

# RM16M VDC-R / RM16M VAC-R

## User's Guide



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## REGULATORY INFORMATION

### FCC Requirements

This equipment complies with FCC rules Part 68. Located on the equipment is the FCC Registration Number and Ringer Equivalence Number (REN). You must provide this information to the telephone company, if requested.

The Registration Number and REN are inscribed on the printed circuit board on insert cards or on a label attached to either the chassis bottom or metal end-plate on standalone or rack models. The FCC requires that these numbers be prominently displayed on an outside surface of the equipment.

The REN is used to determine the number of devices you may legally connect to your telephone line. In most areas, the sum of the REN of all devices connected to one line must not exceed five (5.0). Contact your telephone company to determine the maximum REN for your calling area.

The telephone company may change technical operations or procedures affecting your equipment. You will be notified of changes in advance to give you ample time to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, please contact:

Raymar Information Technology, Inc.  
7325 Roseville Road  
Sacramento, CA 95842  
1-800-747-1522

The telephone company may ask that you disconnect this equipment from the network until the problem has been resolved. If your equipment continues to disrupt the network, the telephone company may temporarily disconnect service. If this occurs you will be informed of your right to file a complaint with the FCC.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

**WARNING:** This equipment uses, generates, and can radiate radio-frequency energy, interfering with radio communications, if not installed and used according to the instruction manual. It has been tested and complies with the limits for a Class A computer device, according to FCC Rules, Part 15. Operation of this equipment in a residential area may cause interference. If it does, you must correct the cause of the interference.

Changes or modifications to this unit are not expressly approved by the party responsible for compliance and could void the user's authority to operate the equipment.

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## **CHAPTER ONE – INTRODUCTION**

The Raymar-Telenetics RM16M Universal Data Shelf™ is a heavy-gauge steel-plated modem rack chassis. It measures 7 inches high and 10.75 inches deep, and mounts in a standard 19- or 23-inch rack. The Data Shelf comes in two versions: AC (RM16M VAC-R) and DC (RM16M VDC-R). This guide covers both versions.

### **OVERVIEW**

The Raymar-Telenetics RM16M Universal Data Shelf has slots that accept 16:

- Modems
- Digital Data Service (DDS) units
- Dial backup units
- Automatic calling units

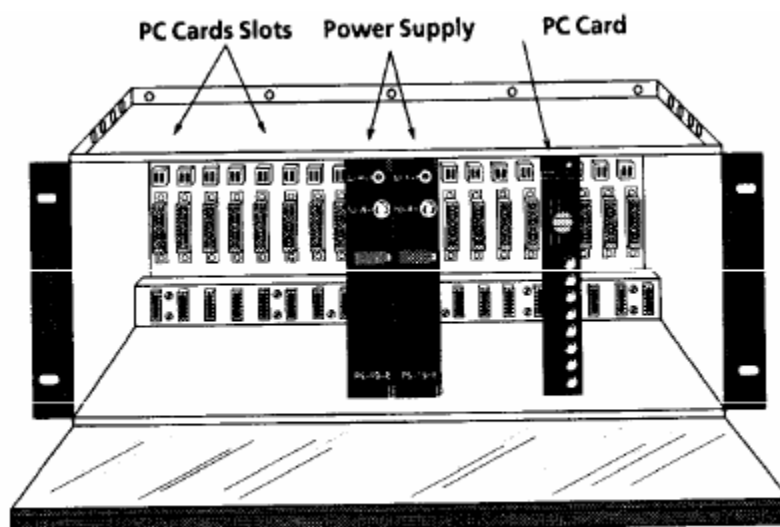
All of these devices are plug-in printed circuit (PC) cards that slide into the front of the Data Shelf. The cards can be mixed in any way within the Data Shelf. Each card has been independently tested and meets Part 68, FCC rules and regulations.

Power, Data Terminal Equipment (DTE), and communications-line connections are made at the back panel of the Data Shelf (see the “Back Panel Interface Connectors” section). This allows PC cards to be installed or replaced, without disturbing the cable connections at the back.

The AC version of the Data Shelf accepts either a single power module that occupies two slots, or two power modules that occupy one slot each. The DC version accepts two power modules that occupy one slot each. The power modules power all the PC cards in the Data Shelf, converting user-supplied 48 volt DC, or 90 – 265 VAC, input to +15 VDC, -15 VDC, and + 8.5 VDC outputs for distribution to the PC cards. Regulators on the PC cards convert the plus and minus 15 VDC to plus and minus 12 VDC and +8.5 VDC to +5 VDC.

**NOTE:** If two power modules are installed, one powers the Data Shelf while the other acts as a redundant power source.

Figure 1-1 shows an example of the location and orientation of the modem cards and power module. For convenience, the front panel of the Data Shelf is hinged to allow easy access to the modem cards and power module(s) without disturbing the DTE and communication-line connections at the back of the Data Shelf.



**Figure 1-1. Data Shelf Example**

## BACK PANEL INTERFACE CONNECTORS

All DTE, Telco and power connections are made at the back panel of the Data Shelf.

The DTE connectors can be:

- Individual 25-pin modular jacks – one for each PC card (standard)

The Telco connectors can be:

- Individual 8-pin modular jacks – one for each PC card (standard)
- Two 50-pin termination connectors (optional)

The telephone-line connectors are identified by the telephone company Universal Service Ordering Code (USOC) and must be specified when ordering standard jack arrangements from Raymar-Telenetics.

Figures 1-2 through 1-3 show examples of Data Shelf back panels.

**NOTE:** For more information about the power connections, refer to the “Electrical Installation” section.



**Single row RJ45 connectors**



**Dual rows of RJ45 connectors**

**Figure 1-2. Examples of Back Panels with 25-pin DTE Connectors and 8-pin Modular Telco Jacks**



**Figure 1-3. Example of Back Panel with 25-pin EIA DTE Connectors and Mass Termination Telco Connectors**



## CONTACT INFORMATION

For more information about Raymar-Telenetics Universal Data Shelves, or other Raymar-Telenetics solutions, contact us using any of the following methods.

### **Voice Mails**

We welcome your calls at **+1 (916) 783-1951**, Monday through Friday, 7:00 am to 5:00 pm PST. For technical support, you may also reach us at **1-800-747-1522**.

### **Fax Number**

You can also send your requests for information to our 24-hour fax number: **+1 (916) 783-1952**.

### **E-mail**

If you prefer, you can send information requests to our 24-hour e-mail address:  
**sales@raymarinc.com**

### **Website**

Our website contains valuable information about our products. We encourage you to visit us online at [www.raymarinc.com](http://www.raymarinc.com).

## **CHAPTER TWO – INSTALLATION**

This chapter describes how to install the Data Shelf.

### **UNPACKING and INSPECTING the EQUIPMENT**

Unpack the equipment and compare the contents to the packing list. Inspect the equipment for any damage that may have occurred in shipment. If you see any damage or if items are missing, contact Raymar-Telenetics. Keep the shipping container and packing material for future shipment.

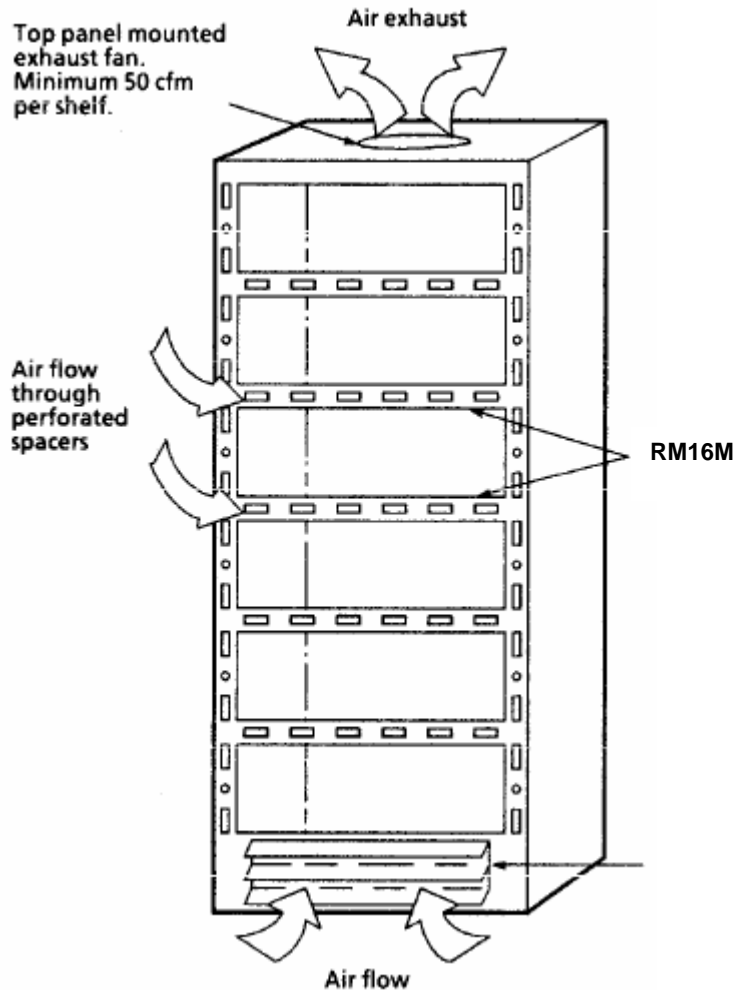
### **SITE PREPARATION**

When selecting a location to install the Data Shelf, choose a site that:

- Is clean, well lit, and free from extremes of temperature, humidity, appreciable shock, and vibration.
- Is within seven feet of a power source that can furnish 48  $\pm$ 4 VDC at 3.5 amps, or 90 – 265 VAC.
- Is within 50 feet of the associated data terminal.
- Provides at least 36 inches of clearance at the front for operating and maintenance accessibility.
- Provides at least 4 inches at the back of the enclosure for interface cable clearance and unobstructed airflow.
- Provides at least 1U above and below the enclosure for airflow.

Side and top clearances for rack-mounted equipment are dictated by the rack-cabinet provisions, but should allow a free flow of cooling air (Figure 2-1). An optional fan tray (1U), part number 0058-1639-005 (see below), can be installed to improve airflow.





**Figure 2-1. Data Shelf Cabinet**

## INSTALLATION PROCEDURES

Service personnel should be familiar with the complete installation procedure before installing the shelf.

### Required Tools and Equipment

Special tools or test equipment are not required for installation.

**CAUTION:** To prevent damage to enclosure components from overheating, ensure clearances of 1 ¾ inch top and bottom between mounted enclosures. Make adequate provision for cool air circulation and exhaust of warm air, such as air intake louvers in the bottom panel of the Data Shelf cabinet and an adequate CFM exhaust fan in the top panel of the Data Shelf cabinet.

## Mechanical Assembly

The Data Shelf mounts into a standard 19-inch cabinet and requires 7 inches of vertical panel space.

The 19-inch Data Shelf also fits into a 23-inch cabinet. This installation requires the rack-mounting brackets to be removed and reinstalled in the reversed position, so the wider tabs are used for mounting to the cabinet.

## ELECTRICAL INSTALLATION

All power connections are made at the back panel of the Data Shelf.

### AC Power (RM16M VAC-R Data Shelf)

Power for the AC version of the Data Shelf (RM16M VAC) is supplied to the power modules through a separate AC power cord.

One power module is sufficient to power all 16 slots. If only one power source is available, it can be connected to either input 1 or 2.

After the power module is installed, insert the power cord into the power module socket on the back of the Data Shelf.

To apply power to the module, plug the opposite end of the power cord into a standard 115/220 VAC grounded wall socket.

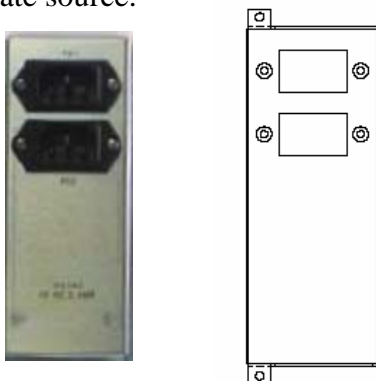
### Redundant AC Power

Power for the redundant AC version of the Data Shelf (RM16M VAC-R) is supplied to the power modules through separate AC power cords (see figure below).

After the power modules are installed, insert the power cords into the power module sockets on the back of the Data Shelf.

To apply power to the modules, plug the opposite ends of the power cords into standard 115/220 VAC grounded wall sockets.

In the event of a power source failure or a power supply module failing, the enclosure will remain online using the alternate source.

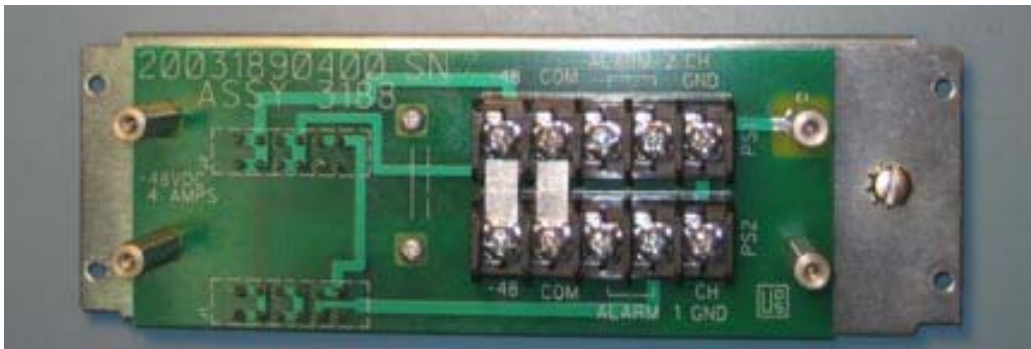


## DC Power (RM16M VDC-R Data Shelf)

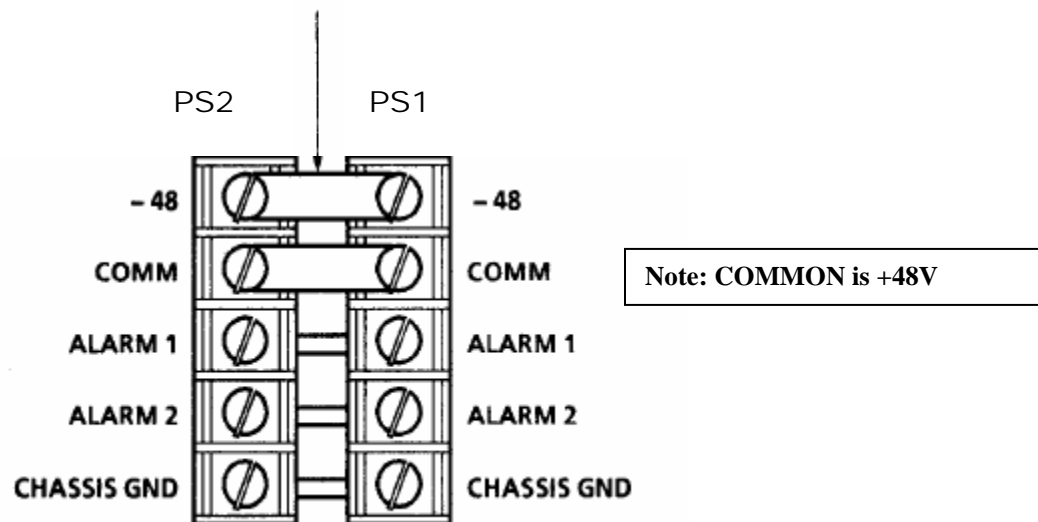
Power for the DC version of the Power Shelf (RM16M VDC-R) is provided by an incoming power source that connects to PS1, PS2 (or both) on the back of the Data Panel (see Figure 2-4). Facing the front of the Data Shelf, PS1 supplies the power module on the left and PS2 supplies power to the power module on the right.

One power module is sufficient to power all 16 slots. If only one power source is available, it can be connected to either terminal strip (PS1 or PS2) on the back of the Data Shelf, with shunt bars installed to connect power to the opposite strip (see Figure 2-5). The bars should always be installed if only one power source is used and must be removed if two power sources are used.

PS1 and PS2 alarms and chassis ground are connected internally. An alarm condition exists on the alarm circuit when any operating or supply voltage is lost on either power supply. By observing which front panel power LED is out, you can identify the faulty power supply.



**Figure 2-4. Power Terminals**



**Figure 2-5. Example of a Single Power Source Installation**

## Digital EIA-232 Interface

The 16 EIA-232C or D digital input connectors are labeled and shown in Figure 2-6. For a description of the active pin connectors, refer to Appendix B.



**Figure 2-6.**

Table 2-1 shows the EIA-232 levels from the modem.

**NOTE:** Some modems may not use all the functions listed in Tables 2-1 and 2-2.

**Table 2-1. Modem EIA Levels**

<b>Received data mark:</b>	<b>-5 to -15 V</b>
<b>Received data space:</b>	<b>+5 to +15 V</b>
<b>Control signal OFF level:</b>	<b>-5 to -15 V</b>
<b>Control signal ON level:</b>	<b>+5 to +15 V</b>

Table 2-2 shows the expected levels on all inputs.

**Table 2-2. Expected Levels on All Inputs**

<b>Mark:</b>	<b>-3 to -25 V</b>
<b>Space:</b>	<b>+3 to +25 V</b>
<b>Controls OFF:</b>	<b>-3 to -25 V</b>
<b>Controls ON:</b>	<b>+3 to +25 V</b>

## TELEPHONE LINE INTERFACES

The Data Shelf is FCC certified for connection to the dial-up Public Switched Telephone Network (PSTN). The following sections describe the standard and optional ways for connecting to the communications line.

### Modular Jack Connectors

The standard Data Shelf back panel has 16 8-pin modular jacks, one for each modem. These jacks provide the interface for connecting individual modems to the telephone line. Each 8-pin jack has contacts that are used in various combinations depending on the type of service installed. Leased-line modems, by comparison, have four contacts: a transmit pair and a receive pair.

For a description of the modular jack functions, refer to Table C-1 in Appendix C.

### Optional Backplanes for Dial Backup Connections

Two optional Data Shelf backplanes are available for use with dial backup modems. These backplanes provide either modular or mass termination jacks for both dial-up and leased line telephone line connections. Figure 1-4 and Figure 1-5 show examples of these backplanes.

Modems with dial backup capability can switch to a dial-up line if the leased line fails. For this reason, both the TELSET/LL and TELCO connections must be made. If the option is not used, connect the modem to the appropriate service, either leased line or dial-up. If standard modems (no dial backup capability) are installed they are limited to connection to the TELCO only.

For a description of the modular jack functions, refer to Table C-1 in Appendix C.

**NOTE:** Telco jack pin functions are identical for both standard and dial backup modems. Similarly, DTE connectors are the same as for standard modems.

## INSTALLING and REMOVING POWER MODULES

Power modules generate power that is bused to the 16 modem edge connectors on the recessed power bus. Power modules are available in AC and DC versions.

### AC Power Module

The AC power module is a 2-slot module designed for the RM16M VAC-R Data Shelf. The RM16M VAC-R Data Shelf can hold a maximum of one AC power module.

The AC power module consists of:

- Two transformers (one for slots 1 through 8 and the other for slots 9 through 16)
- Two push-button circuit breaker switches on the front panel

- A red 3.5 amp light on the front panel
- A 115 or 230 VAC connector on the back of the module

Table 2-3 lists the connector pin functions on the AC power module.

**Table 2-3. Power Connector Pin Functions**

Pin Contact	Function
1 and A	Plus and minus 12 Volt Winding
2 and B	
3 and C	12 Volt Common
4 and D	5 Volt Winding
5 and E	
6 and F	Chassis Ground

### AC Power Module

The AC power module is a single-slot module designed for the RM16M VAC-R Data Shelf. The RM16M VAC-R Data Shelf can hold up to two power modules. When two power supply modules are used, any loss of supply or operating voltage to one module causes the other module to carry the entire load. If this happens, the common alarm contacts close to reflect the alarm condition.

The AC power module consists of:

- An AC-to-AC switching regulator
- A green Power light on the front panel
- An interface connector on the back of the module

### AC Switching Module

The AC switching module is a single-slot module designed for the RM16M VAC-R Data Shelf. The RM16M VAC-R Data Shelf can hold up to two AC switching power modules. When two AC switching power supply modules are used, any loss of supply or operating voltage to one module causes the other module to carry the entire load.

The AC switching module consists of:

- A switching power supply
- A green Power light on the front panel
- An interface connector on the back of the module



## DC Power Module

The DC power module is a single-slot module designed for the RM16M DCV-R Data Shelf. The RM16M DCV-R Data Shelf can hold up to two DC power modules. When two DC power supply modules are used, any loss of supply or operating voltage to one module causes the other module to carry the entire load. If this happens, the common alarm contacts close to reflect the alarm condition.

The DC power module consists of:

- A DC-to-DC switching regulator
- A green Power light on the front panel
- An interface connector on the back of the module
- Cooling fan

## Installing Power Modules

The following procedures describe how to install power modules. This procedure should only be performed by personnel familiar with this procedure.

1. Lower the Data Shelf's hinged front panel.
2. Locate the power module slots between slots 8 and 9.
3. Grasp power module handle with one hand while supporting the bottom of the module with your other hand.
4. Align the module in the Data Shelf guide grooves.
5. Gently slide the module into the Data Shelf until it rests against the edge connector.
6. Firmly push the module in to seat the edge connector.
7. To install a second power module, repeat steps 2 through 5, selecting the adjacent power module slot in step 2.
8. Close the front panel.
9. When you finish, connect a power source to the module.
  - ❖ AC Module: Connect a power cord to AC plug on rear of power module. Then plug power cord into a 115 or 230 VAC outlet, as required.
  - ❖ Redundant AC Modules: Connect both power cords to port 1 and 2.
  - ❖ Redundant DC Modules: Attach a DC power source as described under the "DC Power" section.
10. Raise the hinged front panel.

## Removing Power Modules

To remove power modules:

1. Remove the power source from the back of the Data Shelf.
2. If there is a holding screw on rear of the housing, loosen the screw.
3. Lower the hinged front panel.
4. Grasp power module handle and gently slide it out through the front of the Data Shelf.

## Installing and Removing PC Cards

PC cards have edge connectors that insert into receptacles located on the backplane and power bus. When installing the PC cards, equalize the loads on the power module. For example, if the shelf has nine cards, five should be loaded in one half of the Data Shelf (slots 1 through 8) and four should be loaded into the other half of the Data Shelf (slots 9 through 16).

**CAUTION:** Consult the printed circuit card manual to determine if hardware options need to be changed or verified before inserting the card.

The following procedures describe how to install PC cards. PC cards can be installed while the Data Shelf is powered on. This procedure should only be performed by personnel familiar with this procedure.

1. Lower the Data Shelf's hinged front panel.
2. Orient the card so the component side is facing to the left.
3. Align the module in the Data Shelf guide grooves.
4. Gently slide the module into the Data Shelf until it rests against the edge connector.
5. Firmly push the card in to seat the edge connector.
6. To install additional PC cards, repeat steps 2 through 5.
7. When you finish, close the hinged front panel.

## Removing PC Cards

PC cards can be removed while the Data Shelf is powered on. To remove PC cards:

1. Lower the Data Shelf's hinged front panel.
2. Pull the card pullers on the PC modules to slide the PC card out through the front of the Data Shelf.
3. To remove additional PC cards, repeat step 2.
4. When you finish removing PC cards, raise the hinged front panel.

## **CHAPTER THREE – OPERATION**

The Data Shelf accepts leased line, PSTN, and DDS-type modems. Leased line modems operate on conditioned or unconditioned leased lines. PSTN-type modems operate on the dial-up network and have features that allow establishment of dial-up circuits and data transfer. Some modems can operate on either leased lines or PSTN.

Modems designed for use in the Data Shelf have a standardized interface (EIA-232C or D) that provides for orderly calling, answering, and data modes. Many of the modems also have automatic dialing and answering capabilities.

### **TEST MODES**

Each plug-in modem card has a switch or switches that provide for modem testing. Test features are described in the manual for the modem.

### **FRONT PANEL INDICATORS**

Each PC card has Light Emitting Diode (LED) indicators that can be viewed through the transparent front panel. With the front panel lowered, the modem controls can be accessed.

Most modems have LEDs mounted on the front edge of the card to indicate the status of various EIA-232 interface functions. The LEDs are described in the manual for the modem.

Some PC cards have a Liquid Crystal Display (LCD) for observing modem status or selecting options using pushbuttons on the modem front panel. The LCD functions are explained in the manual for the modem.

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## **CHAPTER FOUR – MAINTENANCE**

This appendix provides maintenance information for PC cards and power modules.

### **PC CARDS**

If a PC card becomes inoperative, replace it. Field repair is not recommended. Contact Raymar-Telenetics for instructions on repairs and replacement (see the “Contact Information” section).

When swapping out PC cards, you do not have to turn off system power. This allows PC cards to be changed while allowing all other PC cards to continue operation.

For more information about installing and removing PC cards, refer to the “Installing and Removing PC Cards” section.

When swapping out PC cards, you do not have to turn off system power. This allows PC cards to be changed while allowing all other PC cards to continue operation.

For more information about installing and removing PC cards, refer to the “Installing and Removing PC Cards” section.

### **POWER MODULE**

The single AC power module has two 115 VAC circuit breakers located on the module front panel. The left-hand breaker protects modem slots 1 through 8. The right-hand breaker protects modem slots 9 through 16.

Switching AC module has a green LED to show power supply status.

DC module has a green LED to show power supply status with a 3.5 amp circuit breaker.

For more information about installing and removing power modules, refer to the “Installing and Removing Power Modules” section.

## NOTES

## APPENDIX A – SPECIFICATIONS

<b>EIA Standard:</b>	Compliant with EIA Standard EIA-310-C
<b>Width:</b>	19 inches (48.3 cm)
<b>Depth:</b>	10.75 inches (27.3 cm)
<b>Height:</b>	7 inches (17.8 cm)
<b>Weight:</b>	20 lbs. (9.1 kg), shipped 50 lbs. (22.7 kg), loaded

		<u>Single</u>	<u>Switching</u>
<b>AC Power:</b> (RM16M ACV-R)	Input Voltage	115 VAC $\pm$ 10% VAC, 50/60 Hz	110/220 VAC, 50/60 Hz
	Output Voltage	15 VAC $\pm$ 10%, 10 VAC $\pm$ 10% 50/60 Hz	15 VAC $\pm$ 10%, 10 VAC $\pm$ 10% 50/60 Hz
	Wattage	150 watts per rack	
<b>DC Power:</b> (RM16M DCV-R)	Input Voltage	48 VDC, 2.5 A	
	Output Voltage	+8.5 VDC, 7.8 ADC +15 VDC, 1.4 ADC -15 VDC, 1.4 ADC	
<b>Heat Load:</b>	510 BTU/Hr (fully loaded rack)		
<b>Environmental Conditions:</b>	Temperature (+32°F to 122°F) (0° to +50°)		

## **APPENDIX B – DIGITAL INTERFACE DESCRIPTIONS**

This appendix lists the digital interface descriptions. The information in this appendix may vary, depending on modem type. Consult the manual for the particular PC card you are using.

**Table B-1. Digital Interface Signal Descriptions (232-C)**

<b>Pin No.</b>	<b>EIA-232C</b>	<b>CCITT</b>	<b>Signal Name</b>	<b>Description</b>
1	AA	101	Protective Ground or Earth Ground	Chassis ground. Isolated from signal ground or common return (pin 7).
2	BA	103	Transmit Data	Serial digital data (to be modulated) from a data terminal or other digital data source.
3	BB	104	Received Data	Serial digital data at the output of the modem receiver. Data is accompanied by an internal data rate clock (pin 17) whose positive-going transitions occur on the data transition. (Synchronous modems only).
4	CA	105	Request to Send	A positive level to the modem when data transmission is desired.
5	CB	106	Clear to Send	A positive level from the modem after receipt of Request to Send (pin 4) and when the modem is ready to transmit.
6	CC	107	Data Set Ready	A positive level from the modem when power is on and it is ready to operate.
7	AB	102	Signal Ground or Common Return	Common signal and DC power ground. Isolated from protective ground (pin 1).
8	CF	109	Received Line Signal Detector	A positive level from the modem indicating the presence of a receive signal (carrier detect).
9			+12 volts	+12 voltage reference
10			-12 volts	-12 voltage reference
11			Not used	
12	SCF		Sec. Received Line Signal Detector	Carrier detect on a secondary channel.
13	SCB	142	Sec. Clear to Send	Clear to send on a secondary channel.

Pin No.	EIA-232C	CCITT	Signal Name	Description
14	SBA	141	Sec. Transmit Data	Transmitted data on a secondary channel.
15	DB		Transmit Clock (DCE)	A transmit data clock output for use by an external data source. Positive clock transitions correspond to data transitions.
16	SSB		Sec. Rec'd. Data	Received data on a secondary channel.
17	DD	115	Receive Clock	A receive data rate clock output for use by the external data sink. Positive clock transitions correspond to data transition.
18				Not used.
19	SCA	140	Sec. Request to Send	Request to send on a secondary channel.
20	CD	108.2	Data Terminal Ready	This circuit is positive when the DTE is ready to originate or answer a call in dial up operation.
21	SQ	110	Signal Quality Indicator	Signals on this circuit are used to indicate the probability of an error in the received data. A positive level indicates good signal quality while a negative level indicates poor signal quality.
22	CE	125	Ring Indicator	In direct dial operation, this circuit is positive in response to an incoming ring signal.
23	CH	111	Data Rate Select	Supplies a data rate control to select Primary or Fallback data rate.
24	DA	113	External Transmit Clock	A serial data rate clock input from the data source. Positive clock transitions correspond to data transitions.
25				Not used.



**Table B-2. Digital Interface Signal Descriptions (232D)**

Pin No.	EIA-232C	CCITT	Signal Name	Description
1		101	Shield	No connection
2	BA	103	Transmit Data	Serial digital data (to be modulated) from a data terminal or other digital data source. It must be accompanied by a transmit clock (pin 15) or by an external data rate clock (pin 24). Data transitions should occur on positive-going transitions at clock. (Synchronous modems only.)
3	BB	104	Received Data	Serial digital data at the output of the modem receiver. The data is accompanied by an internal data rate clock (pin 17) whose positive-going transitions occur on the data transition. (Synchronous modems only.)
4	CA	105	Request to Send	A positive level to the modem when data transmission is desired.
5	CB	106	Clear to Send	A positive level from the modem after receipt of Request to Send and when the modem is ready to transmit.
6	CC	107	Data Set Ready	A positive level from the modem when power is on and it is ready to operate. In dial-up operation, the modem must be off-hook to give a high DSR signal.
7	AB	102	Signal Ground or Common Return	Common signal and DC power ground.
8	CF	109	Received Line Signal Detector	A positive level from the modem indicating the presence of a receive signal (carrier detect).
9			+12 volts	+12 voltage reference
10			-12 volts	-12 voltage reference
11	CG	110	Signal Quality Indicator	Signals on this circuit are used to indicate the probability of an error in the receive data. A positive level indicates good signal quality while a negative level indicates poor signal quality.
12			Not used	
15		114	Transmit Clock (DCE)	A transmit data clock output for use by an external data source. Positive click transitions correspond to data transitions.
16			Not used	

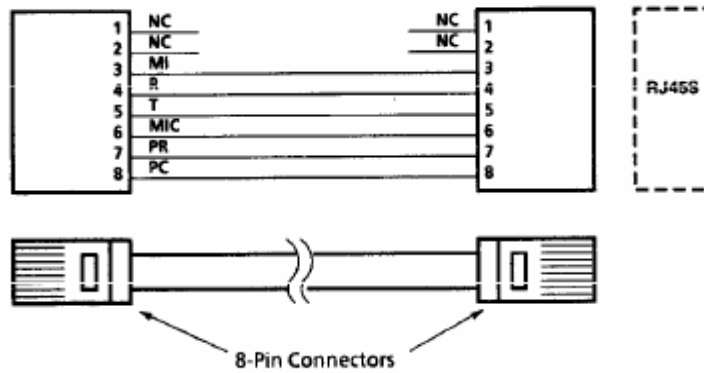
Pin No.	EIA-232C	CCITT	Signal Name	Description
17	DD	115	Receive Clock	A receive data rate clock output for use by the external data sink. Positive clock transitions correspond to data transition.
18		141	Local Loopback (Loop 3) Control	A positive level will cause the modem to go into a local analog loop, when strap enabled.
20	CD	108.2	Data Terminal Ready	This circuit is positive when the DTE is ready to originate or answer a call in dial up operation. DTR must always be active (high) in 2-wire private line operation. Cycling DTR causes retraining.
21		140	Remote Digital Loopback	A positive level will cause a digital loopback at a remote modem, when strap enabled.
22	CE	125	Ring Indicator	In a direct dial operation, this circuit is positive in response to an incoming ring signal.
23	CH	111	Data Rate Select	Supplies a data rate control to select Primary or Fallback data rate.
24	DA	113	External Transmit	A serial data rate clock input from the data source. Positive clock transitions correspond to data transitions.
25		142	Test Mode	Indicates when the modem is in a test mode.

## APPENDIX C – TELEPHONE LINE CABLES

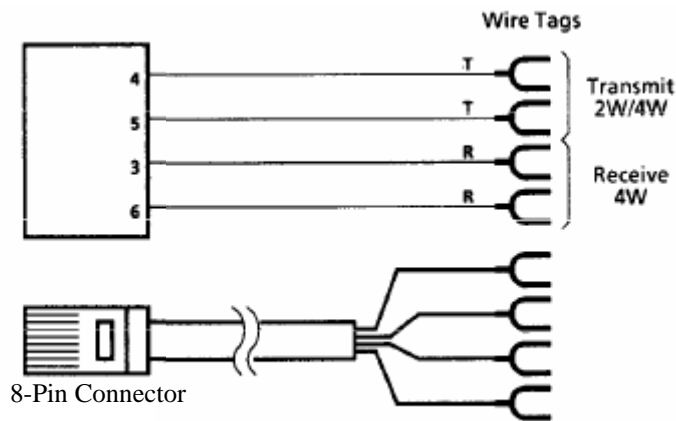
Table C-1 lists the function of the modular jacks on the back panel of the Data Shelf. The figure that follows Table C-1 shows a typical telephone-line cable configuration. The last two figures show DDS cable configurations.

**Table C-1. Modular Jack Pin Functions**

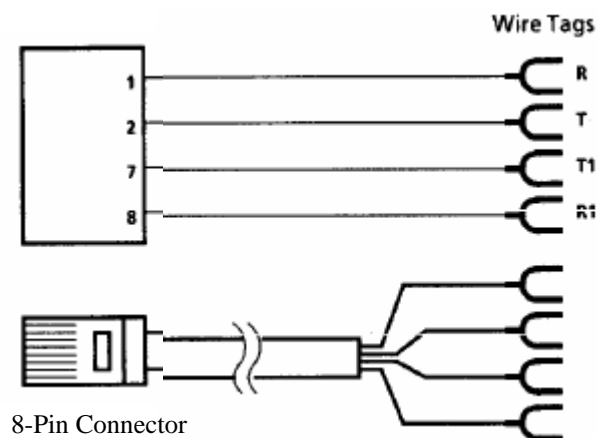
TELCO Jack			TELSET/LL Jack	
Pin		Function	Pin	Function
1	R	Xmit pair of DDS modems. Not used on other type modems	1	Xmit pair (Dial backup modems only)
2	T		2	
3	R1/MI	Receive ring for leased line modems. Mode indicator for dialup modems.	3	Not used
4	R	Ring – dial or leased	4	Not used
5	T	Tip – dial or leased	5	Not used
6	T1/MIC	Receive tip or leased line modems. Mode indicator common for dialup modems.	6	Not used
7	PR	Programmable resistor connections for dial network modems.	7	Rec pair (Dial backup modems only)
8	PC		8	
7	T1	Rec pair for DDS type modems.		
8	R1			



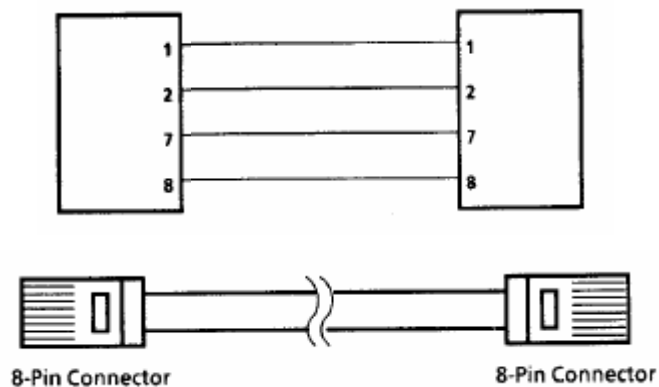
**Figure C-1. Programmable Cable**



**Figure C-2. Leased Line Cable**



**Figure C-3. Example 1: DDS Cable**  
(cable is also used for dial backup-type modems)



**Figure C-4. Example 2: DDS Cable**  
 (cable is also used for dial backup-type modems)

**Table C-2. Telco Connections**

DSP9612 / MOT202T Rear Panel			V.3600 Rear Panel	
Telco			Dial	Telco
PIN	Signal	Direction	RJ45	RJ45
3	RING 1	(INPUT)	3 R1	1 R
6	TIP 1	(INPUT)	4 Ring	2 T
4	RING	(OUTPUT)	5 Tip	7 T1
5	TIP	(OUTPUT)	6 T1	8 R1

## Mass Termination Connector

As an option, a 50-pin mass termination connector may be specified for the TELCO connection. The adapter for conversion from modular connectors to mass termination also has wire-wrap pins for TELCO connection.

Mass termination pin functions for the dial backup backplane are shown in the following table. The 50-pin mass termination connectors are Cinch Number 97-CS-50 with screw lock assembly. The mating connector is 97-12500-181, or equivalent. Wire wrap pins are not available.

**NOTE:** TELCO jack pin functions are identical for both standard and dial backup modems.

DTE connectors are the same as for standard modems.

**Dial Backup Mass Termination (50-pin Receptacle) Pin Functions**

TELCO Connector		TELSET/LL Connector		TELCO CONNECTOR		TELSET/LL Connector	
Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	Ring 1	1	Xmit Ring 1	9	Ring 5	9	Xmit Ring 5
26	Tip 1	26	Xmit Tip 1	34	Tip 5	34	Xmit Tip 5
2	MI 1/Rec Ring 1	2	Rec Ring 1	10	MI 5/Rec Ring 5	10	10 Rec Ring 5
27	MIC 1/Rec Tip 1	27	Rec Tip 1	35	MIC 5/Rec Tip 5	35	Rec Tip 5
3	Ring 2	3	Xmit Ring 2	11	Ring 6	11	Xmit Ring 6
28	Tip 2	28	Xmit Tip 2	36	Tip 6	36	Xmit Tip 6
4	MI 2/Rec Ring 2	4	Rec Ring 2	12	MI 6/Rec Ring 6	12	Rec Ring 6
29	MIC 2/Rec Tip 2	29	Rec Tip 2	37	MIC 6/Rec Tip 6	37	Rec Tip 6
5	Ring 3	5	Xmit Ring 3	13	Ring 7	13	Xmit Ring 7
30	Tip 3	30	Xmit Tip 3	38	Tip 7	38	Xmit Tip 7
6	MI 3/Rec Ring 3	6	Rec Ring 3	14	MI 7/Rec Ring 7	14	Rec Ring 7
31	MIC 3/Rec Tip 3	31	Rec Tip 3	39	MIC 7/Rec Tip 7	39	Rec Tip 7
7	Ring 4	7	Xmit Ring 4	15	Ring 8	15	Xmit Ring 8
32	Tip 4	32	Xmit Tip 4	40	Tip 8	40	Xmit Tip 8
8	MI 4/Rec Ring 4	8	Rec Ring 4	16	MI 8/Rec Ring 8	16	Rec Ring 8
33	MIC 4/Rec Tip 4	33	Rec Tip 4	41	MIC 8/Rec Tip 8	41	Rec Tip 8

## Raymar Information Technology, Inc. Limited Warranty

### One Year Limited Hardware Warranty

Raymar Information Technology, Inc., dba Raymar-Telenetics, warrants their products against defects in hardware, material and workmanship under normal use for one (1) year from the date of purchase. Raymar will, at no charge, either repair the product (with new or reconditioned parts), or replace it (with a new or reconditioned product). Repaired replacement products are warranted for either 90 days or the remainder of the original warranty period, whichever is longer. This warranty extends to the original end-user only.

### What This Warranty Does Not Cover

This warranty does not cover: (a) software; (b) installation or service of the product; (c) conditions resulting from consumer damage such as improper maintenance or misuse, abuse, accident or alteration; (d) all plastic surfaces (including display screens) and all other exposed parts that are scratched or damaged due to normal use; (e) operation of our products with equipment not supplied by Raymar (f) products which have had the serial number removed or made illegible; or (g) products rented to others. This warranty applies only to hardware products manufactured by or for Raymar Information Technology, Inc. and identified by the Raymar-Telenetics trademark, trade name or product identification logo affixed to them. Refer to the Service and Support section of the User's Guide for service after the warranty expires. No warranty is made as to coverage availability or grade of service provided by the carrier.

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This warranty sets forth Raymar's entire hardware responsibilities regarding this product. Repair, replacement or refund of the purchase price is at Raymar's discretion. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER EXPRESS WARRANTIES, IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ARE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. IN NO EVENT SHALL RAYMAR BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVINGS, OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THIS RAYMAR PRODUCT, TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW. WITHOUT LIMITING THE FOREGOING, RAYMAR SHALL HAVE NO LIABILITY FOR ANY DATA STORED IN OR USED WITH THE PRODUCT, INCLUDING THE RECOVERY COSTS OF SUCH DATA OR PROGRAMS.

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### How To Use Raymar's Limited Warranty Service

To take advantage of this warranty, you must do the following:

- If you are having trouble with your product, contact Raymar service using the appropriate number from the Service and Support section of the User's Guide. If it is determined that your product requires service, you will be issued a Return Materials Authorization (RMA) form.
- Pack the defective product securely for shipping. Include only the units pre-approved by service on your RMA form.
- This warranty is void if the product is damaged in transit, you must insure your shipment.
- Ship the defective product, proof of date of purchase, and the RMA form to the address specified.
- Display your RMA number prominently on the outside of the shipping box. Customer is responsible for freight in, door to door. Raymar is responsible for return shipping costs.
- To ensure prompt service, please write on the RMA form a brief description of the problem you are experiencing with the product.

Raymar Information Technology, Inc.

7325 Roseville Road

Sacramento, CA 95842

Service Hotline (800) 747-1522

<http://support.telenetics.com> or e-mail to [techsupport@raymarinc.com](mailto:techsupport@raymarinc.com)

## **Raymar Information Technology, Inc. Return Merchandise Authorization (RMA) Procedure**

Before returning any Raymar-Telenetics product, an RMA number must be obtained.

The most convenient way to obtain an RMA number for a product purchased from Raymar-Telenetics is to call **1-800-747-1522**. When doing so, please have the following information ready:

- Company name
- Full billing address, as well as the address for the location where the product should be returned once repaired or replaced
- Telephone & Fax numbers
- Email address
- Product model number and serial number

For each item being returned, please include the product model number, the serial number, a description of the problem being encountered, and the cause of the problem (if known).

Please note that prior to authorizing a return, a product support specialist may call to verify that the product is properly installed or may ask you to perform tests to insure that the product has actually failed.

The product must be properly packed and returned to:

**Raymar-Telenetics  
7325 Roseville Road  
Sacramento, CA 95842**

The RMA number must be legibly displayed on the shipping carton. Raymar-Telenetics will not be responsible for any product returned without an RMA number.

If the product is out of warranty, estimates for repair rates and any applicable shipping costs will be communicated by a customer service representative. Currently, Raymar-Telenetics accepts purchase orders or credit cards as payment methods.

Repairs currently require 5 – 10 business days and are returned via UPS Ground.