M1707

16-Channel Isolated Digital Output M-Module

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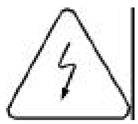
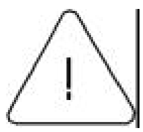
This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.



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.

Chapter 1
Configuring the Module

What's in This Manual

This manual contains a module description, configuration and wiring information, register programming information, and specifications for the M-Module.

- Racal M1707 16-Channel Isolated Digital Output M-Module (P/N 407877)

This chapter contains general information, a simplified schematic, configuring and wiring information for the Racal M1707.

Module Description

General Features

- Four groups of four isolated output channels. Each group requires its own +5VDC power supply (supplied by the user). All channels are isolated from chassis.
- Can be used as simple digital outputs or to drive relays
- Programmable Interrupt Delay Timer provides for delayed acknowledgment of command completion. For example, if you use the module to control relays, you can set the timer to assert interrupt after the relays have settled.
- Each channel can sink up to 200mA and switch voltages up to 36VDC.

Module Description

Refer to Figure 1-3. The Racal M1707 provides four groups of four channels (channels 00 - 03, 04 - 07, 08 - 11, and 12 - 15). For group isolation, the user must supply each group with separate +5VDC power supplies:

Table 1-1. Racal M1707 External Power Supply Connections

Channels	External +5VDc Connections
00 - 03	$+5V_1$ (Pin 18), $TGND_1$ (pins 2, 3, 32, 33)
04 - 07	$+5V_2$ (pin 22), $TGND_2$ (Pins 6, 7, 36, 37)
08 - 11	$+5V_3$ (Pin 24), $TGND_3$ (Pins 8, 9, 38, 39)
12 - 15	$+5V_4$ (Pin 28), $TGND_4$ (Pins 12, 13, 42, 43)

The power supplies power the optical-isolators in each channel. If isolation is not necessary, one power supply can be used for all four groups.

The output of each channel is an open collector NPN transistor (emitter is connected to the $TGND_n$ of each group's isolated power supply). Each channel is zener diode protected to +36VDC, do not exceed this voltage. Each channel's transistor can sink up to 200mA. Figure 1-1 shows a typical application for the module.

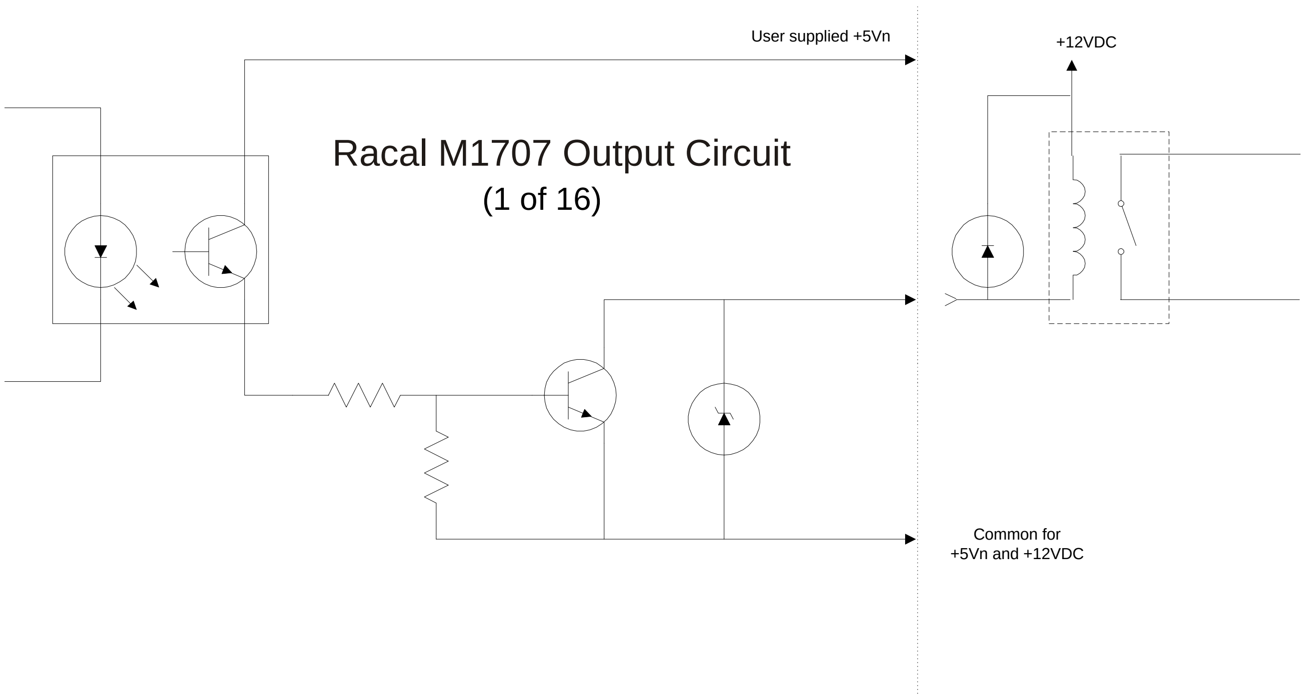


Figure 1-1. Sample Application

Programmable Interrupt Delay Timer

When a command to close a channel or open a channel (CLOSE means the output transistor is biased ON, a low collector-emitter impedance; OPEN means the transistor is biased OFF, a high collector-emitter impedance) completes execution, the module asserts an interrupt. For some external circuits, you may not want the interrupt until some period of time after the module finishes execution. For example, if you are using the module to control relays with a 13 - 15 mS settling time, you can program a delay so that the module does not assert interrupt until after the relays have settled. The delay time is valid for all 16 channels. Programmable range is 0.031875 mS to 2089 mS in 1 mS increments. Default is 13 mS.

Wiring and Configuration

This section describes how to connect user wiring to the Racal M1707.

Note The procedures in this section assume the M-Module has already been installed into an M-Module carrier. Since installation is dependent on the carrier used, instructions for installing M-Modules into the carrier are not included here. Refer to you M-Module carrier documentation for installation procedures. Each M-Module is shipped with identifying labels that should be installed on the carrier.

WARNING **SHOCK HAZARD. Only service-trained personnel aware of the hazards involved should install, configure, or remove the M-Module. Before installing or removing any module or carrier, disconnect power from the mainframe and user wiring.**

Caution **VOLTAGE/CURRENT. Pay more attention to the limitation of maximum voltage/current and maximum power listed in Appendix A. Exceeding any limit or use outside the parameters specified may damage the modules and impair the protection provided by the modules.**

Caution **STATIC ELECTRICITY. Static electricity is a major cause of component failure. To prevent damage to the electrical components on an M-Module or the carrier, observe anti-static techniques whenever installing, removing, or working on a carrier or M-Module.**

Assembling the Field Wiring Connector

Each Racal M-Module includes a 44-pin connector and hood. You must supply your own cable. The drawing below shows how to connect wiring and assemble the connector and hood.

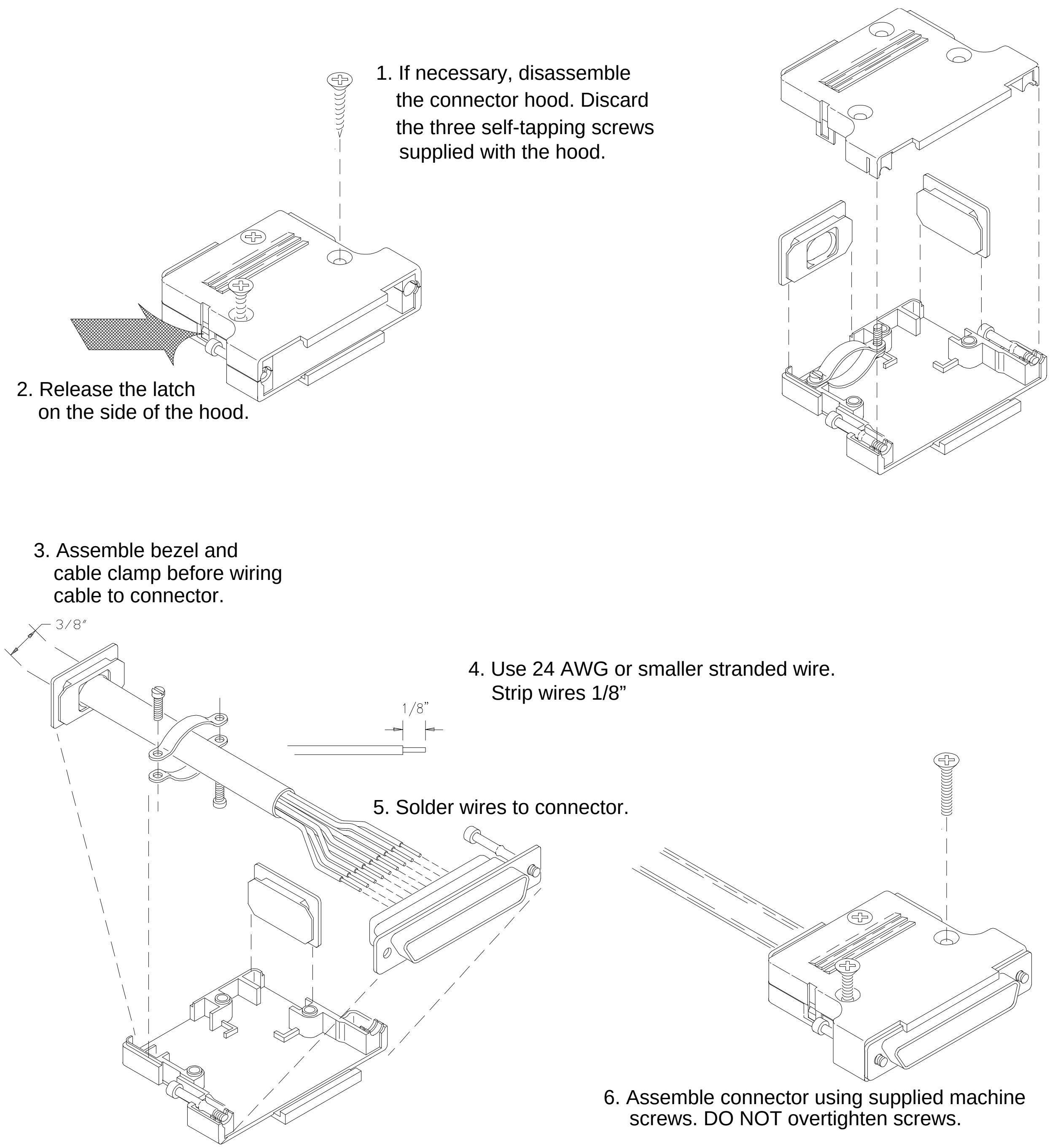
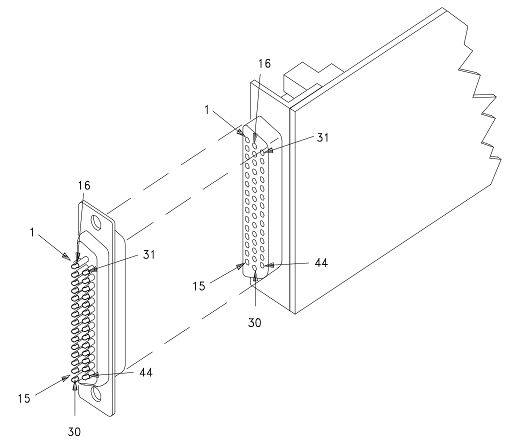
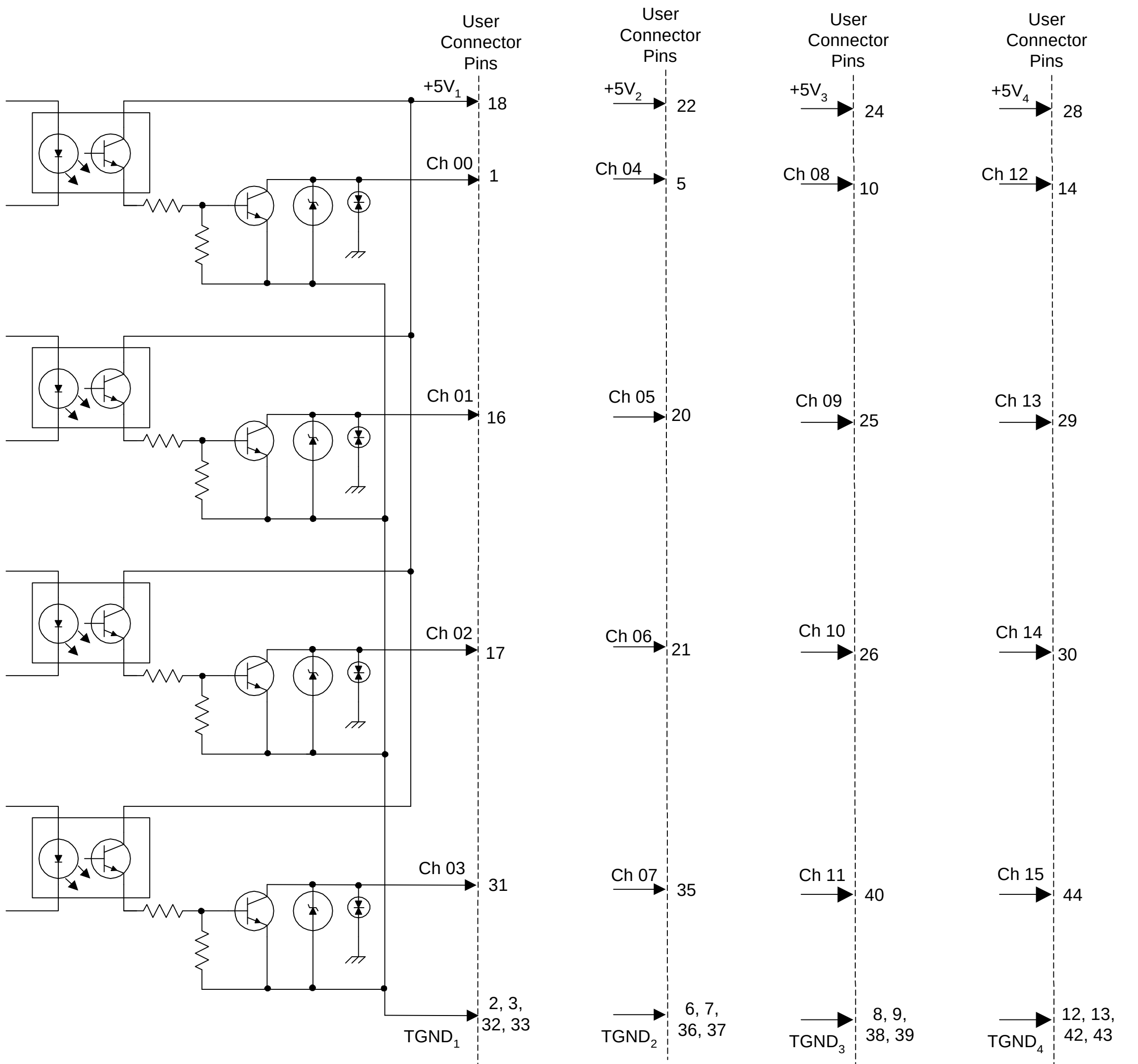


Figure 1-2. Wiring the 44-Pin Field Wiring Connector



Note: User must supply +5Vdc to the module. You can supply up to four isolated supplies (+$5V_1$/$TGND_1$, +$5V_2$/$TGND_2$, +$5V_3$/$TGND_3$, +$5V_4$/$TGND_4$) or they can be combined and one supply used. Refer to the drawing below.

CAUTION: The maximum voltage is 36 VDC or 36 VAC-Peak per channel. Maximum current is 200 mA DC or 200 mA AC-peak per channel.



Pins not used: 4, 11, 15, 19, 23, 27, 34, 41

Figure 1-3. Simplified M1707 User Connections and Simplified Schematic

Chapter 2
Register Descriptions

About This Chapter

This chapter describes how to program the Racal M1707 at the register level in an C&H Technologies VX405C M-Module Carrier installed in a VXIbus mainframe. Register programming is recommended only if you are unable to use the module's higher-level VXI*plug&play* driver. For information on using the VXI*plug&play* driver, refer to the driver help file.

Block Diagram Description

In order to register program the Racal M1707, it is important to understand its operation at the block diagram level. Figure 2-1 shows the block diagram of the Racal M1707. The following paragraphs describe the major sections of the module.

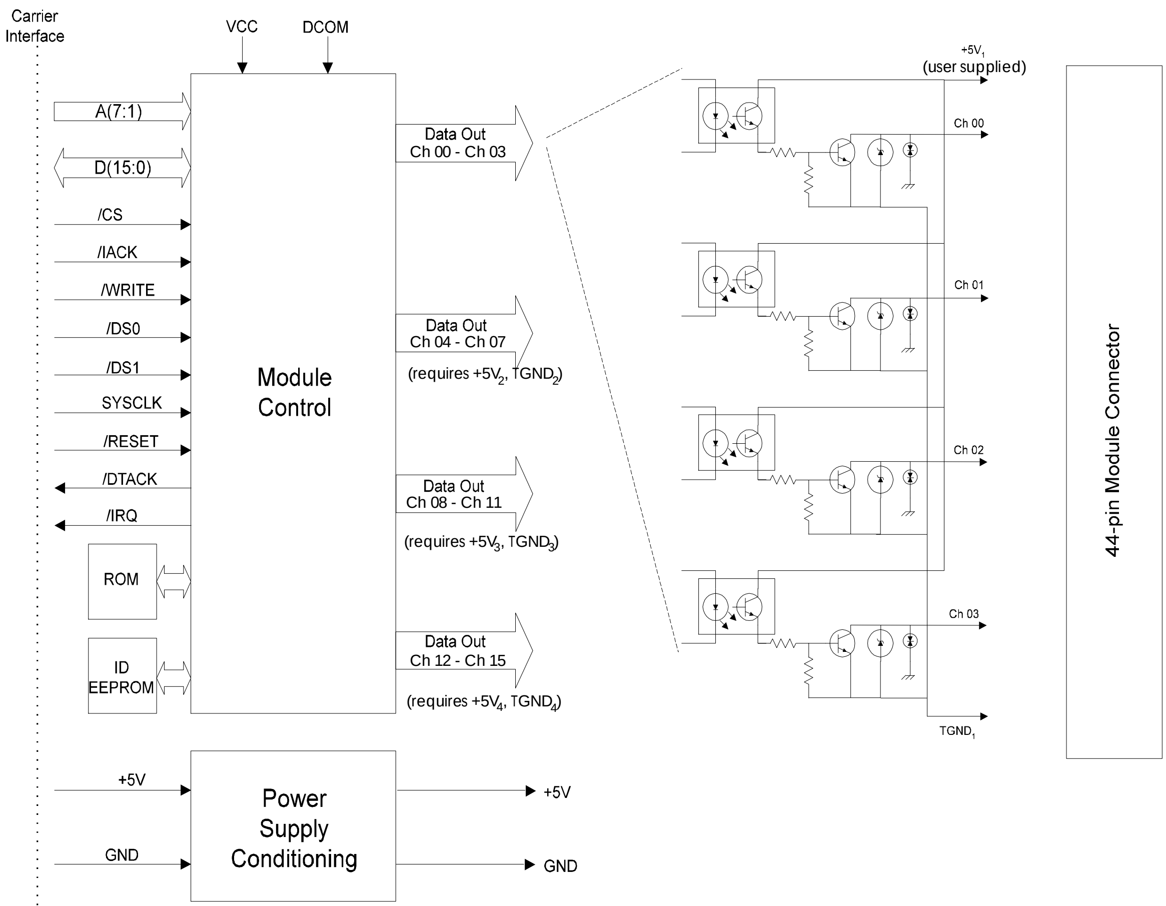


Figure 2-1. Racal M1707 Block Diagram

Module Control

This block contains all of the logic for the module including all registers, Carrier interface and driver control.

ID EEPROM

The EEPROM holds sixty-four 16-bit words of M-Module ID information and VXI M-Module data. Refer to “ID EEPROM Register” on page 2-15 for EEPROM contents.

Output Driver and Output Circuit

The Output Register directly drives the channel output optical isolators. Refer to “Simplified M1707 User Connections and Simplified Schematic” on page 1-5. The channel optical isolators are powered by external power supplies providing channel isolation. Each optical isolator drives one NPN transistor configured as an open collector driver.

Delay Timer

The module asserts an interrupt when a channel OPEN or CLOSE command completes. If you are using this M-Module to control relays for example, you may not want the interrupt to be asserted until after the relays have settled. By setting a delay time equal to or greater than the relay settling time, the M-Module will not assert the interrupt until after the relays have settled. The default value of the timer is 13 mS.

Power Conditioning

This block filters +5VDC power to produce VCC power (+5VDC) for logic and isolates the various grounds used by the module.

Register Addressing in the VXI Environment

Logical Address

Each module in a VXIbus system, whether standard VXI modules or M-Modules, must have a unique logical address. The C&H Technologies VX405C Carrier provides a logical address for each installed M-Module. Refer to the *C&H Technologies VX405C Installation Section of the User Manual* for details (if you are using a different carrier, refer to that carrier's documentation for register-based addressing information).

Register Addresses for register-based devices are located in the upper 25% of VXI A16 address space. Every VXI device (up to 256 devices) is allocated a 32-word (64-byte) block of addresses.

The Racal M1707 is a register based device with two memory windows. One is the same as any other VXIbus register based device (in the A16 address space), all the configuring registers are stored in this area. The second is the real I/O registers which located in the A24 address space. Below paragraphs describe how to determine the registers addresses.

A16/A24 Memory Mapping

The VXI Specification allows for only 64 bytes of address space in A16 memory. However, the M-Module specification defines 256 bytes of address space. To resolve this conflict, the C&H Technologies VX405C Carrier provides two memory segments for each installed M-Module. The first is in VXI A16 memory space and contains the standard VXI registers. The second memory segment is in the A24 memory space and contains all other M-Module registers (these are described starting on Page 2-13. Figure 2-2 shows the A16/A24 mapping for a typical M-Module.

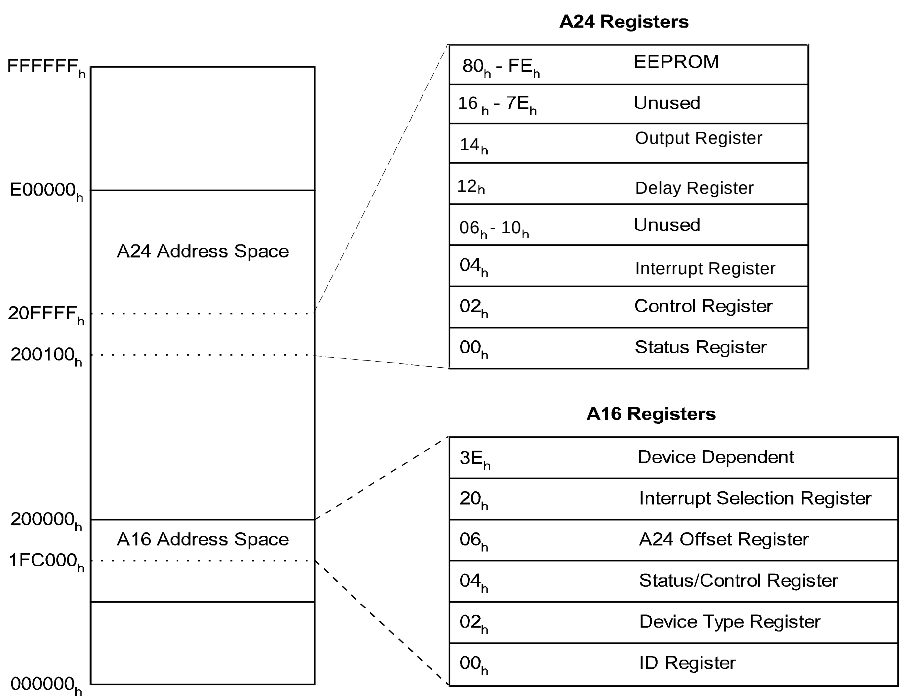


Figure 2-2. A16/A24 Register Mapping

Determining a Module's A16 Base Address

To access a register in A16 memory, you must specify a hexadecimal or decimal register address. This address consists of a base address plus a register offset. The A16 base address depends on whether or not you are using a GPIB Slot 0 Module.

A16 Address Space Outside the Command Module

When a GPIB Slot 0 Module is not part of the VXIbus system, the module's base address is computed as:

$C000_h$ + ($LADDR_h$ * 40_h) *or decimal* 49,152 + (LADDR * 64),

Where:
$C000_h$ (49,152) is the starting location of the register addresses,
LADDR is the M-Module's logical address
40_h (64) is the number of address bytes allocated per VXI device.

For example, if one M-Module's logical address is 120 (78_h), the module's register will have a base address of:

$C000_h$ + (78_h * 40_h) = **$DE00_h$**
or
49,152 + (120 * 64) = 49,152 + 7,680 = **56,832**

A16 Address Space Inside the Command Module or Mainframe

When the A16 address space is inside the Slot 0 Module, the M-Module's base address is computed as:

$1FC000_h$ + ($LADDR_h$ * 40_h) *or decimal* $2{,}080{,}768_{10}$ + (LADDR * 64)

Where:
$1FC000_h$ or 2,080,768 is the VXI A16 starting address,
LADDR is the M-Module's logical address,
40_h (64) is the number of address bytes allocated per VXI device.

For example, if the M-Module's logical address is 78_h (120), then the M-Module will have a base register address of:

$1FC000_h$ + (78_h * 40_h) = **$1FDE00_h$**

or (decimal)

2,080,768 + (120 * 64_0 = 2,080,768 + 7,680 = **2,080,768**

Addressing A16 Registers

Figure 2-2 shows that VXI registers for an M-Module are mapped into A16 address space. To access one of these registers, add the A16 base address to the register offset. For example, an M-Module's VXI Status/Control Register has an offset of 04_h. To access this register (assuming the system does not have a GPIB Slot 0 Module), use the register address:

$1FDE00_h$ + 04_h = $1FDE04_h$
or decimal
2,088,488 + 4 = 2,088,452

For the Racal M1707, there are only five registers in the A16 address space:

- VXI ID Register at offset 00_h
- VXI Device Type Register at offset 02_h
- VXI Status/Control Register at offset 04_h
- VXI A24 Offset Register at offset 06_h
- M-Module's Interrupt Control Register at offset 08_h

Addressing A24 Registers

Figure 2-2 shows that most of the Racal M1707 registers are mapped into A24 memory space. To access these registers:

1. Obtain the A24 base address by reading the VXI A24 Offset Register (06_h) in A16 memory.

2. Add the A24 base address to the register offset (see "Registers in A24 Address Space" on page 2-13).

For example, if the A24 base address is 200100_h, then to access the I/O Register (10_h offset):

200100_h + 10_h = 200110_h
or decimal
2,097,408 + 16 = 2,097,424

Program Example

The following C language program demonstrates how to program at the register level. The program reads the ID, Device Type, Status, and A24 Offset Registers then sets channels 00 and 02 to HI state. This program was written and tested in Microsoft Visual C++ but should compile under any standard ANSI C compiler.

To run this program you must have the NI VISA library, an GPIB interface module installed in your PC, and an GPIB Slot 0 Module, such as a Racal 1260-00C.

```
#include <visa.h>
#include <stdio.h>
#include <stdlib.h>

ViSession viRM,m_mod;
int main()
{

unsigned short id_reg,dt_reg ;              /* ID & Device Type Registers */
unsigned short stat_reg, a24_offset ;       /* Status Register & A24 offset
                                            register */
short value;

ViStatus errStatus;                         /*Status from each VISA call*/

    /* Open the default resource manager  */
errStatus = viOpenDefaultRM ( &viRM);
if (VI_SUCCESS > errStatus){
   printf("ERROR: viOpenDefaultRM() returned 0x%x\n",errStatus);
   return errStatus;}

    /* Open the M-Module instrument session ; Logical Address = 8 */
errStatus = viOpen(viRM,"GPIB-VXI0::8",VI_NULL,VI_NULL,&m_mod);
if (VI_SUCCESS > errStatus){
   printf("ERROR: viOpen() returned 0x%x\n",errStatus);
   return errStatus;}

    /* read  and print the module's ID Register  */
errStatus = viIn16(m_mod,VI_A16_SPACE,0x00,&id_reg);
if (VI_SUCCESS > errStatus){
   printf("ERROR: viIn16() returned 0x%x\n",errStatus);
   return errStatus;}
printf("ID register = 0x%4X\n", id_reg);

    /* read  and print the module's Device Type Register   */
errStatus = viIn16(m_mod,VI_A16_SPACE,0x02,&dt_reg);
if (VI_SUCCESS > errStatus){
   printf("ERROR: viIn16() returned 0x%x\n",errStatus);
   return errStatus;}
printf("Device Type register = 0x%4X\n", dt_reg);
```

```
    /* read and print the module's Status Register  */
errStatus = viIn16(m_mod,VI_A16_SPACE,0x04,&stat_reg);
if (VI_SUCCESS > errStatus){
   printf("ERROR: viIn16() returned 0x%x\n",errStatus);
   return errStatus;}
printf("Status register = 0x%hx\n", stat_reg);

    /* read and print the module's A24 Offset Register  */
errStatus = viIn16(m_mod,VI_A16_SPACE,0x06,&a24_offset);
if (VI_SUCCESS > errStatus){
   printf("ERROR: viOpen() returned 0x%x\n",errStatus);
   return errStatus;}
printf("A24 Offset register value = 0x%hx\n", a24_offset);

    /* Drive Bits 00 and 02 to HI State */
errStatus = viOut16(m_mod,VI_A24_SPACE,0x14,0x05);
if (VI_SUCCESS > errStatus){
   printf("ERROR: viOut16() returned 0x%x\n",errStatus);
   return errStatus;}

    /* Close the M-Module Instrument Session */
errStatus = viClose (m_mod);
if (VI_SUCCESS > errStatus) {
   printf("ERROR: viClose() returned 0x%x\n",errStatus);
   return 0;}

    /* Close the Resource Manager Session */
errStatus = viClose (viRM);
   if (VI_SUCCESS > errStatus) {
   printf("ERROR: viClose() returned 0x%x\n",errStatus);
return 0;}

return VI_SUCCESS;
}
```

Registers in A16 Memory Space

Table 2-1 lists the five registers in the A16 memory space. The following paragraphs describe each register.

Table 2-1. VXIbus A16 Memory Instrument Registers

Address Mapping	Registers
00_{16}	VXI ID Register
02_{16}	VXI Device Type Register
04_{16}	VXI Status/Control Register
06_{16}	VXI Offset Register
20_{16}	M-Module Interrupt Control Register

VXI ID Register

The ID Register is a read only register at address 00_h (MSB) and 01_h (LSB).

$b+00_h$	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	Undefined															
Read	Device Class		Address Space		Manufacturer ID											

- **Device Class:** this field should always be 11 indicating a register-based device.
- **Address Space:** 00 indicating A16/A24 device
- **Manufacturer ID**: 4091 (decimal) for Racal Instruments

VXI Device Type Register

The Device Type Register is a read only register at address 02_h (MSB) and 03_h (LSB). Reading this register returns a unique identifier for each M-Module.

$b+02_h$	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	Undefined															
Read	Required Memory				M-Module Model Code											

- **Required Memory**: F_h indicating 256 byte block required.
- **M-Module Model Code**: $F261_h$ for the Racal M1707.

VXI Status/Control Register

The Status/Control Register is a read/write register (address 04_h and 05_h) that controls the module and indicates its status.

b+04_h	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write (Control)	A24 Enable	Reserved													Sysfail Inhibit	Reset
Read (Status)	A24 Active	MODID*	M-Module Device Dependent										Ready	Passed	Device Dependent	

- **A24 Enable.** A 1 in this field means access to the devices A24 registers is enabled.
- **Sysfail Inhibit.** Writing a 1 disables the M-Module from driving the SYSFAIL* line.
- **Reset.** Writing a 1 to this field forces the M-Module to reset.
- **A24 Active.** A 1 in this field indicates the M-Module's registers in A24 memory space can be accessed. Default = 1.
- **MODID*.** A 1 in this field indicates that the M-Module is not selected via the P2 MODID line. A 0 indicates the M-Modules is selected by a high state on the P2 MODID line.
- **Ready.** A 1 in this field indicates that the M-Module is ready to accept commands. A 0 indicates the M-Module is busy and not ready to accept commands.
- **Passed.** A 1 in this field indicates the M-Module passed its self test successfully. A 0 indicates the M-Module is either executing or has failed its self test.

VXI Offset Register

The Offset Register (address 06_h and 07_h) contains the value of the base address for accessing registers in the A24 address space.

b+06_h	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	A24 Space Base address for those M-Modules needing A24 memory															
Read	A24 Space Base address for those M-Modules needing A24 memory															

Interrupt Selection Register

The Interrupt Selection Register (base + 20_h) specifies which VXI interrupt line the M-Module will use. M-Modules may generate interrupts to indicate that a SCPI command has completed. These interrupts are sent to and acknowledged by the Slot 0 Modules or other system controller via one of seven VXI backplane interrupt lines. Different controllers treat the interrupt lines differently, and you should refer to your controller's documentation to determine how to set the interrupt level. Slot 0 Modules configured as VXI Resource Managers treat all interrupt lines as having equal priority. For interrupters using the same line, priority is determined by which slot they are installed in; lower-numbered slots have higher priority than higher-numbered slots. Slot 0 Modules service line 1 by default, so it is normally correct to leave the interrupt level set to the factory default of IRQ1.

b+20$_h$	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Write	Reserved												INT	VXI Interrupt Line		
Read (default value)	Reserved												INT 1	VXI Interrupt Line 0	0	1

If your controller's documentation instructs you to change the interrupt level, you need to specify the level in the VXI Interrupt Selection Register. To cause the M-Module to interrupt on one of the VXI interrupt lines, write to the appropriate bits (refer to table below). To disable the module's interrupt, set the bits to 000. Selecting other than the default interrupt line 1 is not recommended. Reading the default value of this register returns the value $XXX9_h$.

Bits 2 - 0	**Selected Interrupt Line**
000	NONE (Interrupt Disabled)
001	IRQ1 (default)
010	IRQ2
011	IRQ3
100	IRQ4
101	IRQ5
110	IRQ6
111	IRQ7

M-Module specifications define three types of interrupts. The INT bit (bit 3) determines which M-Module interrupt style is supported. If INT is set to a 0, the M-Module supports interrupt types A and B. If INT is set to a 1, the M-Module supports interrupt type C (this is the default).

Type A Interrupts The interrupting M-Module removes the interrupt request upon a register access (software method) to the interrupting M-Module (such as reading the Status Register). DTACK* is not asserted during interrupt acknowledge.

Type B Interrupts The interrupting M-Module removes the interrupt request via a hardware method (on IACK* going low) but provides no vector information for the interrupt. This is the same as Type C interrupts except that no vector is supplied and DTACK* is not asserted.

Type C Interrupts The interrupting M-Module removes the interrupt request via a hardware method and provides an interrupt vector on the data bus and DTACK* is asserted during the interrupt acknowledge cycle. The M-Module removes the interrupt request by IACK* going low.

In VXI specifications however, only two types of interrupts are defined; RORA (Release on Register Access) and ROAK (Release on C&H Technologies VX405C Carrier converts M-Module Type A interrupts to RORA and Types B and C interrupts to ROAK (default).

RORA Interrupts The interrupting device provides its logical address on the data bus (D0 - D7) during the interrupt acknowledge cycle that was initiated in response to its interrupt request. It does not remove the interrupt request until its Status/Control register is accessed.

ROAK Interrupts The interrupting device removes the interrupt request upon the presence of a properly addressed interrupt acknowledge cycle and provides its logical address on the data bus (D0 - D7). A cause/status byte is also placed on the data bus (D15 - D8)

Registers in A24 Address Space

Table 2-2 lists the six registers in A24 memory. The following paragraphs describe each register.

Table 2-2. Racal M1707 A24 Memory Registers

Address Mapping	Registers
FE$_h$	EEPROM
(16$_h$ - FD$_h$)	(Reserved)
14$_h$	Output Register
12$_h$	Delay Register
10$_h$	Not Used
(06$_h$ - 0F$_h$)	(Reserved)
04$_h$	Interrupt Register
02$_h$	Control Register
00$_h$	Status Register

Status Register

The offset of Status Register is 00_{16}. It is a Read only register.

b+00$_h$	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	Undefined															
Read									BUSY*							RIRQX

- BUSY*: 0-Relay is busy (not stable yet).
- RIRQX: 1-Relay interrupt.

Control Register

The offset of Control Register is 02_{16}. It is a Read/Write register.

b+02$_h$	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	Undefined															
Read															Re-enable	Soft Reset

- RENABLE: 1 - Enable relay interrupt (After BUSY timer).
- Soft Reset: 1 - Soft Reset the M-Module.

When power-on or reset, all bits of Control Register are set to zero.

Interrupt Register

The offset of Interrupt Register is 04_{16}. It is a Read only register.

b+04$_h$	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	Undefined															
Read																RIRQX

- RIRQX: Relay interrupt

Delay Register

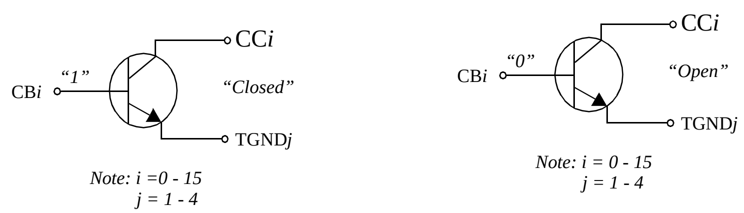
The offset of Racal M1707 Delay Register is 12_h. It is a write only register. The value of this register indicates the delay time between command execution and asserting interrupt. The register has a default delay time of **13ms**. It's value can be determined by the formula:

Delay Time = (Register Value + 1) * 0.031875ms

where: Register Value = 0000_h - $FFFF_h$

Output Register

The offset of the Output Register is 14_{16}, it's a read/write register. Writing a “1” to a specific bit closes that channel; writing a 0 opens that channel. Closed means the output transistor is biased on - a low collector-emitter impedance. Open means the output transistor is biased off - a high collector-emitter impedance.



Write a “1” to Close a Channel   Write a “0” to Open a Channel

Figure 2-3. Write a “1” or “0” to Close/Open One Channel

b+14$_h$	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	Ch 15	Ch 14	Ch 13	Ch 12	Ch 11	Ch 10	Ch 9	Ch 8	Ch 7	Ch6	Ch 5	Ch 4	Ch 3	Ch 2	Ch 1	Ch 0
Read	Ch 15	Ch 14	Ch 13	Ch 12	Ch 11	Ch 10	Ch 9	Ch 8	Ch 7	Ch6	Ch 5	Ch 4	Ch 3	Ch 2	Ch 1	Ch 0

ID EEPROM Register

The ID EEPROM Register allows you to access the contents of the ID EEPROM. The ID EEPROM contains sixty-four 16-bit words of M-Module ID data and VXI M-Module data.

Note This register is intended to be used by the higher-level software driver. The software driver must perform a series of many reads and writes to this register to perform the required functions within the EEPROM. **When register programming, it is much easier to read the module ID data from the VXI registers (A16 memory area) instead of reading the ID EEPROM Register.** A16 addressing is discussed earlier in this chapter. Do NOT attempt to read the ID EEPROM. Do not attempt to read the EEPROM Registers.

$b+80_h$ - $b+FE_h$	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	Unused															
Read (default value)														Chip Select	Clock	Data In/Out

Reset Condition -- Bits 15 - 08 = logic “1”, Bits 07 - Bit 00 = logic “0”.

Caution **Do not attempt to write to Bit 00 of the ID EEPROM register. You could possibly write-over the contents of the ID EEPROM.**

Bit Definitions

Data In/Out -- Reading this bit returns the value returned from the Data Out pin of the ID EEPROM.

Clock -- Writing a logic “1” to this bit forces the SK pin of the ID EEPROM high and writing a logic “0” drives it low. This bit is used as a clock to the ID EEPROM for reading data out. Reading this bit always returns logic “0”.

Chip Select -- Writing a logic “1” to this bit selects the ID EEPROM. Writing a logic “0” to this bit deselects the EEPROM. Reading this bit always returns logic “0”.

Table 2-3. ID EEPROM Contents

Word Number	Description	ID EEPROM Contents
0	Sync Code	5346_h
1	M-Module Number (binary code)	$069B_h$ (binary-coded 1690)
2	Revision Number (binary code)	0001_h
3	Module Characteristics	0868_h
4 - 7	Reserved	0000_h
8 - 15	User Defined	0000_h
16	VXI Sync Code	$ACBA_h$
17	VXI ID	$CFFF_h$
18	VXI Device Type	$F261_h$
19 - 31	Reserved	0000_h
32 - 63	User Defined	0000_h

Appendix A
Specifications

M-Module Specification Compliance

Racal M1707, the 16-Channel Open Collector M-module complies with the Mezzanine Concept M-Module Specification.

Racal M1707 16-Channel Isolated Digital Output M-Module

Number of Channels:

- 16 Open Collector (arranged as four groups of four channels)

Open Collector-Emitter Voltage:

- 36V max.

Saturation Collector-emitter Voltage (DC):

- <0.5V

Sink Current (per Channel):

- 200mA

Isolation voltage:

- 42VDC

Programmable Busy Time:

- 0.031875 mS to 2089 mS

General Characteristics:

- Connector Type: 44-pin D-Sub (female)

Power Requirements:

	I_{PM} (A)	I_{DM} (A)
+ 5VDC	0.200	0.190
+12VDC	0	0
-12VDC	0	0

- External +5VDC Power Supplies; up to four required. Used for powering isolation optical isolators.

A

C

D

I

M

O

R

S

T

V

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.