

# USER MANUAL

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## MODEL 2017RC Miniature RS-232 to 20mA Current Loop Converter: Dual Port Rack Mount Card



**PE PATTON**  
**Electronics Co.**



An ISO-9001  
Certified Company

Part# 07M2017RC-B  
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Revised 1/22/08

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(301) 975-1000  
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(301) 975-1007  
<http://www.patton.com>

## 1.0 WARRANTY INFORMATION

**Patton Electronics** warrants all Model 2017RC components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If this product fails or does not perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall **Patton Electronics** be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. **Patton Electronics** specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

### 1.1 RADIO AND TV INTERFERENCE

The Model 2017RC generates and uses radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer's instructions—may cause interference to radio and television reception. The Model 2017RC has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation.

If the Model 2017RC does cause interference to radio or television reception, which can be determined by turning the power off or disconnecting the unit, the user is encouraged to try to correct the interference by one of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna, and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

If the user detects intermittent or continuous product malfunction due to nearby high power transmitting radio frequency equipment, the user is advised to use data cables with an external outer shield bonded to a metal or metalized connector, and to configure the rear card as shown in Section 3.2 of this manual.

## 1.2 CE NOTICE

The CE symbol on your Patton Electronics equipment indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

## 1.3 SERVICE

All warranty and non-warranty repairs must be returned freight prepaid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Service at **(301) 975-1007; <http://www.patton.com>; or [support@patton.com](mailto:support@patton.com)**. *Packages received without an RMA number will not be accepted.*

Patton Electronics' technical staff is also available to answer any questions that might arise concerning the installation or use of your Model 2017RC. Technical Service hours: **8AM to 5PM EST, Monday through Friday.**

## **2.0 GENERAL INFORMATION**

Thank you for your purchase of this Patton Electronics product. This product has been thoroughly inspected and tested and is warranted for one year parts and labor. If any questions or problems arise during installation or use of this product, please do not hesitate to contact Patton Electronics Technical Support at (301) 975-1007.

### **2.1 FEATURES**

- Bi-directional RS-232 to 20mA current loop conversion
- 2 Independent interface converters per card
- Full duplex, asynchronous transmission over two twisted pairs
- Switch selectable active/passive transmitter
- Optical Isolation and Surge Suppression
- Front Panel LED indicators for TD, RD and power
- Selectable receiver impedance
- Made in the USA

### **2.2 DESCRIPTION**

**The Patton Model 2017RC** Interface Converter Rack Card is a dual rack card that lets two asynchronous RS-232 devices communicate bi-directionally with two asynchronous 20mA current loop devices. Operating full duplex on both ports, the Model 2017RC supports data rates to 115.2 kbps.

Internal active/passive switches allow the user to configure the Model 2017RC with an active or passive transmitter. This unique feature allows configuration to fit a wide variety of current loop applications. The Model 2017RC uses Patton's mid-plane architecture and is equipped with dual RJ-45 connectors on the rear interface card (adapter cables are available from Patton Electronics).

The Model 2017RC is designed to mount in Patton's 2U high 19" rack chassis and 2/4/8 slot Cluster Boxes. The combination of rack mount, Cluster Box and interface powered units provides a completely integrated "networking" solution. The Model 2017RC is made in the USA.

### 3.0 CONFIGURATION

This section describes the location and orientation of the Model 2017RC's configuration straps, and details all possible settings. This section also identifies factory default configuration settings.

#### 3.1 FRONT CARD CONFIGURATION

The Model 2017RC uses one switch and one jumper per port that allow configuration to a wide range of asynchronous applications. These switches and jumpers are accessible when the card is slid out of the rack chassis. Figure 1 shows the switches and jumpers on the position of the Model 2017RC PC board.

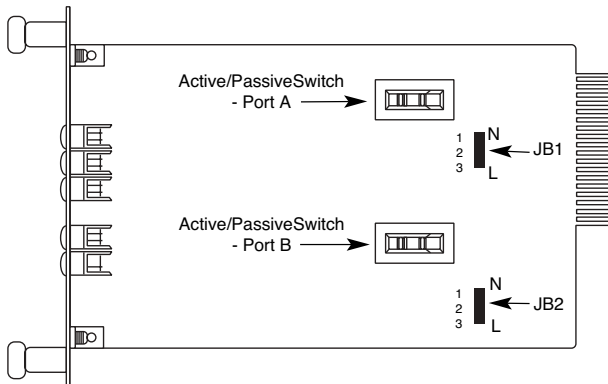


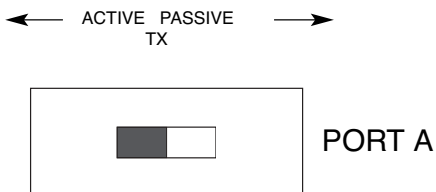
Figure 1. Model 2017RC front card, showing location of the Switches and Jumpers

##### 3.1.1 Active/Passive Configuration

In any closed current loop, the transmitter *or* the receiver acts as the active current source, while the other of the two must be passive. To configure the Model 2017RC active/passive modes, you must first determine whether the transmitter should be active or passive.

The active/passive switches are used to control the mode of the 20mA transmitters. Each converter on the dual port card has one switch. As Figure 2 shows, the switch controls the mode of the transmitter. *The Model 2017RC receivers are always passive.*

**WARNING:** *Never connect two active devices together. Your configurations **must** be "active to passive" or "passive to active".*



**Figure 2.** Orientation of transmitter active/passive switch

The following table shows the factory default settings of switches

<b>SWITCH SUMMARY TABLE</b>		
<b>Position</b>	<b>Function</b>	<b>Factory Default</b>
S1	Transmitter (A) Mode Select	Active
S3	Transmitter (B) Mode Select	Active

S1 and S3. Following the table are descriptions of each switch.

### **Switches S1 and S3: Transmitter Active/Passive Select**

Slide switches S1 (TXA) and S3 (TXB) are used to set the port A and port B transmitter modes of operation, respectively. When the active mode of operation is selected, the Model 2017RC transmitter will supply the 20mA loop current to the connected passive receiver. When the passive mode of operation is selected, the Model 2017RC transmitter must be connected to an active receiver.

### 3.1.2 Setting the Receiver Impedance Straps

JB1 and JB2 are used to set the input impedance of the port A and port B receivers, respectively. This allows the user to choose the optimum impedance setting for the particular application. There are two possible positions for JB1 and JB2: strap covering posts 1 & 2, or strap covering posts 2 & 3. Figure 3 shows the orientation of the strap with respect to its post positions.

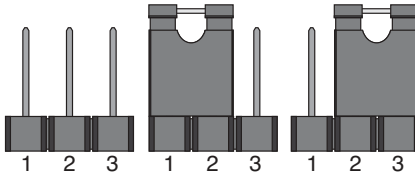


Figure 3. Orientation of interface card straps

The following table provides a summary of strap functions rear interface card.

IMPEDANCE STRAP SUMMARY TABLE		
Strap	Position 1&2	Position 2&3
JB1	Normal <sup>†</sup>	Low
JB2	Normal <sup>†</sup>	Low

NOTE: <sup>†</sup> indicates factory default

#### Straps JB1 and JB2: Receiver Impedance

In the normal setting, JB1 and JB2 are positioned on posts 1 and 2. The “Normal” setting is best suited for applications in which two Model 2017RCs are used together. The low impedance setting may improve performance with other current loop devices.

##### JB1

Position 1&2 = Normal (*default*)

Position 2&3 = Low Receiver Impedance

##### JB2

Position 1&2 = Normal (*default*)

Position 2&3 = Low Receiver Impedance

NOTE: peg 1 is oriented toward top of card, peg 3 is oriented toward bottom of card

### 3.2 REAR CARD CONFIGURATION

The Model 2017RC has two interface card options: the 1Q11 (which comes equipped with two RJ-11 ports and two RJ-45 ports) and the 1Q45 (which comes equipped with four RJ-45 ports). Figure 4 illustrates these two different rear interface options.

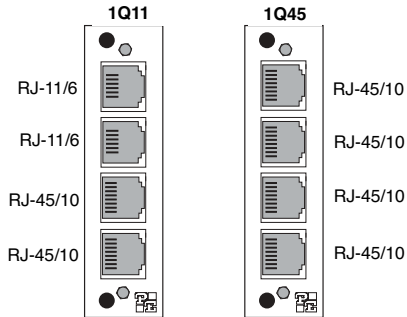


Figure 4. Model 1000RC rear interface card options

Prior to installation, you should examine the rear card you have selected and ensure that it is suitable for your application. Each rear card is configured by setting straps on the PC board. Section 3.2.1 describes the strap locations and settings for each card.

#### 3.2.1 REAR CARD STRAP SETTINGS

Figure 5 shows the strap locations for the 1Q11 and the 1Q45 rear cards. These straps determine various grounding characteristics for the RS-232 and twisted pair lines.

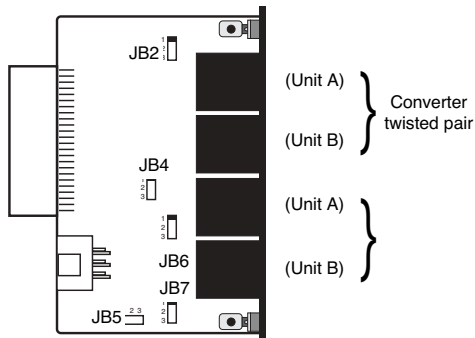


Figure 5. Strap locations for both rear cards



The table below provides a summary of strap functions for both of the rear cards. Descriptions of each strap follow the table.

<b>INTERFACE CARD STRAP SUMMARY TABLE #1</b>		
<b>Strap</b>	<b>Position 1&amp;2</b>	<b>Position 2&amp;3</b>
JB2	Line A Shield	No Shield <sup>†</sup>
JB4	Line B Shield	No Shield <sup>†</sup>
JB5	SGND & FRGND*	Open (Not Connected) <sup>†</sup>
JB6	Unit A DSR <sup>†</sup>	N/A
JB7	Unit B DSR <sup>†</sup>	N/A

**NOTE** <sup>†</sup> indicates factory default  
<sup>\*</sup>via 100 ohm resistor

### **Line A Shield & Line B Shield (JB2 & JB4)**

This strap pertains to the line interface. In position 1&2, the strap links RJ-11 pins 1 and 6 (RJ-45 pins 2 and 7) to frame ground and the rear panel. These pins can be used as connections for the twisted pair cable shield. In position 2&3, pins 1 and 6 (or 2 and 7) are disconnected from frame ground.

#### JB2

Position 1&2 = Line A Shield Connected to Frame Ground  
 Position 2&3 = No Shield

#### JB4

Position 1&2 = Line B Shield Connected to Frame Ground  
 Position 2&3 = No Shield

### **SGND & FRGND (JB5)**

In position 1&2, this strap links signal ground and frame ground through a 100 Ohm, 1/2 W resistor. In position 2&3, pin 1 is “not connected to frame ground.

#### JB5

Position 1&2 = SGND and FRGND Connected  
 Position 2&3 = SGND and FRGND Not Connected

### **DTE as DSR or RI (JB6 & JB7)**

Because the Model 2017RC uses DSR (but not RI), only position 1&2 is valid when this rear card is used. Position 1&2 causes the terminal (DTE) to see DSR when the Model 2017RC is powered up properly. Position 2&3 is for Ring Indicate, which is not used on the Model 2017RC. Furthermore, use of position 2&3 will cause DSR to float, which will lead to improper operation of the Model 2017RC.

#### JB6 & JB7

Position 1&2 = DSR

Position 2&3 = Not a Valid Setting for Model 2017RC

## 4.0 INSTALLATION

This section describes the functions of the Model 1000R16 rack chassis, tells how to install front and rear Model 2017RC cards into the chassis and provides diagrams for wiring up the interface connections correctly.

### 4.1 THE MODEL 1000R16 RACK CHASSIS

The Model 1000R16 Rack Chassis (Figure 6) has sixteen short range modem card slots, plus its own power supply. Measuring only 3.5" high, the Model 1000R16 is designed to occupy only 2U in a 19" rack. Sturdy front handles allow the Model 1000R16 to be extracted and transported conveniently.

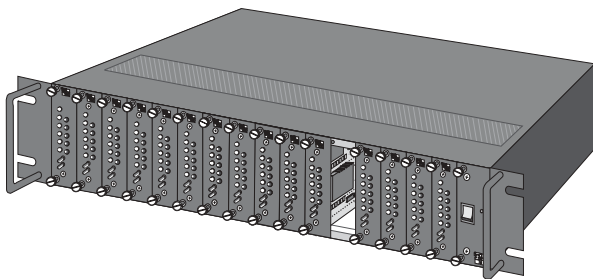


Figure 6. Model 1000R16 Rack Chassis with Power Supply

#### 4.1.1 THE RACK POWER SUPPLY

The power supply included in the Model 1000R16 rack uses the same mid-plane architecture as the modem cards. The front card of the power supply slides in from the front, and the rear card slides in from the rear. They plug into one another in the middle of the rack. The front card is then secured by thumb screws and the rear card by conventional metal screws.

**WARNING!** There are no user-serviceable parts in the power supply section of the Model 2017RC. Fuse replacement should only be performed by qualified service personnel. Contact Patton Electronics Technical support at (301)975-1007 for more information.

## Switching the Power Supply On and Off

The power switch is located on the front panel. When plugged in and switched on, a red front panel LED will glow. Since the Model 1000R16 is a “hot swappable” rack, *it is not necessary for any cards to be installed before switching on the power supply.* The power supply may be switched off at any time without harming the installed cards.

**NOTE:** Please refer to the Model 1000RP Series User Manual *AC and DC Rack Mount Power Supplies* for fuse and power card replacement information.

## 4.2 INSTALLING THE MODEL 2017RC INTO THE CHASSIS

The Model 2017RC is comprised of a front card and a rear card. The two cards meet inside the rack chassis and plug into each other by way of mating 50 pin card edge connectors. Use the following steps as a guideline for installing each Model 2017RC into the Model 1000R16 rack chassis:

1. Slide the rear card into the back of the chassis along the metal rails.
2. Secure the rear card using the metal screws provided.
3. Slide the front card into the front of the chassis. It should meet the rear card when it's almost all the way into the chassis.
4. Push the front card *gently* into the card-edge receptacle of the rear card. It should “click” into place.
5. Secure the front card using the thumb screws.

**Note:** *Since the Model 1000R16 chassis allows “hot swapping” of cards, it is not necessary to power down the rack when you install or remove a Model 2017RC.*

## 4.3 RS-232 CONNECTION

The RS-232 ports are always the *lower* ports on the interface card. The 10-pin RJ-45 is pinned according a modified modular interface standard. For specific interface pin-outs, please refer to the diagrams in **Appendix D**.

The Model 2017RC is wired as a DCE (Data Communications Equipment). Therefore, it wants to connect to a DTE (Data Termination Equipment). If your RS-232 output device is a DTE, you may need to use a special cable. If your RS-232 output device is DCE, you will require a null modem connection. Call Patton Technical Support at (301) 975-1007 for specific installation instructions.

**4.4 TWISTED PAIR CONNECTION**

The Model 2017RC operates half or full duplex over two twisted pairs. In *all* applications, the twisted pair wire must be 26 AWG or thicker, unconditioned, dry, metallic wire. Both shielded and unshielded wire yield favorable results. **Note:** The Model 2017RC can only communicate in a closed data circuit with another Model 2017RC or a compatible 20mA device. Dial-up analog circuits, like those in a standard Hayes-type modem, are *not acceptable*. For further information, see Appendix B.

**4.4.1 POINT-TO-POINT TWISTED PAIR CONNECTION**

The 6-position RJ-11 and 8-position RJ-45 jack options for the Model 2017RC (always the *upper* jack on the rear interface card) are prewired for a standard TELCO wiring environment. Pin descriptions of the RJ-11 and RJ-45 modular jacks.

<b>RJ-11</b>	<b>SIGNAL</b>	<b>RJ-45</b>	<b>SIGNAL</b>
1 .....	GND <sup>†</sup>	1 .....	N/C
2 .....	RCV-	2 .....	GND
3 .....	XMT+	3 .....	RCV-
4 .....	XMT-	4 .....	XMT+
5 .....	RCV+	5 .....	XMT-
6 .....	GND	6 .....	RCV+
		7 .....	GND
		8 .....	N/C

#### 4.4.2 POINT-TO-POINT TWISTED PAIR CONNECTION

The 6-position RJ-11 and 8-position RJ-45 jack options for the Model 2017RC—always the *upper* jack on the rear interface card—are prewired for a standard TELCO wiring environment (See **Appendix D** for pin number orientations). Connection of a 4-wire twisted pair circuit between two or more Model 2017RCs requires a *crossover cable* as shown in the following charts.

##### **RJ-11 Cable**

<b><u>SIGNAL</u></b>	<b><u>PIN#</u></b>	<b><u>PIN#</u></b>	<b><u>SIGNAL</u></b>
GND†	1-----	6	GND†
RCV-	2-----	4	XMT-
XMT+	3-----	5	RCV+
XMT-	4-----	2	RCV-
RCV+	5-----	3	XMT+
GND†	6-----	1	GND†

†Connection to ground is optional

##### **RJ-45 Cable**

<b><u>SIGNAL</u></b>	<b><u>PIN#</u></b>	<b><u>PIN#</u></b>	<b><u>SIGNAL</u></b>
GND†	2-----	7	GND†
RCV-	3-----	5	XMT-
XMT+	4-----	6	RCV+
XMT-	5-----	3	RCV-
RCV+	6-----	4	XMT+
GND†	7-----	2	GND†

†Connection to ground is optional

## 5.0 OPERATION

Once you have configured each Model 2017RC and connected the cables, you are ready to operate the units. This section describes the LED status monitors, and the power-up procedure.

### 5.1 LED STATUS MONITORS

The Model 2017RC features nine front panel LEDs that indicate data activity and power status. Figure 7 (below) shows the positions of the LEDs. Following Figure 7 are functional descriptions of each LED.

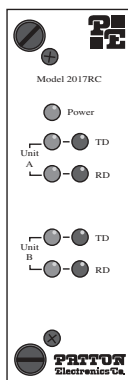


Figure 7. The Model 2017RC front panel, showing LED positions

- Power** glows green when power is applied to the Model 2017RC front card.
- TD** (Transmit Data) - indicates status of transmit data from the DTE. Red indicates a mark or idle state. Green indicates a space or active state.
- RD** (Receive Data) - indicates status of receive data from the DCE. Red indicates a mark or idle state. Green indicates a space or active state.

### 5.2 POWER-UP

There is no power switch on the Model 2017RC: Power is automatically applied to the 2017RC when its card-edge connector touches the chassis' mid-plane socket, or when the chassis' power is turned on. *Note: The 2017RC is a "hot swappable" card—it will not be damaged by plugging it in or removing it while the rack is powered up.*

## APPENDIX A

### MODEL 2017RC SPECIFICATIONS

<b>Data Rates:</b>	0 to 115.2 kbps
<b>Transmission Format:</b>	Asynchronous, full duplex
<b>Transmission Line:</b>	19 to 26 AWG unconditioned, 2 twisted pairs
<b>RS-232 Interface:</b>	10 pin RJ-45 DCE
<b>Control Signals:</b>	RTS looped back to CTS, DTR looped back to DSR and CD
<b>Current loop Interface:</b>	RJ11 (6 position) or RJ45 (8 position)
<b>Drive Voltage:</b>	12 VDC, nominal
<b>Drive Current:</b>	20mA, nominal
<b>Maximum Loop Voltage:</b>	25 VDC
<b>Maximum Loop Current:</b>	60mA
<b>Isolation:</b>	Optical (passive modes only)
<b>Surge Protection:</b>	27V, 600W Silicon Avalanche Diodes
<b>LED Indicators:</b>	Bi-color red/green indicators for TD and RD; single green LED indicator for power
<b>Power:</b>	1.4W, max @ 10VAC, supplied by rack
<b>Temperature:</b>	0-40°C (32-104°F)
<b>Humidity:</b>	5 to-95%, noncondensing
<b>Dimensions:</b>	0.95"w x 3.1"h x 5.4"l



## **APPENDIX B**

### **PATTON MODEL 2017RC CABLE RECOMMENDATIONS**

The following statements apply to the Model 2017RC when used as a short range modem over private twisted pair:

All Patton Electronics Company Short Range Modems (SRMs) are tested to the distances published in our Catalogs and Specification Sheets on twisted-pair cable with the following characteristics:

<b>Wire Gauge</b>	<b>Capacitance</b>	<b>Resistance</b>
19 AWG	83nF/mi or 15.72 pF/ft.	.0163Ω/ft.
22 AWG	83nF/mi or 15.72 pF/ft.	.0326Ω/ft.
24 AWG	83nF/mi or 15.72 pF/ft.	.05165Ω/ft.
26 AWG	83nF/mi or 15.72 pF/ft.	.08235Ω/ft.

We fully expect that the Short Range Modems will operate on lines with specifications different from those tested, but to reduce the potential difficulties in the field, one should ensure that the cable being used has similar or better characteristics (lower capacitance or lower resistance).

Wire with capacitance of 20pF/ft. or less is suitable for all our Short Range Modems however, distances may vary from those published in our catalog. Resistance will also affect distance but not functionality. Wire should be 26 AWG or larger (smaller AWG#).

Patton products are designed to withstand normal environmental noise and conditions; however, other environmental factors too numerous to discuss in this format may affect proper operation of the SRM's.

Selection of the proper SRM for an application is critical to maintaining Customer Satisfaction and must be taken seriously. Certain models are better suited for particular applications and environments than others.

## APPENDIX C

### FACTORY REPLACEMENT PARTS

The Patton Model 2017RC rack system features custom front and rear power supply entry modules and other user-replaceable parts. Model numbers and descriptions for these parts are listed below:

<b><u>Patton Model #</u></b>	<b><u>Description</u></b>
1000RPEM.....	120/240V Rear Power Entry Module
1000RPSM-2.....	120/240V Front Power Supply Module
1000RPEM-DC .....	DC Rear Power Entry Module
1000RPSM-48A .....	48V Front Power Supply Module
1000RPEM-V .....	120/240V CE Compliant Rear Power Entry Module
1000RPSM-V .....	120/240V CE Compliant Front Power Supply Module
0805US .....	American Power Cord
0805EUR.....	European Power Cord CEE 7
0805UK .....	United Kingdom Power Cord
0805AUS.....	Australia/New Zealand Power Cord
0805DEN.....	Denmark Power Cord
0805FR .....	France/Belgium Power Cord
0805IN.....	India Power Cord
0805IS.....	Israel Power Cord
0805JAP.....	Japan Power Cord
0805SW .....	Switzerland Power Cord
0516FPB1 .....	Single Width Blank Front Panel
0516FPB4 .....	4-Wide Blank Front Panel
0516RPB1 .....	Single Width Blank Rear Panel
0516RPB4.....	4-Wide Blank Rear Panel
056S1.....	Set of 16 #4 pan head screws/washers

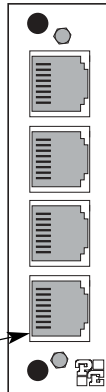
## APPENDIX D

### PATTON MODEL 2017RC INTERFACE SETTINGS AND ORIENTATION

PATTON MODULAR INTERFACE - 10 Wire RJ-45		
Contact Number	Circuit	Description
1	N/A	Not Used
2	125	DSR
3	109	Received Line Signal Indicator (CD)
4	108 / 2	DTE Ready (DTR)
5	102	Signal Common
6	104	Received Data
7	103	Transmitted Data
8	106	Clear to Send
9	105 / 133	Request to Send / Ready for Receiving
10	N/A	Not Used

Pins 2-9 conform to the EIA/TIA-561 eight position non-synchronous interface standard.

For all modular jacks  
(6, 8 or 10 position):  
**Pin 1** is always toward  
the **bottom** when the  
rear card is oriented  
correctly in the slot



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