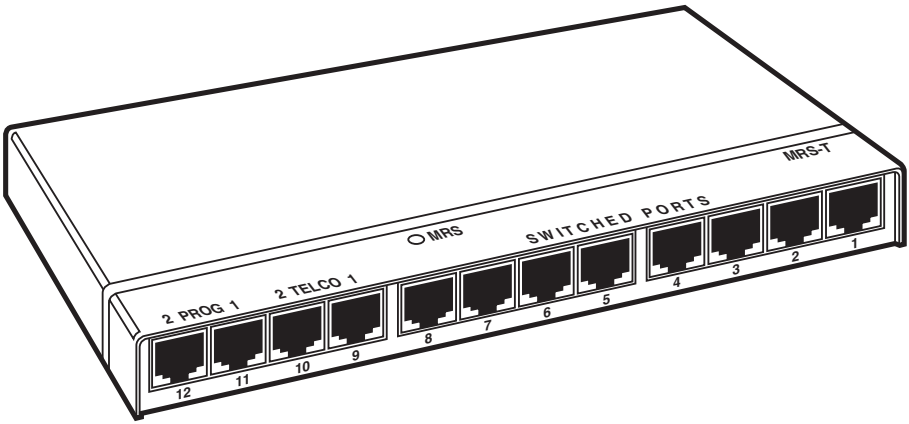
BLACK BOX®
NETWORK SERVICES

JUNE 2001
40416
40417
40418

Modem Router Switch



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Web site: **www.blackbox.com** • E-mail: **info@blackbox.com**

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 J 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 connectado 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 fisica 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 lineas de energia.

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 objectos liquidos 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: Objectos 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

Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

Contents

1. Specifications

Connectors: 40416: (4) RJ-11 female switched ports, (1) RJ-11 female Telco line port, (2) RJ-11 female Programming ports; 40417: (8) RJ-11 female switched ports, (1) RJ-11 female Telco line port, (2) RJ-11 female Programming ports; 40418: (8) RJ-11 female switched ports, (2) RJ-11 female Telco line ports; (2) RJ-11 female Programming ports

Indicators: LEDs: 40416: (4) Link, (1) Power, (1) Mode; 40417–40418: (8) Link, (1) Power, (1) Mode

Power: 115 VAC, 60 Hz

Size: 0.8"H x 7.5"W x 4.3"D (2 x 19.1 x 10.9 cm)

Weight: 1 lb. (0.5 kg)

2. Introduction

The Modem Router Switch allows inbound modem calls to be switched to any of four or eight receiving modems (PCs, servers, etc.) selected by the caller. Although it was designed primarily for modem applications, it can also be used for voice, fax, or other analog switching applications, or it may simply be used to reboot your PC when the optional power adapter is used.

Models available include the standard Modem Router Switch with one Telco line connection and four (part number 40416) or eight (part number 40417) modem ports. The 40418 model provides two Telco line connections and eight modem ports.

For outbound calls, the Modem Router Switch also acts as a telephone line sharing switch. When used for this purpose, 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 will receive no dial tone.

When used to route inbound calls, the desired port is selected by the caller when the call is placed. This is accomplished through one of the two primary operating modes provided by the Modem Router Switch: the Touch-tone and the Secure modes. The desired operating mode is selected through a rotary switch.

The Touch-tone mode provides a simple DTMF tone method of port selection. The caller simply enters a password and the number of the port to which they wish to connect. You can do this manually from any touch-tone keypad or by appending the proper character sequence to the "AT Commands" for dial modem applications.

The Secure mode involves a matchbox-size Security Selection Key with an eight-position rotary selector switch that is connected to the caller's modem. The security device performs an encrypted handshake with the Modem Router Switch and automatically switches the call to the selected port. Any call received without the proper corresponding Security Key is aborted within a half second. This eliminates wrong numbers and nuisance calls. The call is also not recognized as a modem by any of the "hacker" type War Dialers.

The Security Key is programmed through the RJ-11 "Program Ports." Note that each Security Key may be programmed differently, allowing only selected ports to be accessed by various units. Each Modem Router Switch has a unique factory system ID code and a user-selected ID that are transferred to the switching Key during programming. This prevents the Key from being used on other systems. The Keys are shipped fully programmed, with all ports enabled.

In either mode, unauthorized calls can be aborted or routed to the “Default Port” (Port #1). This allows the Modem Router Switch to be shared with other normal voice or data activity.

3. Theory of Operation

Inbound calls are answered in a two-step process.

1) When a ring signal is received, the router will answer the call, verify security, and determine which port is requested.

2) It will then ring the selected port and send a false ring back to the caller. When the selected device answers, the call will be connected through. Note that the call will always be answered by the router, even if the equipment on the ports will not answer. In this case, the call may be disconnected after six rings (three rings for the Modem Router Switch model 40418). On model 40418, you may also request a port that is busy on another line. In this case, you will hear four busy signals and the Modem Router Switch will disconnect.

3.1 Optional AC Power Control Unit

If the device on the "selected port" is not required to be under constant power, an optional Intelligent AC power strip can be installed at the terminal/modem. The caller can then also control the state of the AC power strip connected to the selected port through ON/OFF/RESET touch-tone commands. Note that only the AC outlets on the power strip labeled "Control Ports" are controlled by the Modem Router Switch. The others may be used as standard power-strip ports.

3.2 Identifying the Parts

The following identifies the components on the Modem Router Switch and provides a brief explanation of its function:

- RJ-11 Phone Ports. There are twelve RJ-11 ports on the front panel of the 40418. There are eleven RJ-11 ports on the 40417 and seven on the 40416.

  The ports labeled TELCO provide the connection for the Telephone Central Office line. The two ports labeled PROG 1 and PROG 2 are used to program the Security Selection Key. The port labeled PROG 1 is used to enter the password when the system is used, in the Touch-tone MODE, without the Security Selection Key. A standard telephone hand set is required. The remaining four or eight ports, labeled SWITCHED PORTS (1–4 or 1–8), are the ports to which the incoming calls can be switched.

All other components (listed on the following pages) are located on the unit's rear panel.

- An ENTER switch. This switch is used to enter the commands in the same way that you'd use the Enter key or a mouse click.
- A four-position DIP switch. It is used 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 (isn't applicable for touch-tones).
- An external connection for an optional Alarm "buzzer." This will sound for two seconds when an unauthorized call is attempted; in addition, the "C" LED will flash red until another call is received.
- A rotary Program Mode Switch is located in the round opening. It is labeled 0–7 and is used to program the Router Switch as well as the Security Selection Keys, if used. The functions of the switch positions are explained below. The corresponding LED is also referenced.

  0=Run Mode (LED #C) NOTE: This is the only mode in which calls will be processed.

  1=Key Program Mode. Allows the Security Selection Keys to be programmed (LEDs #1–8).

  2= Selects Routing Method. Touch-tone, Security Key, or Key & Touch toggle (LED #9).

  3=Enable/Disable (toggle) Outbound Calls (LED #12).

  4=Shows the last command state of the the AC power strips connected to any of the ports.

  5=Enable/Disable (toggle) Route Unauthorized Calls to Port 1 (LED #11).

  6=Enable Touch-tone Password programming. (LED #9).

  7=40416 and 40417 only: Halt further call activity. Call in progress will be frozen. 40418 only: Enable or Disable (toggle) outbound calls on Telco Port #2 (LED #10).

LEDs. There are LEDs on the back of the unit that operate in conjunction with the Rotary Selection Switch. They are multi-colored red, green, and orange. These LEDs are quite detailed and will probably tell you more about the operation of the Modem Router Switch than you need or want to know.

LED C. Multicolored.

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).

LEDs 1–8. These LEDs serve a dual function. When in the Run Mode, they display the connected port number and will flash when the Modem Router Switch is ringing that Port. When in the Program Mode, the interpretation is dependent upon the function selected in the rotary switch. See **Chapter 4** for details.

LEDs 9–12. These display the operating modes.

9 Routing Method (SW 2)

Red = Touch-tone (Default)

Green = Security Key Selection

Orange = Security Key access and Touch-tone selection. In this mode, the Security Key is used to make the connection, but the Touch-tone method is used to make the port selection or the AC power selection.

10 Outbound Call Enable/Disable (SW 7)

On = Enables Telco port #2 for outbound calls. (Default)

Off = Disables Telco port #2 for outbound calls.

Flash = Outbound Call in progress.

11 Port 1 Unsecure Call Routing (SW 5)

*On = Unauthorized calls are routed to Port 1.

Off = Unauthorized calls are disconnected. (Default)

Flash = Unsecure call is currently routed to Port #1.

*This may be handy for an unsecured fax connection or to monitor the number of unsecured modem call attempts.

12 Outbound Calls Enable/Disable (SW 3)

On = Outbound calls enabled. (Default)

Off = Outbound calls disabled.

Flash = Outbound call in progress.

LEDs 1–8 will display the number of the outbound port.

4. Programming

4.1 Programming the Modem Router Switch

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

4.2 Programming the Security Selection Key

This operation programs the Security Selection Key to select various ports. It also transfers the unique Modem Router Switch Factory Security Code and the User Code selected in the four-position DIP switches, along with the authorized port numbers to the Key. If you change the User Code, all previously programmed keys will not work; all the keys would have to be re-programmed. This is a useful 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, the keys must still be programmed to permit access to the switch, but the rotary switch setting on the Key is ignored when a call is answered. Note that position 0 on the Key's Port Selector Switch will connect to the router's port 8. 1–7 connect to ports 1–7.

Your programming selection is dependent upon 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 due to a System or User Code mismatch or a bad connection; be sure that your DIP switches have not changed. It 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 Selective 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 of the Keys, disconnect them and select the Run Mode on the Modem Router Switch (#0, Green LED).

If you want to read the Keys, perform only Steps 1 and 2.

4.3 Programming the Touch-tone Password

NOTE

A touch-tone telephone set is required.

The password is only required when using the Touch-tone routing method. 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 to factory defaults, place the program switch on #4 and hold the Enter button in while applying power to the Modem Router Switch.

5. Accessing the Router Switch

5.1 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). Sending the optional AC power command is recommended even though no power strip may be used. The router will ring the port. When the equipment connected to the port answers, you will be connected through.

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.

5.2 Security Key Selection Mode

The use of the Key provides the highest level of security and the most automatic connection to the selected port. The switch on the Key determines which port will be 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 would be 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.

5.3 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 will ring the port. When the equipment connected to the port answers, you will be connected through.

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.

5.4 Optional AC Power Control Switch

The AC power package is controlled by the Modem Router Switch. The communication between the two units is made over the two outside conductors of the telephone cable. It is therefore important to have at least four conductors pinned in the cable.

In the absence of an AC power command in the dial string, the Modem Router Switch will send a Power On message as it makes the port connection if the power strip is connected. After the local modem hangs up, it will transmit 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.

There are other Touch-tone commands that can be used to override the automatic power on/off mode. They must be entered 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.

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