

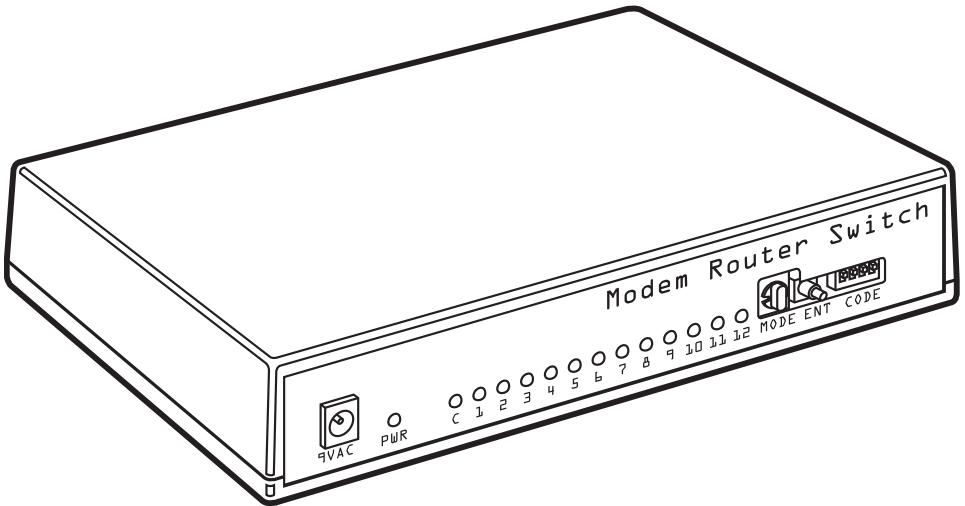


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Modem Router Switch



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**FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate 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 communication. It 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 against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

FCC REQUIREMENTS FOR TELEPHONE-LINE EQUIPMENT

1. The Federal Communications Commission (FCC) has established rules which permit this device to be directly connected to the telephone network with standardized jacks. This equipment should not be used on party lines or coin lines.
2. If this device is malfunctioning, it may also be causing harm to the telephone network; this device should be disconnected until the source of the problem can be determined and until the repair has been made. If this is not done, the telephone company may temporarily disconnect service.
3. If you have problems with your telephone equipment after installing this device, disconnect this device from the line to see if it is causing the problem. If it is, contact your supplier or an authorized agent.
4. The telephone company may make changes in its technical operations and procedures. If any such changes affect the compatibility or use of this device, the telephone company is required to give adequate notice of the changes.
5. If the telephone company requests information on what equipment is connected to their lines, inform them of:
 - a. The telephone number that this unit is connected to.
 - b. The ringer equivalence number.
 - c. The USOC jack required: RJ-11C.
 - d. The FCC registration number.

Items (b) and (d) can be found on the unit's FCC label. The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

6. In the event of an equipment malfunction, all repairs should be performed by your supplier or an authorized agent. It is the responsibility of users requiring service to report the need for service to the supplier or to an authorized agent.

**CERTIFICATION NOTICE FOR
EQUIPMENT USED IN CANADA**

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, and safety requirements. Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly (extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized maintenance facility—in this case, Black Box. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The LOAD NUMBER (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices, subject only to the requirement that the total of the load numbers of all the devices does not exceed 100.

NORMAS OFICIALES MEXICANAS (NOM) ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

TRADEMARKS USED IN THIS MANUAL

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1. Specifications

User Controls: 40418: (1) manual rotary 8-position switch, (1) 4-position DIP switch, (1) Enter key;
40419: (1) manual rotary 8-position switch

Connectors: 40418: (2) RJ-11 female programming ports, (2) RJ-11 female telco line ports, (8) RJ-11 female switched ports;
40419: (2) RJ-11 telco

Indicators: 40418: (14) LEDs: (1) Power, (1) Mode, (12) Key Program;
40419: (1) Verify Connection

Power: 115 VAC, 60 Hz

Size: 40418: 0.8"H x 7.5"W x 4.3"D (2 x 19.1 x 10.9 cm);
40419: 0.8"H x 1.5"W x 3"D (2 x 3.8 x 7.6 cm)

Weight: **40418:** 1 lb. (0.5 kg);
40419: 0.3 lb. (0.1 kg)

2. Overview

2.1 Introduction

With the Modem Router Switch, you can switch inbound modem calls to any of eight receiving modems (PCs, servers, etc.) that the caller selects. Designed primarily for modem applications, you can also use it for voice, fax, or other analog switching applications. The switch also enables you to switch devices on outbound telephone lines. Or, you can simply reboot your PC using the optional power adapter (40420).

The Modem Router Switch has two telco line connections and eight modem ports.

2.1.1 INBOUND CALLS

When used to route inbound calls, the caller selects the desired port when placing the call. The Modem Router Switch's two primary operating modes (Touch-tone and Secure) enable the call routing. Select the desired operating mode via a rotary switch (see Figure 2-2 and Table 2-2 on pages 12–16).

The Touch-tone mode provides a simple DTMF tone port selection method. The caller simply enters a password and the desired port number. You can do this manually from any touch-tone keypad or by appending the proper character sequence to the “AT Commands” for dialup modem applications.

The Secure mode requires a matchbox-size Security Selection Key (part number 40419) with an eight-position rotary selector switch that connects to the caller's modem. The security device encrypts the handshake with the Modem Router Switch and automatically switches the call to the selected port. Any call received without the proper corresponding Security Key aborts within a half second. This eliminates wrong numbers and nuisance calls. Calls by any of the “hacker” type War Dialers are also not recognized as a modem.

2.1.2 OUTBOUND CALLS

For outbound calls, the Modem Router Switch also acts as a telephone line switch. Any of the “switched ports” may bid for the available telco line simply by going off-hook. If the line is already in use by another inbound or outbound call, the bidding modem receives no dial tone.

2.1.3 SECURITY KEY (PART NUMBER 40419)

You can program the Security Key through the RJ-11 “Program Ports.”

NOTE

Each Security Key may be programmed differently, allowing only various units to access selected ports.

Each Modem Router Switch transfers a unique factory system ID code and a user-selected ID to the Security Key during programming. This prevents the Security Key from being used on other systems. The Security Keys are shipped programmed, to have all ports enabled, but you can change this programming.

In either touchtone or secure mode, the switch can abort unauthorized calls and route them to the “Default Port” (Port #1). This allows you to share the Modem Router Switch with other normal voice or data activity on the phone line.

2.2 Components

2.2.1 FRONT PANEL

Figure 2-1 and Table 2-1 identify the Modem Router Switch’s front-panel components. The 40418 has 12 RJ-11 ports on its front panel.

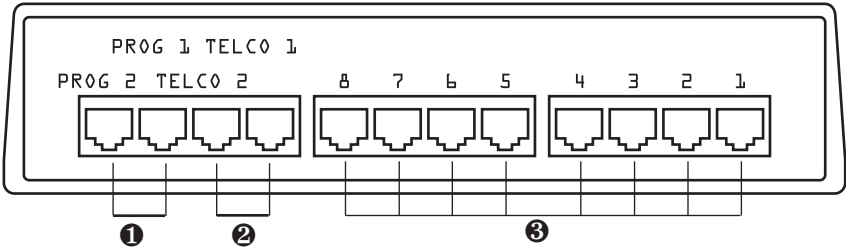


Figure 2-1. The 40418 switch’s front-panel components.

Table 2-1. Front-panel components and their functions.

Component	Function
① PROG ports	The two ports labeled PROG 1 and PROG 2 program the optional Security Selection Key. The port labeled PROG 1 is used to enter the password when the system is in the Touch-tone MODE, without the Security Selection Key. A standard telephone handset is required.
② TELCO ports	The two RJ-11 ports labeled TELCO connect to the Telephone Central Office line.
③ SWITCHED PORTS (1–8)	The remaining eight ports, labeled SWITCHED PORTS (1–8), are the ports to which the incoming calls can be switched.

MODEM ROUTER SWITCH

2.2.2 REAR PANEL

The switch's rear-panel components are shown in Figure 2-2 and described in Table 2-2. Detailed LEDs on the back of the unit operate with the Rotary Selection Switch. The multicolored LEDs are red, green, and orange.

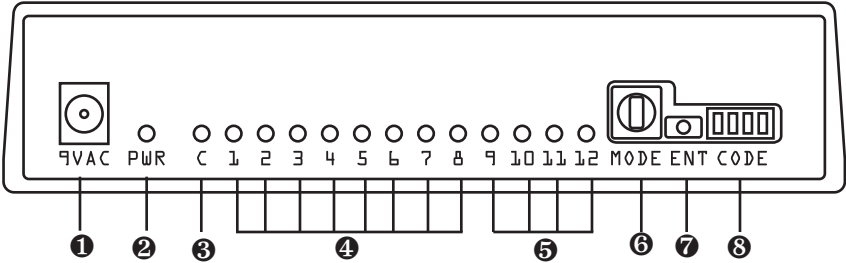


Figure 2-2. The 40418 switch's rear-panel components.

Table 2-2. Rear-panel components and their functions.

Component	Function
① Power connector	Attaches to a 9-VAC power source.
② PWR LED	Lights when the switch is powered on.
③ LED C	Green = Run Mode, idle. Red = Call in process (in or out). Will also show the port number LED 1–8 when the connection is made. Red Flash = The last call was unauthorized. Off = In Program Mode (non-run Mode).

Table 2-2 (continued). Rear-panel components and their functions.

Component	Function
④ LEDs 1–8	<p>These LEDs serve a dual function. When in the Run Mode, the LED corresponding to the connected port number flashes when the Modem Router Switch rings that port. When in the Program Mode, the interpretation depends on the function you select via the rotary switch. See Section 3.3., Programming for details.</p>
⑤ LEDs 9–12	<p>These display the operating modes.</p>
LED 9	<p>Routing Method (SW 2) Red = Touch-tone (Default)</p> <p>Green = Security Key Selection</p> <p>Orange = Security Key access and Touch-tone selection. In this mode, the Security Key is used connect, but the Touch-tone method is used to select the port or the AC power.</p>
LED 10	<p>Outbound Call Enable/Disable (SW 7)</p> <p>On = Enables Telco port #2 for outbound calls. (Default)</p> <p>Off = Disables Telco port #2 for outbound calls.</p> <p>Flash = Outbound Call in progress.</p>

Table 2-2 (continued). Rear-panel components and their functions.

Component	Function
LED 11	<p>Port 1 Unsecure Call Routing (SW 5)</p> <p>*On = Unauthorized calls are routed to Port 1.</p> <p>Off = Unauthorized calls are disconnected. (Default)</p> <p>Flash = Unsecure call is currently routed to Port #1.</p> <p>*Use this for an unsecured fax connection or to monitor the number of unsecured modem call attempts.</p>
LED 12	<p>Outbound Calls Enable/Disable (SW 3)</p> <p>On = Outbound calls enabled. (Default)</p> <p>Off = Outbound calls disabled.</p> <p>Flash = Outbound call in progress.</p> <p>LEDs 1–8 light when the corresponding port number is selected as an outbound port.</p>

Table 2-2 (continued). Rear-panel components and their functions.

Component	Function
⑥ Rotary Program Mode Switch	A rotary Program Mode Switch is located in the round opening. It is labeled 0–7 and programs the Router Switch as well as the Security Selection Keys, if used. The switch positions' functions are explained below. The corresponding LED is also referenced.
0	0=Run Mode (LED C) NOTE: This is the only mode in which calls will be processed.
1	1=Key Program Mode. Allows the Security Selection Keys to be programmed (LEDs 1–8).
2	2= Selects Routing Method. Touch-tone, Security Key, or Key & Touch toggle (LED 9).
3	3=Enable/Disable (toggle) Outbound Calls (LED 12).
4	4=Shows the last command state of the AC power strips connected to any of the ports.
5	5=Enable/Disable (toggle) Route Unauthorized Calls to Port 1 (LED 11).
6	6=Enable Touch-tone Password programming. (LED 9).
7	7=Enable or Disable (toggle) outbound calls on Telco Port 2 (LED 10).

Table 2-2 (continued). Rear-panel components and their functions.

Component	Function
⑦ ENTER switch	Use this switch to enter the commands in the same way that you'd use the Enter key or a mouse click.
⑧ 4-position DIP switch	Use this switch to append your personal security code to the unique system code that's factory programmed into your system. This is transferred to the Security Key, if used (it doesn't apply to touch tones).

3. Operation

3.1 Answering Inbound Calls

The Modem Router Switch answers calls via the following two steps:

- 1) When a ring signal is received, the switch answers the call, verifies security, and determines which port is requested.
- 2) Next, the switch rings the selected port and sends a false ring back to the caller. When the selected device answers, the call connects.

NOTE

The call will always be answered by the switch, even if the equipment on the ports will not answer.

If the ports don't answer, the call may disconnect after three rings. You may also request a port that is busy on another line. This lets you know that the modem you requested is not available. In this case, you will hear four busy signals and the Modem Router Switch will disconnect.

3.2 Optional AC Power Control Unit

The device on the "selected port" does not need to be constantly powered on. Install an optional AC power strip (part number 40420) at the terminal/modem. The caller then controls the AC power strip that's connected to the selected port through ON/OFF/RESET touch-tone commands.

NOTE

Only the AC outlets on the power strip labeled "Control Ports" are controlled by the Modem Router Switch. Use the other ports as standard power-strip ports.

3.3 Programming

3.3.1 PROGRAMMING THE MODEM ROUTER SWITCH

Now that you have an understanding of the components and their functions, you can program the unit. For example, to program the unit to recognize Touch-tone input, simply turn the Program Mode Switch to position #2 and press the Enter key until the Routing LED (#9) turns red. Then, turn the Program Mode Switch to position #0. The Mode LED turns green to indicate the Run Mode.

3.3.2 PROGRAMMING THE SECURITY SELECTION KEY

You can program the Security Selection Key to select various ports. The switch also transfers to the key the unique Modem Router Switch Factory Security Code and the User Code you select via the four-position DIP switches, along with the authorized port numbers. If you change the User Code, all previously programmed keys will not work; you must then re-program all the keys. Use this feature if a Key is lost and you wish to disable it.

Your key(s) cannot be used to access other systems because of the unique Factory System Code that cannot be changed. If you are using the Key + Touch-tone routing method, you still must program the keys to permit access to the switch, but the Modem Router Switch ignores the rotary switch setting on the Key when it answers a call.

NOTE

Position 0 on the Key's Port Selector Switch connects to the router's Port 8. Positions 1–7 connect to Ports 1–7.

Your programming selection depends on the color of the “C” LED when the Enter Switch is released. Be patient; some programming steps may require up to three seconds for the LED to cycle to the desired color. To program the Key, follow these steps:

1. Connect the Key to the ports labeled PROG 1 and PROG 2. Be sure both cables are connected.
2. Select position #1 on the Program Mode Switch and press the Enter Switch. LEDs 1–8 indicate the current allowable port selections for the Key. If the LEDs flash, the Key is being rejected. This is probably caused by a System or User Code mismatch or a bad connection; be sure that your DIP switches have not changed. The Key can still be reprogrammed.
3. To Reset the ports enabled in the Key, press and hold the Enter switch until the C LED is red, then release the Key. This is only necessary when programming selective ports.
4. If you want the Key to be able to access any of the eight ports, simply press the Enter switch and release when the C LED turns orange. All eight LEDs should light. The Key can now access any of the ports.
5. To program the Key to only have access to Selected Ports, first reset the Key with Step 3 above. Then turn the Port Selector Switch on the Key to the desired port number that will be allowed for the Key. Press Enter and hold until the C LED turns green. Select another Port number and repeat this

process for each port that you want to enable for that Key. The appropriate LED (1–8) on the Modem Router Switch will light with each selection.

6. After you have completed programming all the Keys, disconnect them and select the Run Mode on the Modem Router Switch (#0, Green LED).

If you want to make sure that the proper code is loaded, you can read the Keys by performing only Steps 1 and 2.

3.3.3 PROGRAMMING THE TOUCH-TONE PASSWORD

NOTE

A touch-tone telephone set is required.

You only need the password for Touch-tone routing. It requires four characters. The factory-default password is 0000. To change the password to 1234, for example, follow these steps:

1. Connect a touch-tone telephone to the PROG 1 jack and go off-hook.
2. Set the function switch to Position 8 (enable TT) and press Enter.
3. Enter #1234 (don't forget the # sign at the beginning). You will hear two beeps.
4. Enter #1234 again. You will hear four beeps, if successful. (You will hear one long beep if unsuccessful.)
5. The password is now changed to 1234. Reset the Program Mode Switch to Position 0, the Run position.

NOTE

To reset the password to its factory default, place the program switch on #4 and hold the Enter button in while powering on the Modem Router Switch.

3.4 Accessing the Router Switch

3.4.1 TOUCH-TONE MODE

To dial into the modem router, dial the telephone number and wait a few seconds for the router to answer. Once it answers, send a #, the Password, and the desired port number (1–8). We recommend sending the optional AC power command even if you're not using a power strip. The router will ring the port. When the equipment connected to the port answers, the call connects.

The typical modem dial command would be ATDTxxx-yyy-nnnn, #PASS7#ac.

This would connect you to port 7. The “,” is a two-second pause command. You may have to experiment to determine how many you require, especially if going through a PBX. Start with two. The “PASS” is your password. The “ac” is an optional AC “power on” command for the AC power control unit, if used.

3.4.2 SECURITY KEY SELECTION MODE

Use the Key to connect securely and automatically to the selected port. The switch on the Key determines which port is accessed.

Connect the Key between the calling equipment and the CO line. Before dialing, turn the switch on the Key to the desired port. Dial the telephone number, and the equipment connected to the port will answer your call. “A #0” is also transmitted to the optional AC power strip, if available.

The typical modem dial command is ATDTxxx-yyy-nnnn, #ac.

The “i” is a two-second pause command. You may have to experiment to determine how many you need, especially if you are going through a PBX. The “ac” is an optional AC “power on” command for the AC power control unit, if used. It is not necessary if you’re using the power unit in the Auto Mode. It will automatically power up when the port is successfully selected.

3.4.3 SECURITY KEY + TOUCH-TONE SELECTION MODE

In this mode, the key provides the security, but the routing and optional power-strip function is determined by the Touch-tone dial command; that is, it’s software controlled. Connect the Key between the calling equipment and the CO line. To dial into the modem router, dial the telephone number, wait a few seconds for the router to answer, then send a # (pound sign) followed by the port you wish to connect to (1–8). An AC power command then follows (optional). This mode is primarily used to control the AC power unit.

The router rings the port. When the equipment connected to the port answers, the call connects.

The typical modem dial command would be ATDTxxx-yyy-nnnn, #2#ac.

This would connect you to Port 2. The “,” (comma) is a two-second pause command that you will have to experiment with to determine how many you need, especially if going through a PBX. The “ac” is an optional AC command.

Note that the call-processing time can be decreased by about three seconds if the optional AC power command is used. In other words, add the #0 to all commands. It acts as a terminating statement even without the power unit.

3.4.4 OPTIONAL AC POWER CONTROL SWITCH

The Modem Router Switch controls the AC power switch. The two units communicate via the two outside conductors of the telephone cable. You should have at least four conductors pinned in the cable.

If you don't use an AC power command in the dial string, the Modem Router Switch sends a Power On message as it connects to the port if the power strip is connected. After the local modem hangs up, it transmits a Power Off message to the unit. (See #0, below.) This is the default.

In a modem/PC application, you might need to set your calling modem DCD wait time (ATS7 = 255) for a long duration to give the PC and modem an opportunity to boot up. The answer modem may require the AT&D2 setting in its power-up configuration so it doesn't try and answer the line before the PC and the application software have booted up.

You can use other Touch-tone commands that to override the automatic power on/off mode. You must enter them through Touch-tone commands.

#0 = Power on and stay on while call is active, power off at hang-up (default).

#1 = Power on and stay on at hang-up.

#2 = Power off unit and the Modem Router Switch will hang up.

#3 = Power off and back on in 5 seconds (Reboot command). It will ring twelve times before hanging up.

Outbound calls do not affect the status of the power control unit.

WARNING

When the optional power strip is NOT being used (modem connected directly to the Modem Router Switch), be sure that your modem does not use Pins 2 and 5 on the Telco connector. Some modems may use this to be compatible with older features, and the power control signaling from the Modem Router Switch may interfere with this. Check your modem manual or only connect Pins 3 and 4 in your cable.

If the Modem Router Switch loses power, the most recent AC power command is kept in E2prom, and the most recent command is transmitted to the power strip every 30 seconds.

Appendix. Troubleshooting

A.1 Calling Black Box

If you determine that your Modem Router Switch is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

A.2 Shipping and Packaging

If you need to transport or ship your Modem Router Switch:

- Package it carefully. We recommend that you use the original container.
- If you are returning the Modem Router Switch, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.