

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

Universal Switching Corporation

OPERATING AND PROGRAMMING MANUAL

Model VXI-RMR242F-xxxB

DC-26.5GHz

State-of-the-Art Switching Solutions

Duplication of this manual is prohibited by Universal Switching Corporation. Additional copies are available for purchase from Universal Switching Corporation.

Warranty

This product is warranted against manufacturing defects, and workmanship for a period of two years from the date of shipment from our factory. During this period, Universal Switching will, at its option, either repair or replace products which prove to be defective or out of specification per the original purchase order or contract. Damage by misuse or abnormal conditions of operation, or evidence of partial or complete disassembly beyond normal maintenance or expansion procedures voids this warranty. Since Universal Switching Corporation has no control over conditions of use for the products it manufactures, no warranty is made or implied as to the suitability for the customer's intended use, beyond such performance specifications as are made a part or the purchase order or contract.

Equipment shipped F.O.B. Universal Switching Corporation shall become the property of the Buyer upon delivery to the carrier. Equipment shipped F.O.B. Destination shall become the property of the Buyer upon delivery acceptance from the carrier. Damage during shipment, for items shipped F.O.B. Universal Switching Corporation should be handled by immediately requesting the carrier's inspection upon evidence of damage to the equipment. This warranty excludes all other warranties expressed or implied. Universal Switching Corporation shall not be liable for any special, indirect, or consequential damages.

For warranty service or repair, the Buyer shall prepay shipping charges to Universal Switching Corporation, and Universal Switching Corporation shall pay shipping charges to return the product to the Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Universal Switching Corporation from another country.

Universal Switching Corporation warrants that its software and firmware designated by Universal Switching Corporation for use with an instrument will execute its programming instructions when properly installed on that instrument. Universal Switching Corporation does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error-free.

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

CONTENTS

1. INTRODUCTION TO THE VXI-RMR242F-024B 7

1.1. Configurations Available 8

1.2. Improvements 9

2. INSTALLATION AND SETUP 11

2.1. Unpacking 11

2.2. Environmental 11
2.2.1. Storage and Shipping 11
2.2.2. Operating Environment 12
2.2.3. Installation Site Parameters 12

2.3. Shipment of the Module 12

2.4. Installing / Removing the VXI-RMR242F-024B Module 13

2.5. Statically or Dynamically Configured Logical Addressing 14
2.5.1. Changing the Logical Address from the DIP Switch (Statically) 14
2.5.2. Changing the Module to Dynamically Configured Logical Addressing 14

2.6. IRQ and Function DIP Switch Settings 15
2.6.1. Enable Interrupt Upon Completion of Command 16

2.7. Faceplate LED Indicators 17
2.7.1. FAIL LED Indicator 17
2.7.2. ACS LED Indicator 17

3. SWITCHING CONFIGURATION 19

3.1. Description of Configuration 20

4. RELAY SECTION ADDRESSING TABLE 23

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

5. PROGRAMMING THE VXI-RMR242F-024B 25

5.1. ID /Logical Address Space Register (0) 25
5.1.1. Manufacturer ID 25
5.1.2. Address Space 25
5.1.3. Device Class 25

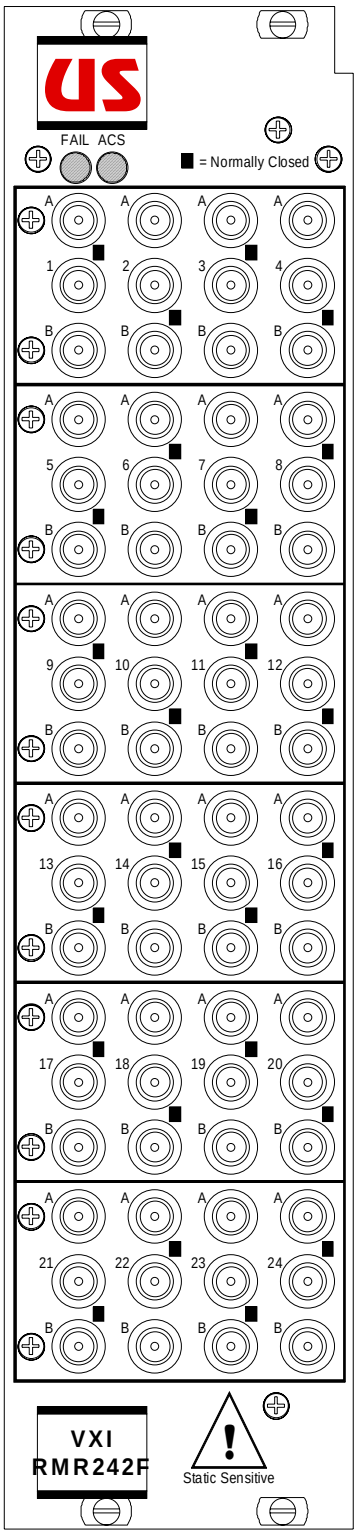
5.2. Device Type Register (2) 26

5.3. Status Register (4) 26

5.4. Command and Address Registers 27
5.4.1. Command Mode Register (8) 27
5.4.2. Relay Port and Store Register (10) 28
5.4.3. GO (execute command) Register (14) 28
5.4.4. Connect Command 29
5.4.4.1. H/P E1406A Command Module and LabVIEW Connect Example 29
5.4.5. Disconnect Command 30
5.4.5.1. H/P E1406A Command Module and LabVIEW Disconnect Example 31
5.4.6. Clear Command 32
5.4.6.1. H/P E1406A Command Module and LabVIEW Clear Example 33
5.4.7. Store Command 34
5.4.8. Recall Command 34
5.4.9. All-Connect Command 35
5.4.9.1. H/P E1406A Command Module and LabVIEW All-Connect Example 36

6. VXI-RMR242F-024B SPECIFICATIONS 37

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com



PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

1. Introduction to the VXI-RMR242F-024B

The Model VXI-RMR242F—024B is a register-based high density VXIbus switching module manufactured by Universal Switching Corporation (**US**). The module occupies two C-size mainframe slots, and is designed to meet version 1.4 of the VXIbus specification. The faceplate of the module has LED indicators and all user signal connections. The switching configuration delivers twenty-four (24) individual 1x2 (form C) relay sections with a minimum bandwidth of DC to 18GHz and a usable bandwidth of DC to 26.5GHz. Each relay section is shielded from the others providing very high crosstalk isolation and low noise for sensitive measurements.

Designed for versatility and high performance signal switching, the unit incorporates the latest in switching and control technology. It is part of the second-generation VXI modules designed by Universal Switching. It delivers compact and lightweight intelligent switching technology.

Some of the key features are:

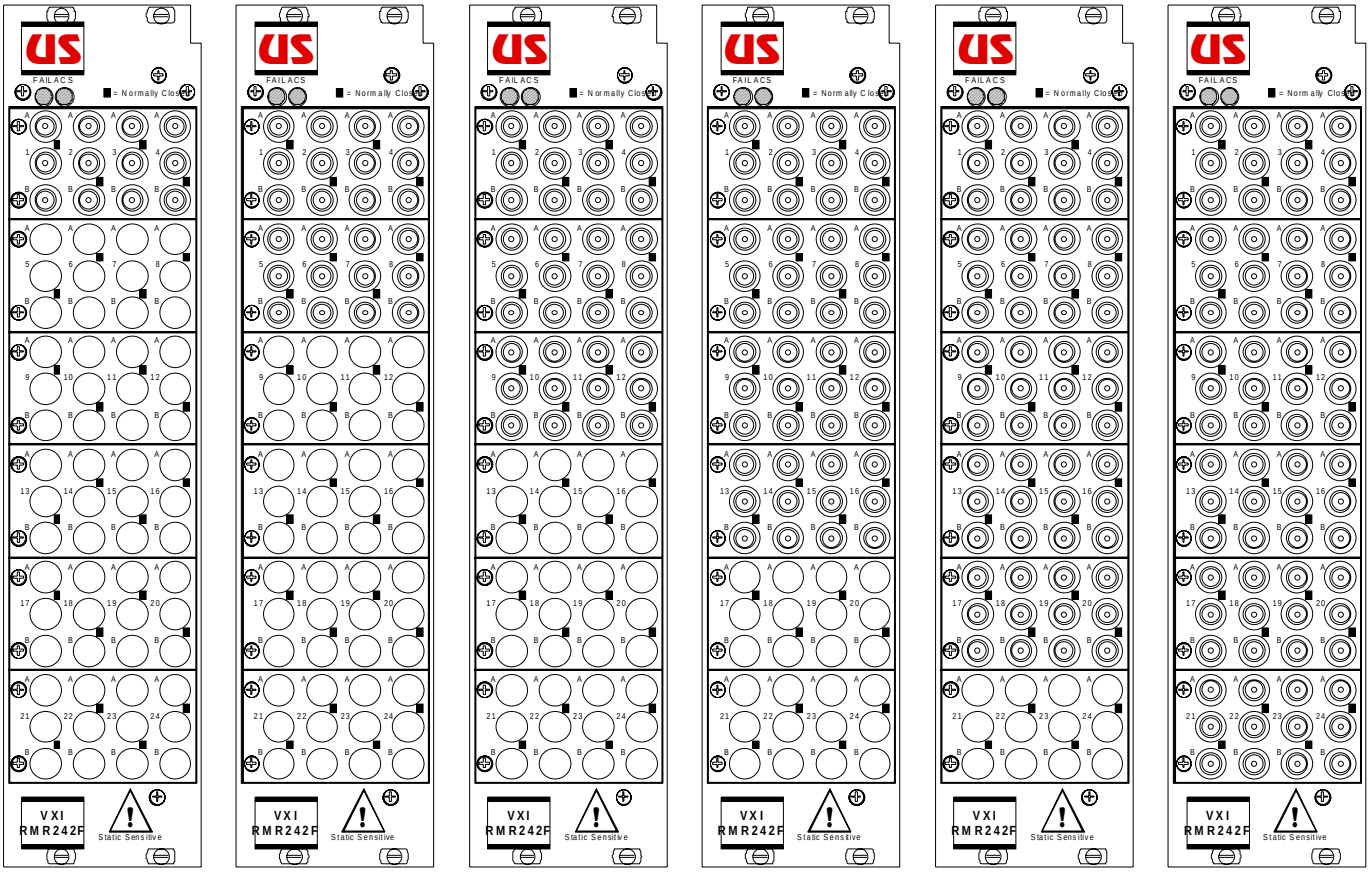
- Wide bandwidth configuration (DC-26.5GHz)
- Compact C-2 module design
- Fail-Safe relay ports reduce power consumption and increases reliability
- Individually controlled relay sections
- Ultra high reliability switching elements (>5 million operations)
- Economical and fast register-based control
- High performance stainless steel SMA signal connectors

The signal paths are bi-directional. The user may connect a single source to one of two different destinations, or may select from either of two sources and connect to a single destination.

1.1. Configurations Available

The VXI-RMR242F is available in six different configurations, each with a different number of relays when delivered from the factory. An update kit can be purchased that will allow the user to upgrade a reduced configuration to a larger capacity while in the field. NOTE: Addressing positions in reduced configurations that are not included will result in a coil error.

Model Number	Number of Relay Sections
VXI-RMR242F-004B	4
VXI-RMR242F-008B	8
VXI-RMR242F-012B	12
VXI-RMR242F-016B	16
VXI-RMR242F-020B	20
VXI-RMR242F-024B	24



Universal Switching Corporation
PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

1.2. Improvements

Some improvements have been added to the Model VXI-RMR242F-024B Switching Module. This module was preceded by the "A" version. Modules manufactured after July 1999 have these features included:

- Lower power consumption due to advanced dual relay control circuitry being added. Power consumption was reduced to only 3 watts of 5-volt power increasing life and simplifying cooling requirements. The original module consumed about 85 watts.

- Virtually eliminated magnetic relay interaction under certain conditions with new and improved relay technology.

- Second-generation register-based controller board.

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

Universal Switching Corporation
PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

2. Installation and Setup

This section contains information regarding setup prior to operation. Once the module has been properly configured, it will be ready for installation into your VXI mainframe and immediate operation.

It is important to follow the instructions in this section. The information that is covered will maximize the performance and life of the System VXI-RMR242F-024B. For safe and trouble-free operation, you should follow these instructions and advisories.

2.1. Unpacking

The system is shipped in commercial grade packaging for worldwide delivery. It is place in a static resistant bag within closed cell foam padding. Please pay attention when opening the shipping container so as to not inflict any cosmetic damage to the module.

If the contents are not complete, if there is mechanical damage or visible defects, or if the instrument does not pass the power up self-test verification, you must notify the factory within 5 days of receipt. Keep all shipping materials for the carrier's inspection.

2.2. Environmental

You may operate the VXI-RMR242F-024B in a normal lab, or production environment, or a more rugged industrial or mobile environment without any additional considerations. Protection should be provided against temperature extremes (shock) which can cause condensation.

2.2.1. Storage and Shipping

The VXI-RMR242F-024B module may be stored or shipped in environments with the following limitations:

- Temperature: -20 degrees C to +85 degrees C
- Humidity: 0 to 90% (non-condensing)
- Altitude: 50,000 feet

2.2.2. Operating Environment

The VXI-RMR242F-024B module may be used in any environment with the following limitations:

- Temperature: -20 degrees C to +65 degrees C
- Humidity: 0 to 90% (non-condensing)

2.2.3. Installation Site Parameters

The area that the VXI-RMR242F-024B is to be installed should be as clean as possible. A dusty environment would cause an increase in maintenance cleaning of the VXI system. Ideally, the VXI system would be installed in a controlled environment equipped with an air filtration system.

It is assumed that the module will be installed in a standard C-size VXIbus mainframe. The module is 2-slots wide. All signal connections to the module are on the faceplate.

2.3. Shipment of the Module

If the module needs to be shipped back to the factory for service or modification, please attach a tag to the system identifying the current owner (including address and phone number) model and serial number of the module, plus a brief description or the required service or suspected problem.

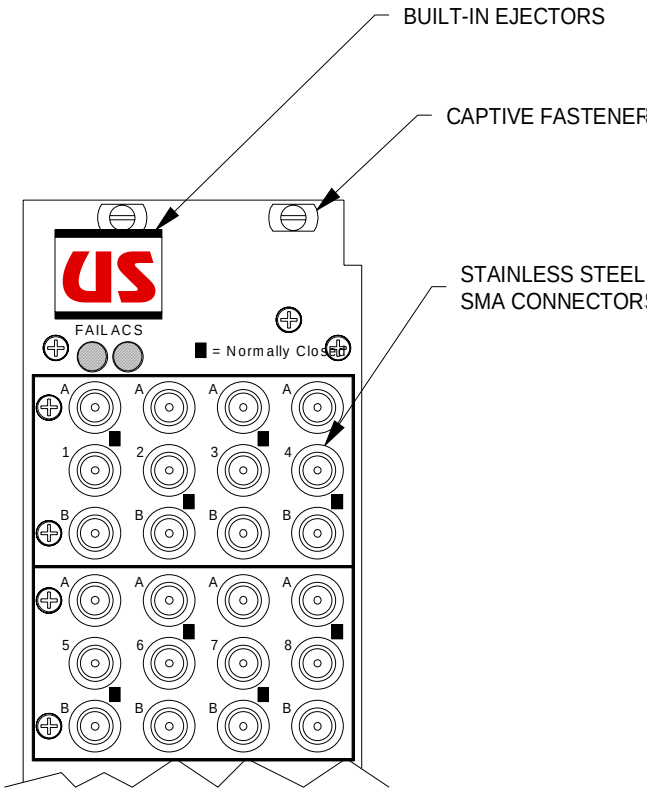
Mark the container ***FRAGILE*** to help insure safe handling by the carrier. In correspondence, refer to the return item by the model number and serial number.

> ***Note: Call the factory for an RMA number prior to sending any module back. No unit will be accepted without an RMA number.***

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

2.4. Installing / Removing the VXI-RMR242F-024B Module

Once it has been configured, install the module into your C-size VXI mainframe by lining the module up with the slot guides and then pressing the module firmly into the backplane connectors.



> ***Note: You should secure the module within the mainframe. You can use the screws located above and below the handles on the module's faceplate. This is important since damage could occur if the module is inadvertently pulled from the mainframe while the power is on. It also insures that the module is completely installed into the mainframe's backplane.***

Remove the module by loosening the screws securing the module then pressing up on the handle with the "**US**" logo while pressing down on the handle with the model number. You will feel the P1 and P2 connectors extract from the backplane connectors. Continue sliding the module out on its guides until free from the mainframe.

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

2.5. Statically or Dynamically Configured Logical Addressing

Statically configured modules are modules whose logical address is set with the logical address switch bank. Dynamically configured modules are modules whose logical address is programmed by the Resource Manager (RM) located in the "Slot 0" position of your VXI mainframe. The RM usually does this during power-up procedures of the VXI system.

When the VXI-RMR242F-024B leaves the factory, **it is pre-configured for logical address 8**. This means that the module's logical address is Statically ready for immediate addressing at logical address 8. The logical address can be altered by means of the DIP switch located on the side of the module. The DIP switches can be accessed by removing the module from the VXI mainframe. The switches are located on the left side near the VXIbus P1 and P2 connectors.

2.5.1. Changing the Logical Address from the DIP Switch (Statically)

Two eight-position DIP switches are located on the side of the module. The upper of the two switches is used to set a "statically" chosen logical address between 2 and 254. Refer to the table below.

Value	Up	Down
1	1	0
2	1	0
4	1	0
8	1	0
16	1	0
32	1	0
64	1	0
128	1	0

The shaded portion of the table indicates the factory default DIP switch positions.

2.5.2. Changing the Module to Dynamically Configured Logical Addressing

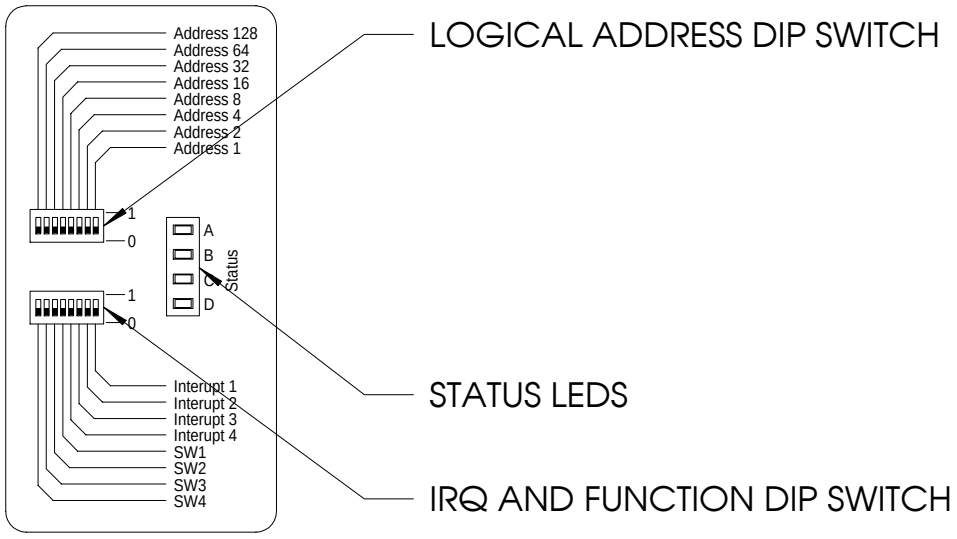
Setting the module's logical address to 255 (all up) will allow the RM (Resource Manager) to assign a logical address to the module during its power-up procedures. This is not a valid logical address for "statically" configured modules. See your Resource Manager Operations Manual for further details on Dynamically configured Modules.

2.6. IRQ and Function DIP Switch Settings

The module may be configured for Interrupt Requests (IRQ). This is set by selecting the desired IRQ number using the lower DIP switch on the side of the module. If positions 1 through 3 are set to the "0" position (down), the IRQ is set for "NONE". The binary setting of the three positions equals the IRQ number. For example; if both position 1 and 3 or S1 were moved to the "1" position (up), then the module would be set for IRQ5.

NOTE: Positions 6, 7 and 8 are not used (future use).

Position	Value	OFF Position	ON Position
1	1	1	0
2	2	1	0
3	4	1	0
4	Enable Interrupt UCC	1	0
5	Auto Interlocking Enable	1	0
6	Not Used	1	0
7	Not Used	1	0
8	Not Used	1	0



490

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

2.6.1. Enable Interrupt Upon Completion of Command

Position 4 on the lower switch allows the user to set a condition where the module will generate an Interrupt Request. With position 4 up (1) the module will generate an interrupt upon completion of a command. This makes it unnecessary to poll the ready bit (8) on register 8 to ensure the command is complete.

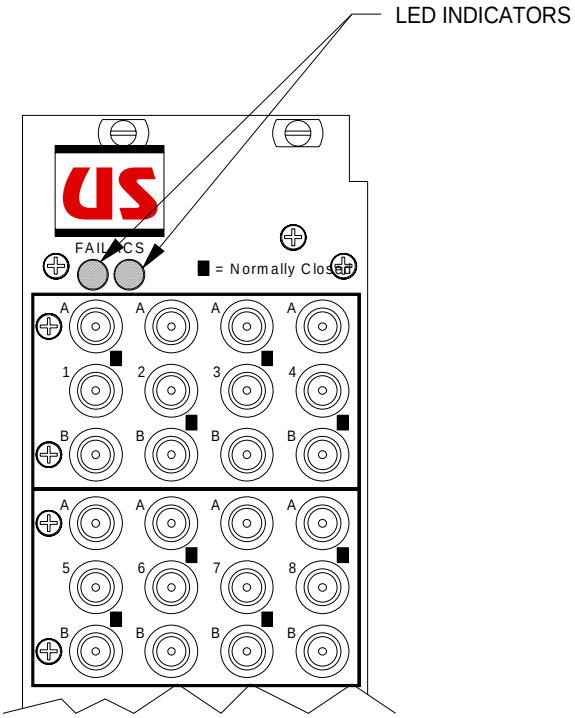
PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

2.7. Faceplate LED Indicators

The faceplate has the following two LED indicators.

2.7.1. FAIL LED Indicator

The module's built-in intelligent controller performs a self-test immediately when powering. The faceplate LED labeled FAIL will stay on during the initial self-test. The FAIL indicator will then be turned off once the self-test has been accomplished unless a FAIL condition occurs. The LED illuminates red when on, or is "water clear" when off.



2.7.2. ACS LED Indicator

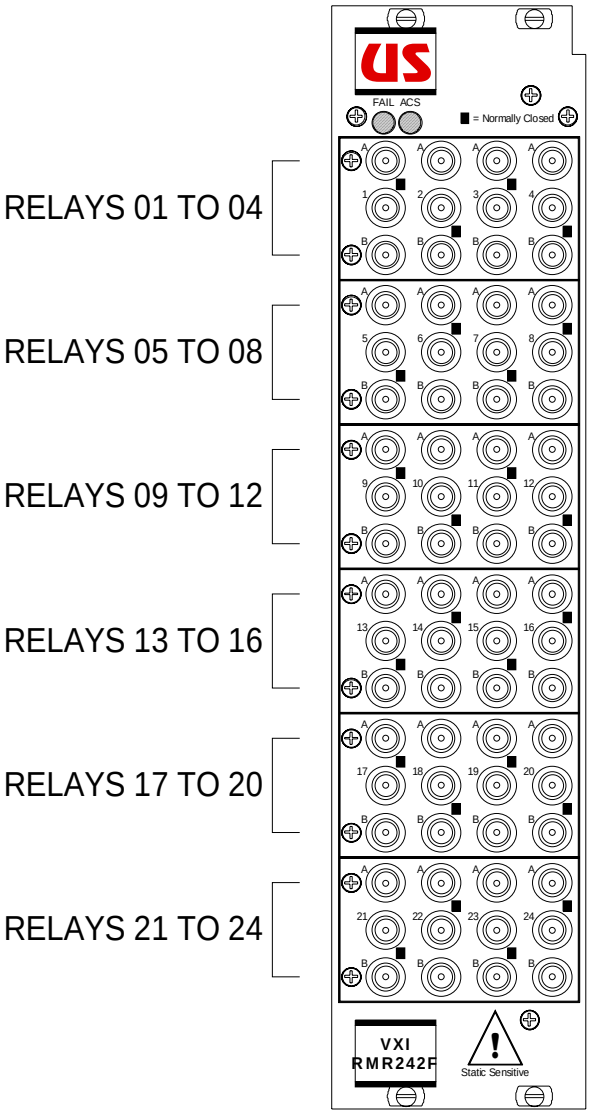
The faceplate has a blue LED labeled ACS. This LED lights while it is being accessed via the VXIbus backplane. Once the activity ceases, the LED is turned off. The LED is illuminated a bright blue color when on, or is "water clear" when off.

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

3. Switching Configuration

This section describes the construction and overall switching configuration of the module as shipped from the factory. The diagram below shows the switching configuration of the system in a simplified form. It is basically comprised of twenty-four independent 1x2 relay sections.



NOTE: These connectors are rated at a maximum torque rating of 8 pounds. Tightening these connectors at pressures higher than this can DAMAGE the connector !!! Be careful.

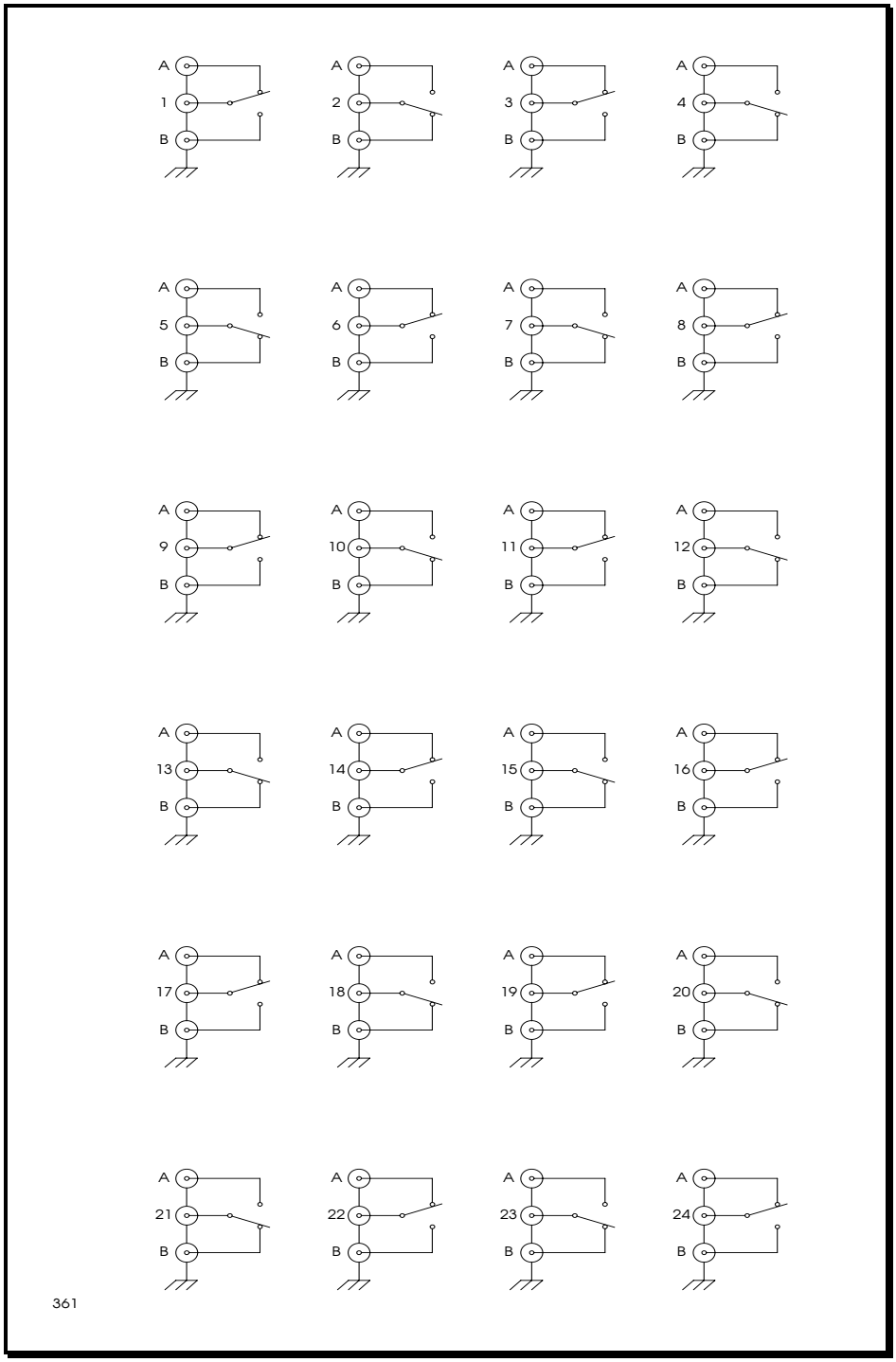
They are individually controlled and bi-directional, meaning that, for example, each 1x2 section may be used to select from one of two sources and connect to a single destination, or to connect a single source to one of two destinations. The high performance individually shielded relays may be cabled externally with semi-flex coaxial cables to deliver any number of switching configurations.

3.1. Description of Configuration

The twenty-four individual 1x2 relay sections are fail-safe type. Fail-safe relays default to a certain position providing a "through" connection when power is removed. **The relays do not stay latched in the last position if power is removed.** They fallback to the fail-safe position.

Each relay section is numbered 1 through 24 on the faceplate, and the numbered port is the "common" or "swinger" of the 1x2 relay section. The port lettered above and below the numbered port are the "throws" of the 1x2 relay section. The number 1 relay section is in the upper left of the faceplate while number 4 is in the upper right, number 21 is in the lower left and number 24 is in the lower right.

All signal connections to the system are via SMA female stainless steel connectors. The microwave relay sections (1x2's) are individually shielded from each other and from the control circuitry. The user has complete control of every port in each section.



361

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

4. Relay Section Addressing Table

Each relay section in the module has a unique address to control and monitor it. The following table is provided as a worksheet and a guide for programming, cabling and other setup operations. A column is provided for the user to add other notes for each "port" in the system. The designation NC indicates a "Normally Closed" (Fail-Safe) port while the NO designation indicates a "Normally Open" port. A bold line separates each section.

> ***Note: Please note the Normally Closed and Normally Open connections for the Fail-Safe position. These have been modified from earlier units. The original configuration specified "odd" numbered sections have the "A" port Normally Closed while the "even" numbered sections have the "B" port Normally Closed (Fail-Safe). See the diagram on Page 15, or the table below.***

Faceplate Section Number	Signal Connector ID	Relay Port	User Designations
1	A	NC	
1	1	Common	
1	B	NO	
2	A	NO	
2	2	Common	
2	B	NC	
3	A	NC	
3	3	Common	
3	B	NO	
4	A	NO	
4	4	Common	
4	B	NC	
5	A	NO	
5	5	Common	
5	B	NC	
6	A	NC	
6	6	Common	
6	B	NO	
7	A	NO	
7	7	Common	
7	B	NC	
8	A	NC	
8	8	Common	

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

Faceplate Section Number	Signal Connector ID	Relay Port	User Designations
8	B	NO	
9	A	NC	
9	9	Common	
9	B	NO	
10	A	NO	
10	10	Common	
10	B	NC	
11	A	NC	
11	11	Common	
11	B	NO	
12	A	NO	
12	12	Common	
12	B	NC	
13	A	NO	
13	13	Common	
13	B	NC	
14	A	NC	
14	14	Common	
14	B	NO	
15	A	NO	
15	15	Common	
15	B	NC	
16	A	NC	
16	16	Common	
16	B	NO	
17	A	NC	
17	17	Common	
17	B	NO	
18	A	NO	
18	18	Common	
18	B	NC	
19	A	NC	
19	19	Common	
19	B	NO	
20	A	NO	
20	20	Common	
20	B	NC	
21	A	NO	
21	21	Common	
21	B	NC	
22	A	NC	
22	22	Common	
22	B	NO	
23	A	NO	
23	23	Common	
23	B	NC	
24	A	NC	
24	24	Common	
24	B	NO	

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

5. Programming the VXI-RMR242F-024B

This section outlines programming information and provides examples to get you started with your programming. Programming is explained for a standard register based VXI system using an HP E1406A Command module (slot 0).

5.1. ID /Logical Address Space Register (0)

The VXI base address for the module is determined by the module's logical address DIP switch setting. Either static or dynamic logical addressing is selectable by the DIP switch setting. Registered 0 is referred to as the ID register. In this register, various parameters are available to the user. The manufacture ID is available, module class and address space.

5.1.1. Manufacturer ID

This number uniquely identifies the manufacturer of the module. The Universal Switching Corporation manufacturers ID number is 3772 (decimal), or EBC (hex). This is written into bits 0 to 11 of register 0.

5.1.2. Address Space

This field indicates the addressing modes of the module. The module supports only A16 registers and addressing. Bits 12 and 13 are reserved for this function and are both written with a logical "1" indicating A16 addressing only mode.

5.1.3. Device Class

This field indicates the classification of the VXI module. This module's classification is register-based. A logical "1" is written into bits 14 and 15.

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

5.2. Device Type Register (2)

Register 2 defines the device type of the module. The model number code for this specific module is 262 (decimal).

5.3. Status Register (4)

Register 4 is referred to as the status register. It is divided into seven different sections providing information about the module's status. The 16 bits of this register are referred to as bit 0 through bit 15.

Bit 0 is the reset bit, bit 1 is the system fail inhibit bit, bits 2 and 3 are the pass and ready bits (respectively), 4 through 8 are utilized to display error codes from the module (see ERROR codes below), bits 9 through 15 are set at a logical 1. If an error occurs, bits 4 through 8 may be read to determine the specific error condition.

The following codes will be written into bits 4-8 if an error is detected.

- 00 No error exists (command executed without errors)
- 01 Specified output does not exist
- 02 Specified input does not exist
- 03 Unrecognized command
- 04 Specified output is used
- 05 Specified input is used
- 06 Output not used
- 07 Input not used
- 08 Specified memory location is empty
- 09 Non-numeric argument
- 12 Random access memory checksum error
- 13 Read only memory (EPROM) checksum error
- 27 Coil error

5.4. Command and Address Registers

Commands are comprised of sequential writes of command characters and I/O information to predefined registers in the local A16 device dependent register space, offset address 08 through 14 relative to the base address of the module. The logical (base) address is determined by the DIP switches on the side of the module or dynamically assigned during power-up by the system resource manager (RM in slot 0).

Command execution status is available by reading the command register 8. To read the command execution status, bit 7 of register 8 will be set high once the current command being executed is finished. During command execution, the bit will remain low (0). This is provided once the GO register (14) has been written to.

All registers except register 14 remain unchanged until new data is written to them. For some applications, this will simplify the control of the module.

5.4.1. Command Mode Register (8)

The local register at location 8 is where the user writes the mode of operation for each command. This includes connecting and disconnecting crosspoints in the switching array. The register retains the command mode until a new value is written to the register, (or power is lost).

Valid entries are the following ASCII characters:

- C = Connect crosspoint
- D = Disconnect crosspoint
- V = Verify crosspoint
- S = Store configuration
- R = Recall stored configuration (volatile RAM)
- c = Clear all crosspoints (lower case)
- a = Close all crosspoints (lower case)

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

5.4.2. Relay Port and Store Register (10)

The local register at location 10 is where the user writes the relay port number desired for manipulation. The register retains the current entry until an new value is written to the register, (or power is lost).

The relay port register 10 is also used with the store command. The store command is used to store complete switching configurations for recall at a later time. If a number of crosspoints are closed, the switching configuration may be stored in a memory location and loaded again using the recall command. Up to 8 configurations may be stored in the configuration memory. Only the input port register (10) is utilized for the memory storage location.

Valid parameters for the input register (10) are as follows:

- Input value = 1 to 24 (for connect, disconnect or verify)
- Store value = 1 to 8 (for store or recall)

5.4.3. GO (execute command) Register (14)

The module looks for a write to the GO register before attempting to execute the information in the other registers. This register is located at location 14. In order to execute a new command, any character must be written to the GO register, plus the Command Mode, Input port and Output Port registers (defined above) must also contain valid data.

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

5.4.4. Connect Command

The connect command is used to connect (close) the Normally Open position of a specified relay section. At the same time, this disconnects (opens) the Normally Closed port of the specified section. It is a toggle effect since the NC and NO ports of a relay section are mechanically interlocked and therefore, impossible to connect at the same time.

The Command register must be written with a 'C' and the Relay Section register must contain valid section information. The Relay Section register should be written with **binary data** (16 bit unsigned) directly representing the desired relay section of the module, while the Command register accepts a regular ASCII character. The command will execute when anything is written to the GO register (see previous section).

Invalid commands will be ignored or cause an error message to be returned in the status register. Since there are only 24 relay sections, only binary 1 through 24 are valid. Anything may be written to register 16 (the example shown below has 13).

```
{base+8} = 'C' (Command, ASCII)
{base+10} = 3 (Section, binary)
{base+14} = 13 (GO)
```

The above example connects (closes) the NO "B" port of relay section 3, while at the same time opens the NC "A" port when the GO register is written. Command status can be read from the Status register when the interrupt flag has been set on the VXI bus.

> ***NOTE: The unit verifies the connection when connect commands are sent. There is no need to send a "verify" command afterwards to see if the crosspoint was made.***

5.4.4.1. H/P E1406A Command Module and LabVIEW Connect Example

The following connect example is given for the H/P E1406A Command Module (GPIB) with factory defaults, and National Instruments LabVIEW GPIB Sample Control VI. The example closes the NO port ("B" port) of relay section 17.

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON

- Type the following in the dialog box: **VXI:WRIT 8,8,67**
- Press the execute button

The data that is shown bold above writes to logical address 8, register 8 (the Command Register), and places `67' in it (which is a capital ASCII "C"). The portion "VXI:WRIT" is required for the H/P E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON
- Type the following in the dialog box: **VXI:WRIT 8,10,17**
- Press the execute button

The data that is shown bold above writes to logical address 8, register 10 (the Relay Section Register), and places a binary 17 in it. ***The binary 17 correlates directly with the relay section number on the faceplate of the module.*** The portion "VXI:WRIT" is required for the H/P E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON
- Type the following in the dialog box: **VXI:WRIT 8,14,0**
- Press the execute button

The data that is shown bold above writes to logical address 8, register 14 (the GO Register). Once something is written to the GO register, the command is executed. A zero was written to the GO register in the above example. The other two registers remain unchanged. The portion "VXI:WRIT" is required for the H/P E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

5.4.5. Disconnect Command

The Disconnect command is used to Disconnect (open) the Normally Open position of a specified relay section, and returns the relay section to the default "Fail-Safe" position. At the same time, this connects (closes) the Normally Closed port of the

specified section. It is a toggle effect since the NC and NO ports of a relay section are mechanically interlocked.

The Command register must be written with a 'D' and the Relay Section register must contain valid section information. The Relay Section register should be written with **binary data** (16 bit unsigned) directly representing the desired relay section of the VXI-RMR242F-024A module, while the Command register accepts a regular ASCII character. The command will execute when any character is written to the GO register (see Section **Error! Reference source not found.**).

Invalid commands will be ignored or cause an error flag to be returned in the status register. A lower case 'd' control character will also generate an error. Since there are only 24 relay sections, only binary 1 through 24 are valid. Anything may be written to register 16 (the example shown below has 13).

{base+8} = 'D' (Command, ASCII)
{base+10} = 12 (Section, binary)
{base+14} = 13 (GO)

The above example Disconnects (opens) the NO "A" port of relay section 12, while at the same time opens the NC "B" port when the GO register is written to. Command status can be read from the Status register when the interrupt flag has been set on the VXI bus.

5.4.5.1. H/P E1406A Command Module and LabVIEW Disconnect Example

The following Disconnect example is given for the H/P E1406A Command Module (GPIB) with factory defaults, and National Instruments LabVIEW GPIB Sample Control VI. The example opens the NO port ("A" port) of relay section 12 (it must have been closed before in order to open it!!).

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON
- Type the following in the dialog box: **VXI:WRIT 8,8,68**
- Press the execute button

The data which is shown bold above writes to logical address 8, register 8 (the Command Register), and places '68' in it (which is an ASCII "D"). The portion "VXI:WRIT" is required for the H/P

E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON
- Type the following in the dialog box: **VXI:WRIT 8,10,12**
- Press the execute button

The data that is shown bold above writes to logical address 8, register 10 (the Relay Section Register), and places a binary 12 in it. ***The binary 12 correlates directly with the relay section number on the faceplate of the module.*** The portion "VXI:WRIT" is required for the H/P E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON
- Type the following in the dialog box: **VXI:WRIT 8,14,0**
- Press the execute button

The data that is shown bold above writes to logical address 8, register 14 (the GO Register). Once something is written to the GO register, the command is executed. A zero was written to the GO register in the above example. The other two registers remain unchanged. The portion "VXI:WRIT" is required for the H/P E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

5.4.6. Clear Command

The Clear command disconnects (de-energizes) all relays. It puts all relays into the "Fail-Safe" condition. The Command register must be written with a lower case "c". The Relay Section register may contain any value of data. The command will execute when anything is written to the GO register.

Invalid commands will be ignored or cause an error message to be returned in the status register. Anything may be written to register 14 (the example shown below has 0).

{base+8} = 'c' (Command, ASCII)
{base+16} = 0 (GO)

The above example sets all relays to the "Fail-Safe" position (de-energized position) all at once when the GO register is written.

5.4.6.1. H/P E1406A Command Module and LabVIEW Clear Example

The following Clear example is given for the H/P E1406A Command Module (GPIB) with factory defaults, and National Instruments LabVIEW GPIB Sample Control VI.

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON
- Type the following in the dialog box: **VXI:WRIT 8,8,99**
- Press the execute button

The data that is shown bold above writes to logical address 8, register 8 (the Command Register), and places '99' in it (which is a lower case ASCII "c"). The portion "VXI:WRIT" is required for the H/P E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON
- Type the following in the dialog box: **VXI:WRIT 8,14,0**
- Press the execute button

The data that is shown bold above writes to logical address 8, register 14 (the GO Register). Once something is written to the GO register, the command is executed. A zero was written to the GO register in the above example.

The portion "VXI:WRIT" is required for the H/P E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

5.4.7. Store Command

The store command allows the user to connect a number of crosspoints within the module, and store them into a memory location within the module. There are a total of 8 memory locations to store switching configurations. Utilizing memory locations allows the user to better use the VXIbus resources for other tasks.

The 8 memory locations are stored into a volatile memory location and will be lost once power is lost to the module. Each of the 8 memory locations may be recalled by using the recall command specified for register 8. It takes approximately one second to recall a total of 24 crosspoints. The capital "S" must be written into register eight (8) followed by the memory location number to be written into register 10. Register 10 accepts binary numbers ranging from 1 to 8.

> ***NOTE: Storing a configuration into a memory location will over-write the previously stored configuration in the location.***

Once both the "S" (register 8) and memory number has been written (register 10), the GO register must be written to to execute the command. Anything may be written to register 14 (the example shown below has 0).

```
{base+8} = 'S' (Command, ASCII)
{base+10} = 5 (Location, binary)
{base+14} = 0 (GO)
```

The above example stores all current connection combinations when the GO register is written to.

5.4.8. Recall Command

The recall command allows the user to recall crosspoint configurations stored within the module's RAM from a memory location. There are a total of 8 memory locations to store switching configurations. Utilizing memory locations allows the user to better use the VXIbus resources for other tasks.

The 8 memory locations are stored into a volatile memory location and will be lost once power is lost to the module. Each of the 199 memory locations may be recalled by using this command

specified for register 8. It takes approximately one second to recall a total of 24 crosspoints. The capital "R" must be written into register eight (8) followed by the memory location number to be recalled from register 10. Register 10 accepts binary numbers ranging from 1 to 8.

Once both the "R" (register 8) and memory number has been written (register 10), the GO register must be written to to execute the command. Anything may be written to register 14 (the example shown below has 0).

```
{base+8} = 'R' (Command, ASCII)
{base+10} = 6 (Location, binary
{base+14} = 0 (GO)
```

The above example recalls a specific configuration combination from memory when the GO register is written to.

5.4.9. All-Connect Command

This command is opposite from the Clear command. The All-Connect command connects (energizes) all relays. It is identical to the Clear command (not requiring any relay select entry) except that the lower case "a" is needed instead of the lower case "c".

The Command register must be written with a lower case 'a'. The Relay Section register may contain any value of data. The command will execute when anything is written to the GO register.

Invalid commands will be ignored or cause an error message to be returned in the status register. Anything may be written to register 14 (the example shown below has 0).

```
{base+8} = 'a' (Command, ASCII)
{base+14} = 0 (GO)
```

The above example closes (energizes) all relays at once when the GO register is written.

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

5.4.9.1. H/P E1406A Command Module and LabVIEW All-Connect Example

The following All-Connect example is given for the H/P E1406A Command Module (GPIB) with factory defaults, and National Instruments LabVIEW GPIB Sample Control VI.

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON
- Type the following in the dialog box: **VXI:WRIT 8,8,97**
- Press the execute button

The data that is shown bold above writes to logical address 8, register 8 (the Command Register), and places '97' in it (which is a lower case ASCII "a"). The portion "VXI:WRIT" is required for the H/P E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

- GPIB Address Setting: 09+00 (address GPIB device 9, secondary 0)
- Set write "toggle switch" ON
- Type the following in the dialog box: **VXI:WRIT 8,14,0**
- Press the execute button

The data that is shown bold above writes to logical address 8, register 14 (the GO Register). Once something is written to the GO register, the command is executed. A zero was written to the GO register in the above example.

The portion "VXI:WRIT" is required for the H/P E1406A Command Module and is part of the VXI command subsystem syntax which is used to Read or Write to the A16 device dependent registers of a register-based module.

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

6. VXI-RMR242F-024B Specifications

- Frequency Range — DC-26.5GHz
- Number — Twenty-four: 1x2 sections
- Impedance — 50 ohms
- Insertion Loss — .20dB @ 4GHz
.30dB @ 8GHz
.40dB @ 12GHz
.50dB @ 18GHz
1.0dB @ 26.5GHz
- Isolation — >85dB @ 4GHz
>70dB @ 8GHz
>65dB @ 12GHz
>60dB @ 18GHz
>55dB @ 26.5GHz
- VSWR — <1.15 : 1 @ 4GHz
<1.25 : 1 @ 8GHz
<1.35 : 1 @ 12GHz
<1.50 : 1 @ 18GHz
<1.70 : 1 @ 26.5GHz
- Contact Ratings — 100 mOhms (initial)
120 watts Max @ 3GHz
- Contact Life — Mechanical: >5,000,000 operations (at 180cpm)
Electrical: >5,000,000 operations (5W @ 3GHz)
- Switching Speed — 50mS (delay to control program must be added)
- Contact bounce — <10mS
- DC Power — +5 volts @ 1 Amp, plus 25mA per energized relay section
(60mA pulse from drawn from +12V supply each time a relay is energized, period = 50mS)
- Control — Register Based (version 1.4)
- Weight — <5.0lbs

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

NOTES

Universal Switching Corporation
PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

NOTES

PHN (818) 785-0200
FAX (818) 785-0680
E-Mail sales@uswi.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP