

USER MANUAL

MODEL IM2RC/F 64k Co-Directional Rack Mount Modem Rear Card



PT PATTON
Electronics Co.



An ISO-9001
Certified Company

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1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model IM2RC/F 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 IM2RC/F 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 IM2RC/F 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 IM2RC/F does cause interference to radio or television reception, which can be determined by disconnecting the unit, the user is encouraged to try to correct the interference by one or more 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). In the event the user detects intermittent or continuous product malfunction due to nearby high power transmitting radio frequency equipment, the user is strongly advised to use only data cables with an external outer shield bonded to a metal or metalized connector at both ends. Shielded cables must be used on the network connection to satisfy compliance with the Electromagnetic Compatibility (EMC) directive.

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 arise during installation or use of this product, please contact Patton Electronics Technical Support at: (301) 975-1007.

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 Services at:

Telephone: **(301) 975-1007**;
Web Address: **<http://www.patton.com>**;
email: **support@patton.com**.

NOTE: 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 IM2RC/F. **Technical Service hours: 8AM to 5PM EST, Monday through Friday.**

2.1 FEATURES

- Designed for use with Patton Electronics short range modem access products that receive Patton's Rear Card modules and support 64k/128k synchronous data rates
- Compliant with ITU-T G.703 electrical specifications
- 120 ohm RJ-45 Network Termination
- Complies with ITU-T G.823 Jitter Control Specifications
- Supports Clear Channel or Octet Timing Modes
- Built-in Transformer Isolation and Surge Protection
- Supports Network or Modem Timing
- Fits in Patton's 2u (3.5") rack chassis and cluster boxes
- Made in the U.S.A.

2.2 DESCRIPTION

The Patton Model IM2RC/F is a rack-mountable rear card that provides Patton baseband modems with an interface to the G.703 PCM network. With the IM2RC/F you can achieve high speed G.703 network extension, dedicated high speed internet access, remote LAN access,...the possibilities are endless! Supporting 64 kbps clear channel or 128 kbps octet mode data streams, the IM2RC/F can set its own clock or it take clocking from the G.703 network.

The Model IM2RC/F meets baseband modem function cards such as 1092ARC, 1045RC and 2500RC in the mid-plane of Patton's 2U (3.5") rack chassis. G.703 access is accomplished via a 120 Ohm RJ-45 jack. 2 or 4 Wire twisted pair Line connections are made via a second RJ-45 jack.

The Model IM2RC/F features on-board transformer isolation and surge protection as well as compliance with ITU-T G.823 Jitter Control Specifications.

3.0 CONFIGURATION

This section describes how to configure the IM2RC/F rear card. Please refer to the appropriate function card user manual to configure the function card.

WARNING! The IM2RC/F card contains sensitive integrated circuitry. Failure to ground yourself during configuration may result in damage to the IM2RC/F card or the front function card.

3.1 CONFIGURING THE IM2RC/F HARDWARE SWITCHES

The Model IM2RC/F rear card features an eight position DIP switch mounted on the rear of the printed circuit board. Use these switches to configure G.703 operational and timing modes. Figure 1, below shows the position of the DIP switches on the board.

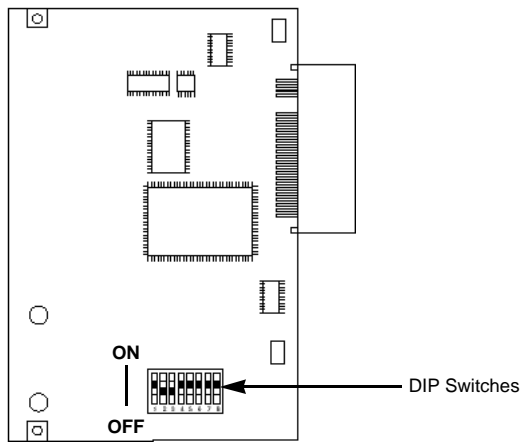


Figure 1. Model IM2RC/F Card Showing DIP Switches

Figure 2 shows the orientation of the DIP switches with respect to the "ON" and "OFF" positions.

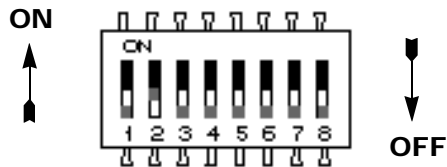


Figure 2. Close up of Configuration switches

SWITCH SUMMARY TABLE		
Position	Function	Factory Default
S1	Reserved for Future Use	Off
S2	Operation Mode	Off Clear Channel
S3	Timing Mode	Off Network Timing
S4	Reserved for Future Use	Off
S5	Reserved for Future Use	Off
S6	G.703 Transmit Octet	Off Injected BPVs
S7	Reserved for Future Use	Off
S8	Reserved for Future Use	Off

Notice! The RJ-45 G.703 port of the Model IM2RC/F is intended to connect to telecommunication network voltage (TNV) circuits which may carry dangerous voltages. Therefore the power and network cables must be disconnected prior to switch configuration.

Switch S1: Reserved for Future Use

Switch S1 is reserved for future use and should remain in the Off position.

Switch S2: Operation Mode

Use Switch S2 to set the IM2RC/F for either Clear Channel or Octet Timing Mode. Most installations use Clear Channel (64kbps) Mode operation, though some installations may use Octet Timing Mode.

When operating in octet timing mode, the IM2RC/F facilitates a sense of frame synchronization by inserting bi-polar violations in the AMI coding structure. When the IM2RC/F is set to Octet Timing Mode (On position), all communications equipment in the channel must be configured to communicate at 128 kbps (64 kbps data plus 64 kbps octet framing pattern) Additionally, all terminal equipment must support octet timing. When set to Clear Channel Mode, the system operates at 64 kbps.

<u>S2</u>	<u>Setting</u>
Off	Clear Channel Mode
On	Octet Timing Mode

Switches S3 Timing Mode

The setting of Switch S3 determines the source of the system timing. The system timing may be provided by:

1. The G.703 network;
2. The local function card or remote baseband modem/CSU/DSU (either a rackable function card or stand-alone unit).

Set Switch S3 to "Network" timing when only one of the two connected baseband modems or CSU/DSUs employ a 64k/G.703 interface card (the "other" baseband modem connects to a V.35, EIA-232, etc device).

Set Switch S3 to "Modem" timing when both of the connected baseband modems or CSU/DSUs employ a 64k/G.703 interface card. In this application, one G.703 interface card must be set to "Modem" timing, and the other must be set to "Network" Timing. (Please refer to the baseband modem or CSU/DSU user manual for additional configuration details).

Switches S4 and S5: *Reserved for Future Use*

Switches S4 and S5 are reserved for future use and should remain in the Off position.

Switch S6: Operation Mode

In some cases it is necessary to include bi-polar violations in the AMI structure when operating in Clear Channel (64 kbps) mode. This necessity is determined by communications or terminal equipment external to the the IM2RC/F. Use Switch S6 to configure the unit to transmit G.703 data to the network with or without BPVs.

S6	Setting
On	No BPVs
Off	Injected BPVs

Switches S7 and S8: *Reserved for Future Use*

Switch S7 and S8 are reserved for future use and should remain in the Off position.

3.2 CONNECTING THE INTERFACE DRIVER BOARD

This package contains an interface driver board that allows you to configure your front function card for G.703 operation. Figure 3 shows the Interface Driver Board connected to a Model 1092ARC front function card (You may also use this product with other Patton rack cards, such as Model 2500RC, 1045RC or 1092RC).

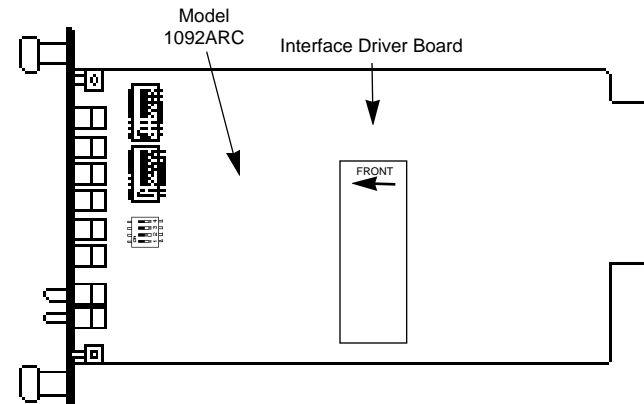


Figure 3 Model IM2RC/F Driver Board mounted on Model 1092ARC

Follow the instructions below to connect the interface driver board to the front function card:

1. With the function card (such as 1092ARC, shown above) pulled out of the rack or clusterbox chassis, locate the driver board to be replaced on the top of the base unit front card.
2. Lift the old interface board gently off of the PC board.
3. Position the IM2RC/F driver board on top of the function card's pc board with the sockets oriented toward the male pins. Please be sure the label marked **FRONT** ← is pointed toward the front of the function card (toward the LEDs).
4. Push the Interface Driver Board gently onto the socket and re-install the function card into the rack or cluster system.

4.0 INSTALLATION

This section describes the functions of the Model 1000R16 rack chassis, tells how to install the rear-mounted Model IM2RC/F card into the chassis, and how to connect to the G.703 PCM network, and to the twisted pair line interface. Please refer to the appropriate function card user manual for further details.

4.1 THE MODEL 1000R16 RACK CHASSIS

The Model 1000R16 Rack Chassis (Figure 4, below) has sixteen baseband 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.

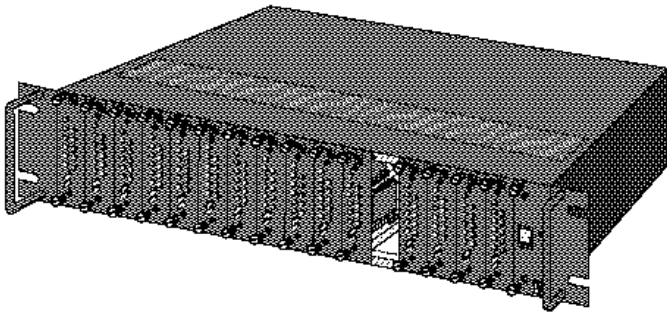


Figure 4: Model 1000R16 Rack Chassis with power supply

4.1.1 The Rack Power Supply

The power supply included in the Model 1000R16 rack uses the same mid-plane architecture as the function cards. The front function card and the power supply slide in from the front, while the rear card and power entry modules slide 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. Voltage setting changes and fuse replacement should only be performed by qualified service personnel. Contact Patton Electronics Technical support at (301)975-1007 for more information.

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 REAR IM2RC/F CARD AND FRONT FUNCTION CARD

The Model IM2RC/F is a rear-mountable G.703 interface card that works with Patton function card access products that support 64k/128k synchronous data rates. 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 IM2RC/F and its function card mate into the rack chassis:

WARNING! The IM2RC/F card contains sensitive integrated circuitry. Failure to ground yourself during installation may result in damage to the IM2RC/F card or the front function card.

1. Slide the IM2RC/F rear card into the back of the chassis along the metal rails provided.
2. Secure the IM2RC/F rear card using the metal screws provided.
3. Slide the front function card into the front of the chassis. It should meet the IM2RC/F rear card when it is 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.

4.3 MAKING INTERFACE CONNECTIONS

The Model IM2RC/F is designed to provide access to a 64 kbps co-directional G.703 PCM network. Figure 5 shows the position of the G.703 interface and the line interface of the IM2RC/F. This section describes how to connect the G.703 interface and the line interface.

Notice! The G.703 line surge protection on this unit was installed for circuit protection only. By no means does this include the preservation of signal quality during a large surge.

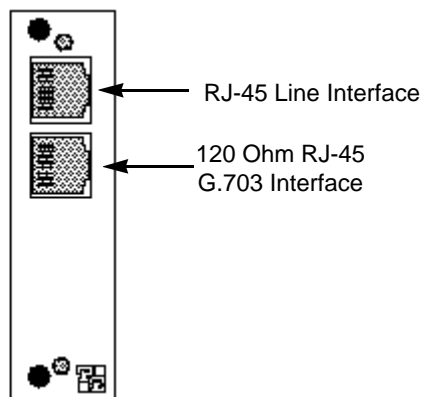


Figure 5: Model IM2RC/F Interface Ports

4.3.1 CONNECTING TO A G.703 PCM NETWORK CHANNEL

The 120 Ohm RJ-45 port on a Model IM2RC/F is pre-wired for direct connection to the G.703 PCM network. Connect the RJ-45 jack provided by your digital service carrier to the 120 Ohm G.703 interface on the Model IM2RC/F using a **straight through** twisted pair cable between 19 and 26 AWG (0.4mm to .9mm, inversely). To be sure you have the right wiring, refer to Figure 6, below.

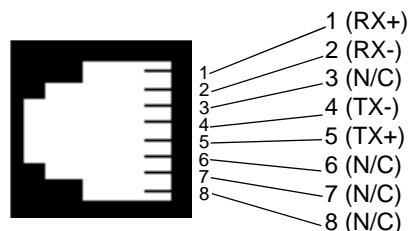


Figure 6: 120 Ohm RJ-45 G.703 Interface

4.3.2 CONNECTING THE LINE INTERFACE

The Model IM2RC/F is to be used with Patton function card access products (i.e. 1045RC, 1092RC, 1092ARC, 2500RC) that support 64k/128k synchronous data rates. There are two essential requirements for connecting the line interface on Model IM2RC/F:

1. These units work in **pairs**. Both units at the end of the twisted pair must have the proper 2-Wire/4-Wire setting. For instance, if you are operating in 2-Wire mode, both units must be in the 2-Wire setting. Similarly, if you are operating in 4-Wire mode, both units must be in the 4-Wire setting. **NOTE:** Currently only the 1092 and 1092A families support 2-Wire Mode.
2. To function properly, the Model IM2RC/F needs one or two **twisted** pairs of metallic wire. The twisted pairs must be **unconditioned**, dry, metallic wire, between 19 (.9mm) and 26 AWG (.4mm) (Appendix B describes cable requirements). Standard dial-up telephone circuits, or leased circuits that run through signal equalization equipment, or standard, flat modular telephone type cable, are **not acceptable**. Figure 7, below, shows the pin/signal relationships of the Line Interface Port.

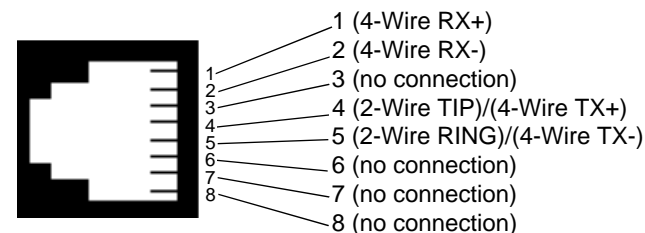


Figure 7: RJ-45 Line Interface

5.0 OPERATION

4.3.3 Two-Wire and Four-Wire Cable Connection Via RJ-45

1. The Line Interface Port on the Model IM2RC/F's twisted pair interface is polarity insensitive and is wired for a two-wire interface.
2. **Proper 2-Wire Pairing** between the two modems is as follows:

SIGNAL	PIN#	PIN#	SIGNAL
TIP	4-----	4	TIP
RING	5-----	5	RING

3. **Proper 4-Wire Pairing** between the two modems is as follows:

SIGNAL	PIN#	PIN#	SIGNAL
Tx	4-----	3	Rx
Tx	5-----	6	Rx
Rx	3-----	4	Tx
Rx	6-----	5	Tx

NOTE: The pin designations shown above are to be used when connecting to another IM2RC/F or other similarly pinned line interface on a Patton rear card. Please review the appropriate function card user manual or stand-alone product user manual to determine the correct pin assignments.

Notice! Any G.703 or line interface cable connected to the Model IM2RC/F must be shielded cable, and the outer shield must be 360 degree bonded—at both ends—to a metal or metalized backshell.

Once the Model IM2RC/F is installed and configured, it should operate transparently. This section describes a typical application and general operating instructions.

5.1 TYPICAL APPLICATION

The Model IM2RC/F allows a remotely connected LAN or high speed application to connect to the 64k/G.703 (PCM) network through a pair of Patton baseband modems. Figure 8 (below) shows a typical application of the IM2RC/F.

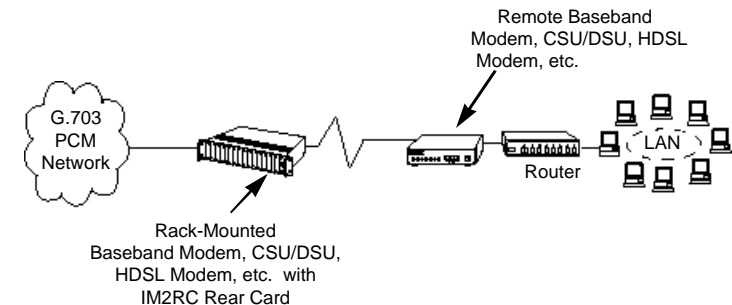


Figure 8: IM2RC/F Typical Application

5.2 OPERATING INSTRUCTIONS

In order to operate, the Model IM2RC/F must be installed in the rear of a Patton 16 port rack or a 2, 4, or 8 port ClusterBox™ chassis. A front function card, such as a baseband modem, CSU/DSU, or HDSL modem meets the IM2RC/F rear card in the mid-plane of the chassis. The IM2RC/F also requires a G.703 connection to the 64 kbps co-directional PCM network and a line connection to a remote Patton transmission device. After applying power, the function card and IM2RC/F operate transparently according to the applied settings (Please refer to the function card manual for further details).

APPENDIX A

PATTON IM2RC/F SPECIFICATIONS

Applications:	64kbps G.703 PCM network extension
G.703 Interfaces:	Symmetrically balanced 4-wire, 120 Ohm RJ-45 jack termination
Line Interface:	Entire module plugs into 1092RC, 1092ARC, 2500RC, 1045RC, HDSL Series Patton transmission devices products
Operating Modes:	Supports octet or clear channel mode; co-directional timing, Rx recovered: 64/128 kbps±500/1000ppm. Octet timing auto detection on receiver.
Line Encoding:	AMI with bi-polar violations for octet timing.
Timing Modes:	Modem or network timing
G.703 Input Signal Level:	0 to -10 dB
Transmit Level:	2.0V differential into 100 Ohms, nominal
Load Impedance:	120 Ohms
Jitter Performance:	CTR 14, G.823
Surge Protection:	Complies with IEC 801.5 level 1, 500V
Isolation:	1500V RMS isolation, transformer coupled
PCB Dimensions:	2.04" x 3.24"
Approvals:	CE Mark
Compliance:	EMC directive: 89/336/ECC Emissions: EN55022 Immunity: EN50082-1 Low Voltage (LVD) Directive: 73/23/ECC Safety: EN60950 CTR 14, (Type Approval) - The symbol indicates that the Model IM2RC/F is in compliance with the applicable Telecom Directive of the EU. If your IM2RC/F is marked with this symbol, it is EU Telecom Type Approved and may be connected to the public network.
Power Consumption:	<140mA @ 10 VAC RMS, including integrated front card modem with the rack card power supply under full load
Temp. Range:	0 - 60° C (32 - 140° F)
Altitude Range:	Up to 15,000 ft (4572 m)
Humidity Range:	5 - 95% non-condensing

APPENDIX B

PATTON IM2RC/F CABLE RECOMMENDATIONS

All Patton Electronics Company Baseband Modems, CSU/DSUs and Short Range Modem are tested to the distances published in our Catalogs and Specification Sheets on twisted-pair cable with the following characteristics:

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

We fully expect that the Baseband Modems, CSU/DSUs and 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 Baseband Modems, CSU/DSUs and 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.

Selection of the proper Baseband Modem, CSU/DSU or 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

**PATTON IM2RC/F
FACTORY REPLACEMENT PARTS
AND ACCESSORIES**

<u>Patton Model #</u>	<u>Description</u>
1000RCM12592.....	Rear card w/DB25F & RJ45 (V.24 interface)
1000RCM12492.....	Rear card w/ M/34F & RJ45 (V.35 interface)
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
1000RPEM-V.....	120/240V CE Compliant Rear Power Supply Entry Module
1000CC.....	Control Card
1000RCM703/64DB...	Interface daughter card, G.703
1180RCDB.....	Interface daughter card, V24/V.35
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
IM2RC/F	G.703 Rear Card

APPENDIX D

**PATTON IM2RC/F
120 OHM G.703 INTERFACE PIN ASSIGNMENT**

(RJ45 Female Connector)

<u>Pin Number</u>	<u>Signal</u>
1.....	RX+
2	RX-
3	no connection
4.....	TX-
5	TX+
6	no connection
7	no connection
8	no connection

APPENDIX E

LINE INTERFACE PIN ASSIGNMENT

(RJ45 Female Connector)

<u>Pin Number</u>	<u>Signal</u>
1.....	4-Wire RX+
2.....	4-Wire RX-
3.....	no connection
4.....	2-Wire TIP/4-Wire TX+
5.....	2-Wire RING/4-Wire TX-
6.....	no connection
7.....	no connection
8.....	no connection

APPENDIX F

**PATTON IM2RC/F
ARCHITECTURE**

