1260 VXI
SWITCHING CARD

1260-121A/B
12 CHANNEL PLUG-IN

PUBLICATION NO. 980824-121

RACAL INSTRUMENTS

United States

(Corporate Headquarters and Service Center)
4 Goodyear Street, Irvine, CA 92618
Tel: (800) 722-2528, (949) 859-8999; Fax: (949) 859-7139

5730 Northwest Parkway Suite 700, San Antonio, TX 78249
Tel: (210) 699-6799; Fax: (210) 699-8857

Europe

(European Headquarters and Service Center)
18 Avenue Dutartre, 78150 LeChesnay, France
Tel: +33 (0)1 39 23 22 22; Fax: +33 (0)1 39 23 22 25

29-31 Cobham Road, Wimborne, Dorset BH21 7PF, United Kingdom
Tel: +44 (0) 1202 872800; Fax: +44 (0) 1202 870810

Via Milazzo 25, 20092 Cinisello B, Milan, Italy
Tel: +39 (0)2 6123 901; Fax: +39 (0)2 6129 3606

Technologie Park, Friedrich Ebert Strasse, 51429 Bergisch Gladbach, Germany
Tel: +49 (0) 2204 844200; Fax: +49 (0) 2204 844219

info@racalinstruments.com
sales@racalinstruments.com
helpdesk@racalinstruments.com
http://www.racalinstruments.com/

PUBLICATION DATE: October 29, 2003

THANK YOU FOR PURCHASING THIS RACAL INSTRUMENTS PRODUCT.

For this product, or any other Racal Instruments product that incorporates software drivers, you may access our web site to verify and/or download the latest driver versions. The web address for driver downloads is:

http://www.racalinstruments.com/downloads

You will be asked to register one time only to gain access to the driver and product manual downloads sections. At registration a cookie will be placed on your computer if you choose to accept it. This is done to facilitate your use of these sections on future visits. You may refuse to accept the cookie and still have complete access to the software driver database but will have to re-register every time you visit. This cookie is for ease of use only and no information is gathered for, sold, or reported to, any third party organization.

If you have any questions about software driver downloads or our privacy policy, please contact us at info@racalinstruments.com.

WARRANTY STATEMENT

All Racal Instruments, Inc. products are designed and manufactured to exacting standards and in full conformance to Racal's ISO 9001 procedures.

This warranty does not apply to defects resulting from any modification(s) of any product or part without Racal's express written consent, or misuse of any product or part. The warranty also does not apply to fuses, software, non-rechargeable batteries, damage from battery leakage, or problems arising from normal wear, such as mechanical relay life, or failure to follow instructions.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. The remedies provided herein are buyer's sole and exclusive remedies.

For the specific terms of your standard warranty, or optional extended warranty or service agreement, contact your Racal customer service advisor. Please have the following information available to facilitate service.

1. Product serial number
2. Product model number
3. Your company and contact information

You may contact your customer service advisor by:

E-Mail:	Helpdesk@racalinstruments.com	
Telephone:	+1 800 722 3262	(USA)
	+44(0) 8706 080134	(UK)
	+852 2405 5500	(Hong Kong)
Fax:	+1 949 859 7309	(USA)
	+44(0) 1628 662017	(UK)
	+852 2416 4335	(Hong Kong)

RETURN of PRODUCT

Authorization is required from Racal Instruments before you send us your product for service or calibration. Call your nearest Racal Instruments support facility. A list is located on the last page of this manual. If you are unsure where to call, contact Racal Instruments, Inc. Customer Support Department in Irvine, California, USA at 1-800-722-3262 or 1-949-859-8999 or via fax at 1-949-859-7139. We can be reached at:

helpdesk@racalinstruments.com.

PROPRIETARY NOTICE

This document and the technical data herein disclosed, are proprietary to Racal Instruments, and shall not, without express written permission of Racal Instruments, be used, in whole or in part to solicit quotations from a competitive source or used for manufacture by anyone other than Racal Instruments. The information herein has been developed at private expense, and may only be used for operation and maintenance reference purposes or for purposes of engineering evaluation and incorporation into technical specifications and other documents which specify procurement of products from Racal Instruments.

DISCLAIMER

Buyer acknowledges and agrees that it is responsible for the operation of the goods purchased and should ensure that they are used properly and in accordance with this handbook and any other instructions provided by Seller. RII products are not specifically designed, manufactured or intended to be used as parts, assemblies or components in planning, construction, maintenance or operation of a nuclear facility, or in life support or safety critical applications in which the failure of the RII product could create a situation where personal injury or death could occur. Should Buyer purchase RII product for such unintended application, Buyer shall indemnify and hold RII, its officers, employees, subsidiaries, affiliates and distributors harmless against all claims arising out of a claim for personal injury or death associated with such unintended use.

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.

Racal Instruments

EC Declaration of Conformity

We

Racal Instruments Inc.
4 Goodyear Street
Irvine, CA 92718

declare under sole responsibility that the

1260-121A 12-Channel Plug-In Module W/Screw Terminals
P/N 407740-001
1260-121B 12-Channel Plug-In Module W/Rack & Panel Connectors
P/N 407740-002

conforms to the following Product Specifications:

Safety: EN 61010-1

EMC: Immunity: EN61326, Class A, Table 1
Emissions: EN61326, Class A, Table 3

Supplementary Information:

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

The product herewith complies with the requirements of EN61010-1 and EN61326.

Irvine, CA, February 22, 2001

Quality Manager

Table of Contents

List of Figures

List of Tables

This page was left intentionally blank.

Chapter 1
SPECIFICATIONS

Introduction

The 1260-121A/B is a plug-in switch module developed for the Racal Instruments 1260-100 Adapt-a-Switch Carrier. The 1260-121A/B includes the following features:

- Standard Adapt-a-Switch plug-in design, providing for ease of replacement
- Data-Driven embedded descriptor, allowing immediate use with any Option-01T switch controller, regardless of firmware revision level.

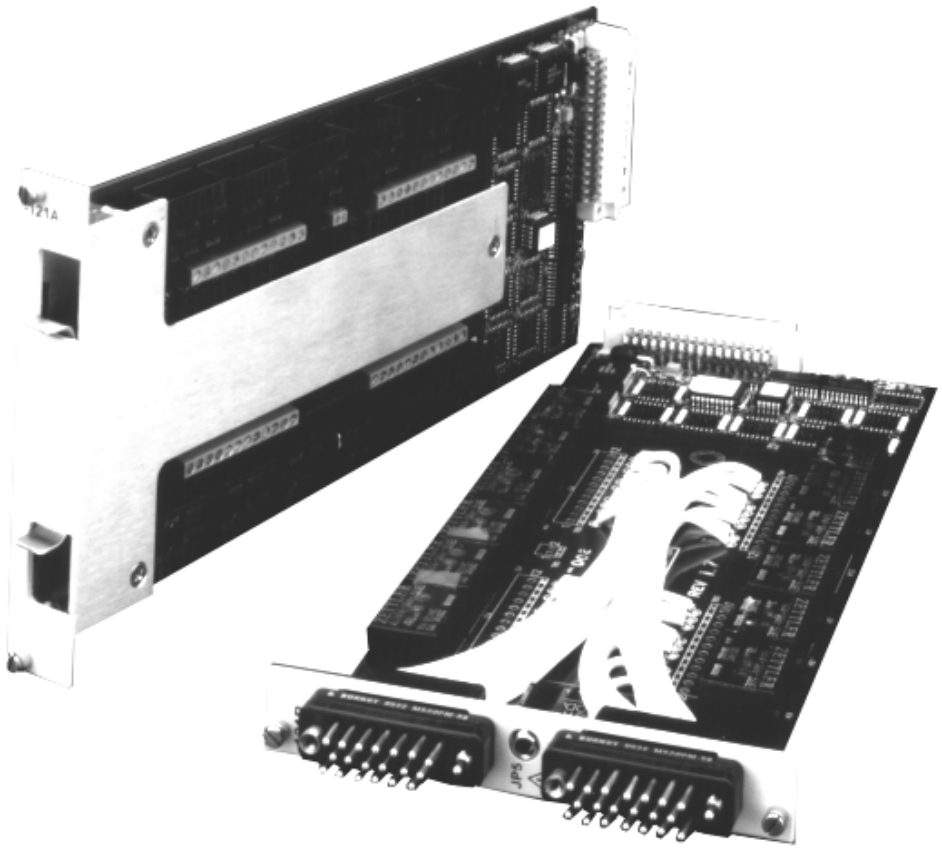


Figure 1-1, The 1260-121A/B

The 1260-121A/B is a 12-channel single-wire switch consisting of 12 individual SPDT relay switches. The version “A” has a screw terminal block interface and version “B” has Rack-and-Panel connectors. The 1260-121A/B plug-in fits into a 1260-100 Adapt-a-Switch Carrier.

Specifications

Bandwidth (-3dB)	Small signal: 35MHz Power: 400Hz
Insertion Loss	
1 KHz	< -1dB
Isolation	
1 KHz	> 100dB
Crosstalk	
1 KHz	< -100dB
Switching Voltage	
AC	250V, Max
DC	125V, Max
Switching Current	
AC	12A, Max. (1260-121A) 13A, Max. (1260-121B)
DC	10A, Max
Switching Power	
AC	1250VA, Max
DC	150W, Max
Path resistance	< 0.5Ω (measured by voltage drop, 6VDC, 1A)
Thermal EMF	< 20uV
Capacitance	
Channel-Chassis	< 1pF
Open-Channel	< 12pF
Insulation resistance	> $10^9\Omega$
Relay Settling Time	< 10ms
Shock	30g, 11ms, ½ sine wave
Vibration	0.013in. P-P, 5-55Hz
Bench Handling	4 in., 45°

(see the **Mating Connectors** section in Chapter 2)

Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +60°C
Non-operating	-40°C to +75°C
Relative Humidity	85% Max., non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Power Requirements	
+5VDC	0.9A Max.
Weight	13oz. (0.45kg)
MTBF	979,058 hours (MIL-HDBK-217E)

Power Dissipation

While the cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed, the carrier can normally dissipate approximately 100 W. Care must be taken, then, in the selection and loading of the plug-in modules used in the carrier. It is not possible to fully load the carrier, energize every relay, and run full power through every set of contacts, all at the same time. In practice this situation would never occur.

To properly evaluate the power dissipation of the plug-in modules, examine the path resistance, the current passing through the relay contacts, the ambient temperature, and the number of relays closed at any one time.

For example, if a 1260-118 module (containing 80 relays) has 25 relays closed, passing a current of 0.5 A, then:

Total power dissipation =
$[(\text{current})^2 * (\text{path resistance}) * 25] + (\text{quiescent power})$

By substituting the actual values:

Total power dissipation =
$[(0.5\ A)^2 * (1\ \Omega) * 25] + (\ 0.75\ W) = 7\ W$ at 55°C

This is acceptable power dissipation for an individual plug-in module. If five additional modules are likewise loaded, then the overall carrier dissipation is approximately 36 W, which is well within the cooling available in any commercial VXIbus chassis. In practice, rarely are more than 25% of the module's relays

energized simultaneously, and rarely is full rated current run through every path. In addition, the actual contact resistance is typically one-half to one-fourth the specified maximum, and temperatures are normally not at the rated maximum. The power dissipated by each plug-in should be no more than 15 W if all six slots are used simultaneously. This yields the following guideline:

0.5 A	Max. 56 relays closed
1.0 A	Max. 14 relays closed
2.0 A	Max. 4 relays closed

Most users of a signal-type switch, such as the 1260-118, switch no more than a few hundred milliamperes and are able to energize all relays simultaneously, should they so desire. The numbers in the above table represent worst-case, elevated-temperature, end-of-life conditions.

Additionally, if fewer plug-in modules are used, more power may be dissipated by the remaining cards. By using a chassis with high cooling capacity, such as the Racal Instruments 1261B, almost any configuration may be realized.

About MTBF

The 1260-121A/B MTBF is 979,058 hours, calculated in accordance with MIL-HDBK-217E, with the exception of the electromechanical relays. Relays are excluded from this calculation because relay life is strongly dependent upon operating conditions. Factors affecting relay life expectancy are:

1. Switched voltage
2. Switched current
3. Switched power
4. Maximum switching capacity
5. Maximum rated carrying current
6. Load type (resistive, inductive, capacitive)
7. Switching repetition rate
8. Ambient temperature

The most important factor is the maximum switching capacity, which is an interrelationship of maximum switching power, maximum switching voltage and maximum switching current. When a relay operates at a lower percentage of its maximum switching capacity, its life expectancy is longer. The maximum switching capacity specification is based on a resistive load, and

must be further de-rated for inductive and capacitive loads.

For more details about the above life expectancy factors, refer to the data sheet for the switch plug-in module.

The relay used on the 1260-121A/B plug-in is Racal part no. 310265-001. The relay manufacturer's specifications for this relay are:

Life Expectancy

Mechanical	10,000,000 operations
Electrical	100,000 operations at full rated load

For additional relay specifications, refer to the relay manufacturer's data sheet.

Ordering Information

Listed below are part numbers for both the 1260-121A and 1260-121B switch modules and available mating connector accessories. Each 1260-121B uses two mating connectors.

ITEM	DESCRIPTION	PART #
1260-121A Switch Module	1260-121A w/ Termination Block Interface	407740-001
	Consists of:	
	PCB Assembly	405167-001
	Manual for 1260-121A/B	980824-121
1260-121B Switch Module	1260-121B, 12 Channel SPDT, 10 A	407740-002
	Consists of:	
	PCB Assembly	405167-002
	Shipping Kit (mating connectors, manual)	407653-121B
20 Pin Mating Connector "B" Model Only	20 Pin Conn. Kit w/backshell & solder cup pins	407660
Cable Assy. 6ft, Sleeved "B" Model Only	18-Conductor Cable Assy, 6 Ft, 14 AWG (2 Req'd)	407657-018
Additional Manual	Manual for 1260-121A/B	980824-121

This page intentionally left blank

Chapter 2
INSTALLATION INSTRUCTIONS

Unpacking and Inspection

1. Before unpacking the switching module, check the exterior of the shipping carton for any signs of damage. All irregularities should be noted on the shipping bill and reported.
2. Remove the instrument from its carton, preserving the factory packaging as much as possible.
3. Inspect the switching module for any defects or damage. Immediately notify the carrier if any damage is apparent.
4. Have a qualified person check the instrument for safety before use.

Reshipment Instructions

1. Use the original packing material when returning the switching module to Racal Instruments for 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.

Installation

Installation of the 1260-121A/B Switching Module into a 1260-100 Carrier assembly is described in the Installation section of the 1260-100 Adapt-a-Switch Carrier Manual.

Module Configuration

The 1260-121A/B is a 12-channel single-wire switch module consisting of twelve SPDT relay switches. This architecture permits the 1260-121A/B module to be organized via software in any configuration from twelve SPDT to one 12PDT, or any combination in between, by use of the *Include* command, without the use of hardware jumpers. This is the same as a 1-wire, 2-wire,

…, n-wire switch.

In addition, by jumpering pins at the module connectors, the user can configure the module as a SP2T, SP3T, etc., up to a SP12T switch. This type of configuration is known as a multiplexer.

For a block diagram of the 1260-121A/B, see **Figure 2-1**.

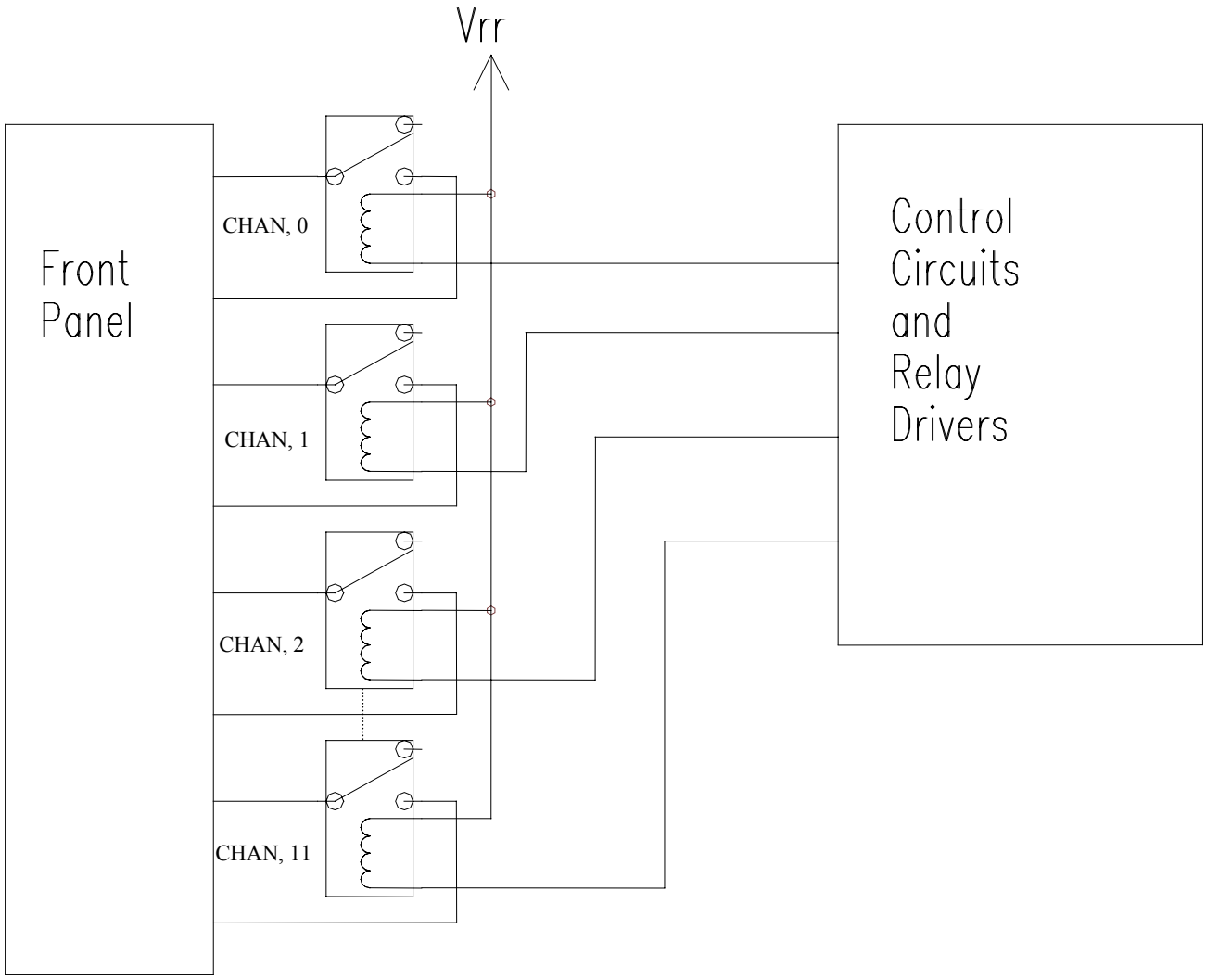


Figure 2-1, 1260-121A/B Block Diagram

Front Panel Connectors

The 1260-121A/B has two 20-pin front-panel connectors, labeled J200 and J202. It has one pin for each input and one for each output. See **Figure 2-2** for pin numbering. **Table 2-1** shows the mapping of channel numbers to connector pins. Information about available mating connectors is provided immediately after **Table 2-1**.

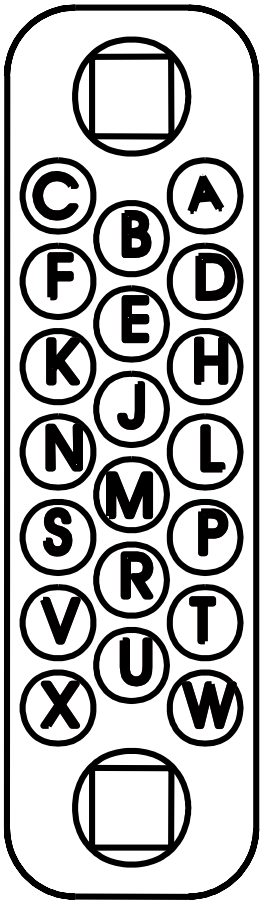


Figure 2-2, Front Panel Connector Pin Numbering

Table 2-1, 1260-121A/B Front-Panel Connections

Channel	Connector	Pin	Relay
0 In	J200	A	1
0 Out N.O.	J200	B	1
0 Out N.C.	J200	C	1
1 In	J200	D	2
1 Out N.O.	J200	E	2
1 Out N.C.	J200	F	2
2 In	J200	H	3
2 Out N.O.	J200	J	3
2 Out N.C.	J200	K	3
3 In	J200	L	4
3 Out N.O.	J200	M	4
3 Out N.C.	J200	N	4
4 In	J200	P	5
4 Out N.O.	J200	R	5
4 Out N.C.	J200	S	5
5 In	J200	T	6
5 Out N.O.	J200	U	6
5 Out N.C.	J200	V	6
6 In	J201	A	7
6 Out N.O.	J201	B	7
6 Out N.C.	J201	C	7
7 In	J201	D	8
7 Out N.O.	J201	E	8
7 Out N.C.	J201	F	8
8 In	J201	H	9
8 Out N.O.	J201	J	9
8 Out N.C.	J201	K	9
9 In	J201	L	10
9 Out N.O.	J201	M	10
9 Out N.C.	J201	N	10
10 In	J201	P	11
10 Out N.O.	J201	R	11
10 Out N.C.	J201	S	11
11 In	J201	T	12
11 Out N.O.	J201	U	12
11 Out N.C.	J201	V	12

Mating Connectors

Mating connector accessories are available for the 1260-121B:

20 Pin Connector Kit with backshell and pins
P/N 407660

20 Pin, 18 Conductor Cable Assembly, 6 Ft., 14 AWG
P/N 407657-018

The 20-pin connector kit consists of a connector housing, aluminum backshell, and twenty solder-cup pins. The pins are also available from Positronic in crimp versions and for smaller wire diameters.

The mating connector pins are solder type. The corresponding removal tool is Racal P/N 9081.

After wire attachment, the pin is inserted in the housing and will snap into place, providing positive retention. To ensure that the pin is locked into place, the assembler should pull on the wire after insertion.

The 20-Pin 18-Conductor Cable Assembly uses 14 AWG wire with crimp pins to mate with the 1260-121. The other cable end is un-terminated. Refer to **Table 2-1** for channel-to-pin mapping information. **Table 2-2** shows additional mating connectors and pins.

Table 2-2, Mating Connectors and Pins

Racal P/N	Manufacturer	Mfr. P/N	Description
602349-120	Positronic	GMCT20F0E100J0	Insulator block (diallyl pthalate), 20-position. Mates with front-panel connector. Pins sold separately.
601850-900	Positronic	FC114N2	Female contact, crimp type, for 14 AWG wire. Mates with front-panel connector pins.
None	Positronic	FC116N2	Female contact, crimp type, for 16 AWG wire. Mates with front-panel connector pins.
None	Positronic	FS114N2	Female contact, solder type, for 14 AWG wire. Mates with front-panel connector pins.
None	Positronic	FS116N2	Female contact, solder type, for 16 AWG wire. Mates with front-panel connector pins.
602349-020	Burndy	MS20PM-58	Insulator block, 20-position. Part of front-panel connector assembly. Pins sold separately.
601349-900	Burndy	FS114N2	Male contact, 0.105” dia., crimp type, for 14 to 20 AWG wire. Part of front-panel connector assembly.

More About Maximum Current Ratings

The front panel connector and pins are rated for 10A DC per pin (13A AC for 1260-121B), with all channels conducting full-rated current. This keeps the temperature rise within 10°C. It should be noted that with all electromechanical relays, the higher the switched power (voltage times current), the shorter the useful life of the relays.

Definitions:

- *Max current carrying capacity*
  The maximum current that the relay can conduct if the relay is not switched while voltage is applied. The maximum current carrying capacity is affected by the size of the conducting section of the contact at its smallest area. The listed values are obtained from several tests in laboratories under room-temperature conditions (21°C). The contact is considered to be in free air. The maximum current carrying

for the 1260-121A/B is 22 A.

- *Max operating current*
  The current the contacts can switch while conducting, without deteriorating. This depends on working conditions, such as dissipated heat, cooling provisions, ambient temperature, insulation material, etc. The maximum operating current for the 1260-121A/B is 13 A.

- *Recommended continuous current*
  The maximum current recommended for indefinitely-long time periods. The primary concern here is the heat generated in the relay. This specification can be applied for normal working conditions. The specification includes a safety margin. However, there are restrictions in the application of the given values. The most important restriction is the cross-sectional area of the connecting wire, insulation temperature range, and wire bundling. The recommended continuous current for the 1260-121A/B is 10 A.

Installation

To install the 1260-121A/B Switching Module into a 1260-100 Carrier, engage the printed circuit board into the grooves of the desired carrier slot. Slide the 1260-121A/B into the carrier until its connector mates with the connector on the carrier backplane. Push firmly to fully seat the connector. Tighten the two retaining screws at the top and bottom of the 1260-121A/B plug-in.

This page was left intentionally blank.

Chapter 3
MODULE OPERATION

Operating Modes

The 1260-121 may be operated either in *message-based* mode or in *register-based* mode.

In the *message-based* mode, the 1260-01T switch controller interprets commands sent by the slot 0 controller, and determines the appropriate data to send to the control registers of the 1260-121 module.

Operating In Message-Based Mode

Channel Descriptors For The 1260-121

The standard 1260-01T commands are used to operate the 1260-121 module. These commands are described in the 1260-01T User's Manual.

Each 1260-01T relay command uses a *channel descriptor* to select the channel(s) of interest. The syntax for a channel descriptor is the same for all 1260 series modules. In general, the following syntax is used to select a single channel:

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

Where:

- <module address> is the address of the 1260-121 module. This is a number is in the range from 1 through 12, inclusive.
- <channel> is the 1260-121 channel to operate. This is a number in the range from 0 through 11, inclusive.

Multiple individual channels may be specified using the following channel descriptor syntax:

```
@ <module address> ( <chan1> , <chan2>
, . . ., <chanN> ))
```

A range of channels may be specified using the following channel descriptor syntax:

```
@ <module address> ( <first channel> :
<last channel> ))
```

The following examples illustrate the use of the channel descriptors for the 1260-121:

`OPEN (@8(0))`	Open channel 0 on the 1260-121 that has module address 8.
`CLOSE (@8(0,7))`	Close channels 0 and 7 on the 1260-121 that has module address 8.
`CLOSE (@2(7:11))`	Close channels 7 through 11 inclusive on the 1260-121 that has module address 2.

Reply To The MOD:LIST? Command

The chassis containing the 1260-121 returns a reply to the MOD:LIST? command. This reply is unique for each different 1260 series switch module. The syntax for the reply is:

<module address> : <module-specific identification string>

For the 1260-121 module the string value is:

```
1260-121 12-CHANNEL SPDT 10A SWITCH MODULE
```

Thus, for a 1260-121 whose module address is 2, the reply to this query would be:

```
2 : 1260-121 12-CHANNEL SPDT 10A SWITCH MODULE
```

Operating in Register-Based Mode

The 1260-121 offers register-based mode when installed in VXI platforms that support it. In register-based mode, the 1260-121 is operated by directly writing and reading to/from ports controlling up to eight relays each. To access the registers the following details must be assembled to generate an absolute address that can be wrote or read from:

The port and control registers are located in the VXIbus A24 Address Space. The A24 address for a port or control register depends on:

1. The A24 Address Offset assigned to the 1260-01T module by the Resource Manager program. The Resource Manager program is provided by the VXIbus slot-0 controller vendor. The A24 Address Offset is placed into the “Offset Register” of the 1260-01T by the Resource Manager.

2. The <module address> of the 1260-121 module. This is a value in the range from 1 and 12 inclusive.

3. The 1260-121 port or control register to be written to or read from. Each register on the 1260-121 has a unique offset from the base address.

The base A24 address for the 1260-121 module may be calculated by:

(A24 Offset of the 1260-01T) + (1024 x Module Address of 1260-121).

The A24 address offset is usually expressed in hexadecimal. A typical value of 204000_{16} is used in the examples that follow.

A 1260-121 with a module address of 7 would have the base A24 address computed as follows:

Base A24 Address of 1260-121 = 204000_{16} + (400_{16} x 7_{10}) = $205C00_{16}$

The port and control registers for Adapt-a-Switch plug-ins and conventional 1260-Series modules are always on odd-numbered A24 addresses. For port registers, the 1260-121 reads and writes to the same location. For control registers, the 1260-121 writes to one location, but reads back from another. **Table 3-1 and 3-5** provides offsets relative to the base address of the module for all port and control registers of the 1260-121. To obtain the absolute address where data is to be written or read from, the base address is added to the offset:

(Base A24 1260-121 Address) + offset = absolute address

So, for our example base A24 address computed earlier, the following absolute addresses would apply for the operations indicated:

205C01 Port A read or written at this location

205E01 ID register read at this location

Before explaining the particulars of reading and writing to port and control registers, it is necessary to understand how the registers interact with the 1260-121 relays. **Table 3-2 through 3-5** provides a detailed explanation of each register and how it interacts with the 1260-121 module.

Table 3-1, Register Offset Addresses of the 1260-121A/B Module

Register Name	Register Offsets to Add to Base Module Address	
	Write Location (hexadecimal)	Read Location (hexadecimal)
Port A	0x01	0x01
Port B	0x03	0x03
ID	Read Only	0x201
EPROM Descriptor	Read Only	0x203

Table 3-2, ID Register Functionality of the 1260-121A/B Module

Register Table		ID Register
Module Version	Bit	Functionality Description
All	0	Always Reads 0x00 (Read Only)
	1	
	2	
	3	
	4	
	5	
	6	
	7	

Table 3-3, Port A Register Functionality of the 1260-121A/B Module

Register Table		Port A	
Module Version	**Bit**	**Functionality Description**	
All	0	Relay 00	(0: relay open 1: relay closed)
	1	Relay 01	(0: relay open 1: relay closed)
	2	Relay 02	(0: relay open 1: relay closed)
	3	Relay 03	(0: relay open 1: relay closed)
	4	Relay 04	(0: relay open 1: relay closed)
	5	Relay 05	(0: relay open 1: relay closed)
	6	Relay 06	(0: relay open 1: relay closed)
	7	Relay 07	(0: relay open 1: relay closed)

Table 3-4, Port B Register Functionality of the 1260-121A/B Module

Register Table		Port B	
Module Version	**Bit**	**Functionality Description**	
All	0	Relay 08	(0: relay open 1: relay closed)
	1	Relay 09	(0: relay open 1: relay closed)
	2	Relay 10	(0: relay open 1: relay closed)
	3	Relay 11	(0: relay open 1: relay closed)
	4	(Not Used)	
	5	(Not Used)	
	6	(Not Used)	
	7	(Not Used)	

Note:

Open: Indicates C connected to NC with NO contact open
Closed: Indicates C connected to NO with NC contact open

Table 3-5, EPROM Descriptor Functionality of the 1260-121A/B Module

Register Table		EPROM Descriptor Register
Module Version	**Bit**	**Functionality Description**
All	0	Each time this register is read, it advances a memory pointer to the next memory location in the on-board EPROM. To reset this pointer to the beginning, read the ID register. This resets the memory pointer. The descriptor register contains a long string of data, typically used by the Adapt-a-Switch carrier for configuration purposes. Additionally, this data contains the card identification string for the specific type of card (i.e. 1260-121). These identification strings are located at EPROM memory locations 0x23 through 0x34.
	1	
	2	
	3	
	4	
	5	
	6	
	7	

Writing to a port location is a straightforward process. Setting a bit high in a port register causes the corresponding relay channel to close.

It is especially important to realize that a single write operation controls eight separate control lines or output devices simultaneously. Therefore if only a single bit change is desired, the following process must be observed.

1. Read the register, inverting the bit pattern.

2. Mask the appropriate bit with an ‘AND’ operation and a byte mask with all undesired bits set to a ‘1’ and the desired bit set to a ‘0’ or ‘1’ depending on whether the bit is to be set or cleared in the desired register.

3. Write the masked data back into the register.

As simple as this may seem, a number of products reported as faulty and sent back for repair are typically the result of inappropriate register accesses.

Because of the 1260-121 relay driver architecture, registers A and B will read back inverted from what was written to them.

The VISA I/O library may be used to control the module. The VISA function `viOut8()` is used to write a single 8-bit byte to a control register, while `viIn8()` is used to read a single 8-bit byte from the control register. The following code example shows the use of `viOut8()` to update the 1260-121 module.

1260-121A/B Example Code

```
#include <visa.h>

/* This example shows a 1260-01T at logical address 16 and a VXI/MXI */
/* interface */
#define RI1260_01_DESC     "VXI::16"

/* For a GPIB-VXI interface, and a logical address of 77 */
/* the descriptor would be:  "GPIB-VXI::77" */


/* this example shows a 1260-121 with module address 7 */
#define MOD_ADDR_120  7


void example_operate_1260_121(void)
{
      ViUInt8 creg_val;
      ViBusAddress creg0_addr;
      ViBusAddress creg1_addr;
      ViSession hdl1260;    /* VISA handle to the 1260-01T */
      ViSession hdlRM;      /* VISA handle to the resource manager */
      ViStatus error;       /* VISA error code */

      /* open the resource manager */
      /* this must be done once in application program */
      error = viOpenDefaultRM (&hdlRM);

      if (error < 0) {
            /* error handling code goes here */
      }

      /* get a handle for the 1260-01T */
      error = viOpen (hdlRM, RI1260_01_DESC, VI_NULL,VI_NULL, &hdl1260);
      if (error < 0) {
            /* error handling code goes here */
      }


      /* form the offset for control register 0 */
      /* note that the base A24 Address for the 1260-01T */
      /* is already accounted for by VISA calls viIn8() and */
```

```
/* viOut8() */

   /* module address shifted 10 places = module address x 1024 */
creg0_addr = (MOD_ADDR_120 << 10) + 1;
creg1_addr = creg0_addr + 2;

/* close channel 9 without affecting the state of */
/* channels 8, 9, 10, 11*/
error = viIn8 (hdl1260, VI_A24_SPACE, creg1_addr, &creg_val);
if (error < 0) {
     /* error handling code goes here */
}

/* invert the bits to get the present control register value */
creg_val = ~creg_val;

/* AND to leave every channel except 9 unchanged */
creg_val &= ~ (0x02);

/* OR in the bit to close channel 9 */
creg_val |= 0x02;

/* write the updated control register value */
error = viOut8 (hdl1260, VI_A24_SPACE, creg1_addr, creg_val);
if (error < 0) {
     /* error handling code goes here */
}

/* open channel 7 without affecting channels 0 through 6 */
error = viIn8 (hdl1260, VI_A24_SPACE, creg0_addr, &creg_val);
if (error < 0) {
     /* error handling code goes here */
}

/* invert the bits to get the present control register value */
creg_val = ~creg_val;

/* AND to leave every channel except 7 unchanged */
/* leave bit 7 clear to open channel 7 */
creg_val &= ~ (0x80);

/* write the updated control register value */
error = viOut8 (hdl1260, VI_A24_SPACE, creg0_addr, creg_val);
if (error < 0) {
     /* error handling code goes here */
}
```

```
      /* close the VISA session */
      error = viClose( hdl1260 );
      if (error < 0) {
            /* error handling code goes here */
      }
}
```

EMERGENCY RESET

The Emergency Reset Feature provides a simple, reliable mechanism to open all relays quickly. This helps the system integrator maximize safety in a system that performs high-current switching.

The 1260-121A and 1260-121B each provide a connection for an emergency safety switch. The user provides the switch, and may mount it wherever desired so that it is easily and quickly accessible.

When the emergency reset switch is activated, the relays are immediately opened by hardware action alone. No software or firmware intervention is required. Even if the host computer or switch controller fails, the emergency reset function is still effective.

After the relays open in response to the emergency reset switch, they do not automatically return to their previous states when the switch is deactivated. The relays remain open until the user issues a command to close them.

Connecting the Safety Switch

Use a general-purpose mechanical switch. It need not have a high voltage or current rating. The signal passing through the switch is TTL compatible, and has a magnitude of 5 volts and a current of 0.5mA. The switch may be either normally-open or normally-closed.

For the 1260-121A, use insulated wire to connect the two switch contacts to the screw terminals marked “TB5” on the printed circuit board (PCB). Make the connections to pins 1 and 2. You may route the wire through the front-panel strain relief of the 1260-121A, along the same path as the relay contact wiring.

To connect the switch to the 1260-121B, use a standard miniature (IEC 3.5mm diameter) phone plug. Connect one side of the switch to the phone plug tip, and the other side to the phone plug sleeve. Insert the phone plug into the jack in the 1260-121B front panel.

Normally-Open and Normally-Closed Switches

The 1260-121 can work with either a normally-open or normally-closed switch. In the normally-open configuration, the 1260-121 detects an emergency reset when the switch is closed for more than 500ns. The normally-open configuration is the factory default. To verify that the 1260-121 is configured for a normally-open switch, ensure that no jumper or resistor is installed across the two pads comprising JP6 on the PCB (see **Figure 3-1, JP6**

Configuration Jumper).

In the normally-closed configuration, the 1260-121 detects an emergency reset condition when the switch contacts are opened for more than 500ns. To configure the 1260-121 for normally-closed operation (normally-closed switch), install a jumper across the two pads comprising JP6 on the 1260-121 printed circuit board (see **Figure 3-1, JP6 Configuration Jumper**). If possible, use a zero-ohm surface-mount resistor in the standard 0805 outline package. If such a resistor is not available, you may carefully solder a short piece of bare, solid, 28AWG wire across the two pads of JP6. Ensure that the wire does not contact any circuitry other than these two pads.

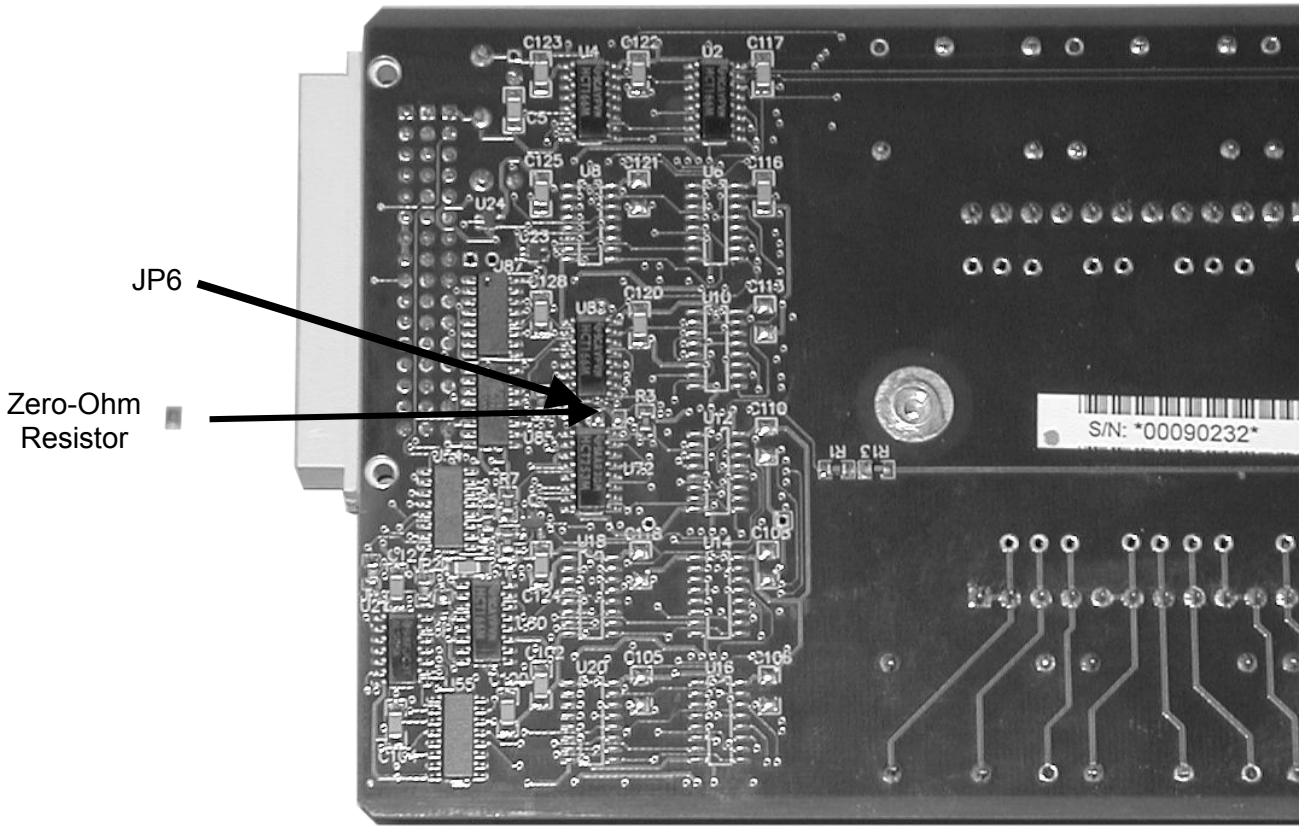


Figure 3-1, JP6 Configuration Jumper

Local and Global Reset Options

The scope of the reset can be set to either local or global. With a global reset, an emergency reset detected by one switch module will reset ALL other switch modules that are connected to the same controller (e.g. Option-01T Controller or 1256 Switching System). To configure the 1260-121 for the global reset option, install a jumper across the two pins comprising JP7 on the PCB (see **Figure 3-2, JP7 Configuration Jumper**).

If the 1260-121 is configured for the local reset option (the factory default), the emergency reset switch will affect only the module to which it is connected. All relays of that module will open when the switch is activated. Relays on other switch modules remain unaffected. The local reset option is configured by not installing a jumper at JP7 on the PCB (see **Figure 3-2, JP7 Configuration Jumper**).

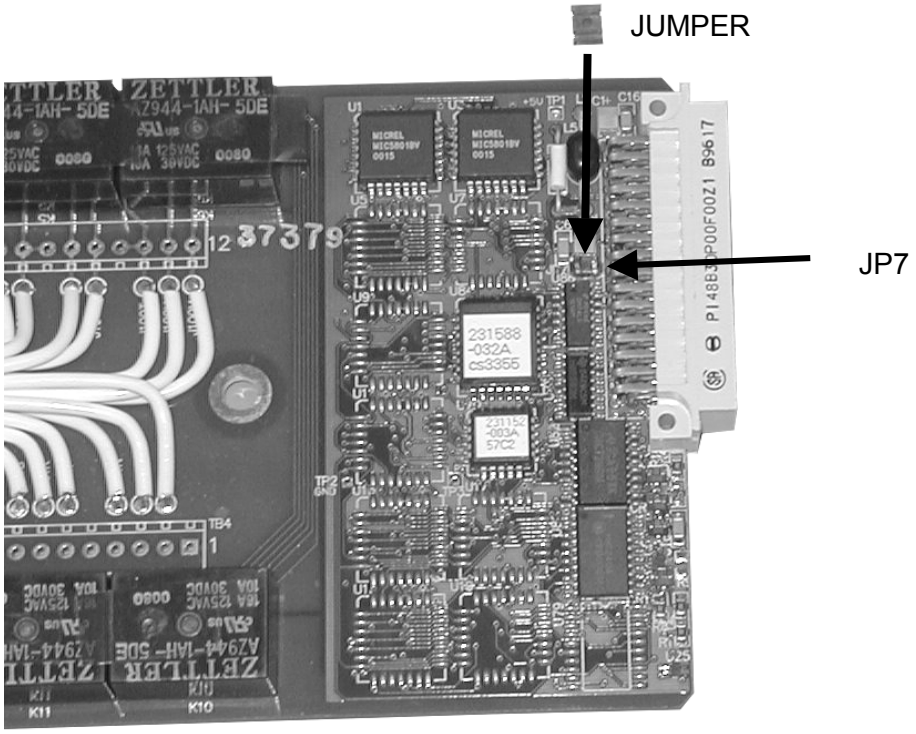


Figure 3-2, JP7 Configuration Jumper

Momentary vs. Latching Switches

Latching switches, also referred to as toggle switches, remain in one position (open or closed) until deliberately set to the other position. Momentary switches, on the other hand, change positions when activated, then return automatically to the normal position when released. Either type of switch may be used as a safety switch, depending upon the desired result.

A latching (toggle) switch, when activated, causes all relays to open. It also prevents any closure of relays until the switch is manually returned to its normal position. The switch modules ignore any commands sent to them while the switch is activated.

A momentary switch, when activated, also causes all relays to open. However, the switch returns to its normal position when released, and relay operations can then resume. Although the relays do not automatically return to their previous states when the switch is released, they resume normal operation, and respond to all commands.

A latching (toggle) switch provides the maximum safety by not only opening the relays, but preventing them from being closed again until the safety switch is manually returned to the normal position.

This page was left intentionally blank.

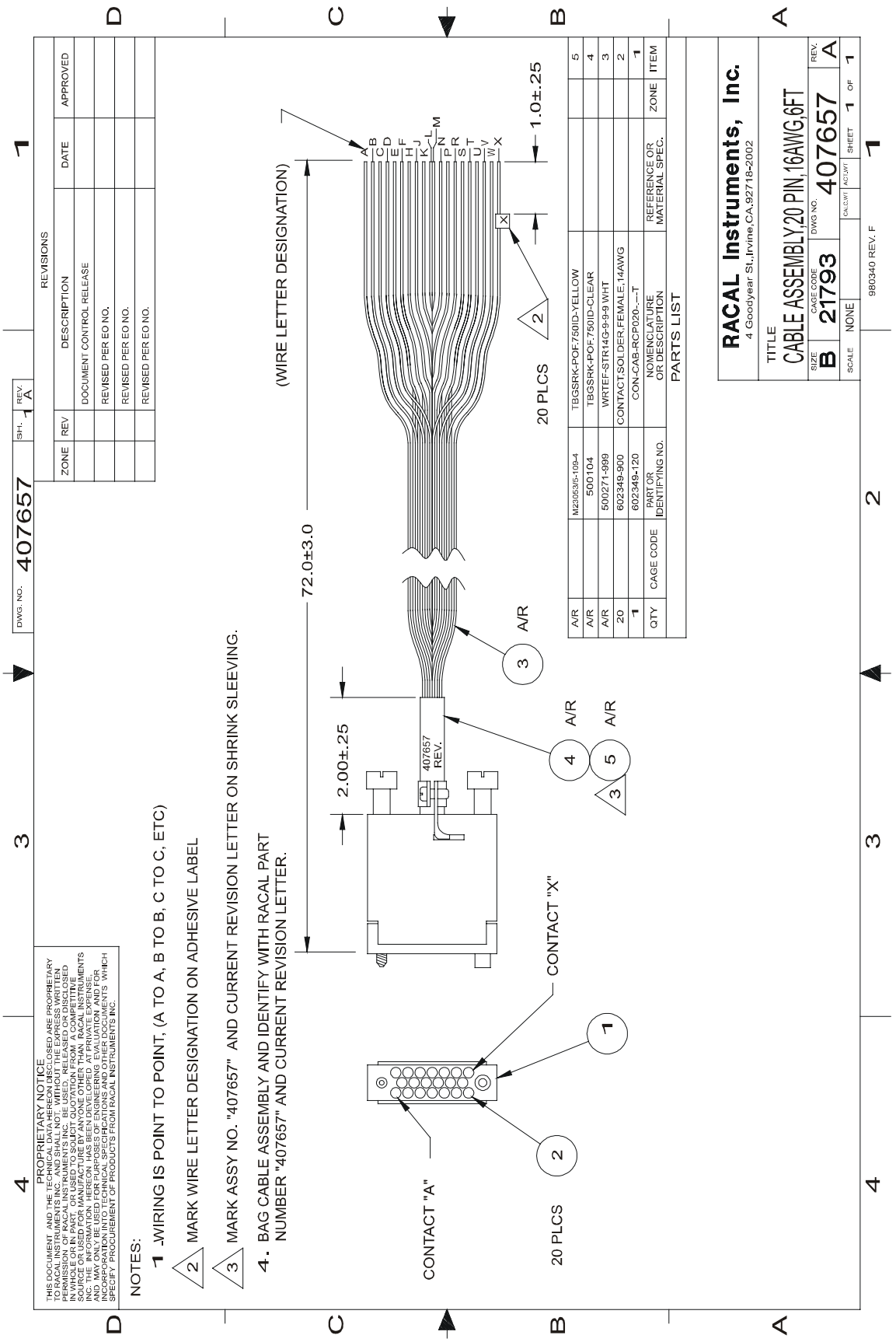
Chapter 4
OPTIONAL HARNESS ASSEMBLIES

This page was left intentionally blank.

PSR35O 1 LRMC RACAL INSTRUMENTS INC. PAGE 1
Product Structure Report 3/29/01
By Assembly/Balloon No.

Assembly 407660 Low Level Cd
U/M EA 20 PIN CONN KIT W/BACKSHELL-E Rev Date 7/14/98 Revision A

#	Component	Description	U/M	Qty Reqd	Engineer Txt
	602349-120	CON-CAB-RCP020-.---T	-E EA	1.00000	
	602349-900	CONTACT,SOLDER,FEMALE,14AWG	-E EA	20.00000	


DWG. NO. 407657
SH. 1
REV. A
REVISIONS
ZONE REV DESCRIPTION DATE APPROVED
DOCUMENT CONTROL RELEASE
REVISED PER EO NO.
REVISED PER EO NO.
REVISED PER EO NO.
PROPRIETARY NOTICE
THIS DOCUMENT, AND THE TECHNOLOGY IT DISCLOSES ARE PROPRIETARY TO RACAL INSTRUMENTS INC., AND SHALL NOT, WITHOUT THE EXPRESS WRITTEN PERMISSION OF RACAL INSTRUMENTS INC. BE USED, RELEASED OR DISCLOSED IN WHOLE OR IN PART, OR USED TO SOLICIT QUOTATION FROM A COMPETITIVE SOURCE OR USE FOR MANUFACTURE BY ANYONE OTHER THAN A RACAL INSTRUMENTS INC. THE INFORMATION HEREON HAS BEEN DEVELOPED AT PRIVATE EXPENSE, AND MAY ONLY BE USED FOR PURPOSES OF ENGINEERING EVALUATION AND FOR PROCUREMENT OF PRODUCTS FROM RACAL INSTRUMENTS INC. USE OR DISCLOSURE FOR MANUFACTURING PURPOSES OR OTHER THAN SPECIFIED RACAL INSTRUMENTS INC. AGREEMENTS IN CONNECTION WITH THE SPECIFIED PURPOSE IS PROHIBITED EXCEPT AS MAY BE SPECIFICALLY AUTHORIZED BY SUCH AGREEMENTS WHICH SPECIFY PROCUREMENT OF PRODUCTS FROM RACAL INSTRUMENTS INC.
NOTES:
1. WIRING IS POINT TO POINT, (A TO A, B TO B, C TO C, ETC)
2 MARK WIRE LETTER DESIGNATION ON ADHESIVE LABEL
3 MARK ASSY NO. "407657" AND CURRENT REVISION LETTER ON SHRINK SLEEVING.
4. BAG CABLE ASSEMBLY AND IDENTIFY WITH RACAL PART NUMBER "407657" AND CURRENT REVISION LETTER.
(WIRE LETTER DESIGNATION)
72.0±3.0
2.00±.25
1.0±.25
20 PLCS
CONTACT "A"
CONTACT "X"
20 PLCS
407657 REV.
A/R
A/R
A/R
A/R
PARTS LIST
ITEM ZONE REFERENCE OR MATERIAL SPEC. NOMENCLATURE OR DESCRIPTION PART OR IDENTIFYING NO. CAGE CODE QTY
5 TBGSRK-POF-750ID-YELLOW M23053/5-109-4 A/R
4 TBGSRK-POF-750ID-CLEAR 500104 A/R
3 WRTEF-STR14G-9-9-9 WHT 5002271-999 A/R
2 CONTACT,SOLDER,FEMALE,14AWG 602349-900 20
1 CON-CAB-RCP020-***T 602349-120 1
RACAL Instruments, Inc.
4 Goodyear St.,Irvine,CA.92718-2002
TITLE
CABLE ASSEMBLY,20 PIN,16AWG,6FT
SIZE B CAGE CODE 21793 DWG NO. 407657 REV. A
SCALE NONE CAL:W1 AC1:W1 SHEET 1 OF 1
980340 REV: F

This page was left intentionally blank.

Chapter 5
PRODUCT SUPPORT

Product Support

Racal Instruments 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 closes to your facility, refer to the Support Offices section on the following page.

Reshipment Instructions

Use the original packing material when returning the 1260-121 to Racal Instruments for calibration or servicing. The original shipping crate and associated packaging material will provide the necessary protection for safe reshipment.

If the original packing material is unavailable, contact Racal Instruments Customer Service for information.

Support Offices

RACAL INSTRUMENTS

United States

(Corporate Headquarters and Service Center)
4 Goodyear Street, Irvine, CA 92618
Tel: (800) 722-2528, (949) 859-8999; Fax: (949) 859-7139

5730 Northwest Parkway Suite 700, San Antonio, TX 78249
Tel: (210) 699-6799; Fax: (210) 699-8857

Europe

(European Headquarters and Service Center)
18 Avenue Dutartre, 78150 LeChesnay, France
Tel: +33 (0)1 39 23 22 22; Fax: +33 (0)1 39 23 22 25

29-31 Cobham Road, Wimborne, Dorset BH21 7PF, United Kingdom
Tel: +44 (0) 1202 872800; Fax: +44 (0) 1202 870810

Via Milazzo 25, 20092 Cinisello B, Milan, Italy
Tel: +39 (0)2 6123 901; Fax: +39 (0)2 6129 3606

Technologie Park, Friedrich Ebert Strasse, 51429 Bergisch Gladbach, Germany
Tel: +49 (0) 2204 844200; Fax: +49 (0) 2204 844219

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 Racal 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.