RACAL INSTRUMENTS™

1260-112

MULTIPLEXER PLUG-IN

Publication No. 980824-112 Rev. A

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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.

EC Declaration of Conformity

We

Astronics Test Systems Inc.
4 Goodyear
Irvine, CA 92618

declare under sole responsibility that the

1260-112 Power Switch Plug In Module, P/N 407696

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 an Astronics Test Systems 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, June 28, 2002

Engineering Director

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DOCUMENT CHANGE HISTORY

Revision	Date	Description of Change
A	04/23/09	Revised per EO 29691 Revised format to current standards. Company name revised throughout manual. Manual now revision letter controlled. Added Document Change History Page v. Back of cover sheet. Revised Warranty Statement, Return of Product, Proprietary Notice and Disclaimer to current standards. Removed Reshipment Instructions in (Chap. 2-1) and removed (Chap 5). Information. Now appears in first 2 sheets behind cover sheet. Updated table of contents to reflect changes made.

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Chapter 1
SPECIFICATIONS

Introduction

The 1260-112 is a plug-in switch module developed for the 1260-100 Adapt-a-Switch Carrier. It switches 20 two-wire channels of DPDT switches. Its switching current is 2 A at 220 VDC or 250 VAC. The 3 dB bandwidth is 100 MHz minimum.

The 1260-112 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.

Specifications

Bandwidth (-3dB)	> 120MHz
Insertion Loss	
300 kHz	< 0.5 dB
1 MHz	< 0.5 dB
10 MHz	< 0.5 dB
Isolation	
300 kHz	> 70 dB
1 MHz	> 65 dB
10 MHz	> 50 dB
Crosstalk	
300 KHz	< -75 dB
1 MHz	< -70 dB
10 MHz	< -45 dB
Switching Voltage	
AC	250 V, Max
DC	220 V, Max
Switching Current	
AC	2 A, Max
DC	2 A, Max
Switching Power	
AC	125 VA, Max
DC	60 W, Max

Path resistance	< 250 MΩ
Thermal EMF	< 50 uV
Capacitance	
Channel-Chassis	< 100 pF
Open-Channel	< 50 pF
Insulation resistance	> 10^9 Ω
Relay Settling Time	< 10 ms
Shock	30g, 11 ms, ½ sine wave (MIL-T-28800E)
Vibration	0.013 in. P-P, 5-55 Hz (MIL-T-28800E)
Bench Handling	4 in., 45°
Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +55°C
Non-operating	-40°C to +75°C
Relative Humidity	85% ± 5% non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Power Requirements	
+5 VDC	15 mA + 28 mA per energized relay max.
Weight	13 oz. (0.45 kg.)
Mean Time Between Failures (MTBF)	>100,00 hours (MIL-HDBK-217E)
Mean Time to Repair (MTTR)	< 5 minutes

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 1260-112 module (containing 20 relays) has 20

relays closed, passing a current of 2 A, then:

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

By substituting the actual values:

Total power dissipation =
$[(2\ A)^2 * (0.5\ \Omega) * 20] + (\ 0.75\ W) = 41\ W$ 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 200 W, which is outside the cooling range available in most commercial VXIbus chassis. In practice however, 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 50 W if all six slots are used simultaneously and the 25% rule is used. This yields the following guideline:

Most users of a signal-type switch, such as the 1260-112, 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 at maximum current.

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 1261B, almost any configuration may be realized.

About MTBF

The 1260-112 MTBF is >100,000 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 1260-112 plug-in is Astronics Test Systems part no. 310256-001. The relay manufacturer's specifications for this relay are:

Life Expectancy:

Mechanical	100,000 operations
Electrical	100,000 operations at full rated load (resistive)

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

Ordering Information

Listed below are part numbers for both the 1260-112 switch module and available mating connector accessories. Each 1260-112 uses a single mating connector.

ITEM	DESCRIPTION	PART #
1260-112 Switch Module	Switch Module, 20-Channel DPDT, 2 A Consists of: 405151 PCB Assembly 980824-112 Manual	407696
160-pin Mating Connector	160 Pin Conn. Kit with pins	407664
Cable Assy. 6ft, Sleeved	160 Pin Cable Assy, 6 Ft, 24 AWG	407408-001
Connector Bracket	Bracket, Strain Relief	456673
Additional Manual		980824-112
1260-100 Adapt-a-Switch Carrier Manual		980824-100

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Chapter 2
INSTALLATION INSTRUCTIONS

Unpacking and Inspection

1. Remove the 1260-112 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 1260-112 module option and the 1260-112 Users Manual. Notify Customer Service if the module appears damaged in any way. Do not attempt to install a damaged module into a VXI chassis.
3. The 1260-112 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

Installation

Installation of the 1260-112 Switching Module into a 1260-100 Carrier assembly is described in the Installation section of the 1260-100 Adapt-a-Switch Carrier Manual, publication number 980824-100.

Module Configuration

The 1260-112 is a 20-channel, two-wire plug-in for the Adapt-a-Switch Series. Its relay architecture permits it to be organized via software into any configuration from twenty DPDTs to one 20PDT, or any combination in between. These configurations are equivalent to 2-wire, 4-wire, … n-wire switches. The software command *Include* provides this flexibility without the use of hardware jumpers.

For connector pin assignments, refer to **Figure 2-1**.

Front Panel Connectors

The 1260-112 has one 160-pin front-panel connector, labeled J200. It is a 160-pin, modified DIN style, with 0.025" square posts as pins. It has one pin for each input and one for each output. See **Figure 2-1** 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**.

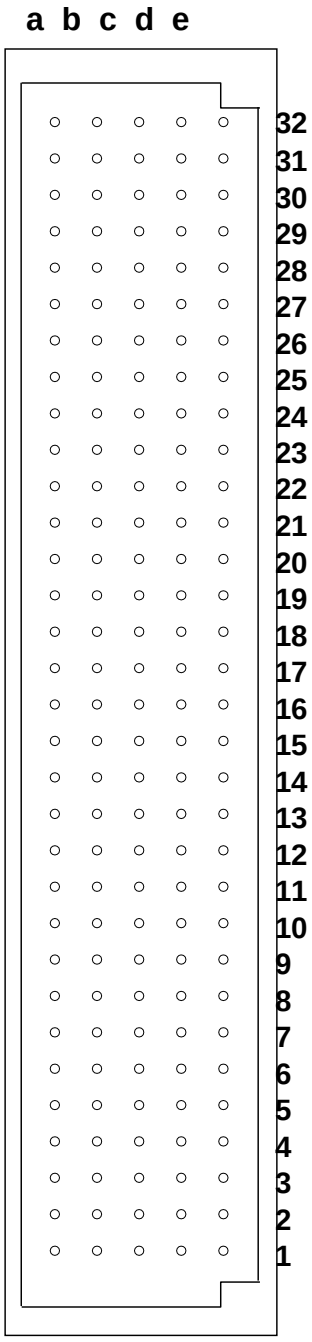


Figure 2-1, Front-Panel Connector Pin Numbering

Table 2-1, 1260-112 Front-Panel Connections

Channel	Connector	Pin
COM 0H	J200	P28B
0000H NC	J200	P29B
0000H NO	J200	P27B
COM 0L	J200	P28A
0000L NC	J200	P29A
0000L NO	J200	P27A
COM 1H	J200	P31B
0001H NC	J200	P32B
0001H NO	J200	P30B
COM 1L	J200	P31A
0001L NC	J200	P32A
0001L NO	J200	P30A
COM 2H	J200	P28E
0002H NC	J200	P29E
0002H NO	J200	P27E
COM 2L	J200	P28D
0002L NC	J200	P29D
0002L NO	J200	P27D
COM 3H	J200	P31E
0003H NC	J200	P32E
0003H NO	J200	P30E
COM 3L	J200	P31D
0003L NC	J200	P32D
0003L NO	J200	P30D
COM 4H	J200	P22B
0004H NC	J200	P23B
0004H NO	J200	P21B
COM 4L	J200	P22A
0004L NC	J200	P23A
0004L NO	J200	P21A
COM 5H	J200	P25B
0005H NC	J200	P26B
0005H NO	J200	P24B
COM 5L	J200	P25A
0005L NC	J200	P26A
0005L NO	J200	P24A
COM 6H	J200	P22E
0006H NC	J200	P23E
0006H NO	J200	P21E
COM 6	J200	P22D
0006L NC	J200	P23D

Channel	Connector	Pin
0006L NO	J200	P21D
COM 7H	J200	P25E
0007H NC	J200	P26E
0007H NO	J200	P24E
COM7L	J200	P25D
0007L NC	J200	P26D
0007L NO	J200	P24D
COM 8H	J200	P15B
0008H NC	J200	P16B
0008H NO	J200	P14B
COM 8L	J200	P15A
0008L NC	J200	P16A
0008L NO	J200	P14A
COM 9H	J200	P18B
0009H NC	J200	P19B
0009H NO	J200	P17B
COM 9L	J200	P18A
0009L NC	J200	P19A
0009L NO	J200	P17A
COM 10H	J200	P15E
0010H NC	J200	P16E
0010H NO	J200	P14E
COM 10L	J200	P15D
0010L NC	J200	P16D
0010L NO	J200	P14D
COM 11H	J200	P18E
0011H NC	J200	P19E
0011H NO	J200	P17E
COM 11L	J200	P18D
0011L NC	J200	P19D
0011L NO	J200	P17D
COM 12H	J200	P08B
0012H NC	J200	P09B
0012H NO	J200	P07B
COM 12L	J200	P08A
0012L NC	J200	P09A
0012L NO	J200	P07A
COM 13H	J200	P11B
0013H NC	J200	P12B
0013H NO	J200	P10B
COM 13L	J200	P11A

Channel	Connector	Pin
0013L NC	J200	P12A
0013L NO	J200	P10A
COM 14H	J200	P08E
0014H NC	J200	P09E
0014H NO	J200	P07E
COM 14L	J200	P08D
0014L NC	J200	P09D
0014L NO	J200	P07D
COM 15H	J200	P11E
0015H NC	J200	P12E
0015H NO	J200	P10E
COM 15L	J200	P11D
0015L NC	J200	P12D
0015L NO	J200	P10D
COM 16H	J200	P02B
0016H NC	J200	P03B
0016H NO	J200	P01B
COM 16L	J200	P02A
0016L NC	J200	P03A
0016L NO	J200	P01A
COM 17H	J200	P05B
0017H NC	J200	P06B
0017H NO	J200	P04B
COM 17L	J200	P05A
0017L NC	J200	P106A
0017L NO	J200	P04A
COM 18H	J200	P02E
0018H NC	J200	P03E
0018H NO	J200	P01E
COM 18L	J200	P02D
0018L NC	J200	P03D
0018L NO	J200	P01D
COM 19H	J200	P05E
0019H NC	J200	P06E
0019H NO	J200	P04E
COM 19L	J200	P05D
0019L NC	J200	P06D
0019L NO	J200	P04D
GND	J200	P13A
GND	J200	P20A
GND	J200	P13B
GND	J200	P20B

Channel	Connector	Pin
GND	J200	P01C
GND	J200	P02C
GND	J200	P03C
GND	J200	P04C
GND	J200	P05C
GND	J200	P06C
GND	J200	P07C
GND	J200	P08C
GND	J200	P09C
GND	J200	P10C
GND	J200	P11C
GND	J200	P12C
GND	J200	P13C
GND	J200	P14C
GND	J200	P15C
GND	J200	P16C
GND	J200	P17C
GND	J200	P18C
GND	J200	P19C
GND	J200	P20C
GND	J200	P21C
GND	J200	P22C
GND	J200	P23C
GND	J200	P24C
GND	J200	P25C
GND	J200	P26C
GND	J200	P27C
GND	J200	P28C
GND	J200	P29C
GND	J200	P30C
GND	J200	P31C
GND	J200	P32C
GND	J200	P13D
GND	J200	P20D
GND	J200	P13E
GND	J200	P20E

Mating Connectors

Mating connector accessories are available:

160-Pin Connector Kit with backshell and pins, P/N 407664

160-Pin Cable Assembly, 6 Ft., 24 AWG, P/N 407408-001

The 160-Pin Connector Kit consists of a connector housing, and 170 crimp pins. After wire attachment, the pin is inserted into the housing and will snap into place, providing positive retention.

The suggested hand tool for the crimp pins is P/N 990898. The corresponding pin removal tool is P/N 990899.

The 160-Pin Cable Assembly uses 24 AWG cable with crimp pins to mate with the 1260-112. The other cable end is unterminated. Refer to **Table 2-1** for channel-to-pin mapping information.

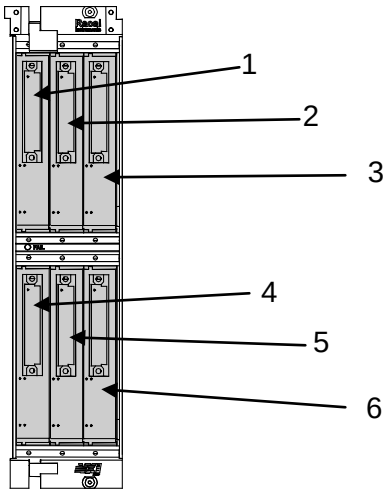
Chapter 3
MODULE OPERATION

Setting the Module Address

The Option-01T switch controller identifies each Adapt-a-Switch plug-in or conventional 1260-Series module by a *module address* that is unique to that module. The module address is a number from 1 through 12, inclusive.

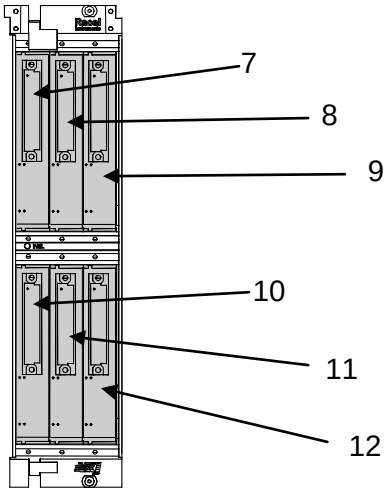
The module address assigned to the 1260-112 depends on the carrier slot into which the 1260-112 is inserted, and on the position of the logical address DIP switch on the carrier side panel. The switch has two settings:

- 1-6 (closed): When the switch is set to this position, the module addresses of the plug-ins in the 1260-100 Carrier are from 1 through 6. The module with address 1 is in the left slot of the top row. The plug-ins are addressed in the following pattern:



Front View – Module Addresses for 1260-100 Carrier

- 7-12 (open): When the switch is set to this position, the module addresses of the plug-ins in the 1260-100 Carrier are from 7 through 12, in the following pattern:



Front View – Module Addresses for 1260-100 Carrier

When setting module addresses for Adapt-a-Switch Carriers and conventional 1260-Series modules, be sure that no address is used by more than one plug-in or 1260-Series module.

For instructions on setting module addresses for a conventional 1260-Series module, see the label on the side panel of the module.

Operating Modes

The 1260-112 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 1260-112 module.

A conceptual view of the message-based mode of operation is shown in **Figure 3-1** below.

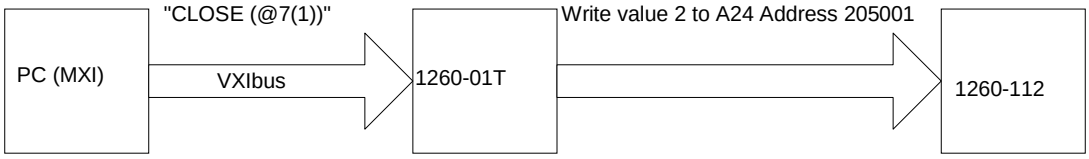


Figure 3-1, Message-Based Mode of Operation

In the *register-based* mode, the user writes directly to the control registers on the 1260-112 module. The 1260-01T command module does not monitor these operations, and does not keep

track of the relay states on the 1260-112 module in this mode.

A conceptual view of the register-based mode is shown in **Figure 3-2** below.

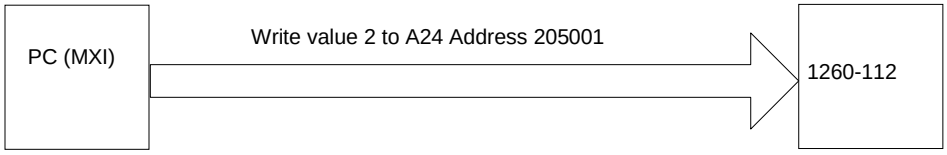


Figure 3-2, Register-Based Mode of Operation

Since the 1260-01T switch controller does not keep track of relay states during the register-based mode, it is advisable to use **either** the message-based or the register-based mode, and continue to use the same mode throughout the application program.

In general, the message-based mode of operation is easier to use with utility software such as the National Instruments VXI Interactive Control (VIC) program. The message-based mode allows the user to send ASCII text commands to the 1260-01T and to read replies from the 1260-01T. In addition, some features, such as the SCAN list, are available only in the message-based mode of operation.

The register-based mode provides faster control of relay channels. In this mode, relay operations are processed in less than 9 microseconds, not counting relay settling time or software overhead inherent in I/O libraries such as VISA. To determine the relay settling time, refer to Relay Settling Time in the Specifications section.

Consult the 1260-01T User's Manual for a comparison of the message-based and register-based modes of operation.

Operating In Message-Based Mode

Channel Descriptors For The 1260-112

The standard 1260-01T commands are used to operate the 1260-112 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 1260-112 module. This is a number is in the range from 1 through 12, inclusive.
- <channel> is the 1260-112 channel to operate. This is a number in the range from 0 through 20, 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 1260-112:

`OPEN (@8(0))`	Open channel 0 on the 1260-112 that has module address 8.
`CLOSE (@8(0,7))`	Close channels 0 and 7 on the 1260-112 that has module address 8.
`CLOSE (@2(7:12))`	Close channels 7 through 12 inclusive on the 1260-112 that has module address 2.

Reply To The MOD:LIST? Command

The 1260-01T 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>

The <module-specific identification string> for the 1260-112 is:

```
1260-112 20-CHANNEL DPDT 2A SWITCH MODULE
```

So, for a 1260-112 whose <module address> is set to 8, the reply to this query would be:

```
8 : 1260-112 20-CHANNEL DPDT 2A SWITCH
MODULE
```

Operating The 1260-112 in Register-Based Mode

In register-based mode, the 1260-112 is operated by directly writing and reading control registers on the 1260-112 module. The first control register on the module operates channels 0 through 7. The second control register operates channels 8 through 15. The third control register operates channels 16 through 19, etc. When a control register is written to, all channels controlled by that register are operated simultaneously.

The control registers are located in the VXIbus A24 Address Space. The A24 address for a 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 1260-112 module. This is a value in the range from 1 and 12 inclusive.
3. The 1260-112 control register to be written to or read from. Each control register on the 1260-112 has a unique address.

The base A24 address for the 1260-112 module may be calculated by:

(A24 Offset of the 1260-01T) + (1024 x Module Address of 1260-112).

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

A 1260-112 with a module address of 7 would have the base A24 address computed as follows:

Base A24 Address of 1260-112 = 204000_{16} + (400_{16} x 7_{10}) = $205C00_{16}$

The control registers for Adapt-a-Switch plug-ins and conventional 1260-Series modules are always on odd-numbered A24 addresses. The three control registers for the 1260-112 reside at

the first three odd-numbered A24 addresses for the module:

(Base A24 Address of 1260-112) + 1 = Control Register 0

(Base A24 Address of 1260-112) + 3 = Control Register 1

(Base A24 Address of 1260-112) + 5 = Control Register 2

So, for our example, the three control registers are located at:

205C01	Control Register 0, controls channels 0 through 7
205C03	Control Register 1, controls channels 8 through 15
205C05	Control Register 2, controls channels 16 through 19.

Table 3-1 shows the channel assignments for each control register.

Table 3-1, Control Register Channel Assignments

Control Register	Channels							
	Bit 7 (MSB)	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0 (LSB)**
0	7	6	5	4	3	2	1	0
1	15	14	13	12	11	10	9	8
2	23	22	21	20	19	18	17	16
3	31	30	29	28	27	26	25	24
4	39	38	37	36	35	34	33	32
5	47	46	45	44	43	42	41	40
6	55	54	53	52	51	50	49	48
7	63	62	61	60	59	58	57	56
8	71	70	69	68	67	66	65	64
9	79	78	77	76	75	74	73	72

Setting a control bit to 1 closes the corresponding channel, and clearing the bit to zero opens the corresponding channel. Thus, if you write the value 1000 0101 binary = 133 decimal = 85 hexadecimal to Control Register 0, channels 0, 2, and 7 will close, while channels 1, 3, 4, 5, and 6 will open.

The present control register value may be read back by reading an 8-bit value from the control register address. **The value is inverted.** In other words, the eight-bit value read back is the one's complement of the value written.

If you want to change the state of a single relay without affecting the present state of the other relays controlled by the control register, you must:

1. Read the control register
2. Invert the bits (perform a one's complement on the register data)
3. Perform a bit-wise AND operation, leaving all but the specific control register bit for the relay to change
4. **To open**: continue to step 5. **To close**: OR in the bit for the relay to close.
5. Write the modified value back to the control register.

For example, to close channel 13:

1. Read Control Register 1 (this register controls channels 8 through 15, with channel 8 represented by the LSB)
2. Invert the bits in the value read in step 1

3. AND with 1101 1111 binary (the zero is in the position corresponding to channel 13)
4. OR with 0010 0000 binary
5. Write the value to Control Register 1

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 1260-112 module.

Test Points

The following test points are available: GND, +5V (V_{CC}) and LBOARDSEL. LBOARDSEL is useful as a SYNC pules to view logic events and verify individual board addressing.

1260-112
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 1260-112 with module address 7 */
#define MOD_ADDR_120    7


void example_operate_1260_112(void)
{
      ViUInt8 creg_val;
      ViBusAddress creg0_addr;
      ViBusAddress creg1_addr;
      ViBusAddress creg2_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_118 << 10) + 1;
      creg1_addr = creg0_addr + 2;
      creg2_addr = creg1_addr + 2;
```

```
	/* close channel 13 without affecting the state of */
	/* channels 8, 9, 10, 11, 12, 14, and 15 */
	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 13 unchanged */
	creg_val &= ~ (0x20);

	/* OR in the bit to close channel 13 */
	creg_val |= 0x20;

	/* 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 16 without affecting channels 17 through 23 */
	error = viIn8 (hdl1260, VI_A24_SPACE, creg2_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 16 unchanged */
	/* leave bit 0 clear to open channel 16 */
	creg_val &= ~ (0x01);

	/* write the updated control register value */
	error = viOut8 (hdl1260, VI_A24_SPACE, creg2_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 */
	}
}
```

Chapter 4
OPTIONAL ASSEMBLIES

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Assembly 407664
Connector kit, 160 Pin, Crimp

#	Component	Description	U/M	Qty Reqd.	REF
1	602258-116	CON-CAB-RCP160C, 100S	-E EA	1.000	
2	602258-900	TRMCRP-SNP-U-F26-20G	-E EA	170.000	

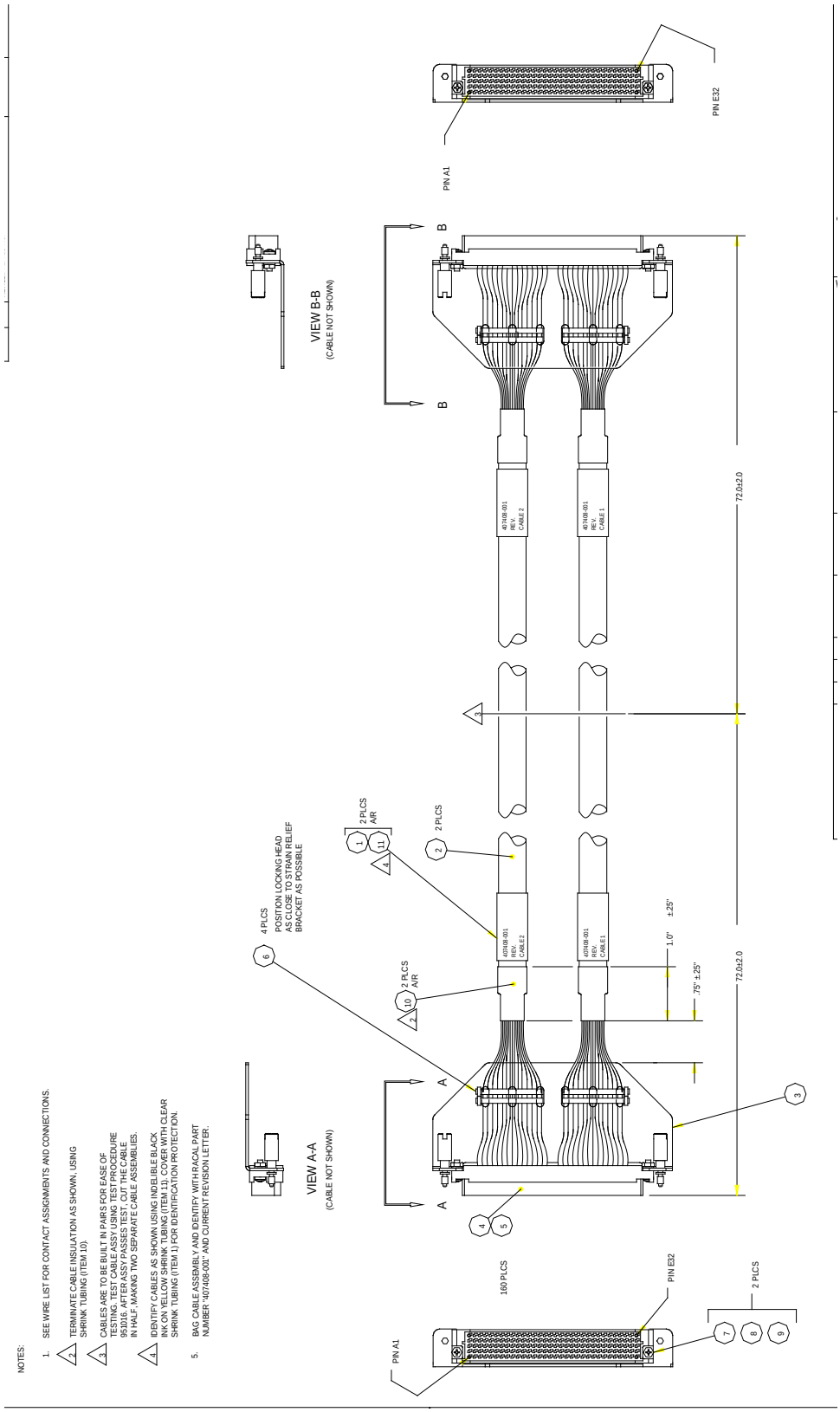

Figure 4-1, Cable Assembly 407408-001, 160 Pin