USER MANUAL

MODEL 1068
Variable Rate
VLINK Modem

PATTON Electronics Co.

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TECHNICAL SUPPORT
(301) 975-1007

ISO 9001 CERTIFIED

An ISO-9001Certified
Company

CONTENTS

1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 1068 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 the 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 performs 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.

> **Note** Conformity documents of all Patton products can be viewed online at www.patton.com under the appropriate product page.

1.1 RADIO AND TV INTERFERENCE

The Model 1068 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 1068 has been tested and found to comply with the limits for a Class A computing device in accordance with 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 1068 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).

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 European Union (EU). A Certificate of Compliance is available by contacting Technical Support.

1.3 FCC PART 68 (1068DV ONLY)

The Model 1068D is not intended to be connected to the public telephone network.

Caution

The VLINK port is not intended to be connected to the public telephone network. The 1068DV contains a POTS/ISDN connection that can be connected to the public telephone network.

Caution

This equipment complies with Part 68 of the FCC Rules. Please note the following:

1. You are required to request service from the telephone company before you connect the Model 1068DV to a network. When you request service, you must provide the telephone company with the following data.

   — The required Universal Service Order code (USOC) jack: RJ-11C

   — The make, model number, Ringer Equivalence Number (REN), and FCC Registration number of the Model 1068DV.

   The REN helps you determine the number of devices you can connect to your telephone line and still have all of those devices ring when your number is called. In most, but not all, areas, the sum of the RENs of all devices should not exceed five (5.0). To be certain of the number of devices you can connect to your line, you should call your local telephone company to determine the maximum REN.

   — The Facility Interface Code: **02LS2**

   — The Service Order Code(s) (SOC): **9.0F**

   — REN No.: **0.2**

2. Your telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. The telephone company will notify in advance of such changes to give you an opportunity to maintain uninterrupted telephone service.

3. If your Model 1068DV causes harm to the telephone network, the telephone company may temporarily discontinue your service. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible and will be informed of your right to file a complaint with the FCC.

4. If you experience trouble with the Model 1068DV, please contact Patton Electronics Company for service or repairs. Repairs should be performed only by Patton Electronics Co.

5. You are required to notify the telephone company when you disconnect the Model 1068DV from the network.

1.4 INDUSTRY CANADA NOTICE

NOTICE: This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

1.5 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:

• Tel: **+1 (301) 975-1007**

• Email: **support@patton.com**

• URL: **http://www.patton.com**

> **Note** Packages received without an RMA number will not be accepted.

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 for parts and labor. If any questions or problems arise during installation or use of this product, contact Patton Electronics Technical Support at +1 (301) 975-1007.

2.1 FEATURES

• Easy to install standalone VLINK modems—*no configuration required*

• Auto-sensing full or half-duplex Ethernet

• Auto-sensing 10/100Base-T

• Extends network connections up to 6,652 ft (2.03 km) over 2-wire 24-AWG unconditioned lines

• Switch selectable line rates up to 16.67 Mbps

• 7 symmetric or asymmetric settings via DIP switch

• POTS/ISDN splitter on board

• Transparent operation

• LED indicators for Power, Ethernet Link & Activity, VLINK & Quality of Line (QOL)

• Surge suppression up to 20 kA (8/20 μs)

• Available in rack-mount or standalone configurations

• Made in the USA

2.2 DESCRIPTION

The Patton Electronics Model 1068/CO* and 1068/CP VDSL* modems provide high-speed LAN connections between peered Ethernet LANs, remote PC's, or any other network enabled 10/100Base-T device.

Operating in pairs, a Model 1068/CO (central office) located at one end of the LAN extension and a Model 1068/CP (customer premise) at the other end, these units can automatically forward LAN broadcasts, multicasts, and frames across a 2-wire voice-grade twisted-pair link. The data is

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*   Only Models 1068DV/CO and 1068DV/CP have POTS/ISDN splitters on board.

passed transparently (unmodified) through the 1068s. The 1068s automatically add and delete MAC addresses, only passing packets across the VDSL link that are meant for the remote peered LAN.
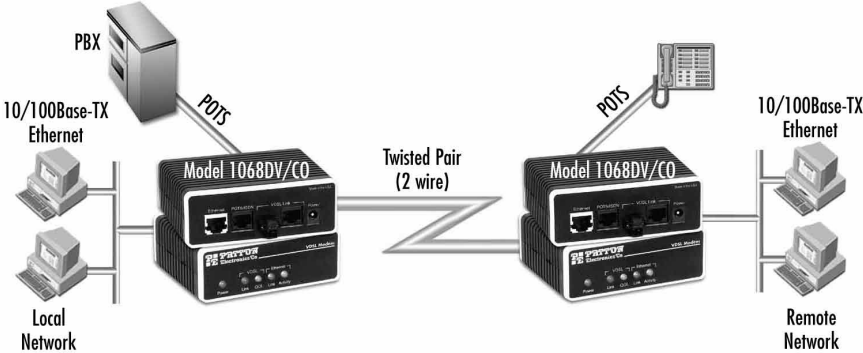

Figure 1. Typical application

The 1068DV/CO and 1068DV/CP work together to create a transparent extension between two peered Ethernet LANs. POTS/ISDN calls can be made over a VDSL link without interfering with the data. Figure 1 shows a typical point-to-point application.

3.0 INSTALLATION

Because the Model 1068 requires no configuration, it can be installed quickly. If you are installing a standalone unit, refer to section 3.1 "Standalone unit installation". Otherwise, refer to section 3.2 "Rack card installation".

> **Note**   If asymmetric transmission or line rates other than 12.5 Mbps are required, refer to section 4.0, "Configuration" on page 15.

3.1 STANDALONE UNIT INSTALLATION

Do the following:

1. Connect the line interface between the units (refer to section 3.3, "Connecting the Twisted-Pair Line Interface" on page 11)

   > **Note**   See Figure 2 for the standalone unit's rear panel arrangements.

2. Connect the Ethernet interface (refer to section 3.4, "Connecting the 10/100Base-T Ethernet Interface" on page 12).

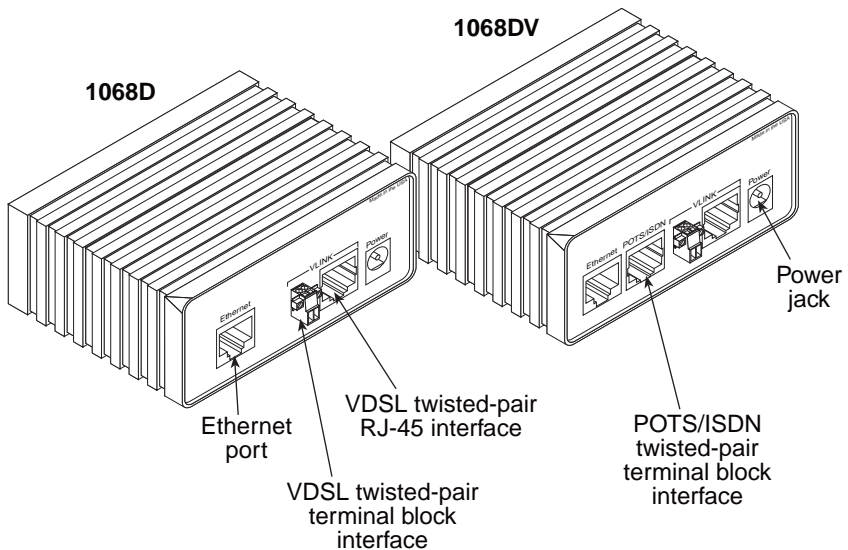3. Connect the power plug (refer to section 3.6, "Connecting Power" on page 14).

Figure 2. Model 1068 standalone rear panel

3.2 RACK CARD INSTALLATION

The Model 1068 rack card version comprises a front card and a rear card.Do the following to install the cards into the rack chassis:

1. Slide the rear card into the back of the chassis along the metal rails.

2. Secure the rear card using the supplied metal screws.

3. Slide the front card into the chassis until you feel resistance as the front card engages the rear card. When that happens, *gently* push the front card forward until it is fully seated in the card-edge receptacle of the rear card (it should *click* into place).

4. Secure the front card using the captive fasteners.

> **Note**   The Model 1001R14 chassis supports "hot swapping" of cards, so it is not necessary to power down the rack when you install or remove a Model 1068 rack card.
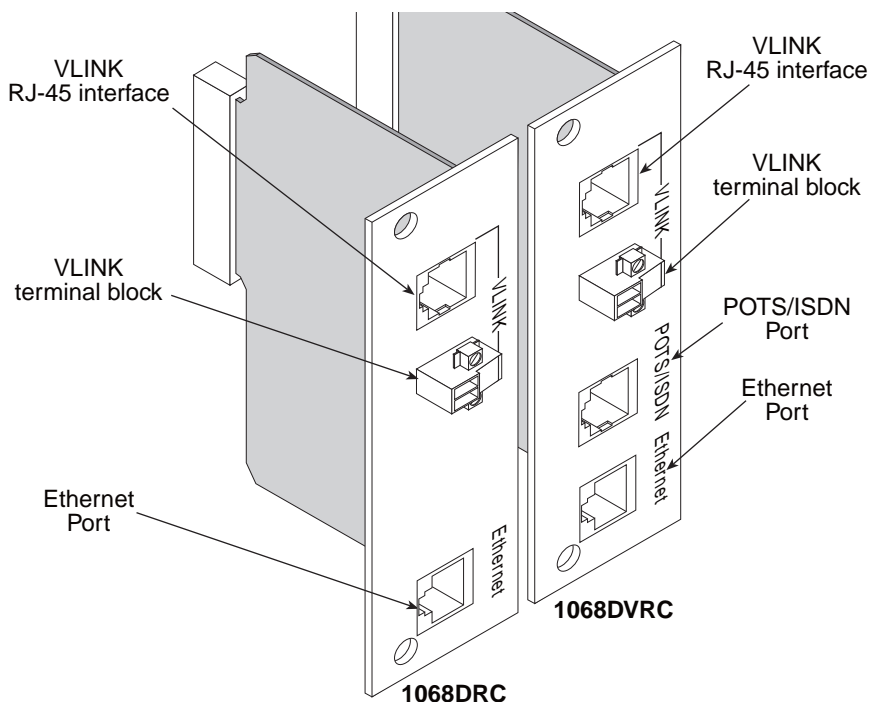

Figure 3. Model 1068 rack cards

5. Connect the line interface between the units (refer to section 3.3, "Connecting the Twisted-Pair Line Interface" on page 11)

> **Note**   See Figure 3 for the rack card's panel arrangements.

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6. Connect the Ethernet interface (refer to section 3.4, "Connecting the 10/100Base-T Ethernet Interface" on page 12).

3.3 CONNECTING THE TWISTED-PAIR LINE INTERFACE

The Model 1068 supports communication between two peer Ethernet LAN sites over a distance of up to 6,652 ft (2.03 km) over 24 AWG (0.5 mm) twisted-pair wire.

> **Note**   Actual distance and link performance may vary depending on the environment and type/gauge of wire used.

Follow the steps below to connect the Model 1068 VDSL Interfaces.

> **Note**   The Model 1068 units work in pairs. One of the units must be a Model 1068/CO (Central Office), and the other unit must be a Model 1068/CP (Customer Premise). It does not matter which end is the 1068/CO and which is the 1068/CP. The link is always initiated by the 1068/CP. As long as the 1068/CO is powered on, the 1068/CP can establish a link by being powered on or by having its power reset.

1. To function properly, the two Model 1068s must be connected together using twisted-pair, unconditioned, dry, metal wire, between 19 (0.9mm) and 26 AWG (0.4mm). Leased circuits that run through signal equalization equipment are not acceptable.

2. The Model 1068 is equipped with two interface jacks that can be used on the VDSL interface, an RJ-45 or a terminal block. These VDSL interfaces are a two-wire interface. Observe the signal/pin relationships on the Model 1068's VDSL interface jacks.

The RJ-45 connector on the Model 1068's twisted pair interface is polarity insensitive and is wired for a two-wire interface. The signal/pin relationship is shown in Figure 4.
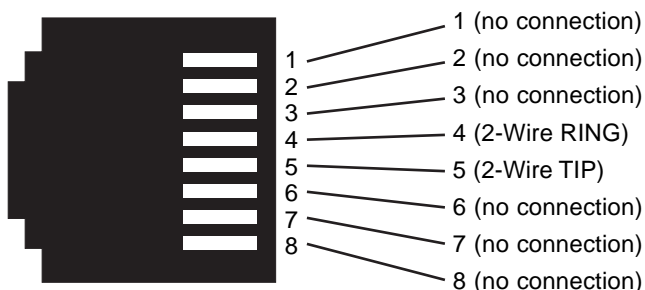

Figure 4. Model 1068 (RJ-45) twisted pair line interface.

The terminal block connector on the Model 1068's twisted pair interface is polarity insensitive and is wired for a two-wire interface. The signal/pin relationships is shown in Figure 5.
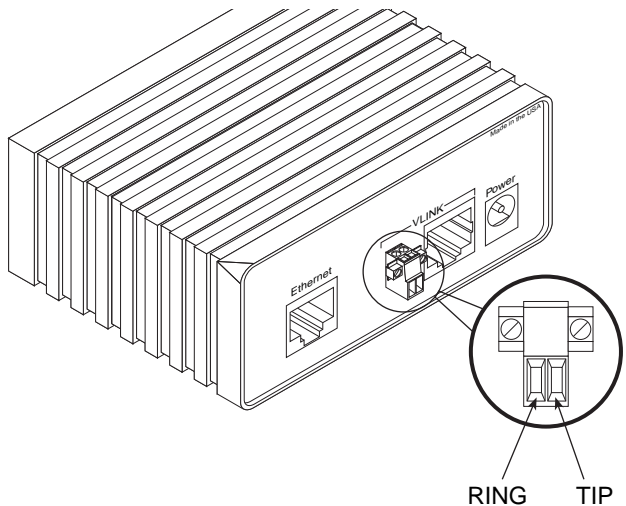
Figure 5. Model 1068D (Terminal Block) twisted pair line interface.

3.4 CONNECTING THE 10/100BASE-T ETHERNET INTERFACE

The shielded RJ-45 port labeled *Ethernet* is the 10/100Base-T interface. This port is designed to connect directly to a 10/100Base-T network. Figure 6 shows the signal/pin relationships on this interface. You may connect this port to another Ethernet device via a Type 4 or Type 5 cable that is up to 328 ft long.

1 — 1 TX+ (data output from 1068)
2 — 2 TX- (data output from 1068)
3 — 3 RX+ (data input to 1068)
4 — 4 (no connection)
5 — 5 (no connection)
6 — 6 RX- (data input to 1068)
7 — 7 (no connection)
8 — 8 (no connection)

Figure 6. Model 1068 10/100Base-T RJ-45 Connector Pinout.

Connecting the 10/100Base-T Ethernet Port to a Hub

The Model 1068 10/100Base-T interface is configured as DTE (Data Terminal Equipment), just like a 10/100Base-T network interface card in a PC. Therefore, it "expects" to connect to a 10/100Base-T Hub using a straight-through RJ-45 cable. Figure 7 diagrams the cable wiring for connecting the Model 1068 to a 10/100Base-T hub.
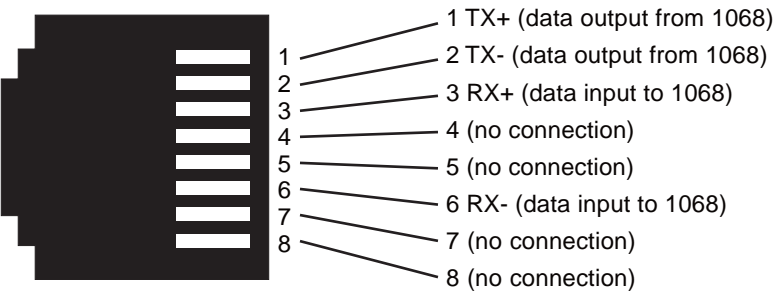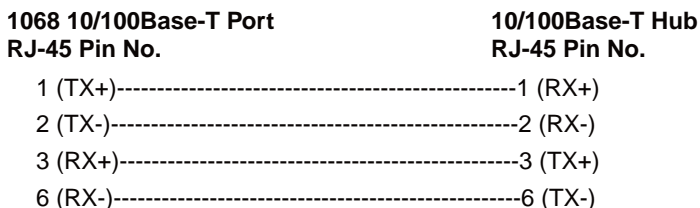
1068 10/100Base-T Port   **10/100Base-T Hub**
RJ-45 Pin No.   **RJ-45 Pin No.**

  1 (TX+)--1 (RX+)

  2 (TX-)--2 (RX-)

  3 (RX+)--3 (TX+)

  6 (RX-)--6 (TX-)

Figure 7. Wiring diagram for connecting the Model 1068 to a 10/100Base-T hub

Connecting the 10/100Base-T Ethernet Port to a PC (DTE)

The Model 1068 10/100Base-T interface is configured as DTE (Data Terminal Equipment). If you wish to connect the 1068 to another DTE devices such as 10/100Base-T network interface card in a PC (or 1068s in a back-to-back arrangement), you must construct a 10/100Base-T crossover cable as shown in Figure 8.

1068 10/100Base-T Port   **10/100Base-T DTE**
RJ-45 Pin No.   **RJ-45 Pin No.**

1 (TX+)   1 (TX+)

2 (TX-)   2 (TX-)

3 (RX+)   3 (RX+)
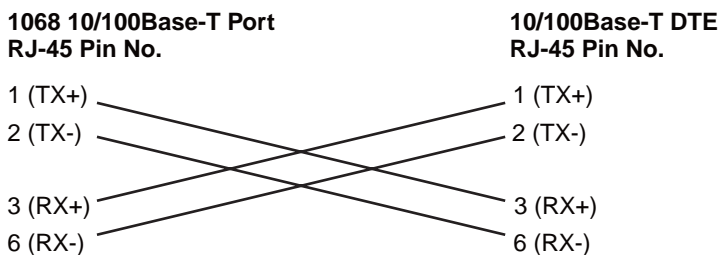
6 (RX-)   6 (RX-)

Figure 8. 10/100Base-T crossover cable

3.5 CONNECTING THE POTS/ISDN LINE

The RJ-45 port labeled "POTS/ISDN" is the POTS/ISDN interface. A telephone or an ISDN device may be connected to this port and carried over the VDSL line. The units do not need power for the POTS interface to

work. The RJ-45 connector in the model 1068's POTS/ISDN interface is wired as shown in Figure 9.
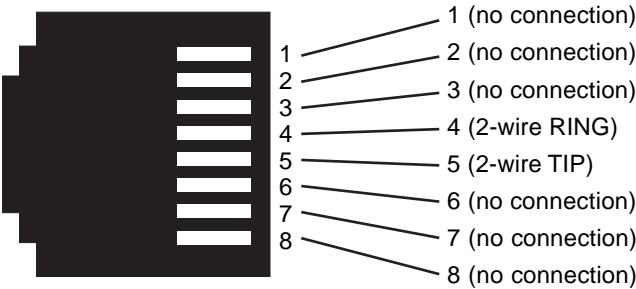

Figure 9. Model 1068DV (RJ-45) POTS/ISDN interface

3.6 CONNECTING POWER

An external AC or DC power supply is available separately. This connection is made via the barrel jack on the rear panel of the Model 1068. No configuration is necessary for the power supply (See Appendix B for domestic and international power supply and cord options).

DC power (supplied via the power supply jack to the 1068) must meet the following requirements; DC power supplied must be regulated +5VDC ±5%, 1.0A minimum. Center pin is +5V. The barrel type plug has a 2.5/5.5/10mm I.D./O.D./Shaft Length dimensions.

The Model 1068 does not have a power switch, so it powers up as soon as it is plugged in.

4.0 CONFIGURATION

The Model 1068 has four DIP switches for configuring the unit for a wide variety of applications. This section describes switch locations and explains the different configurations.

4.1 CONFIGURING THE HARDWARE DIP SWITCHES

Using a small flat-tip screwdriver, remove the protective cover located on the underside of the Model 1068 (see Figure 10).
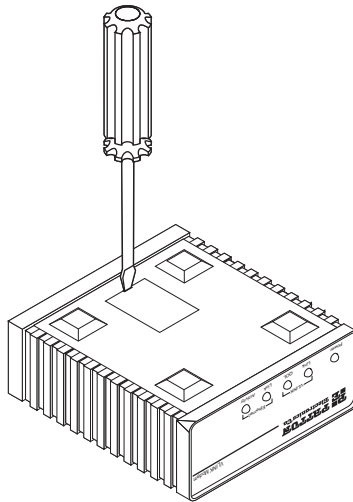
Figure 10. Removing protective cover

Figure 11 and Figure 12 on page 16 show the orientation of the DIP switches in the On and Off positions.

S1

Switch toggle

Push toggle up for ON position

Push toggle down for OFF position

ON

1 2 3 4

S1

Figure 11. DIP switch orientation

S1

VLINK Modem

Power

VLINK

Link

QOL

Ethernet

Link

Activity

Switch toggle

S1

Push toggle to left for ON position

Push toggle to right for OFF position

ON

1 2 3 4

Figure 12. Rack card DIP switch orientation

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4.2 CONFIGURING DIP SWITCH S1

DIP switch S1 is where you configure the VDSL line rate, symmetric or asymmetric, Ethernet full auto sense capability (100BaseT full or half duplex, 10BaseT full or half duplex) or limited 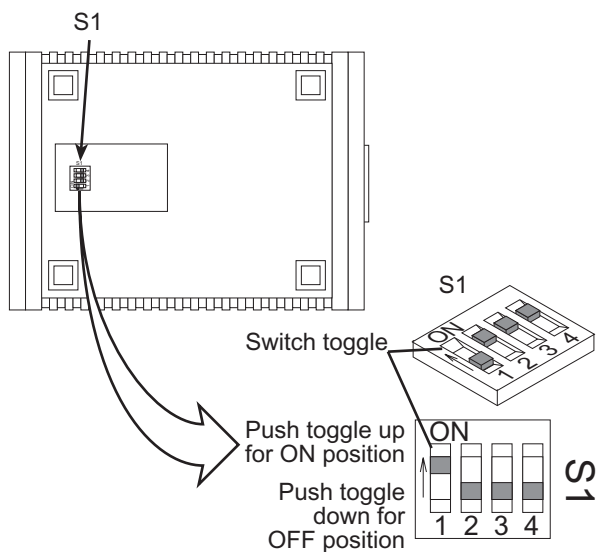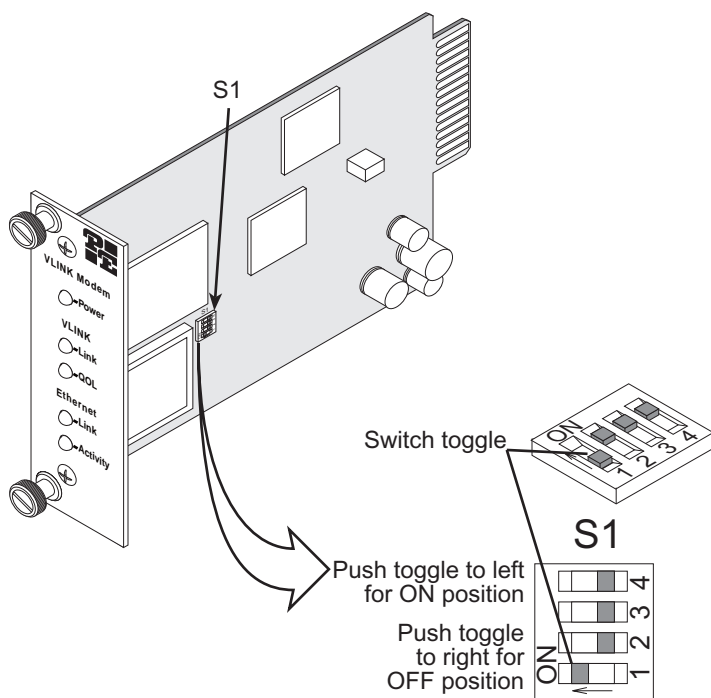auto sense (only 100BaseT half duplex, 10BaseT full or half duplex). Table 1 summarizes default positions of DIP switches S1-1 through S1-4. Detailed descriptions of each switch follow the table.

Table 1: S1 Summary

Position	Function	Factory Default
S1-1	Ethernet Auto Sense	OFF Full Auto Sense capability
S1-2	Line Rate	ON
S1-3	Line Rate	OFF 12.5Mbps Symmetric
S1-4	Line Rate	OFF

Switch S1-1: Ethernet Auto Sense

Use switch S1-1 to configure the unit for full auto sense capability or limited auto sense capability. Full Auto sense capability consists of standard Ethernet Auto sensing (100BaseT full duplex, 100BaseT half duplex, 10BaseT full duplex, and 10BaseT half duplex). Limited Auto sensing capability consists on only auto sensing for 100BaseT half duplex, 10BaseT full duplex, and 10BaseT half duplex. The limited auto sensing feature is used when an Ethernet device does not comply with IEEE 802.3x (back pressure flow control) at 100M full duplex.

Table 2: Ethernet Auto Sense Selection Chart

S1-1	Setting
OFF	Full Auto Sensing (100 Mbps, Full or Half Duplex) (10 Mbps, Full or Half Duplex)
ON	Limited Auto Sensing (100 Mbps Half Duplex) 10 Mbps Full or Half Duplex)

Switches S1-2 and S1-4: Data Rate

Use switches S1-2 and S1-4 to configure the VDSL line rates.

Table 3: Symmetric VDSL Line Rates Selection Chart

S1-2	S1-3	S1-4	Symmetric Line Rate
ON	ON	ON	6.25 Mbps
ON	ON	OFF	9.38 Mbps

Table 3: Symmetric VDSL Line Rates Selection Chart

S1-2	S1-3	S1-4	Symmetric Line Rate
ON	OFF	OFF	12.5 Mbps
ON	OFF	ON	16.67 Mbps

Table 4: Asymmetric VDSL Line Rates Selection Chart

S1-2	S1-3	S1-4	Asymmetric Line Rates DS/US
OFF	OFF	ON	4.17 Mbps/1.56 Mbps
OFF	ON	ON	9.38 Mbps/1.56 Mbps
OFF	ON	OFF	16.67 Mbps/2.34 Mbps

5.0 OPERATION

Once the Model 1068s are properly installed, they should operate transparently. No user settings required. This section describes reading the LED status monitors.

5.1 POWER UP

Before applying power to the Model 1068, please review section 3.6, "Connecting Power" on page 14 to verify that the unit is connected to the appropriate power source.

5.2 FRONT PANEL LED STATUS MONITORS

The Model 1068 features five front panel LEDs that monitor power, the Ethernet signals, and the VDSL connection. Figure 13 (standalone version) and Figure 14 on page 20 (rack card version) show the front panel location of each LED. Table 5 on page 20 describes the LED functions.
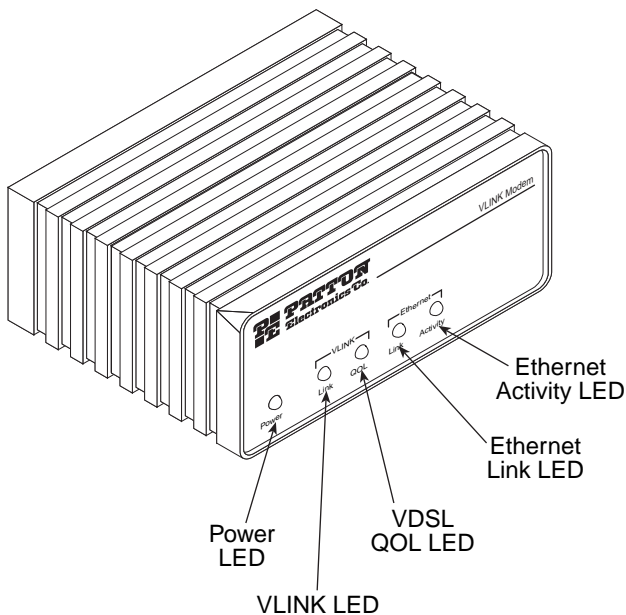

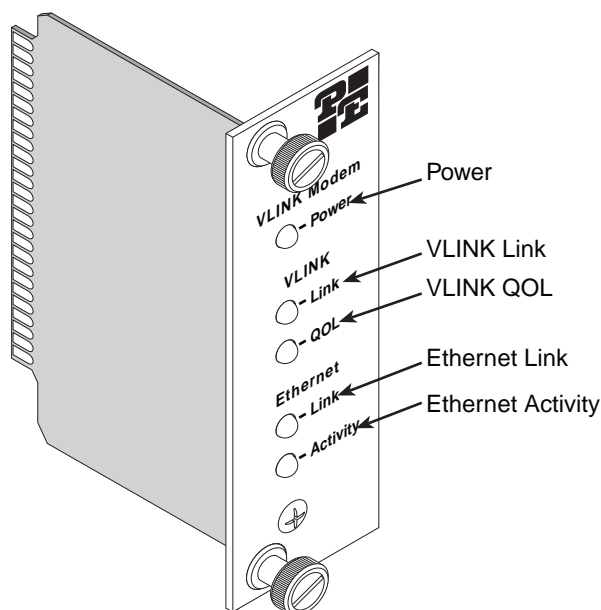**Figure 13.** Model 1068 standalone unit front panel

Figure 14. Model 1068 rack card front panel

Table 5: Front panel LED description

LED	Description
Power	Solid GREEN to indicate the unit is powered on.
VLINK Link	(Active Green) Solid green (ON) to indicate that the end-to-end VDSL link between the Model 1068s is established. The VLINK LED is OFF when the link is down.
VLINK QOL	(Active Yellow) Flashes YELLOW to indicate the processor is correcting an error in the data thus preventing the transmission of corrupted data to the Ethernet port. The more error corrections, the more often the LED blinks. If the light remains lit continuously, it means that the VDSL line is noisy—although the data at the Ethernet port remains uncorrupted. Further impairment of the line however, risks having the line fail, as indicated by the green VLINK Link LED extinguishing.
Ethernet Link	(Active Green) Solid Green indicates that 10/100Base-T Ethernet link has been established.
Ethernet Activity	(Active Yellow) Flashes yellow to indicate Ethernet activity on the Model 1068's 10/100Base-T Ethernet port.

APPENDIX A
SPECIFICATIONS

A.1 LAN CONNECTION
- Shielded RJ-45, 10/100Base-T, IEEE 802.3 Ethernet
- VDSL Connection: RJ-45 and Terminal Block

A.2 TRANSMISSION LINE
Two-wire unconditioned twisted pair.

A.3 VDSL LINE RATE
16.67 Mbps, symmetric upstream/downstream. Additional symmetric and asymmetric rates are available via DIP switch settings.

A.4 VDSL DISTANCE
6,000 ft (1.83 km) at 1.56 Mbps upstream/4.17 Mbps downstream

> **Note** Distances depend on selected line rate.

A.5 VDSL SURGE SUPPRESSOR
Gas tube with maximum current surge: 20 kA (8120 μs).

A.6 LED STATUS INDICATORS
- Power (Green)
- VDSL: Link (Green) & QOL (Red)
- Ethernet: Link (Green) & Activity (Yellow)

A.7 POWER SUPPLY
External AC and DC options:
- AC: 120 VAC, 220 VAC, and UI (120–240 VAC)
- DC: 12 VDC, 24 VDC and 48 VDC
- Power consumption: 450 mA at 5 VDC

A.8 TEMPERATURE RANGE
0–50°C

A.9 HUMIDITY
Up to 90% non-condensing.

A.10 DIMENSIONS
1.58H x 4.16W x 3.75D in. (10.6H x 4.1W x 8.8D cm)

APPENDIX B

MODEL 1068 SERIES FACTORY
REPLACEMENT PARTS AND ACCESSORIES

Patton Model #	Description
Base Models	
1068DRC/CO	CO Variable Rate VDSL Rack Card; data only
1068DRC/CP	CP Variable Rate VDSL Rack Card; data only
1068DVRC/CO	CO Variable Rate VDSL Rack Card; voice and data
1068DVRC/CP	CP Variable Rate VDSL Rack Card; voice and data
1068D/CO	CO Variable Rate VDSL Modem, data only, no power supply
1068D/CP	CP Variable Rate VDSL Modem, data only, no power supply
1068D-2PK	Variable Rate VDSL Modem Kit: includes one central office (CO) and one customer premise (CP) Model 1068, data only, no power supply
1068DV/CO	CO Variable Rate VDSL Modem, voice & data, no power supply
1068DV/CP	CP Variable Rate VDSL Modem, voice & data, no power supply
1068DV-2PK	Variable Rate VDSL Modem Kit: includes one central office (CO) and one customer premise (CP) Model 1068, voice & data, no power supply
07M1068-A	User Manual
Power Supplies	
08055DCUI	100-240VAC (+5V reg. DC/2A) Universal Input Adapter.
08055-120-5-1	120 VAC (+5V reg. DC/1A) Input Adapter
12V-PSM	12 VDC Input Adapter
24V-PSM	24 VDC Input Adapter
48V-PSM	48 VDC Input Adapter
Power Cords*	
0805US	American Power Cord
0805EUR	European Power Cord CEE 7
0805UK	United Kingdom Power Cord
0805AUS	Australian 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

*Only required with optional UI power supply (08055DCUI)

APPENDIX C
MODEL 1068 SERIES INTERFACE PIN ASSIGNMENT

C.1 10/100BASE-T INTERFACE

RJ-45

- Pin 1: TX+
- Pin 2: TX-
- Pin 3: RX+
- Pin 6: RX-
- Pins 4, 5, 7, 8: no connection

C.2 VDSL INTERFACE

RJ-45

- Pin 4: RING
- Pin 5: TIP
- Pins 1, 2, 3, 6, 7, 8: no connection

Terminal Block

See Figure 5 on page 12.

C.3 POTS/ISDN INTERFACE

RJ-45

- Pin 4: 2-wire RING
- Pin 5: 2-wire TIP
- Pins 1, 2, 3, 6, 7, 8: no connection

APPENDIX D
DISTANCE CHART, BASED ON 24 AWG (0.5 MM)

Symm Line Rate (DS/US)	Distance in feet (km)
6.25 Mbps	4,500 (1.37)
9.38 Mbps	4,150 (1.26)
12.5 Mbps	4,000 (1.22)
16.67 Mbps	3,300 (1.00)

Asymm Line Rate (DS/US)	Distance in feet (km)
4.17 Mbps/1.56 Mbps (Mode 0)	6,000 (1.83)
9.38 Mbps/1.56 Mbps	5,500 (1.68)
16.67 Mbps/2.34 Mbps	5,000 (1.52)