# USER MANUAL

## MODEL 1012B

**Asynchronous Carrier Controlled Short Range Modem**

PATTON Electronics Co.


An ISO-9001 Certified Company

Part# 07M1012B
Doc# 040061U,
Rev. B
Revised 1/22/08



SALES OFFICE
(301) 975-1000
TECHNICAL SUPPORT
(301) 975-1007
http://www.patton.com

# 1.0 WARRANTY INFORMATION

**Patton Electronics** warrants all Model 1012B 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 1012B generates and uses radio frequency electromagnetic 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 1012B has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B 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 1012B 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). 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.

## 1.2 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 Patton Model 1012B. Technical Service hours: **8AM to 5PM EST, Monday through Friday.**

## 2.0 GENERAL INFORMATION

Thank you or buying the Patton Model 1012B. This product has been thoroughly inspected and tested and is warranted for One Year parts and labor. Contact Patton Electronics Technical Support if you have any questions.

### 2.1 FEATURES

- Supports up to 10 multi-point terminals
- Full or half duplex, point-to-point or multipoint
- Supports hardware handshaking
- External DCE/DTE switch
- Automatic equalization and gain control
- Transformer isolation
- No AC power required
- Supports data rates to 38,400 bps, distances to 6 miles
- Silicon Avalanche Diode surge protection
- Twisted pair connection via RJ-11, RJ-45, or terminal blocks (for daisy chaining)
- Made in the U.S.A

### 2.2 DESCRIPTION

In a multi-point environment, the master transmits data to all of the addressable slave devices (there can be up to 10 slave devices). Typically the modem at the master site is set for *constant carrier*, whereas the modems at the slave sites must be configured for *controlled carrier*. Automatic equalization and gain control ensure the optimal performance for a specific environment. Environments vary in the twisted-pair wire gauge, quality of the twisted-pair, the data rate, length of the transmission line, number of slave devices on the circuit, etc. The transformers eliminate problems caused by ground loops. With all these features, the 1012B can be used in numerous types of applications. Some of them are simple point-to-point between buildings, multipoint applications, and point-to-point applications which require passing a control signal from end-to-end.

The 1012B uses silicon avalanche diodes (SADs) for protection against transients. With SADs, the clamping response is superior and does not degrade in performance after transient “hits.” The surge/transient protection protects the 1012B as well as the port to which it is connected.

## 3.0 CONFIGURATION

By default, the Model 1012B is configured to be a DCE with the transmitter set for controlled carrier. If the 1012B is in controlled carrier mode for multi-point operation, the transmitter is controlled by RTS (pin 4) when it is a DCE, and controlled by CD (pin 8) when configured as a DTE.

The DTE/DCE slide switch (SW1 in Figure 1) is used to configure DTE or DCE orientation. The RTS/CD control jumper (J2 in Figure 1) is used to configure constant/controlled carrier mode.

Section 3.1 describes how to configure the DTE/DCE switch. Section 3.2 provides information on configuring the transmitter to be *constant* or *controlled.*

### 3.1 SETTING THE MODEL 1012B AS DCE OR DTE

**Note**: Remember that when the DTE/DCE switch is set for DCE, the 1012B functions as a DCE device. Otherwise, when the switch is in the DTE position, the short range modem operates as a DTE device..

SW1 (located inside the Model 1012B) controls the DTE/DCE configuration of the Model 1012B. Figure 1 shows the location of the DTE/DCE switch on the 1012B circuit board.

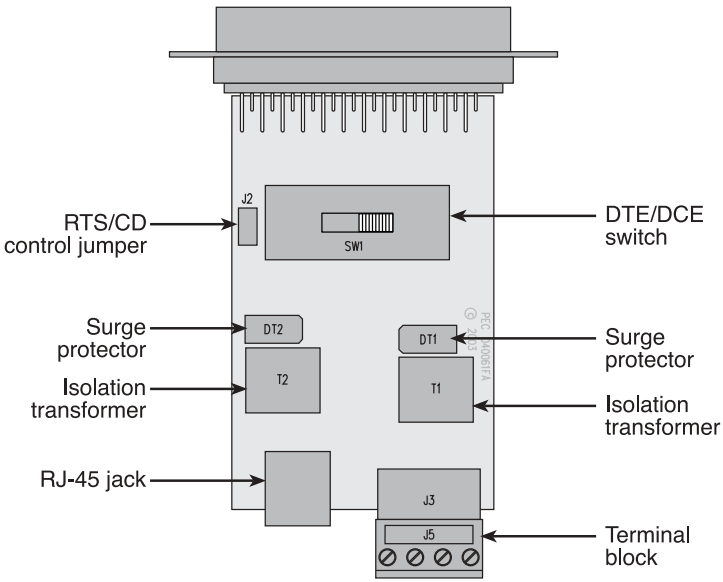



**Figure 1.** Model 1012B Board, showing switch and strap locations

To change the DTE/DCE setting, do the following:

1. Using a small screwdriver, insert the tip into one of the slots in the side of the Model 1012B (see Figure 2).

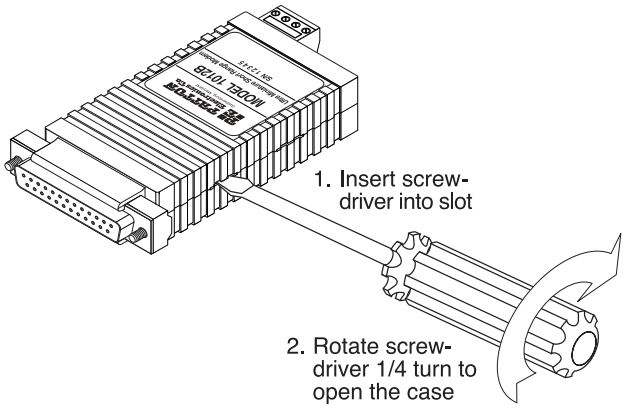



**Figure 2.** Using a small screwdriver to open the Model 1012B case

2. Rotate the screwdriver as shown in Figure 2 to open the case.

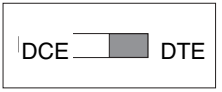



**Figure 3.** SW1 DTE/DCE switch

3. If the device connected to the Model 1012B is a PC, terminal or host computer (or is wired like one), set switch SW1 to “DCE” (see Figure 3). This causes the Model 1012B to behave like data communications equipment.

4. If the device connected to the Model 1012B is a modem or multiplexer (or is wired like one), set the switch to “DTE.” This setting causes the Model 1012B to behave like data terminal equipment.

5. After you finish configuring the DTE/DCE switch, snap the case halves back together, then go to section 4.0, “Installation.”

## 3.2 SETTING THE RTS/CD CARRIER CONTROL JUMPER

The RTS/CD jumper (see Figure 1) is identified as J2 inside the 1012B (see Figure 1). To access this strap, do the following:

1. Using a small screwdriver, insert the tip into one of the slots in the side of the Model 1012B (see Figure 2).

2. Rotate the screwdriver as shown in Figure 2 to open the case.

| DTE/DCE Switch Setting | DCE (Default) | DTE |
|---|---|---|
| RTS/CD jumper in place (default) | Carrier activated by RTS - pin 4 (default) | Carrier activated by CD - pin 8 |
| RTS/CD jumper removed | Carrier constantly ON | Carrier constantly ON |

**Table 1.** Interaction of DTE/DCE switch and RTS/CD strap

3. The RTS/CD carrier control jumper setting on the 1012B determines whether the transmitter is constantly on or is controlled by an RS-232 control signal. When this jumper is removed from the pegs, the 1012B transmitter is constantly on. When the jumper is in place on the pegs, the transmitter is controlled by either RTS or CD. When the control signal is a positive voltage, the transmitter is turned on, if negative voltage, the transmitter is off. See Table 1 for the correspondence between DTE/DCE and RTS/CD parameters.

| DTE/DCE Switch Setting | DCE | DTE |
|---|---|---|
| Carrier Detect Function | Carrier detect is output on pin 8 (CD) | Carrier detect is output on pin 4 (RTS) |

**Table 2.** Interaction of DTE/DCE switch and RTS/CD jumper

4. The RTS/CD carrier control jumper also controls which signal will function as the Carrier Detect (CD) signal. If the DTE/DCE switch is set to “DCE,” the carrier detect is output on Pin 8. If the DTE/DCE switch is set to “DTE,” the carrier detect is output on Pin 4. Table 2 shows which control signal provides the carrier detect function, per the DTE/DCE setting.

**Note**: For multi-point applications, it is necessary to have a jumper in place on the pegs on the slave modems.

5. After you finish configuring the DTE/DCE switch, snap the case halves back together and continue the installation process.

## 4.0 INSTALLATION

Once you have properly configured the Model 1012B, you are ready to connect it to your system. This section tells you how to connect the Model 1012B to the twisted pair and RS-232 interfaces, and how to operate the Model 1012B.

### 4.1 HOW TO CONNECT TO THE TWISTED PAIR INTERFACE

The Model 1012B passes data and handshaking signals between two RS-232 devices at distances to 6 miles (9.7 km) and data rates to 38.4 kbps. There are two requirements for installing the Model 1012B.

1. These units work in pairs. Therefore, you must have one Model 1012B at each end of a two twisted pair interfaces.

2. To function properly, the Model 1012B needs two twisted pair of metallic wire. They must be unconditioned, dry metallic wire, unloaded, between AWG 19 and 26 (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 1012B is available with the following twisted pair interfaces: RJ-11 jack, RJ-45 jack, and terminal blocks.

#### 4.1.1 TERMINAL BLOCK TWISTED PAIR CONNECTION

If your application requires you to connect one or two pair of bare wires to the Model 1012B, you will need to access the external terminal blocks. The following instructions will tell you how to connect the bare wires to the terminal blocks.

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

2. Strip the insulation on each of the twisted pair wires about 0.25 inch.

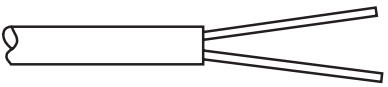


**Figure 4.** Stripping the outer insulation from the twisted pairs

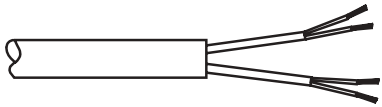


**Figure 5**. Stripping 0.25-inch of insulation from the twisted pairs

3. 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.

4. 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. Your completed crossover cable should be pinned electrically as shown below:

| | | |
|---|---|---|
| XMT + | RCV+ | One Pair |
| XMT - | RCV - | |
| RCV - | XMT - | One Pair |
| RCV + | XMT+ | |

5. When you finish connecting the wires to the terminal block, the assembly should resemble the diagram Figure 6 below.

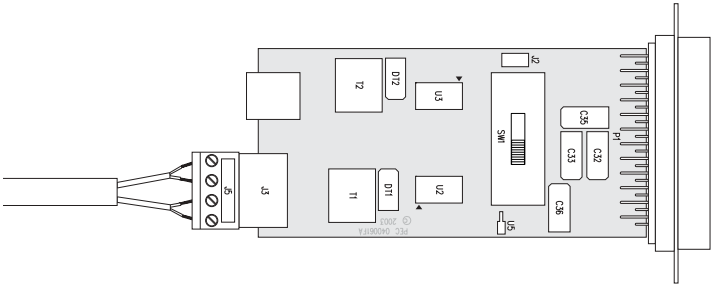



**Figure 6**. Wiring terminal block of Model 1012B

The Model 1012B is now installed.

### 4.1.2 MODULAR TWISTED PAIR CONNECTION

The Model 1012B offers two interface options for twisted pair connection: RJ-11 (6-wire) jack and RJ-45 (8-wire) jack. Pages 9 and 10 show signal/pin assignments for the jacks, as well as pin-outs for the appropriate twisted pair cable topologies.

### *Signal/Pin Assignments*

The 6-wire RJ-11 and 8-wire RJ-45 jack options for the Model 1012B are prewired for a standard TELCO wiring environment. Use the guide below when ordering or constructing twisted pair cables.

| 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

### *Crossover Cable Construction*

Connection of a 4-wire twisted pair circuit between two or more Model 1012Bs requires a **crossover cable** as shown in the figures on the following page.

| | | RJ-11 | |
|---|---|---|---|
| SIGNAL | PIN# | PIN# | SIGNAL |
| GND† | 1 | 6 | GND† |
| RCV- | 2 | 4 | XMT- |
| XMT+ | 3 | 5 | RCV+ |
| XMT- | 4 | 2 | RCV- |
| RCV+ | 5 | 3 | XMT+ |
| GND† | 6 | 1 | GND† |

| | | RJ-45 | |
|---|---|---|---|
| SIGNAL | PIN# | PIN# | SIGNAL |
| 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


AT&T standard modular pin assignments

### 4.2 WIRING FOR MULTI-POINT CIRCUITS

The Model 1012B supports multi-point applications using either a star or a daisy chain topology. Both topologies require special wiring.

**Note:** Refer to Section 3.2 for multi-point settings.

#### 4.2.1 STAR TOPOLOGY

Using a star topology, you may connect several Model 1012Bs together in a master/slave arrangement. Maximum distance between the units will vary based upon the number of drops, data rate, wire gauge, etc. Contact Patton Technical Support **(301) 975-1007**; **http://www.patton.com**; or, **support@patton.com** for specific distance estimates.

Table 3 shows how to wire the two-pair cables properly for a Model 1012B star topology. Note that the ground connection is not needed.

| HOST | FIRST SLAVE | SECOND SLAVE |
|---|---|---|
| XMT+ | RCV+ | RCV+ |
| XMT- | RCV- | RCV- |
| RCV+ | XMT+ | XMT+ |
| RCV- | XMT- | XMT- |

**Table 3.** Star wiring for Model 1012B host and slaves

### 4.2.2 DAISY CHAIN TOPOLOGY

Using a daisy chain topology, you may connect several Model 1012Bs together in a master/slave arrangement. Maximum distance between the units will vary based upon the number of drops, data rate, wire gauge, etc. Contact Patton Technical Support at **(301) 975-1007**; **http://www.patton.com**; or, **support@patton.com** for specific distance estimates.

Figure 6 shows how to wire the two-pair cables properly for a

| HOST | FIRST SLAVE | OTHER SLAVE(S) |
|---|---|---|
| XMT+ | RCV+ | RCV+ |
| XMT- | RCV- | RCV- |
| RCV+ | XMT+ | XMT+ |
| RCV- | XMT- | XMT- |

**Table 3.** Daisy Chain Wiring for Model 1012B Host and Slaves

Model 1012B's daisy chain topology. Note that the ground connection is not needed.

***Optional Connection: Dual Modular Jacks***

To facilitate daisy chaining, the Model 1012B is available in a "DRJ11" (dual RJ-11) or "DRJ45" (dual RJ-45) version. These units have two specially wired modular jacks for twisted pair connection. With the dual modular units, you do not need to build cumbersome "Y" cables for your daisy chain application. Simply use a crossover cable to go between the host and the first slave (see Section 4.1.2 for crossover cable wiring instructions), and straight through cables between the slaves.

### 4.3 CONNECTION TO THE RS-232 INTERFACE

Once you have properly configured the Model 1012B and connected the twisted pair wires correctly, plug the Model 1012B directly into the DB-25 port of the RS-232 device. After doing so, remember to insert and tighten the two captive connector screws.

**Note**: If you must use a cable to connect the Model 1012B to the RS-232 device, make sure it is a straight through cable of the shortest possible length—we recommend 6 feet (1.8 meters) or less.

### 4.4 OPERATING THE MODEL 1012B

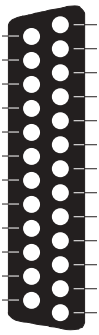
Once the Model 1012B is properly installed, it should operate transparently—as if it were a standard cable connection. Operating power is derived from the RS-232 data and control signals; there is no "ON/OFF" switch. All data signals from the RS-232 interface are passed straight through. Additionally, one control signal is passed in each direction.

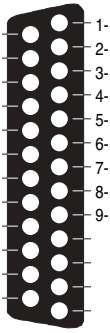
## APPENDIX A
## SPECIFICATIONS

| | |
|---|---|
| **Transmission Format:** | Asynchronous, full duplex, half duplex |
| **Transmission Line:** | Two unconditioned twisted pair AWG 19–26 |
| **Interfaces:** | EIA RS-232, ITU/CCITT V.24 |
| **Data Rates:** | 0–38.4 kbps |
| **Isolation:** | Minimum 1500 V RMS via custom transformers |
| **Surge Protection:** | 600W power dissipation at 1 mS |
| **Factory Switch Setting:** | DCE (transmits from RS-232 on pin 3) |
| **Control Signals:** | CTS follows RTS from the terminal (DTE); DSR follows DTR from the terminal (DTE); CD indicates reception of carrier |
| **RTS/CTS Delay:** | Approximately 30 mS |
| **Connectors:** | DB-25 male or female on RS-232 side; RJ-11, RJ-45 or terminal block with strain relief on line side |
| **Power Supply:** | No external power required; uses power from EIA data and control signals |
| **Temperature Range:** | 0–60°C (32–140°F) |
| **Altitude:** | 0–15,000 feet (0–4,500 meters) |
| **Humidity:** | 5 to 95% non-condensing |
| **Weight:** | 2 oz. (60 grams) |
| **Dimensions:** | 3.54L x 2.09W x 0.79H in. (90L x 53W x 20H mm) |

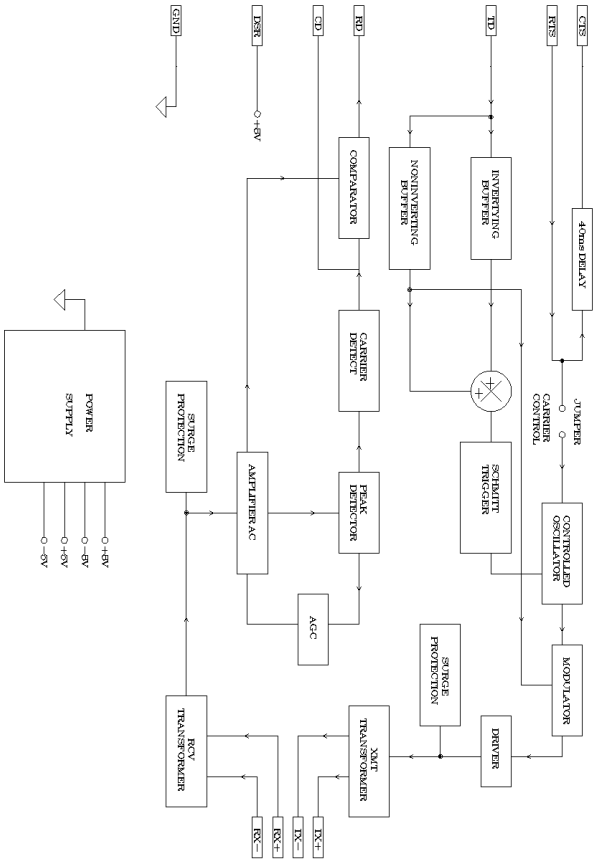
| Distance Table (miles) | | | |
|---|---|---|---|
| Data Rate | Wire Gauge | | |
| | 19 | 24 | 26 |
| 1,200 to 38,400 | 6.0 | 4.0 | 2.5 |

## APPENDIX B
## RS-232C PIN CONFIGURATIONS

| DIRECTION | "DCE" STANDARD SETTING | DIRECTION |
|---|---|---|
| | 1- (FG) Frame Ground | |
| | 2- (TD) Transmit Data | To Model 1012B |
| | 3- (RD) Receive Data | From Model 1012B |
| | 4- (RTS) Request to Send | To Model 1012B |
| | 5- (CTS) Clear to Send | From Model 1012B |
| | 6- (DSR) Data Set Ready | From Model 1012B |
| To Model 1012B | Data Term. Ready (DTR) - 20  7- (SG) Signal Ground | |
| | 8- (CD) Carrier Detect | From Model 1012B |
| | 9- External Power | To Model 1012B |

| DIRECTION | "DTE" STANDARD SETTING | DIRECTION |
|---|---|---|
| | 1- (FG) Frame Ground | |
| | 2- (TD) Transmit Data | From Model 1012B |
| | 3- (RD) Receive Data | To Model 1012B |
| | 4- (RTS) Request to Send | From Model 1012B |
| | 5- (CTS) Clear to Send | To Model 1012B |
| | 6- (DSR) Data Set Ready | To Model 1012B |
| From Model 1012B | Data Term. Ready (DTR) - 20  7- (SG) Signal Ground | |
| | 8- (CD) Carrier Detect | To Model 1012B |
| | 9- External Power | To Model 1012B |

## APPENDIX C
## MODEL 1012B BLOCK DIAGRAM



## Notes

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 |
| Mail: | Patton Electronics Company<br>7622 Rickenbacker Drive<br>Gaithersburg, MD 20879 USA |

We are committed to a quality product at a quality price. Patton Electronics is ISO 9001 certified. We meet and exceed the highest standards in the industry (CE, UL, etc.).

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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