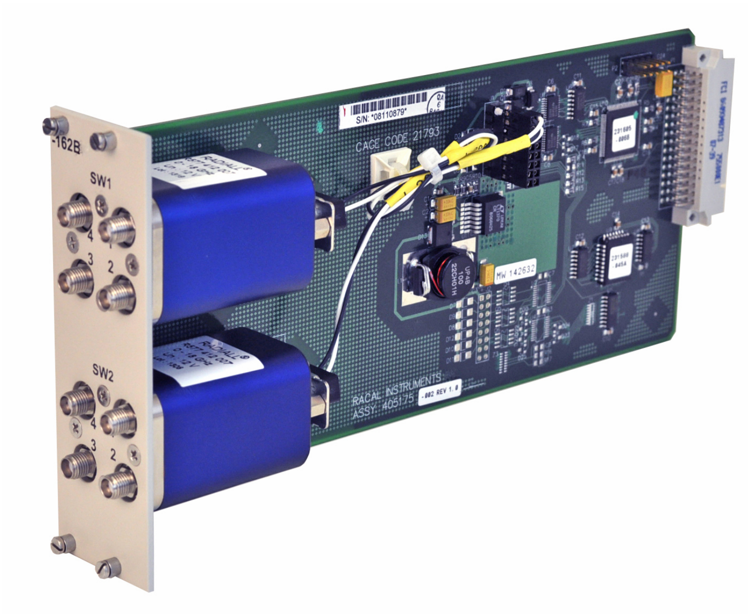
RACAL INSTRUMENTS™
1260-162AH/BH
MICROWAVE TRANSFER
SWITCH PLUG-IN

Publication No. 980824-162AH/BH Rev. A



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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.

EC Declaration of Conformity

We

Astronics Test Systems
4 Goodyear Street
Irvine, CA 92618

Declare under sole responsibility that the

1260-162AH,-162BH
RF SPDT Switch Plug-In
PN 408597-001AH,-002BH

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 the 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, August 11th, 2015

Quality Manager

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DOCUMENT CHANGE HISTORY

Revision	Date	Description of Change
A	8/6/2015	Initial release
A	8/18/2015	Admin. No revision roll. ECN06380. Adds CE certificate.

Chapter 1
SPECIFICATIONS

Introduction – 1260-162AH/BH

The 1260-162AH and 1260-162BH are microwave plug-in switch modules developed for a variety of platforms such as the 1260-100 Adapt-a-Switch carrier and the 1256 Switching System. These switches are software-configurable, single (–162AH) and dual DPDT (–162BH) Microwave Transfer Switches for DC to 18 GHz.

The 1260-162 modules include the following features:

- Standard Adapt-a-Switch™ and 1256 Switching System plug-in design, providing for ease of replacement.
- Data-Driven embedded descriptor, allowing immediate use with any platform compatible with the Adapt-a-Switch standard, regardless of firmware level.

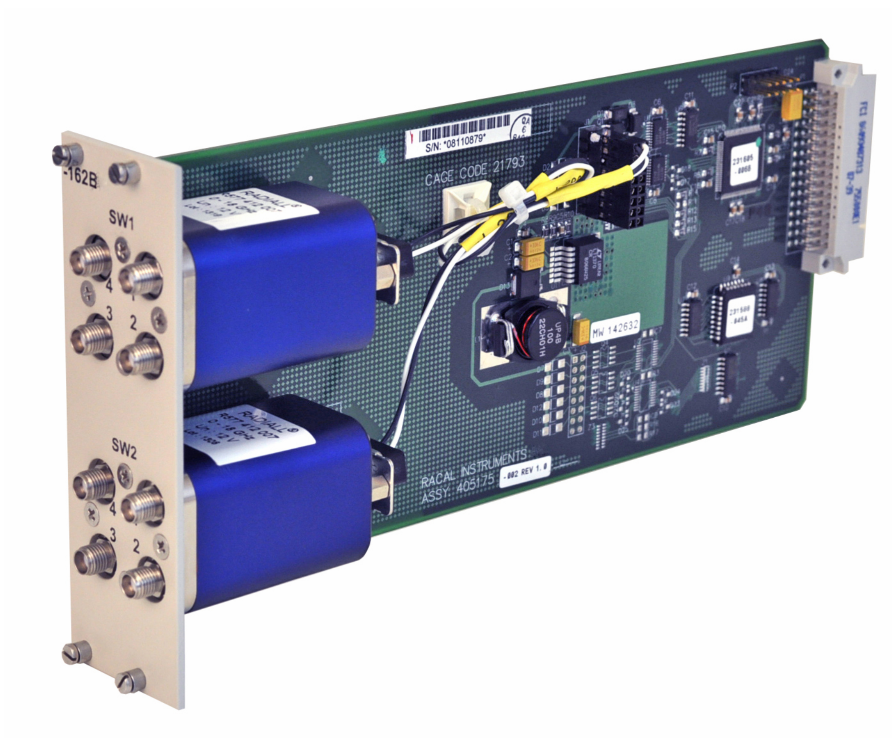

Figure 1-1, 1260-162BH

Specifications – 1260-162AH/BH

Input / Output Specifications

Frequency Range (GHz)	**DC-3**	**3-8**	**8-12.4**	**12.4-18**
VSWR (Max dB)	1.20	1.30	1.4:1	1.50
Insertion loss (Max dB)	0.2	0.3	0.4	0.5
Isolation (Min dB)	80	70	65	60
Impedance	50 Ω nominal			
Max Avg Power (Watts)	240	150	120	100

Switching Time	<20 msec typical	
Switch Contact Lifetime	2.5 million cycles per position	
Available I/O Channels	Single DPDT RF Transfer Switch	
Shock	30g, 11 ms, ½ sine wave	
Vibration	0.013 in. P-P, 5-55 Hz	
Bench Handling	4-inch drop at 45°	
Cooling	See 1260-100 cooling data	
Temperature		
Operating	-20°C to +60°C	
Storage	-40°C to +75°C	
Relative Humidity	90% non-condensing at <30° C	
Altitude		
Operating	10,000 feet	
Non-operating	15,000 feet	
Power Requirements +5 VDC Amps Maximum	1260-162AH	1.77 A
	1260-162BH	3.53 A
Weight	1260-162AH	5.4 oz, 150 gm
	1260-162BH	7.0 oz, 200 gm
Mean Time Between Failures (MTBF)	860,000 hrs	
Mean Time to Repair (MTTR)	< 5 minutes	

Power Dissipation – 1260-162AH/BH

The cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed. The carrier can nominally dissipate approximately 100 W. Even with all channels driven to maximum outputs, up to two 1260-162AH plug-ins may be used together in a 1260-100 without exceeding the maximum allowable power dissipation of the carrier.

If the 1260-162AH will be used in conjunction with other cards, the dissipation should be computed and summed with the total worst-case dissipation of the remaining modules.

For example, a 1260-162AH module would dissipate the following energy:

Quiescent power dissipation = 0.75 W maximum

With one relay energized = 4.85 W maximum

For example, a 1260-162BH module would dissipate the following energy:

Quiescent power dissipation = 0.75W maximum

With one coil energized = 4.85 W maximum

With two coils energized = 9.7 W maximum

This is acceptable power dissipation for an individual plug-in module. If one additional module is likewise loaded, then the overall carrier dissipation is approximately 9.7 W for the –162AH and 19.4 W for the –162BH, both of which are well within the cooling available in most commercial VXIbus chassis.

Ordering Information

Listed below are part numbers for both the 1260-162 switch module and available mating connector accessories. Each 1260-162 uses a single mating connector.

ITEM	DESCRIPTION	PART #
1260-162AH RF Switch Module	Switch Module, 1 DPDT DC-18 GHz Consists of: P/N 405175-001 PCB Assy P/N 980824-162AH/BH Manual	408597-001
1260-162BH RF Switch Module	Switch Module, 2 DPDT DC-18 GHz Consists of: P/N 405175-002 PCB Assy P/N 980824-162AH/BH Manual	408597-002
Additional Manual		980824-162AH/BH

Chapter 2
INSTALLATION INSTRUCTIONS

Unpacking and Inspection

1. Remove the 1260-162 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 1260-162 module option and the 1260-162AH/BH Users Manual. Notify Customer Support if the module appears damaged in any way. Do not attempt to install a damaged module into a VXI chassis.
3. The 1260-162 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:

For instructions on installing the 1260-162 into a switching platform, refer to the user manual for that platform, in the "Getting Started" chapter under the "Inserting and Removing Plug-ins" section. Manuals are available at the Astronics Test Systems website: www.astronicstestsystems.com

Module Configuration

The 1260-162 modules are software-selectable coaxial switch plug-ins for switching platforms such as Adapt-a-Switch and 1256 System. The 1260-162AH is a single DPDT RF Transfer Switch, and the 1260-162BH is a dual DPDT RF Transfer Switch.

Front Panel Connectors 1260-162AH

The 1260-162AH has one front panel RF relay, labeled SW1, with 4 SMA connectors. See **Figure 2-1** for SMA connector designations. See **Figure 2-2** for the relay diagram, and **Figure 2-3** for a block diagram of the 1260-162AH.

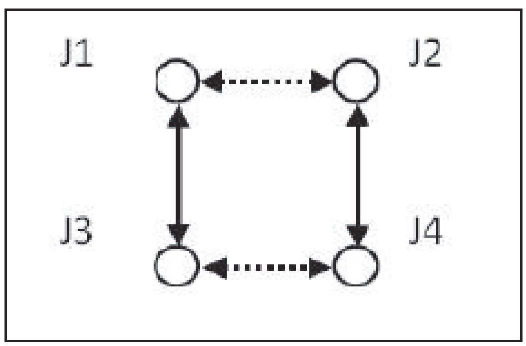

Figure 2-1, 1260-162AH SMA Connector Designations

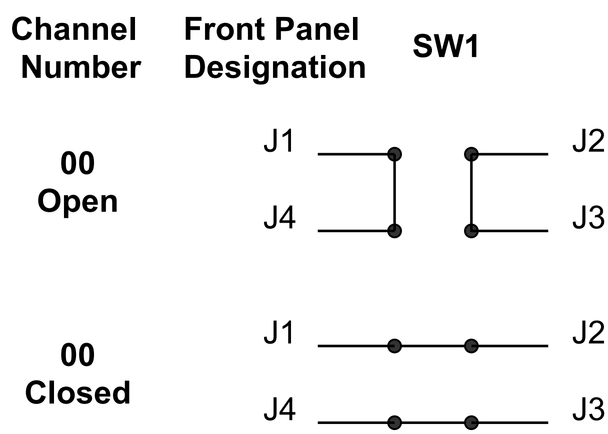

Figure 2-2, 1260-162AH Relay Diagram

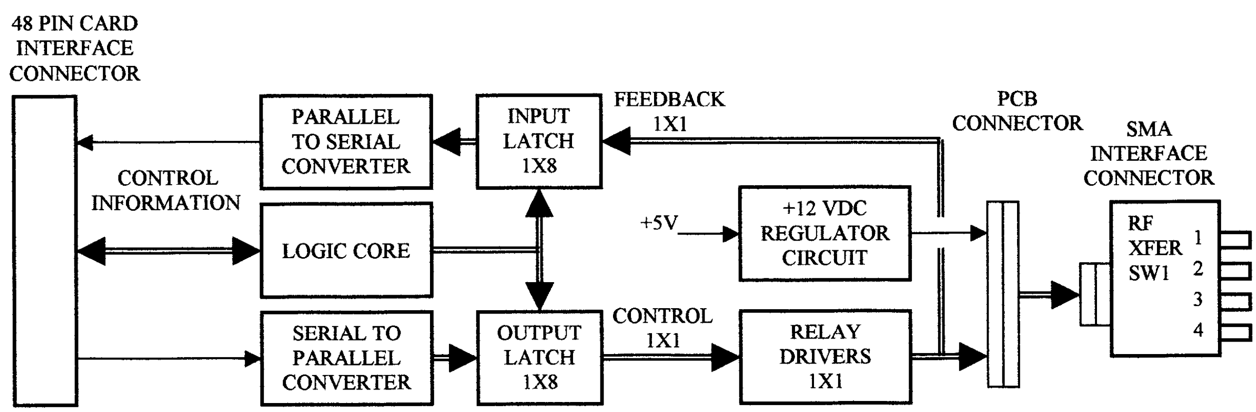

Figure 2-3, 1260-162AH Block Diagram

Front Panel Connectors 1260-162BH

The 1260-162BH has two front panel RF relays, labeled SW1 and SW2, with 4 SMA connectors each. See **Figure 2-4** for SMA connector designations. See **Figure 2-5** for the relay diagram and **Figure 2-6** for a block diagram of the 1260-162BH.

See page 2-6 for torque requirements.

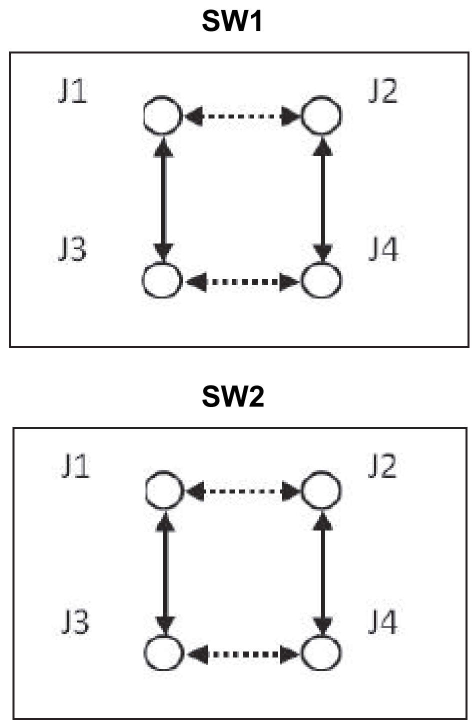

Figure 2-4, 1260-162AH SMA Connector Designations

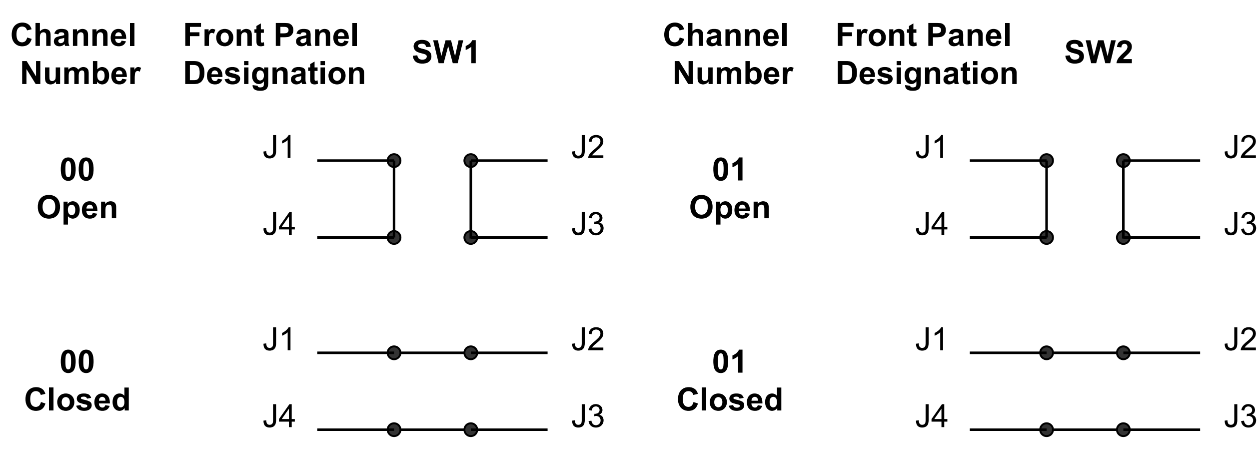

Figure 2-5, 1260-162BH Relay Diagram

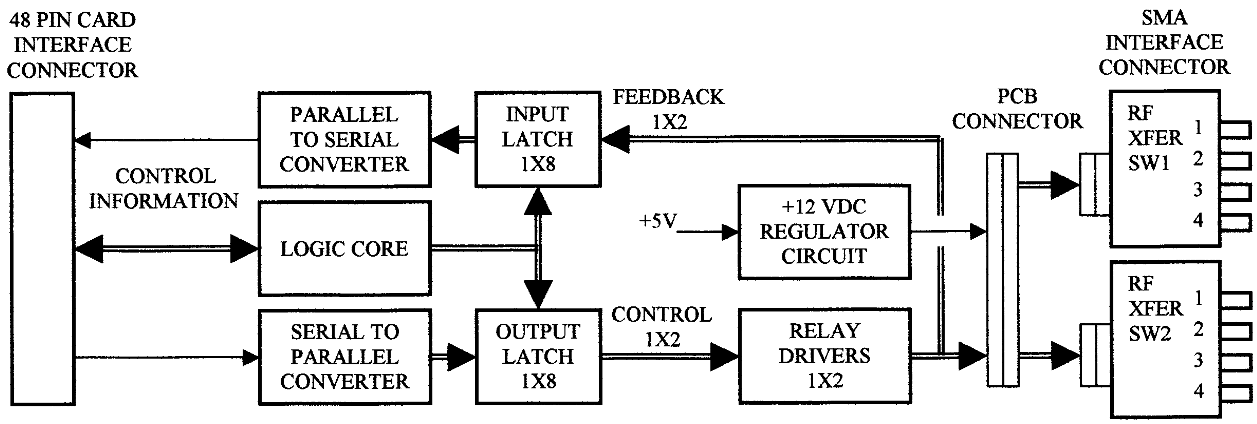

Figure 2-6, 1260-162BH Block Diagram

Mating Connectors

Mating connectors are SMA type. Use connectors that are suitable for the type of connecting coax and frequency range to be used. **Maximum connector engagement should not exceed 9 in. lbs. torque**. It is highly recommended that a torque wrench (Ma-Com P/N 2098-5065-54 or equivalent) be used to torque the SMA connectors. A ¼-inch drive deep slotted socket, P/N 456890, is available for installation and removal of connectors.

Chapter 3
MODULE OPERATION

Reply to the MOD:LIST? Command

The platform containing the 1260-162 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 value of <module-specific identification string> for the 1260-162 depends on the version (1260-162AH or 1260-162BH). For the single transfer switch (1260-162AH), the string value is:

```
1260-162A SINGLE RF TRANSFER SWITCHING MODULE
```

For the two transfer switches (1260-162BH), the string value is:

```
1260-162B DUAL RF TRANSFER SWITCHING MODULE
```

Thus, for a 1260-162AH whose module address is 2, the reply to this query would be:

```
2 : 1260-162A SINGLE RF TRANSFER SWITCHING MODULE
```

Operating in Register-Based Mode

The 1260-162 offers register-based mode when installed in VXI platforms that support it. In register-based mode, the 1260-162 is operated by directly writing and reading to/from ports controlling eight relays each. To access the various 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 1260-162 module. This is a value in the range from 1 and 12 inclusive.
3. The 1260-162 port or control register to be written to or read from. Each register on the 1260-162 has a unique offset from the base address.

The base A24 address for the 1260-162 module may be calculated by:

(A24 Offset of the 1260-01T) + (1024 x Module Address of 1260-162).

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

A 1260-162 with a module address of 7 would have the base A24 address computed as follows:

Base A24 Address of 1260-162 = 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 1260-162 reads and writes to the same location. For control registers, the 1260-162 writes to one location, but reads back from another. **Table 3-1** provides offsets relative to the base address of the module for all port and control registers of the 1260-162. To obtain the absolute address where data is to be written or read from, the base address is added to the offset:

(Base A24 1260-162 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 1260-162 relays. **Table 3-1 through 3-4** provide a detailed explanation of each register and how it interacts with the 1260-162 module.

Table 3-1, Register Offset Addresses of the 1260-162 Module

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

Table 3-2, ID Register Functionality of the 1260-162

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 1260-162 Module

Register Table		Port A
Module Version	**Bit**	**Functionality Description**
All -162BH	0	Relay SW1 (0: switch open 1: switch closed)
	1	Relay SW2 (0: switch open 1: switch closed)
	2	(not used)
	3	(not used)
	4	(not used)
	5	(not used)
	6	(not used)
	7	(not used)

Table 3-4, EPROM Descriptor Functionality of the 1260-162 Module

Register Table		EPROM Descriptor Register
Module Version	**Bit**	**Functionality Description**
All	0 1 2 3 4 5 6 7	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. 1260-162AH or 1260-162BH). These identification strings are located at EPROM memory locations 0x23 through 0x34.

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 1260-162 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 1260-162 module.

1260-162 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 1260-162 with module address 7, port 1,
and write data of 0xAA */
#define MOD_ADDR_162  7
#define PORT_NUMBER   1
#define DATA_ITEM     0xAA


void example_operate_1260_162(void)
{
     ViUInt8 creg_val;
     ViBusAddress portA_addr, offset;
     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 */
```

```
    portA_addr = (MOD_ADDR_162 << 10) + 1;
    offset = portA_addr + (PORT_NUMBER << 1);
    error = viOut8 (vi, VI_A24_SPACE, offset, DATA_ITEM);
    if (error < 0)
        return( error );
    /* close the VISA session */
    error = viClose( hdl1260 );
    if (error < 0) {
        /* error handling code goes here */
    }
}
```

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