USER MANUAL

MODEL 1012ARC

**Asynchronous,
Two-Channel
Short Range Modem
Rack Card**

PATTON Electronics Co.

SALES OFFICE
(301) 975-1000
TECHNICAL SUPPORT
(301) 975-1007

1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 1012ARC 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 1012ARC 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 1012ARC 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 1012ARC 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 take the following steps: use only data cables with an external outer shield bonded to a metal or metalized connector; and, configure the rear card as shown in section 3.3 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 nonwarranty 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 Support: **(301) 975-1007**; **http://www.patton.com**; or, **support@patton.com**. **Notice**: 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 1012ARC. 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

- Houses two short range modems
- Full or half duplex
- Asynchronous data rates to 38.4 Kbps
- Point-to-point or multipoint
- Automatic equalization and gain control
- Software and hardware handshaking
- Distances to 6 miles over two unconditioned twisted pair
- Transformer isolation
- Silicon Avalanche Diode surge protection
- Mounts in Patton's rack chassis
- Made in USA

2.2 DESCRIPTION

The Patton Model 1012ARC is a miniature rack card designed to house two asynchronous short range modems. Operating full or half duplex at data rates to 38.4 Kbps, the Model 1012ARC supports point-to-point or multidrop applications and offers automatic equalization and gain control. The Model 1012ARC supports distances up to 6 miles over two twisted pair. Built-in transformer isolation and surge protection provide protection against ground potential differences and AC/DC over-voltages, making the Model 1012ARC ideal for connections between two buildings.

The Model 1012ARC is designed to mount in Patton's Model 1000R16P rack chassis. This 16-card chassis has a switchable 120/240 volt power supply and uses mid-plane architecture: The front card can be plugged into different rear cards. This means that the 1012ARC can have several interface options, and can be switched with other Patton short haul cards. The rear card is available with an RJ-45 connection for each RS-232 channel and either RJ-11 or RJ-45 connections for twisted pair.

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3.0 CONFIGURATION

The Model 1012ARC rack card is easy to set up since there are only two configuration straps. Figure 1 (below) shows the location of these straps on the Model 1012ARC PC board.
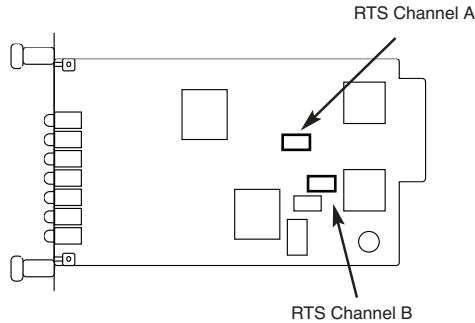
RTS Channel A

RTS Channel B

Figure 1. Model 1012ARC, showing straps locations

3.1 MOVING THE CONFIGURATION STRAPS

Figure 2 shows how to move the configuration straps. Note that the Model 1012ARC only has two pegs, thus the straps can only be "installed" or "removed". The rear card uses three pegs, and can be on either pegs 1 and 2, or pegs 2 and 3.

Figure 2. Orientation of interface card straps
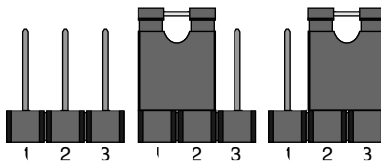
3.2 SETTING THE RTS/DCD STRAPS

Each RTS/DCD strap affects one of your modems. Their setting determines how the respective transmitters (i.e., carrier) are activated. When these straps are installed, the Model 1012ARC transmitter is CONTROLLED CARRIER. When these straps are removed, the transmitter is CONSTANT CARRIER. Each strap may be configured separately.

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3.3 REAR CARD CONFIGURATION

After you have configured the Model 1012ARC, you will need to set up your rear card. The Model 1012ARC 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).

1Q11   **1Q45**
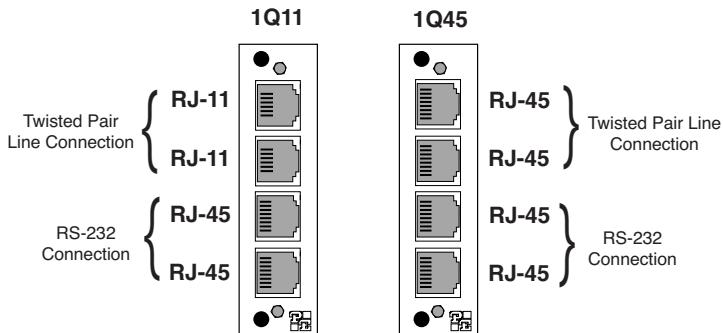
Figure 3. Model 1012ARC rear interface card options

Figure 3 illustrates these two different options.

Prior to installation, you should examine the rear card you have selected and ensure that it is configured for your application. Each rear card is configured by setting straps on the PC board. Section 3.4 describes the strap locations and settings for each card.

3.4 REAR CARD STRAP SETTINGS

Figure 4 shows the strap locations for the 1Q11 and the 1Q45 rear
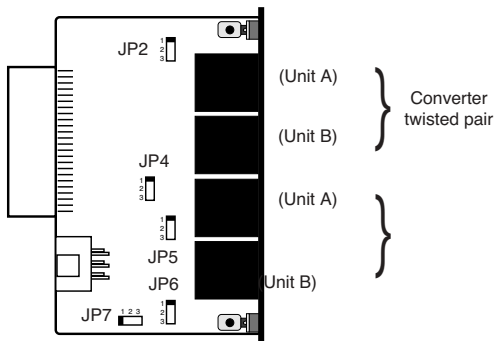
Figure 4. Strap locations for both rear cards   cards. These

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straps determine various grounding characteristics for the RS-232 and twisted pair lines.

INTERFACE CARD STRAP SUMMARY TABLE #1		
Strap	Position 1&2	Position 2&3
JB2	Line A Shield	No Shield†
JB4	Line B Shield	No Shield†
JB5	SGND & FRGND	Open†
JB6	DTE A DSR†	N/A
JB7	DTE B DSR†	N/A

Summary of strap settings, † indicates factory default

The table below provides a summary of strap functions for both of the rear cards. Following Figure 5 is a description of each strap and its function.

JB2 & JB4: Line A Shield & Line B Shield

This strap pertains to the line interface. In the connected (closed) position, the strap links RJ-11 pins 1 and 6 (RJ-45 pins 2 and 7) to frame ground. These pins can be used as connections for the twisted pair cable shield. In the open (disconnected) position, pins 1 and 6 (or 2 and 7) remain connected, but are "lifted" from frame ground.

JB2	Setting
Position 1&2	Line A Shield Connected
Position 2&3	No Shield *(default)*

JB4	Setting
Position 1&2	Line B Shield Connected
Position 2&3	No Shield *(default)*

JB5: SGND & FRGND

In the connected (closed) position, this strap links signal ground and frame ground. In the open (disconnected) position, pin 1 is "lifted" from frame ground.

JB5	Setting
Position 1&2	SGND and FRGND Connected
Position 2&3	SGND and FRGND Not Connected *(default)*

JB6 & JB7: DTE as DSR or RI

Because this rear card is designed to function with a variety of rack cards, it comes equipped with two strap positions. However, when used with the Model 1012ARC, this strap must be installed only in one position. Place the jumper across pins 1&2 so that the terminal (DTE) sees DSR as high when the DTE raises DTR. The other positions—across pins 2&3, are for Ring Indicate as defined by EIA/TIA-561. The RI function is irrelevant (and on the Model 1012ARC is also disconnected) and can cause improper operation if the jumper is installed incorrectly.

<u>JB6 & JB7</u>   <u>Setting</u>

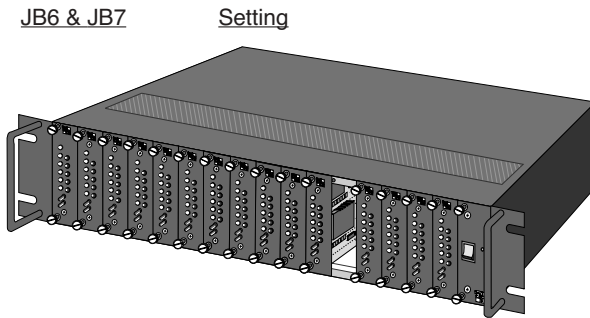**Figure 5.** Model 1000R16 Rack Chassis with power supply

Position 1&2   DSR *(default)*
Position 2&3   N/A

WARNING! **There are no user-serviceable parts in the power supply section of the Model 1012ARC Series. 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.**

4.0 INSTALLATION

This section describes the functions of the Model 1000R16 rack chassis, tells how to install front and rear Model 1012ARC cards and provides diagrams for correctly wiring the interface connections.

4.1 THE MODEL 1000R16 RACK CHASSIS

The Model 1000R16 Rack Chassis (Figure 5) has sixteen short range modem card slots, plus its own power supply. Measuring only 3.5" high, the Model 1000R16 occupies only 2U in a 19" rack. Sturdy front handles allow the Model 1000R16 to be transported conveniently.

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.

(continued)

Switching the Power Supply On and Off

The power supply on/off switch is located on the front panel. When plugged in and switched on, the power LED will glow. Since the Model 1000R16 is "hot swappable", *you do not need to turn off the power before removing rack cards.* 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 Supplie*s for fuse and power card replacement information.

4.2 INSTALLING THE MODEL 1012ARC INTO THE CHASSIS

The Model 1012ARC is comprised of a front card and a rear card. The two cards meet inside the rack chassis and plug into each other via mating 50 pin card edge connectors. Use the following steps to install each Model 1012ARC 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 card into the front of the chassis. It should meet the rear card when it is almost in 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 turn the power off* when you install or remove a Model 1012ARC.

4.3 TERMINAL INTERFACE CONNECTION

The RS-232 ports are always the *lower* ports on the interface card. The 10-pin RJ-45 is pinned according Patton's Modified Modular Interface Standard (based on the EIA/TIA-561Standard). For specific interface pin-outs, please refer to the diagrams in Appendix D.

The Model 1012ARC is wired as a DCE (Data Circuit-Terminating 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 (such as a DB-25 to modular cable). If your RS-232 output device is DCE, call Technical Support at (301) 975-1007 for specific installation instructions.

4.4 TWISTED PAIR CONNECTION

The Model 1012ARC operates over two twisted pair. 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 1012ARC can only communicate in a closed data circuit with another Model 1012ARC. Dial-up analog circuits, such as those used with a standard Hayes-type modem, are *not acceptable.* For further information about acceptable

HOST	FIRST SLAVE	SECOND SLAVE
XMT+	RCV+	RCV+
XMT-	RCV-	RCV-
RCV+	XMT+	XMT+
RCV-	XMT-	XMT-
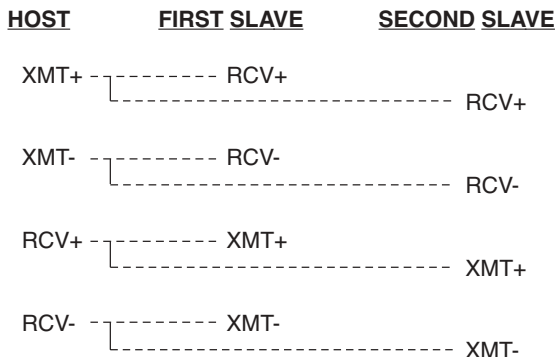
Figure 6. Star wiring for Model 1012ARC host and slaves

wire grades, please refer to the diagrams in Appendix B.

4.4.1

1 - Blue
2 - Yellow
3 - Green
4 - Red
5 - Black
6 - White

1 - Blue
2 - Orange
3 - Black
4 - Red
5 - Green
6 - Yellow
7 - Brown
8 - Slate
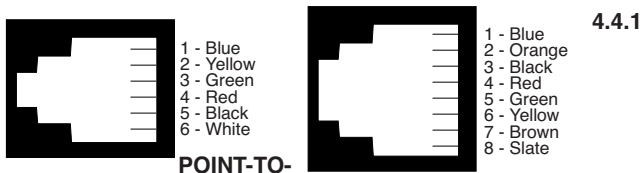
POINT-TO-

Figure 7. AT&T standard modular color codes

POINT TWISTED PAIR CONNECTION

Notice! **Any modular twisted pair cable connected to the Model 1012ARC must be shielded cable, and the outer shield must be properly terminated to a shielded modular plug on both ends of the cable.**

The 6-position RJ-11 and 8-position RJ-45 jack options for the Model 1012ARC (always the *upper* jack on the rear interface card) are pre-wired for a standard TELCO wiring environment. Connection of a 4-wire twisted pair circuit between two or more Model 1012ARCs

requires a *crossover cable* as shown in the following charts.

RJ-11

SIGNAL	PIN#	COLOR‡	COLOR	PIN#	SIGNAL
GND†	1	Blue‡.................White		6	GND†
RCV-◊	2	Yellow................Red		4	XMT-
XMT+	3	Green ....Black		5	RCV+
XMT-	4	Red ....Yellow		2	RCV-
RCV+	5	Black ....Green		3	XMT+
GND†	6	White................Blue		1	GND†

RJ-45

SIGNAL	PIN#	COLOR‡	COLOR	PIN#	SIGNAL
GND†	2		Orange	Brown	
		7	GND†		
RCV-	3				
Black		Green			
		5	XMT-		
		XMT+	4	Red	
		Yellow	6	RCV+	
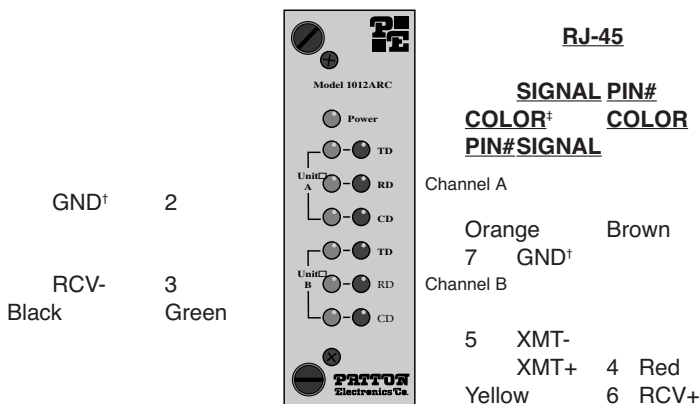
Figure 8. The Model 1012ARC front panel, showing LED positions

XMT-	5	Green...............Black	3	RCV-
RCV+	6	Yellow ....Red	4	XMT+
GND†	7	Brown ....Orange	2	GND†

†Connection to ground is optional
‡Standard color codes—yours may be different

4.4.2 MULTIPOINT TWISTED PAIR CONNECTION

The Model 1012ARC supports multipoint applications using a star topology. Maximum distance between the units will vary based upon the number of drops, data rate, wire gauge, etc. Call Patton Technical Support for specific distance estimates. Figure 6 shows how to wire the cables properly for a Model 1012ARC star topology. Note that the ground connection is not needed.

5.0 OPERATION

Once you have configured each Model 1012ARC and connected the cables, you are ready to operate the units. Section 5.0 describes the LED status monitors and the power-up procedure.

5.1 LED STATUS MONITORS

The Model 1012ARC features thirteen front panel status LEDs that indicate the condition of the modem and communication link. Figure 8 shows the relative front panel positions of the LEDs. Following Figure 8 is a description of each LED's function.

• The "PWR" LED glows when power is being applied to the modem card through its mid-plane chassis connection.

• The "TD" and "RD" indicators glow green to show a positive voltage on the interface, and glow red to show negative voltage or an idle data state.

• The "CD" indicators glow green to show a positive voltage on the interface, and glow red to show negative voltage or an idle data state.

5.2 POWER-UP

There is no power switch on the Model 1012ARC: Power is automatically applied to the Model 1012ARC when its card-edge connector makes contact with the chassis' mid-plane socket, or when the chassis' power supply is turned on. *The Model 1012ARC is a "hot swappable" card—it will not be damaged by plugging it in or removing it while the rack's power supply is switched on.*

When the local and remote Model 1012ARCs are *both* powered up and are passing data *normally*, the following LED conditions will exist:

- PWR = solid green
- TD & RD = flashing
- CD = solid green

APPENDIX A
SPECIFICATIONS

Transmission Format: Asynchronous, half or full duplex

Transmission Line: Two unconditioned twisted pair 19 - 26 AWG

Transmit Level: -6 dBm

Operation: Point-to-point or multipoint

Interfaces: EIA RS-232, CCITT V.24

Data Rates: To 38.4 Kbps

Isolation: Minimum 1500 V RMS transformer coupled

Surge Protection: Silicon Avalanche Diodes

RTS/CTS Delay: 40mS

Connectors: RJ-45 on RS-232 side; RJ-11 or RJ-45 on line side

Power Supply: Rack-mount power supply is switchable between 120V and 240V AC; rack chassis supplies 10V AC to the Model 1012ARC, typical consumption is 700 mW

Internal Interface: Connection to the Model 1000R16 rack chassis via 50 pin male card edge

Fuse: 400mA for 120V applications; 200mA for 240V applications

Temperature Range: 0-50°C (32-122°F)

Altitude: 0-15,000 feet

Humidity: Up to 95% non-condensing

Dimensions: 0.95"w x 3.1"h x 5.4"l

APPENDIX B
CABLE RECOMMENDATIONS

The Patton Model 1012ARC operates at frequencies of 20kHz or less and has been performance tested by Patton technicians using twisted-pair cable with the following characteristics:

Wire Gauge	Capacitance	Resistance
19 AWG	83nf/mi or 15.72 pf/ft.	.0163 Ohms/ft.
22 AWG	83nf/mi or 15.72 pf/ft.	.0326 Ohms/ft.
24 AWG	83nf/mi or 15.72 pf/ft.	.05165 Ohms/ft.

Using or simulating cable with the above characteristics, the following data rate/distance results were obtained by Patton during bench tests:

Data Rate (Bps)	Gauge (AWG) / Distance (Mi)		
	19	24	26
Up to 38,400	6.0	3.5	2.0

To gain optimum performance from the Model 1012ARC, please keep the following guidelines in mind:

• *Always* use **twisted pair** wire—this is not an option.

• Use twisted pair wire with a capacitance of 20pf/ft or less.

• Avoid twisted pair wire thinner than 26 AWG (i.e. avoid AWG numbers higher AWG numbers than 26)

• Use of twisted pair with a resistance greater than the above specifications may cause a reduction in maximum distance obtainable. Functionality should not be affected.

• Many environmental factors can affect the maximum distances obtainable at a particular site. Use the above data rate/distance table as a *general guideline only.*

APPENDIX C
FACTORY REPLACEMENT PARTS

PATTON MODULAR INTERFACE - 8/10 Wire RJ-45		
Contact Number	Circuit	Description
1	N/A	Not Used
2	125	DSR
3	109	Received Line Signal Indicator
4	108 / 2	DTE Ready
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.

The Patton Model 1012ARC rack system features interchangeable rear cards, power cords/fuses for international various operating environments and other user-replaceable parts. Model numbers and descriptions for these parts are listed below:

Patton Model #   **Description**

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

0821R4...............................400 mA Fuse (5x20mm)
                              Littlefuse 239.400 or equivalent

0821R2...............................200 mA Fuse (5x20mm)
                              Littlefuse 239.200 or equivalent

Dear Valued Customer,

Thank you for purchasing Patton Electronics products! We do appreciate your business. I trust that you find this user manual helpful.

We manufacture one of the widest selections of data communications products in the world including CSU/DSU's, network termination units, powered and self-powered short range modems, fiber optic modems, interface converters, baluns, electronic data switches, data-line surge protectors, multiplexers, transceivers, hubs, print servers and much more. We produce these products at our Gaithersburg, MD, USA, facility, and can custom manufacture products for your unique needs.

We would like to hear from you. Please contact us in any of the following ways to tell us how you like this product and how we can meet your product needs today and in the future.

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Phone - Support	(301) 975-1007
Fax:	(301) 869-9293
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Vice President

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