USER MANUAL

MODEL 1009/1009S
Ultra-miniature, Asynchronous, DB-9 Short Range Modem

PATTON Electronics Co.

An ISO-9001 Certified Company

SALES OFFICE
(301) 975-1000
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1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 1009 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 1009 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 1009 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 1009 does cause interference to radio or television reception, which can be determined by disconnecting the RS-232 interface, 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).

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 Patton 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**.

> **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 1009. 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

• Full duplex, asynchronous operation over 4 wires

• Data rates from 300 to 19,200 bps

• Ranges to 17 miles (27.2 km) using 19 AWG (0.9mm) wire

• No AC power required; draws necessary power from
  RS-232 signals

• Ultra-miniature size (2.50" x 1.20" x 0.75") (6.4 x 3.0 x 1.9 cm)

• Twisted pair connection via strain relief, RJ-11 or RJ-45

• Compatible with Model 1000 and 1015 Short Hauls

• Made in the USA

2.2 DESCRIPTION

The Model 1009 Asynchronous Short Range Modem lets two asynchronous RS-232 devices with DB-9 connectors communicate at distances up to 17 miles. Operating full duplex over two unconditioned twisted pair, the Model 1009 supports data rates from 300 to 19,200 bps. The Model 1009 draws all necessary operating power from the RS-232 interface, and requires no AC power or batteries.

The Model 1009 has been designed to connect directly to IBM AT compatibles, Unisys 6000/7000 Series, NCR "Towers" and other RS-232 machines with DB-9 serial ports. Its ultra-miniature size (2.50" x 1.20" x 0.75") allows the Model 1009 to fit in very tight installation spaces. Twisted pair connection can be made using RJ-11, RJ-45 or terminal blocks with strain relief. For added flexibility, the Model 1009 is compatible with Patton's Model 1000 and 1015 Short Hauls.

The Model 1009S uses the latest in bi-directional, clamping transient suppressors to guard itself and connected equipment against data line transients. For surge handling capability, the Model 1009S is compliant with IEC 801.5, Level 2, 1kV. The Model 1009S is recommended for environments prone to lightning storms, static discharge and other forms of EMR.

3.0 INSTALLATION

The Model 1009 is easy to install and requires no pre-configuration. This section tells you how to properly connect the Model 1009 to the twisted pair and RS-232 interfaces, and how to operate the Model 1009.

3.1 CONNECTION TO THE TWISTED PAIR INTERFACE

The Model 1009 operates full duplex in point-to-point environments. It passes data as well as X-ON/X-OFF (software) handshaking signals. There are two essential requirements for installing the Model 1009:

1. These units work in **pairs**. Therefore, you must have one Model 1009 at each end of a two twisted pair interface.

2. To function properly, the Model 1009 needs two twisted pairs of metallic wire. These pairs must be **unconditioned** , dry, metallic wire, between 19 and 26 AWG (the higher number gauges may limit distance somewhat). Standard dial-up telephone circuits, or leased circuits that run through signal equalization equipment, are *not acceptable*.

For your convenience, the Model 1009 is available with three different twisted pair interfaces: RJ-11 jack, RJ-45 jack, and terminal blocks with strain relief.

3.1.1 TWISTED PAIR CONNECTION USING RJ-11 OR RJ-45

The RJ-11 and RJ-45 connectors on the Model 1009's twisted pair interface are pre-wired for a standard TELCO wiring environment. The signal/pin relationships are shown below:

RJ-11	**SIGNAL**	**RJ-45**	**SIGNAL**
1----------------GND*		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	

 * Connection to Ground is Optional

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When connecting two Model 1009s it is necessary to use a "cross over" cable. The diagram below shows how a cross over cable should be constructed for an environment where both Model 1009s use a 6-wire RJ-11 connector. Similar logic should be followed when using RJ-45 connectors or a combination of the two.

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

*Connection to Ground is Optional
**Standard Color Codes - Yours may be different

RJ-11 Jack   RJ-45 Jack

Figure 1: RJ-11 and RJ-45 Modular Pin Assignments

3.1.2 TERMINAL BLOCK TWISTED PAIR CONNECTION

If your application requires you to connect one or two pairs of bare wires to the Model 1009, you will need to access the internal terminal blocks. The instructions on the following pages will tell you how to open the case, connect the bare wires to the terminal blocks, and fasten the strain relief collar in place so that the wires won't pull loose.

Note: The terminal block configurations are different for the 1009M (male) and 1009F (female).
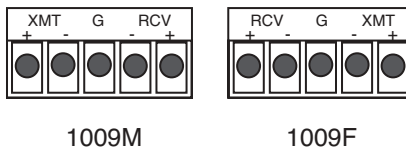

1009M   1009F

Figure 2: 1009M and 1009F Terminal Block Signal Orientation

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1. Open the unit by gently inserting a screw driver between the DB-9 connector and the lip of the plastic case (See below). You don't have to worry about breaking the plastic, but be careful not to bend the D-sub connector.
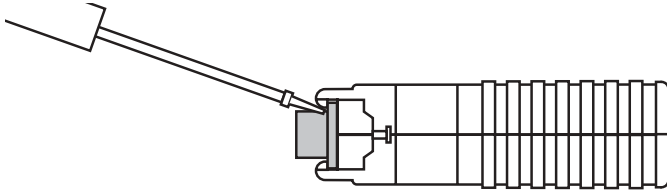

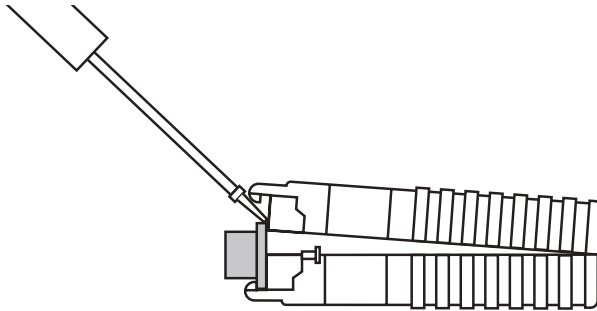**Figure 3:** How to Use a Small Flathead Screwdriver to Begin to Open the Model 2070 Case

Figure 4: How to Use a Small Flathead Screwdriver to Finish Opening the Model 2070 Case

Once the unit has been opened, you will be able to see the terminal block located at the rear of the PC board.

2. Strip the outer insulation from the twisted pairs about one inch from the end.

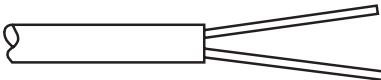**Figure 5:** Stripping the Outer Insulation from the Twisted Pair

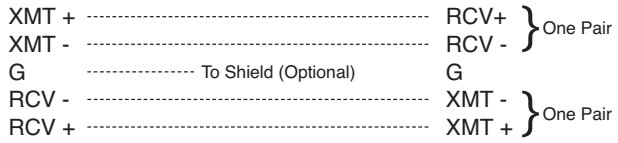**Figure 6:** Stripping the Inner Insulation from Each Twisted Pair

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XMT +  ---------------------------------------------  RCV+   ⎫
XMT -  ---------------------------------------------  RCV -  ⎬ One Pair
G          ---------------- To Shield (Optional)      G      ⎭
RCV -  ---------------------------------------------  XMT -  ⎫
RCV +  ---------------------------------------------  XMT +  ⎬ One Pair
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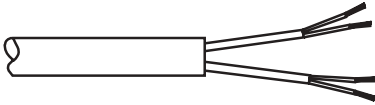
Figure 7: Proper Twisted Pair Connections to the Model 1009 Terminal Blocks

3. Strip back the insulation on each of the 2 twisted pair wires about .25".

4. Connect *one pair* of wires to XMT+ and XMT- (transmit positive and negative) on the terminal block, making careful note of which color is positive, and which color is negative.

5. Connect the *other pair* of wires to RCV+ and RCV- (receive positive and negative) on the terminal block, again making careful note of which color is positive, and which color is negative.

Ultimately, you will want to construct a two pair cross over cable that

Figure 8: Re-connecting the Strain Relief Assembly

makes a connection between the Model 1009s as shown below:

6. If there is a shield around the telephone cable, it may be connected to "G" on the terminal block. We recommend connecting the shield at the computer end only to avoid ground loops. A ground wire is *not necessary* for proper operation of the Model 1009.

7. When you finish connecting the wires to the terminal block, the assembly should resemble the diagram below:

**Figure 9:** Positioning the Model 1000 Inside the Plastic Case
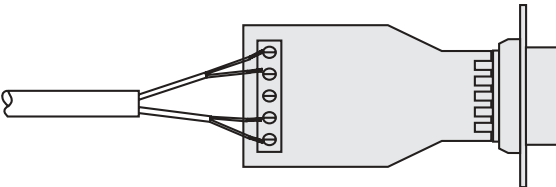
8. Place the 2 halves of the strain relief assembly on either side of the telephone wire and press together very lightly. Slide the assembly so that it is about 2 inches from the terminal posts and press together firmly. If your cable diameter is too small or too large for our strain relief, please contact our technical support. We have strain relief assemblies to accommodate most cable diameters.

Figure 10. Connecting the Case Halves
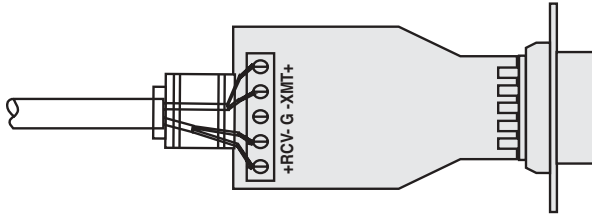
9. Insert the strain relief assembly with the wire going through it into the slot in the bottom half of the modem case and seat it into the recess in the case. (If the telephone wire is too thin to be held by the strain relief assembly, you will need to order a different sized strain relief. Call Patton's Sales Department at (301) 975-1000.)
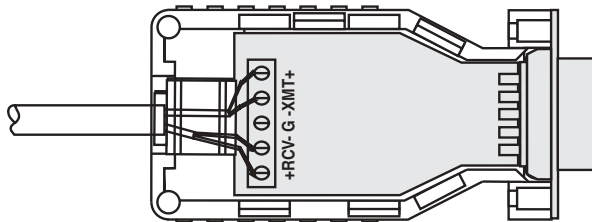
10. BEND the top half of the case as necessary to place it over the strain relief assembly. Do not snap the case together yet.
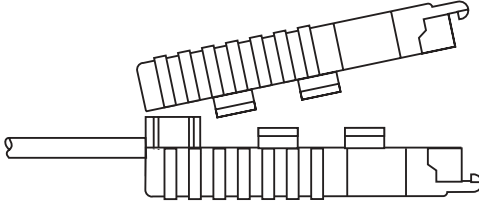
11. Insert one captive screw through a saddle washer and then insert the captive screw with the washer on it, through the hole in the DB-25 end of the case. Snap that side of the case closed. Repeat the process for the other side. This completes the cable installation process.

3.2 CONNECTION TO THE RS-232 INTERFACE

The Model 1009 is configured as a DCE, and is designed to connect to the DB-9 serial port of an RS-232 DTE (PC, laptop, host). If you must use a cable to connect the Model 1009 to the DTE device, make sure that it is a *straight through* cable of the shortest possible length—we recommend 6 ft or less (See Appendix C).

Should you wish to connect a DTE to a DCE using short range modems (ex. a PC/AT connecting to a multiplexer several hundred feet away), we recommend using a Model 1009 for the DB-9 DTE connection and a Patton Model 1000 for the DB-25 DCE connection. These two short hauls *are compatible*. If you need to use a Model 1009 on both ends, connection to the DCE device will require a *cross over* RS-232 cable. Call Patton Technical Support at (301) 975-1007 for more details.

3.3 OPERATING THE MODEL 1009

Model 1009 Distance Table in Miles (km)

Data Rate (bps)	Wire Gauge		
	19 AWG (0.9 mm)	24 AWG (0.5 mm)	26 AWG (0.4 mm)
19,200	6.2(9.9)	3.7(5.9)	1.2(1.9)
9,600	7.5(12.0)	4.9(7.8)	2.5(4.0)
4,800	8.7(13.9)	5.6(9.0)	3.7(5.9)
2,400	11.8(18.9)	8.0(12.8)	4.9(7.8)
1,200	17.0(27.2)	11.8(18.9)	8.0(12.8)

Once the Model 1009 is properly installed, it should operate transparently—as if it were a standard cable connection. Operating power is derived from the RS-232 data and control signals; there is no "ON/OFF" switch. All data

from the RS-232 interface, including X-ON/X-OFF flow control information, is passed straight through. Any hardware flow control signals are looped back at the interface and are not passed between the short hauls.

APPENDIX A

PATTON MODEL 1009/1009S SPECIFICATIONS

Transmission Format: Asynchronous

Data Rate: 0 to 19,200 bps (no strapping)

Control Signal: CTS (Pin 8) turns ON immediately after the terminal raises RTS (Pin 7). DSR (Pin 6) and DCD (Pin 1) turn ON immediately after the terminal raises DTR (Pin 4).

Transmit Line: 4 wire, unconditioned line (2 twisted pairs)

Transmit Mode: Full Duplex, 4-wire

Transmit Level: 0 dBm

Line Connection: RJ-11 or RJ-45 jack or 5 screw terminal posts (4 wires and 1 ground) and a strain relief insert. Works well with data signals only.

Surge Protection: Compliant with IEC 801.5 level 2, 1kV (Model 1009S Only)

Power Supply: None required, uses ultra low power from EIA data and control signals

Size: 2.50" x 1.2" x .75" (6.4 x 3.0 x 1.9 cm)

APPENDIX B

PATTON MODEL 1009 CABLE RECOMMENDATIONS

The Patton Model 1009 operates at frequencies of 20kHz or less and has been performance tested by Patton technicians using twisted-pair cable with the following characteristics:

DIRECTION	STANDARD "DCE" CONFIGURATION		DIRECTION
From Model 1009 To Model 1009 From Model 1009	Data Set Ready (DSR) - 6 Request To Send (RTS) - 7 Clear to Send (CTS) - 8	1- (FG)Data Carrier Detect 2- (RD) Receive Data 3- (TD) Transmit Data 4- (DTR)Data Terminal Ready 5- (SG) Signal Ground	From Model 1009 From Model 1009 To Model 1009 To Model 1009 -

| Wire Gauge	Capacitance	Resistance
19 AWG/.9mm	83nf/mi or 15.72 pf/ft.	.0163 Ohms/ft.
22 AWG/.6mm	83nf/mi or 15.72 pf/ft.	.0326 Ohms/ft.
24 AWG/.5mm	83nf/mi or 15.72 pf/ft.	.05165 Ohms/ft.

To gain optimum performance from the Model 1009 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 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.

• Environmental factors too numerous to mention can affect the maximum distances obtainable at a particular site. Use "maximum distance" figures as a **general guideline only**.

APPENDIX C

PATTON MODEL 1009 PIN ASSIGNMENTS
(D-Sub 9 Connector, DCE Configuration)

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Notes

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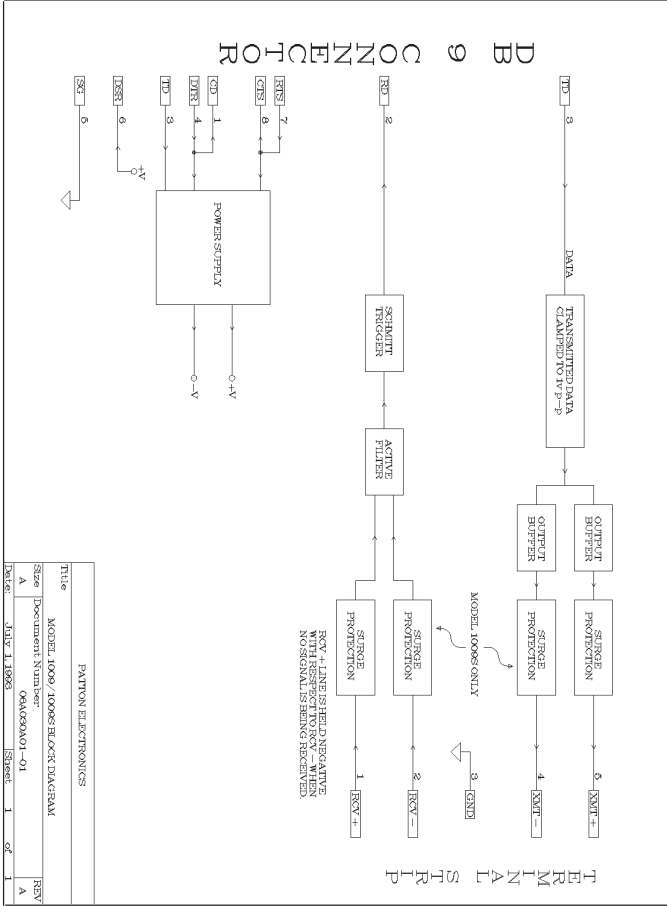
Dear Valued Customer,

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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It is our business to serve you. If you are not satisfied with any aspect of this product or the service provided from Patton Electronics or its distributors, please let us know.

Thank you.

Burton A.Patton
Vice President

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