 BL
26	J103-7	J201-B20	TAN	407357	41.5"	ROW 12 BL
27	J103-9	J201-B22	TAN	407357	41.5"	ROW 09 BL
28	J102-10	J201-B24	TAN	407357	41.5"	ROW 13 BL
29	J102-8	J201-B26	TAN	407357	41.5"	ROW 10 BL
30	J102-6	J201-B28	TAN	407357	41.5"	ROW 14 BL
31	J102-4	J201-B30	TAN	407357	41.5"	ROW 11 BL
32	J102-2	J201-B32	TAN	407357	41.5"	ROW 15 BL
33	J110-3	J202-A1	RED	407260	41.5"	COL 31 A
34	J110-1	J202-A2	BRN	407260	41.5"	COL 15 A
35	J109-2	J202-A3	BLK	407260	41.5"	COL 30 A
36	J109-4	J202-A4	WHT	407260	41.5"	COL 14 A
37	J109-6	J202-A5	GRY	407260	41.5"	COL 29 A
38	J109-8	J202-A6	VIO	407260	41.5"	COL 13 A
39	J109-10	J202-A7	BLU	407260	41.5"	COL 28 A
40	J108-9	J202-A8	GRN	407260	41.5"	COL 12 A
41	J108-7	J202-A9	YEL	407260	41.5"	COL 27 A
42	J108-5	J202-A10	ORN	407260	41.5"	COL 11 A

DOC. NO. 407287

RACAL Instruments, Inc., 4 Goodyear St., Irvine, CA 92718

DOCUMENT TITLE	SIZE	CODE NO.	DOCUMENT NO.	REV
HARNESS ASSEMBLY, 1260-45, TTI	A	21793	407287	A
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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
43	J108-3	J202-A11	RED	407260	41.5"	COL 26 A
44	J108-1	J202-A12	BRN	407260	41.5"	COL 10 A
45	J107-2	J202-A13	BLK	407260	41.5"	COL 25 A
46	J107-4	J202-A14	WHT	407260	41.5"	COL 09 A
47	J107-6	J202-A15	GRY	407260	41.5"	COL 24 A
48	J107-8	J202-A16	VIO	407260	41.5"	COL 08 A
49	J107-10	J202-A17	BLU	407260	41.5"	COL 23 A
50	J106-9	J202-A18	GRN	407260	41.5"	COL 07 A
51	J106-7	J202-A19	YEL	407260	41.5"	COL 22 A
52	J106-5	J202-A20	ORN	407260	41.5"	COL 06 A
53	J106-3	J202-A21	RED	407260	41.5"	COL 21 A
54	J106-1	J202-A22	BRN	407260	41.5"	COL 05 A
55	J105-2	J202-A23	BLK	407260	41.5"	COL 20 A
56	J105-4	J202-A24	WHT	407260	41.5"	COL 04 A
57	J105-6	J202-A25	GRY	407260	41.5"	COL 19 A
58	J105-8	J202-A26	VIO	407260	41.5"	COL 03 A
59	J105-10	J202-A27	BLU	407260	41.5"	COL 18 A
60	J104-9	J202-A28	GRN	407260	41.5"	COL 02 A
61	J104-7	J202-A29	YEL	407260	41.5"	COL 17 A
62	J104-5	J202-A30	ORN	407260	41.5"	COL 01 A
63	J104-3	J202-A31	RED	407260	41.5"	COL 16 A
64	J104-1	J202-A32	BRN	407260	41.5"	COL 00 A
65	J110-4	J202-B1	TAN	407260	41.5"	COL 31 B
66	J110-2	J202-B2	TAN	407260	41.5"	COL 15 B
67	J109-1	J202-B3	TAN	407260	41.5"	COL 30 B
68	J109-3	J202-B4	TAN	407260	41.5"	COL 14 B
69	J109-5	J202-B5	TAN	407260	41.5"	COL 29 B
70	J109-7	J202-B6	TAN	407260	41.5"	COL 13 B
71	J109-9	J202-B7	TAN	407260	41.5"	COL 28 B
72	J108-10	J202-B8	TAN	407260	41.5"	COL 12 B
73	J108-8	J202-B9	TAN	407260	41.5"	COL 27 B
74	J108-6	J202-B10	TAN	407260	41.5"	COL 11 B
75	J108-4	J202-B11	TAN	407260	41.5"	COL 26 B
76	J108-2	J202-B12	TAN	407260	41.5"	COL 10 B
77	J107-1	J202-B13	TAN	407260	41.5"	COL 25 B
78	J107-3	J202-B14	TAN	407260	41.5"	COL 09 B
79	J107-5	J202-B15	TAN	407260	41.5"	COL 24 B
80	J107-7	J202-B16	TAN	407260	41.5"	COL 08 B
81	J107-9	J202-B17	TAN	407260	41.5"	COL 23 B
82	J106-10	J202-B18	TAN	407260	41.5"	COL 07 B
83	J106-8	J202-B19	TAN	407260	41.5"	COL 22 B
84	J106-6	J202-B20	TAN	407260	41.5"	COL 06 B
85	J106-4	J202-B21	TAN	407260	41.5"	COL 21 B
86	J106-2	J202-B22	TAN	407260	41.5"	COL 05 B
87	J105-1	J202-B23	TAN	407260	41.5"	COL 20 B
88	J105-3	J202-B24	TAN	407260	41.5"	COL 04 B
89	J105-5	J202-B25	TAN	407260	41.5"	COL 19 B
90	J105-7	J202-B26	TAN	407260	41.5"	COL 03 B

DOC. NO. 407287

RACAL Instruments, Inc., 4 Goodyear St., Irvine, CA 92718

DOCUMENT TITLE	SIZE	CODE NO.	DOCUMENT NO.	REV
HARNESS ASSEMBLY, 1260-45, TTI	A	21793	407287	A
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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
91	J105-9	J202-B27	TAN	407260	41.5"	COL 18 B
92	J104-10	J202-B28	TAN	407260	41.5"	COL 02 B
93	J104-8	J202-B29	TAN	407260	41.5"	COL 17 B
94	J104-6	J202-B30	TAN	407260	41.5"	COL 01 B
95	J104-4	J202-B31	TAN	407260	41.5"	COL 16 B
96	J104-2	J202-B32	TAN	407260	41.5"	COL 00 B
97	J117-3	J203-A1	RED	407260	41.5"	COL 63 A
98	J117-1	J203-A2	BRN	407260	41.5"	COL 47 A
99	J116-2	J203-A3	BLK	407260	41.5"	COL 62 A
100	J116-4	J203-A4	WHT	407260	41.5"	COL 46 A
101	J116-6	J203-A5	GRY	407260	41.5"	COL 61 A
102	J116-8	J203-A6	VIO	407260	41.5"	COL 45 A
103	J116-10	J203-A7	BLU	407260	41.5"	COL 60 A
104	J115-9	J203-A8	GRN	407260	41.5"	COL 44 A
105	J115-7	J203-A9	YEL	407260	41.5"	COL 59 A
106	J115-5	J203-A10	ORN	407260	41.5"	COL 43 A
107	J115-3	J203-A11	RED	407260	41.5"	COL 58 A
108	J115-1	J203-A12	BRN	407260	41.5"	COL 42 A
109	J114-2	J203-A13	BLK	407260	41.5"	COL 57 A
110	J114-4	J203-A14	WHT	407260	41.5"	COL 41 A
111	J114-6	J203-A15	GRY	407260	41.5"	COL 56 A
112	J114-8	J203-A16	VIO	407260	41.5"	COL 40 A
113	J114-10	J203-A17	BLU	407260	41.5"	COL 55 A
114	J113-9	J203-A18	GRN	407260	41.5"	COL 39 A
115	J113-7	J203-A19	YEL	407260	41.5"	COL 54 A
116	J113-5	J203-A20	ORN	407260	41.5"	COL 38 A
117	J113-3	J203-A21	RED	407260	41.5"	COL 53 A
118	J113-1	J203-A22	BRN	407260	41.5"	COL 37 A
119	J112-2	J203-A23	BLK	407260	41.5"	COL 52 A
120	J112-4	J203-A24	WHT	407260	41.5"	COL 36 A
121	J112-6	J203-A25	GRY	407260	41.5"	COL 51 A
122	J112-8	J203-A26	VIO	407260	41.5"	COL 35 A
123	J112-10	J203-A27	BLU	407260	41.5"	COL 50 A
124	J111-9	J203-A28	GRN	407260	41.5"	COL 34 A
125	J111-7	J203-A29	YEL	407260	41.5"	COL 49 A
126	J111-5	J203-A30	ORN	407260	41.5"	COL 33 A
127	J111-3	J203-A31	RED	407260	41.5"	COL 48 A
128	J111-1	J203-A32	BRN	407260	41.5"	COL 32 A
129	J117-4	J203-B1	TAN	407260	41.5"	COL 63 B
130	J117-2	J203-B2	TAN	407260	41.5"	COL 47 B
131	J116-1	J203-B3	TAN	407260	41.5"	COL 62 B
132	J116-3	J203-B4	TAN	407260	41.5"	COL 46 B
133	J116-5	J203-B5	TAN	407260	41.5"	COL 61 B
134	J116-7	J203-B6	TAN	407260	41.5"	COL 45 B
135	J116-9	J203-B7	TAN	407260	41.5"	COL 60 B
136	J115-10	J203-B8	TAN	407260	41.5"	COL 44 B

DOC. NO. 407287

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DOCUMENT TITLE	SIZE	CODE NO.	DOCUMENT NO.	REV
HARNESS ASSEMBLY, 1260-45, TTI	A	21793	407287	A
	DRN			SHEET 6 of 8

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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
137	J115-8	J203-B9	TAN	407260	41.5"	COL 59 B
138	J115-6	J203-B10	TAN	407260	41.5"	COL 43 B
139	J115-4	J203-B11	TAN	407260	41.5"	COL 58 B
140	J115-2	J203-B12	TAN	407260	41.5"	COL 42 B
141	J114-1	J203-B13	TAN	407260	41.5"	COL 57 B
142	J114-3	J203-B14	TAN	407260	41.5"	COL 41 B
143	J114-5	J203-B15	TAN	407260	41.5"	COL 56 B
144	J114-7	J203-B16	TAN	407260	41.5"	COL 40 B
145	J114-9	J203-B17	TAN	407260	41.5"	COL 55 B
146	J113-10	J203-B18	TAN	407260	41.5"	COL 39 B
147	J113-8	J203-B19	TAN	407260	41.5"	COL 54 B
148	J113-6	J203-B20	TAN	407260	41.5"	COL 38 B
149	J113-4	J203-B21	TAN	407260	41.5"	COL 53 B
150	J113-2	J203-B22	TAN	407260	41.5"	COL 37 B
151	J112-1	J203-B23	TAN	407260	41.5"	COL 52 B
152	J112-3	J203-B24	TAN	407260	41.5"	COL 36 B
153	J112-5	J203-B25	TAN	407260	41.5"	COL 51 B
154	J112-7	J203-B26	TAN	407260	41.5"	COL 35 B
155	J112-9	J203-B27	TAN	407260	41.5"	COL 50 B
156	J111-10	J203-B28	TAN	407260	41.5"	COL 34 B
157	J111-8	J203-B29	TAN	407260	41.5"	COL 49 B
158	J111-6	J203-B30	TAN	407260	41.5"	COL 33 B
159	J111-4	J203-B31	TAN	407260	41.5"	COL 48 B
160	J111-2	J203-B32	TAN	407260	41.5"	COL 32 B
161	J101-1	NO CONNECT				
162	J101-2	NO CONNECT				
163	J101-3	NO CONNECT				
164	J101-4	NO CONNECT				
165	J103-1	NO CONNECT				
166	J103-2	NO CONNECT				
167	J103-3	NO CONNECT				
168	J103-4	NO CONNECT				
169	J110-5	NO CONNECT				
170	J110-6	NO CONNECT				
171	J110-7	NO CONNECT				
172	J110-8	NO CONNECT				
173	J110-9	NO CONNECT				
174	J110-10	NO CONNECT				
175	J117-5	NO CONNECT				
176	J117-6	NO CONNECT				
177	J117-7	NO CONNECT				
178	J117-8	NO CONNECT				

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DOCUMENT TITLE	SIZE	CODE NO.	DOCUMENT NO.	REV
HARNESS ASSEMBLY, 1260-45, TTI	A	21793	407287	A
	DRN			SHEET 7 of 8

DOC. NO. 407287

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ENGINEERING WIRE LIST

WIRE	FROM	TO	TYPE	PART #	WIRE LEN	REFERENCE
179	J117-9	NO CONNECT				
180	J117-10	NO CONNECT				

DOC. NO. 407287

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DOCUMENT TITLE	SIZE	CODE NO.	DOCUMENT NO.	REV
HARNESS ASSEMBLY, 1260-45, TTI	A	21793	407287	A
	DRN		SHEET 8 of 8	

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Chapter 6
PRODUCT SUPPORT

Product Support

EADS North America Defense Test and Services, Inc. has a complete Service and Parts Department. If you need technical assistance or should it be necessary to return your product for repair or calibration, call 1-800-722-3262. If parts are required to repair the product at your facility, call 1-949-859-8999 and ask for the Parts Department.

When sending your instrument in for repair, complete the form in the back of this manual.

For worldwide support and the office closest to your facility, refer to the website for the most complete information http://www.eads-nadefense.com.

Warranty

Use the original packing material when returning the 1260-45 to EADS North America Defense Test and Services, Inc. for calibration or servicing. The original shipping container and associated packaging material will provide the necessary protection for safe reshipment.

If the original packing material is unavailable, contact EADS North America Defense Test and Services, Inc. Customer Service at 1-800-722-3262 for information.

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REPAIR AND CALIBRATION REQUEST FORM

To allow us to better understand your repair requests, we suggest you use the following outline when calling and include a copy with your instrument to be sent to the EADS North America Defense Test and Service, Inc. Repair Facility.

Model_____ Serial No._____ Date_____

Company Name_____ Purchase Order #_____

Billing Address_____

City

State/Province Zip/Postal Code Country

Shipping Address_____

City

State/Province Zip/Postal Code Country

Technical Contact_____ Phone Number ( )_____
Purchasing Contact_____ Phone Number ( )_____

1. Describe, in detail, the problem and symptoms you are having. Please include all set up details, such as input/output levels, frequencies, waveform details, etc.

2. If problem is occurring when unit is in remote, please list the program strings used and the controller type.

3. Please give any additional information you feel would be beneficial in facilitating a faster repair time (i.e., modifications, etc.)

4. Is calibration data required? Yes No (please circle one)

Call before shipping
Note: We do not accept "collect" shipments.

Ship instruments to nearest support office.

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Appendix A

HOW TO CONFIGURE THE 1260-45 MATRIX MODULE

Introduction

The 1260-45 is a high-density matrix module containing four 4x16 matrices. Larger matrices may be configured via internal jumpers or by using external cabling. This application note will detail how to achieve this interconnection and give a practical example. **Figure A-1** shows that J200 and J201 contain the rows of the matrices and J202 and J203 contain the columns of the matrices.

Configuration

The 1260-45 module is constructed from two printed circuit boards mounted one on top of the other. (See **Figures A-1** and **A-2** for a block diagram of the module.) Modules may be purchased from the factory with internal jumpers installed. Following are the three basic configurations:

* 1260-45A Quad 4x16 matrices (no jumpers) (See **Figure A-4**)
* 1260-45B Dual 4x32 matrices (rows jumpered), J9, J10 (See **Figure A-5**)
* 1260-45C Dual 8xl6 matrices (columns jumpered), J7 J8 (See **Figure A-6**)

The flexibility of this module allows the user to reconfigure these on-board jumpers. Additional flexibility is achieved because of the pin-out of the front panel connectors. The matrices may also be interconnected across boards via external cabling. A simple ribbon cable across J200 and J2Ol connects the rows of group 0-2, 1-3 in parallel.

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Larger Matrices

To build a 4x64 matrix, start with the dual 4x32 module (1260-45B). This is used because the 1260-45B already has the rows paralleled, eliminating the time it would take the user to do this by removing module covers on a 1260-45A. The 1260-45C has the columns paralleled, which is not required here. Connect a ribbon cable between J200 and J20 I to parallel group 0 to 2 and group 1 to 3. See **Figure A-7**.

The principle of interconnecting multiple matrices to build larger matrices is the same:

1. Establish the module building blocks (-45 A, B or C)
2. Establish external interconnect

Example

Let's look at the configuration of an 8x64 matrix. Start with the Dual 4x32 matrix (1260-45B). Two modules will be required. Connect J200 on each module and J201 on each module to achieve the 8 rows. Connect J202 to J203 on each of the modules to give you the 64 columns. See **Figure A-8**.

We could easily have started with a 1260-45C, because in this example some paralleling of rows and columns was necessary.

Summary

The following table provides a list of a number of different configurations and how you would realize them with the 1260-45 module.

Configuration	Start With	Cabling Used
4 x 64	1260-45B	Rows with LB
8 x 32	1260-45B	Columns with LB
16 x 16	1260-45C	Columns with LB
8 x 64	4 x 64 2 modules	Columns with LBBM
16 x 32	8 x 32 2 modules	Columns with LBBM

Note: LB refers to the loopback connector used to connect J200 to J201 (rows) or J202 to J203 (columns). LBBM refers to the loopback connector connecting the rows or columns on adjacent modules.

Also remember, all of these configurations can be made from the 126045A module. The covers must be removed to access the on-board jumpers to turn the module into a B or C version.

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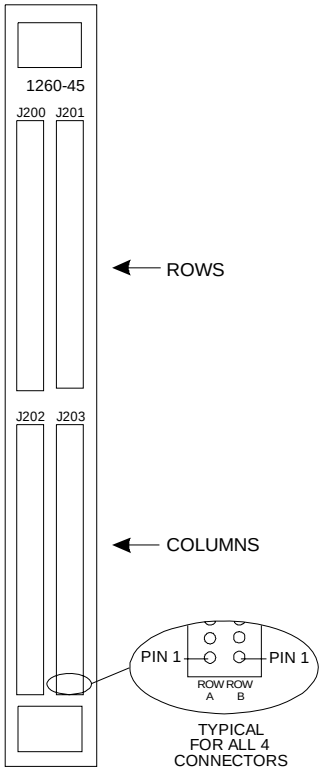


Figure A-1, 1260-45 Connector "Rows and Columns"

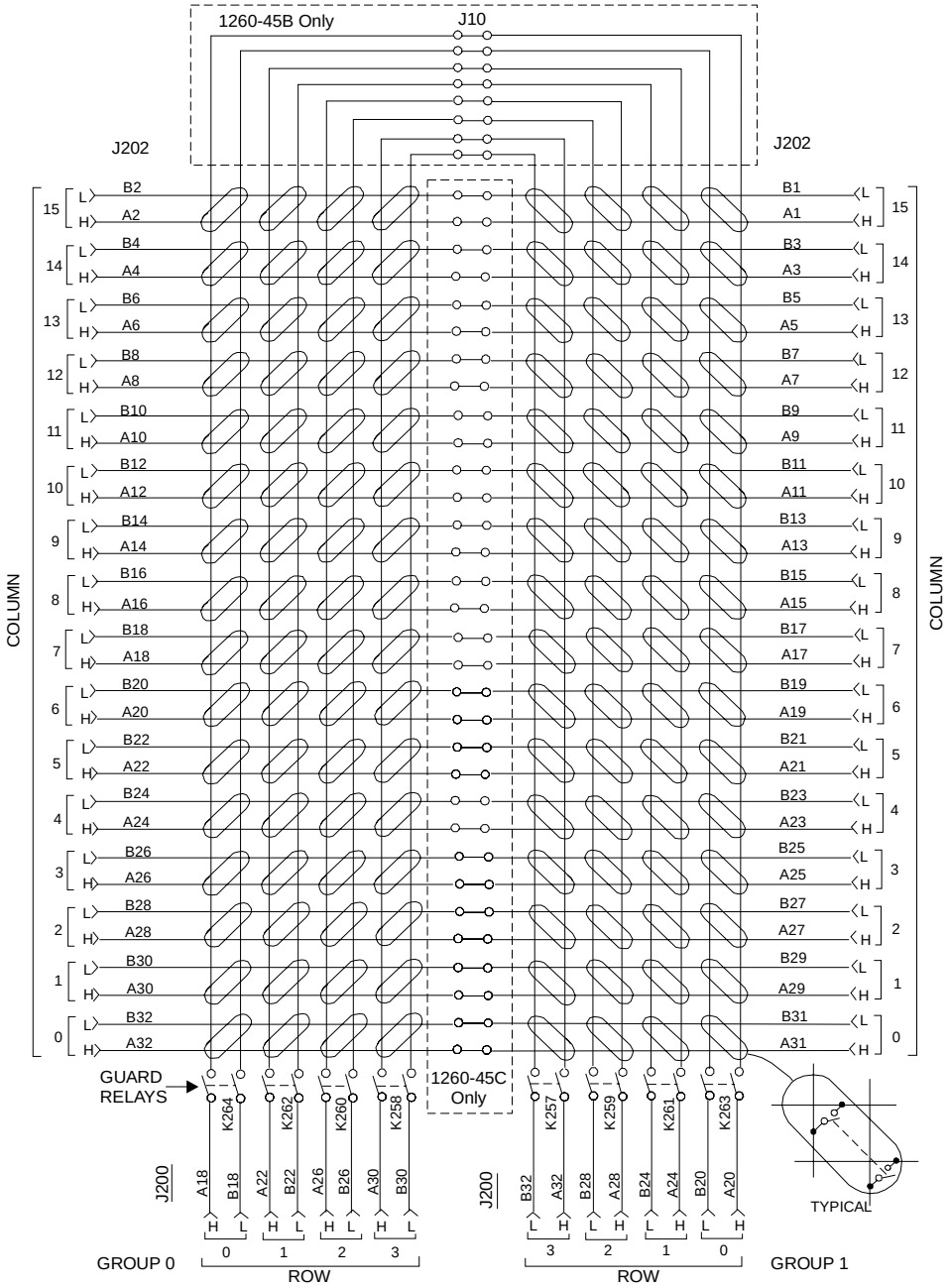


Figure A-2, J200 & J202 Block Diagram

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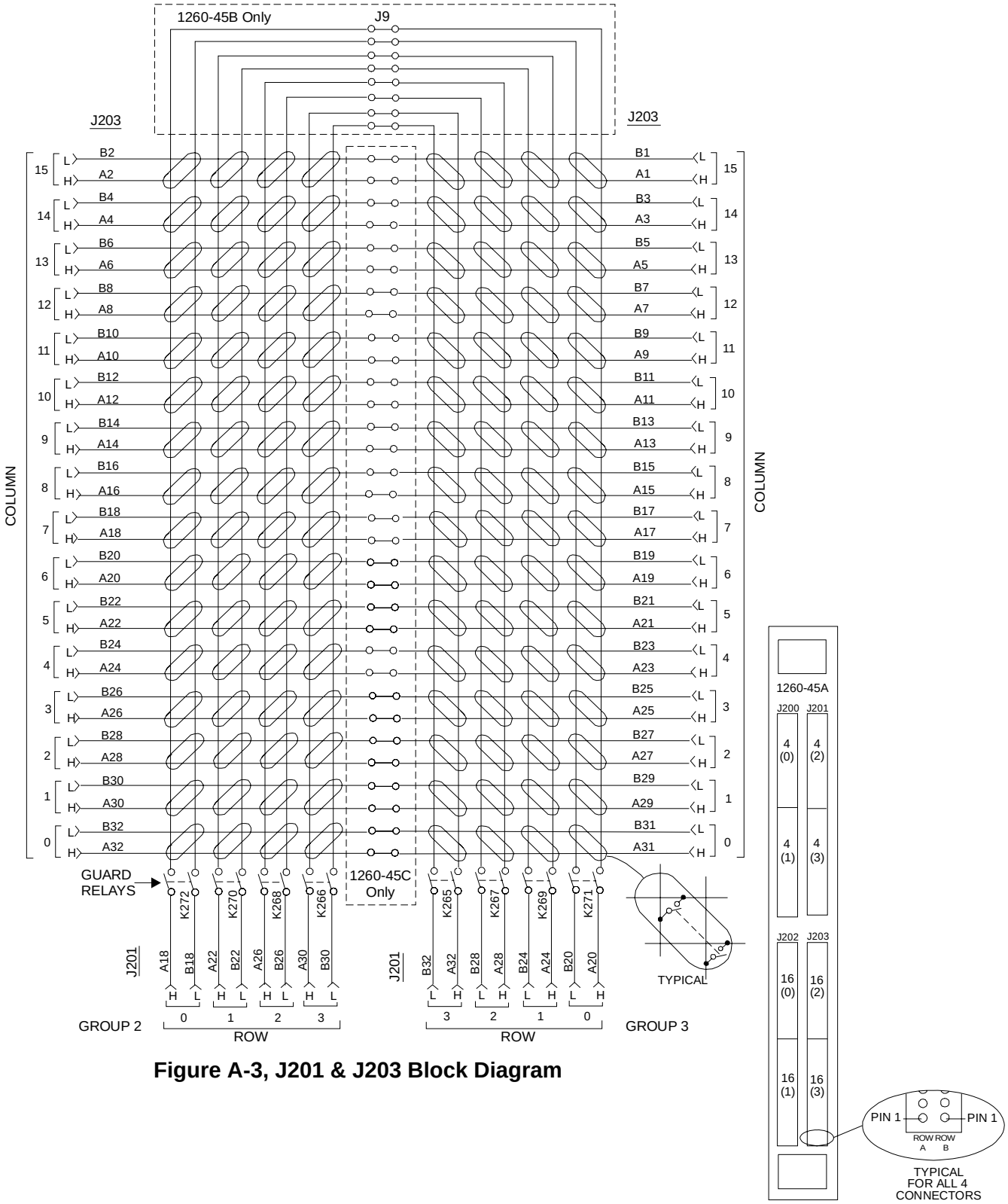


Figure A-3, J201 & J203 Block Diagram

Figure A-4, 1260-45A Quad 4X16 Matrices

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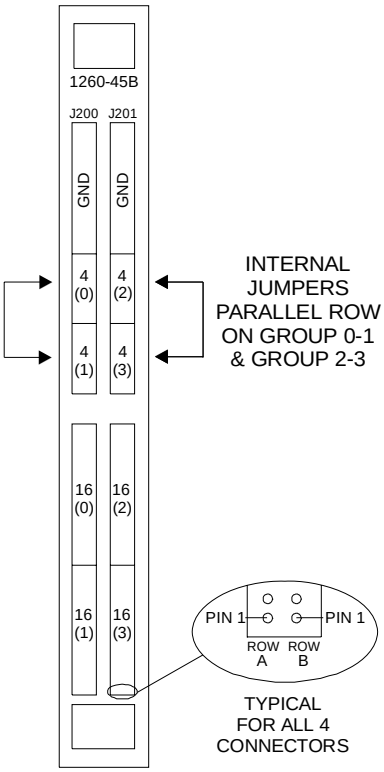


Figure A-5, 1260-45B Dual 4X32 Matrices

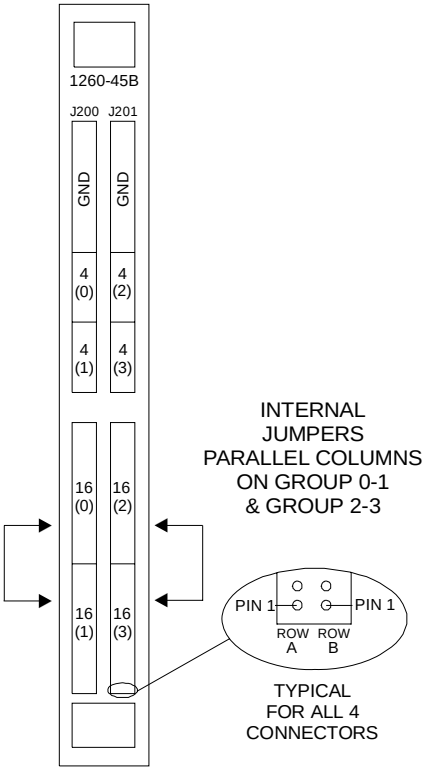


Figure A-6, 1260-45C Dual 8X16 Matrices

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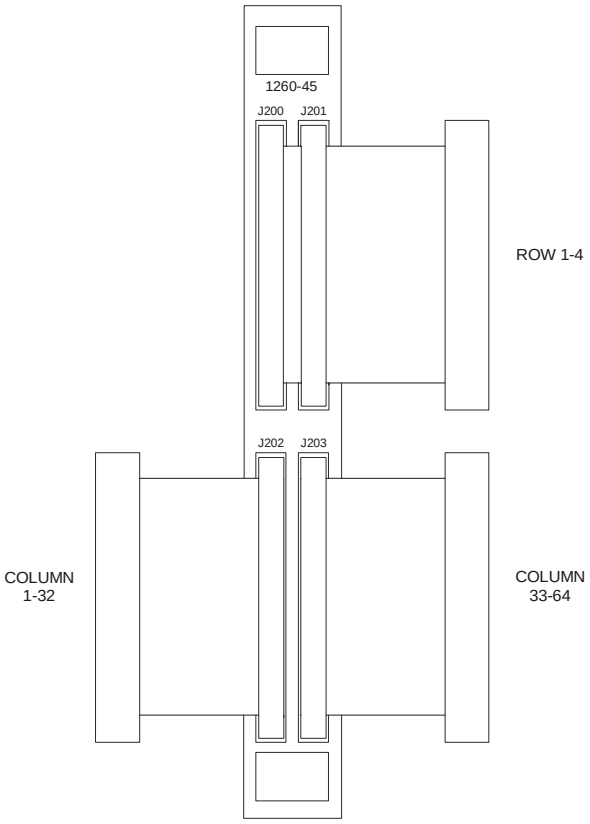


Figure A-7, 1260-45B Configured as 4X64 Matrix

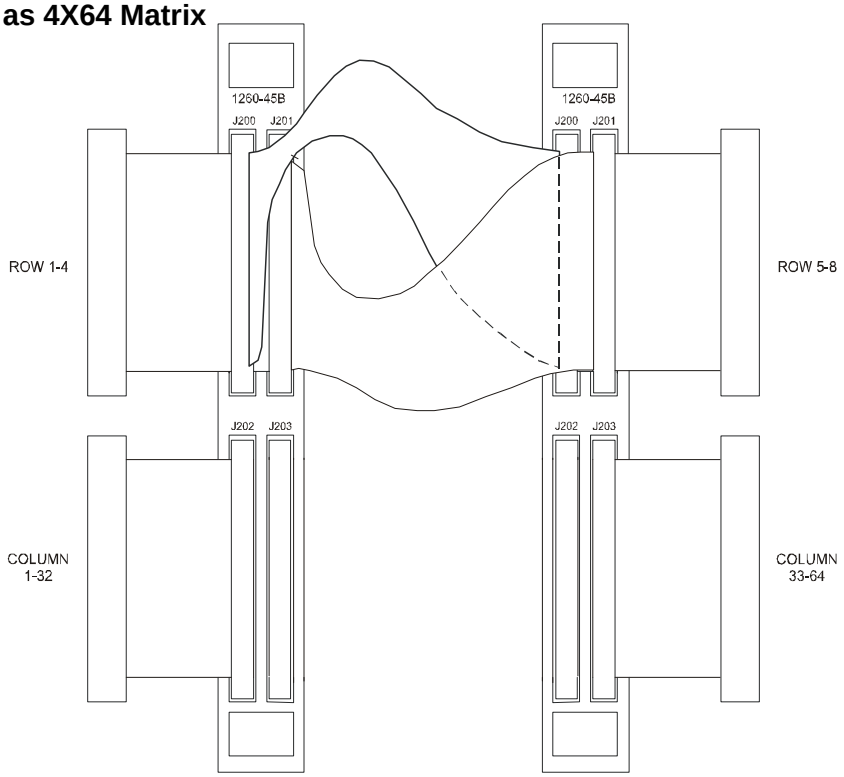


Figure A-8, 1260-45B Configured as 8X64 Matrix

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