# USER MANUAL

## MODEL 1016 and 1016S

**DB-15 Async. Short Range Modem with Transformer Isolation**

**PATTON Electronics Co.**

## 1.0  WARRANTY INFORMATION

**Patton Electronics** warrants all Model 1016 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 1016 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 1016 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 1016 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  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**.  *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 1016.  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

- Connects directly to RS-232 port via DB-15 connector
- Works with Unisys 5000/NCR Tower Series Processors
- Range to 9 miles
- Data rates to 19,200 bps
- Very thin case for closely spaced computer ports
- No AC power or batteries required
- Transformer isolation
- Surge protection (1016S)
- Available with RJ-11, RJ-45 or terminal block with strain relief
- Made in USA

### 2.2  DESCRIPTION

**The Patton Model 1016** Short Range Modem provides direct connection to RS-232 devices equipped with DB-15 connectors, including the Unisys (Sperry) 5000 and the NCR Tower series.  Supporting data rates to 19.2 Kbps and distances to 9 miles, the Model 1016 requires no AC power or batteries.

Compatible with Patton Models 1010 and 1019, the Model 1016 uses built-in transformers which provide protection against ground potential differences.  Consequently, the Model 1016 is ideal for extending RS-232 distances in connections between two buildings.

Measuring only 2.5" x 1.2" x .75", the Model 1016 is housed in a pop-open ABS plastic case.  The Model 1016 comes with a male or female DB-15 connector and a choice of interfaces (RJ-11 jack, RJ-45 jack or terminal blocks with strain relief).  The surge protected Model 1016S incorporates Silicon Avalanche Diodes, which provide 600 watts peak per wire of protection against harmful transient surges.

# 3.0 INSTALLATION

The Model 1016 is easy to install. This section tells you how to properly connect the Model 1016 to the twisted pair and RS-232 interfaces and how to operate the Model 1016.

## 3.1 CONNECTION TO THE TWISTED PAIR INTERFACE

The Model 1016 supports data-only communication between two RS-232 devices at distances to 9 miles and data rates to 19.2 Kbps. There are two essential requirements for installing the Model 1016:

1. These units work in pairs. Therefore, you must have one Model 1016 at each end of a two twisted pair interface.

2. To function properly, the Model 1016 needs two twisted pairs of metallic wire. The pairs must be unconditioned, dry metallic wire, between 19 and 26 AWG (the higher number gauges may limit distance). Standard dial-up telephone circuits or leased circuits that run through signal equalization equipment are not acceptable.

For your convenience, the Model 1016 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 1016's twisted pair interface are pre-wired for a standard TELCO wiring environment (see Figure 1). The table on the following page describes the signal/pin relationships.



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

**Figure 1.** AT&T standard modular color codes

| 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

When connecting two Model 1016s, it is necessary to use a "crossover" cable. The diagram below shows how a crossover cable should be constructed for an environment where both Model 1016s use a 4-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

### 3.1.2 TWISTED PAIR CONNECTION USING TERMINAL BLOCKS

If your RS-232 application requires you to connect two pairs of bare wires to the Model 1016, you will need to open the case to access the terminal blocks. The following instructions 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.

1. Open the unit by gently inserting a screwdriver between the DB-15 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.
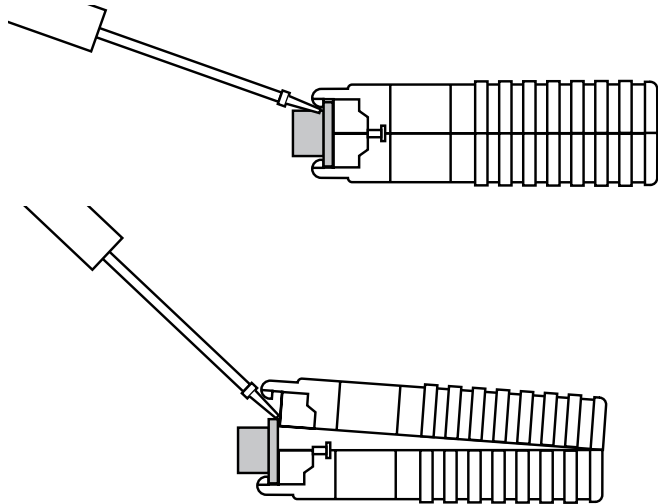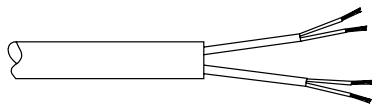


Once the unit has been opened, you will be able to see the terminal blocks located at the rear of the PC board.

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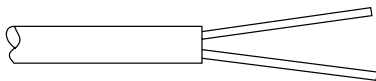


3. Strip the insulation on each of the twisted pair wires about .25".



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 crossover cable that connects the two short hauls as shown below:
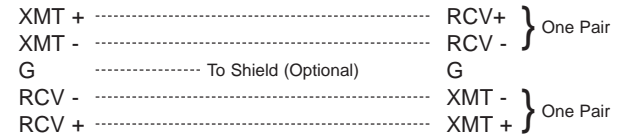


6. If there is a shield around the telephone cable, it may be connected to "G" on the terminal block. To avoid ground loops, we recommend connecting the shield at the computer end only. A ground wire is *not necessary* for proper operation of the Model 1016.

7. When you finish connecting the wires to the terminal block, the assembly should resemble the diagram below:
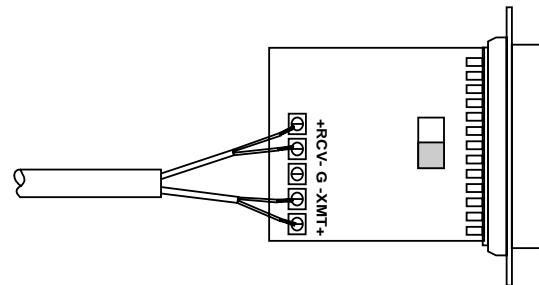
8. Place the 2 halves of the strain relief assembly on either side of the telephone wire and press together very lightly. Slide the assembly so that it is about 2 inches from the terminal posts and press together firmly. If your cable diameter is too small or too large for our strain relief, please contact our technical support. We have strain relief assemblies to accommodate most cable diameters.
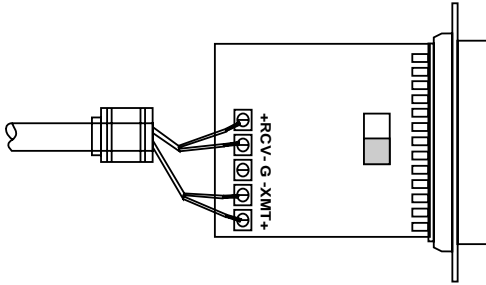


9. Insert the strain relief assembly with the wire going through it into the slot in the bottom half of the modem case and set it into the recess in the case.
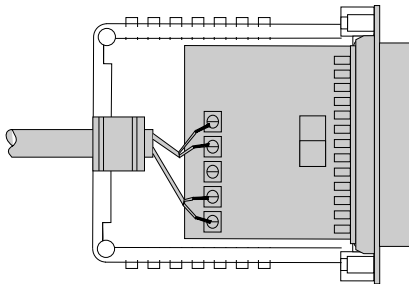


10. BEND the top half of the case as necessary to place it over the strain relief assembly. Do not snap the case together yet.
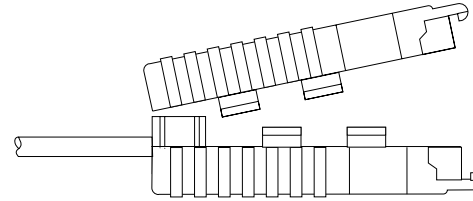


11. Insert one captive screw through a saddle washer and then insert the entire piece through the hole in the DB-15 end of the case. Snap that side of the case closed. Repeat the process for the other side. This completes the cable installation process.

## 3.2  CONNECTION TO THE RS-232 INTERFACE

Once you have connected the twisted pair wires correctly, simply plug the Model 1016 directly into the DB-15 port of the RS-232 device. Remember to insert and tighten the two captive connector screws.

Note: If you must use a cable to connect the Model 1016 to the RS-232, make sure it is a *straight through* cable of the shortest possible length—we recommend 6 feet or less. The Model 1016 requires a cable that incorporates pins 1, 2, 3, 4, 9, 10, 11 and 12.

## 3.3  OPERATING THE MODEL 1016

Once the Model 1016 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 signals from the RS-232 interface are passed straight through. All control signals from the RS-232 interface are looped back.

**Transmission Format**:  Asynchronous

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

**Power Supply**:  No external power required, uses ultra low power from EIA data and control signals

**Control Signal**:  DSR turns on when powered up (connected to DB-15); DCD follows DTR from the terminal; CTS follows RTS from the terminal

**Transmit Line**:  4 wire, unconditioned twisted pair

**Transmit Mode**:  Full duplex, 4-wire

**Transmit Level**:  -6 dBm

**Connectors:**  Either a male or female DB-15 connector

**Line Connection**:  RJ-11 or RJ-45 jack or 5 screw terminal posts (4 wires and 1 ground)

**Surge Protection:**  600W peak power dissipation at 1 mS  (10 x 1000µs exponential waveform) and response time of 1.0 pS, transformer isolation (1016S only)

**Range:**  Up to 9 miles over two 19-26 AWG twisted pair

**Temperature:**  32° to 140°F

**Humidity:**  Non-condensing

**Size**:  2.5" x 1.2" x 0.75"

| Distance Table (miles) | | | |
|---|---|---|---|
| Data | Wire Gauge | | |
| Rate | 19 | 24 | 26 |
| 19,200 | 2.5 | 1.8 | 1.2 |
| 9,600 | 5.5 | 3.7 | 2.5 |
| 4,800 | 7.5 | 5.0 | 3.0 |
| 2,400 | 8.5 | 5.6 | 3.7 |
| 1,200 | 9.0 | 6.2 | 4.1 |