BLACK BOX®
NETWORK SERVICES

Fallback Switch
(RS-232, V.35, or RS-530)
Loopback Switch (RS-232)
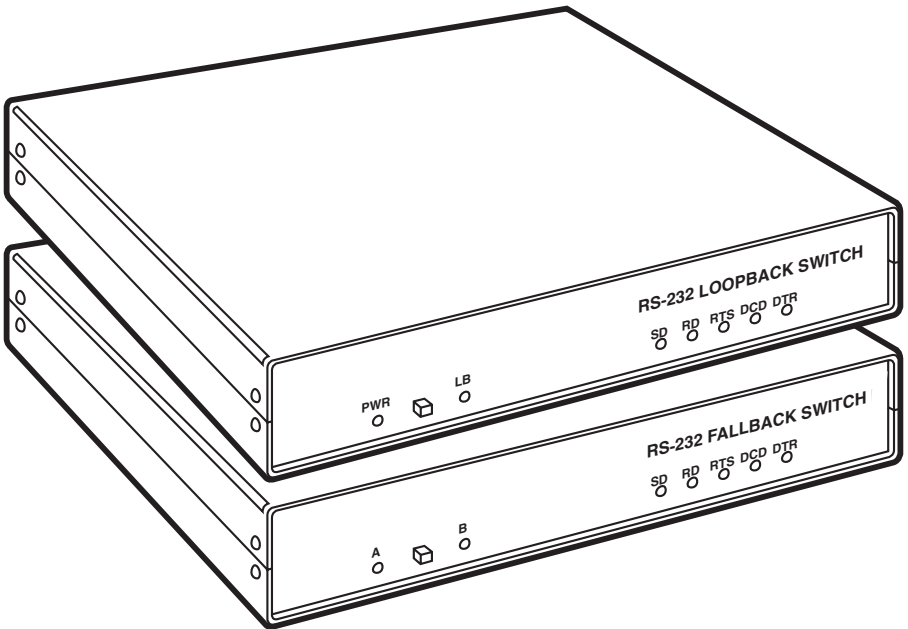
FEDERAL COMMUNICATIONS COMMISSION
AND
CANADIAN DEPARTMENT OF COMMUNICATIONS
RADIO FREQUENCY INTERFERENCE STATEMENTS

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 the Canadian Department of Communications.

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 le ministère des Communications du Canada.

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The Fallback Switch and the Loopback Switch are CE certified.

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 parato 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

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

CONTENTS

1. Specifications

Interface—SW111A(E), SW112A(E): RS-232; SW115A(E): V.35; SW116A(E): RS-530

Connectors—All: (1) 8-pin RJ-45; RS-232 and RS-530: (3) DB25 female; V.35: (3) M/34 female

Leads Supported—1 through 25

Maximum Data Rate—Depends upon cabling

Switches—(1) 2-position mode selector

Indicators—All models: (1) SD, (1) RD, (1) CD, (1) DTR, (1) RTS; SW111A(E), SW112A(E), SW116A(E): (1) pushbutton for A/B; SW115A(E): (1) pushbutton for Loop/Normal

CE Approval—Yes

Energy Rate—6 VA

Receptacle—3-prong grounding

Power—A models: 100-120 V, 60 Hz; AE models: 200-240 V, 50 Hz

Size—1.6"H x 8.4"W x 10.8"D (4.1 x 21.3 x 27.4 cm)

Weight—4.8 lb. (2.2 kg)

2. Description

2.1 Introduction

The Fallback Switch is a standalone remotely controllable A/B switch for EIA RS-232/V.24, V.35, or RS-530/422 circuits. You can switch via console command, manual pushbutton, or automatically upon alarm. The Loopback Switch (SW112A or SW112AE) is identical to the RS-232 Fallback Switch (SW111A or SW111AE) except that the "B" switch connector has been replaced by an internal loopback plug.

Both Switches include control-interface firmware that functions as the logical bridge between a management console (any ASCII terminal) and the Fallback or Loopback Switch module. The console connects to the Switch via 4-wire modular cabling.

2.2 Switch Capability Summary

From the console, you can:

1. Determine A/B switch status of any interface.

2. Define alarms per interface.

3. Switch the circuit (Fallback Switch) or invoke loopback (Loopback Switch).

4. Configure autoswitch on alarm.

5. Disable front-panel control.

6. Establish or change the password (optional).

7. Access the HELP screen for all functions.

8. Access or set time and date.

You can also control address selection and A/B switching pushbutton control manually at each Switch.

2.3 Connectors

Located on the rear of the Fallback Switch are three user data connectors ("common," "A," and "B") and one 8-pin modular jack for console control. The user data connectors are DB25 female for RS-232 or RS-530, or M/34 female for V.35.

The RS-232 Loopback Switch is identical to the RS-232 Fallback Switch, except that it has an internal loopback plug instead of a "B" switch connector.

2.4 Switches and Indicators

A pushbutton is used to manually set the Fallback Switch to the desired position (A or B). To prevent accidental switching, you must push the button and hold it for several seconds for switching to take effect. An LED indicates the current Fallback Switch position (regardless of whether you switch with the button or from the console).

A pushbutton manually sets the Loopback Switch to the desired position (loop or normal). To prevent accidental switching, you must push the button and hold it for several seconds for switching to take effect. An LED lights when the Loopback Switch has been set to loop back. The Loopback Switch will automatically switch to normal upon power-up.

In both cases, five LEDs indicate lead status activity. For RS-232 switching, the monitored leads are SD, RD, DCD, DTR, and RTS.

2.5 Alarming

The Fallback Switch supports console-controlled data circuit alarming on both the "A" connector and the "B" connector (independent of switch position), while the Loopback Switch supports alarming only on the "A" side. Each data line can be programmed, through the console, to alarm on the following interface leads:

- SD, Send Data, present/absent

- RD, Receive Data, present/absent

- SCT, Serial Clock Transmit, present/absent

- SCR, Serial Clock Receive, present/absent

- RTS, Request to Send, high/low

- CTS, Clear to Send, high/low

• DCD, Data Carrier Detect, high/low

• DTR, Data Terminal Ready, high/low

The alarming can be used to alert the operator and, optionally, to automatically switch to a backup link (Fallback Switch) or to a loopback or normal condition (Loopback Switch). For example, loss of Carrier Detect on a Fallback Switch "A" connector can trigger automatic switching to the "B" side, and return of Carrier Detect on "A" can trigger automatic switching back to "A."

In order for an alarm to be reported to the console, the condition causing the alarm must be present for a user-definable period of time, the "Time to Alarm." After an alarm has been reported to the console, the clearing of that alarm is also reported. The "clear" report is issued after the original alarm condition has been clear for a user-definable period of time, the "Time to Clear."

2.6 "Smart" Switching

The control firmware accepts switching commands from the console and relays these commands to the Switch within the switch housing.

When switching has automatically occurred as a result of an alarm, the "Time to Clear" becomes functionally a "Time to Ignore" (although the console nomenclature does not change). This "Ignore" function takes effect immediately upon initial alarm detection and switching. The alarm for the time in question is artificially cleared (regardless of its actual status) and, for the "Time to Clear" duration, all activity on that line is ignored. If any alarm conditions are present when the timer times out, they are treated as if they had just occurred (and the "Time to Alarm" begins its function).

2.7 Manual Switching

A front-panel push button lets you manually toggle the Fallback Switch between the "A" position and the "B" position. To prevent accidental switching, you must press the button for several seconds to enable the switching.

A front-panel push button lets you manually toggle the Loopback Switch between the "normal" position and the "loopback" position. To prevent inadvertent operation, you must press the button for several seconds to enable the switching.

2.8 In-Band Switching

The Loopback Switch accepts in-band loop/normal switching commands. Using an over-sampling technique, the async 1200-bps commands are carried over any customer link. The in-band loop command also includes a timer value for an automatic "return to normal."

3. Installation

3.1 Inspection

Check the unit for possible shipping damage. Notify Black Box immediately if the unit is damaged, and save the packing material and shipping container for equipment return.

Located on the rear of each unit is a power connector and an 8-pin modular jack. The Fallback Switch has three data connectors ("A," "B," and "Common") while the Loopback Switch has only two data connectors ("A" and "Common"). RS-232/V.24 and RS-530 signaling use DB25 connectors, and V.35 signaling uses 34-pin M-series connectors.

3.2 Power Requirements

These Switches are intended for use when powered by an internal power supply. Other use may invalidate any approvals given to the system. Standard AC voltage is 100-120 V for A models, and 200-240 V for AE models.

CAUTION

For continued protection against risk of fire, replace the fuse with one of the exact same type and rating. The 100-120 V fuse is 0.100 A, 250 VAC, slow-blow, and the 200-240 V fuse is 0.200 A, 250 VAC, slow-blow.

NOTE

Since the colors of the cores in the mains lead of this equipment may not correspond with the colored markings identifying the terminals in your plug, proceed as follows if you need to replace the plug:

• The core that is colored green and yellow must be connected to the terminal in the plug that is marked with the letter "E" or by the earth symbol, or colored green and yellow.

• The core that is colored blue must be connected to the terminal that is marked with the letter "N" or colored black.

• The core that is colored brown must be connected to the terminal that is marked with the letter "L" or colored red.

3.3 Disconnect Device

To disconnect the switch, pull out the plug on the power supply.

WARNING: IMPORTANT INFORMATION FOR USERS IN THE UNITED KINGDOM

The socket outlet should be installed near the equipment and should be easily accessible.

Before connecting ports marked with an "X" as shown in Figure 3-1, seek advice from a competent engineer. Such connections might produce hazardous conditions on the network.

Identified rear-mounted connectors on the Switches do not provide isolation sufficient to satisfy the requirements of BS 6301. The Fallback Switch rear is shown in Figure 3-1. The "B" connector does not exist on the Loopback Switch.

All apparatus attached to such ports should either have been approved to BS 6301 or have previously been evaluated against British Telecommunications PLC (Post Office) technical guide 2 or 26 and given permission to attach. Other use will invalidate any approval given to the apparatus.
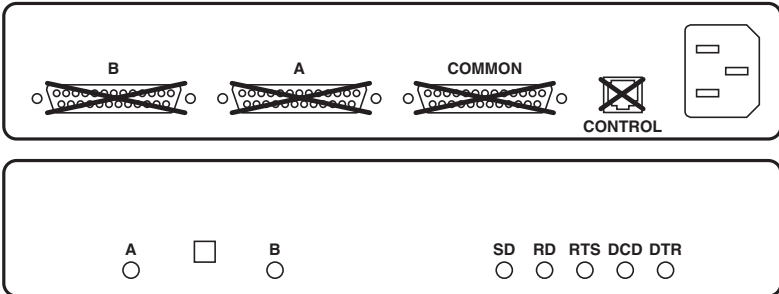

Figure 3-1. Connectors on the rear of the Fallback Switch that do not provide isolation.

3.4 Connecting the ASCII Terminal

Fallback or Loopback Switch units can be connected to the management terminal via direct cabling or via modem link. A single management console can manage multiple Switches. The Switch addressing allows support of up to eight units. However, because of signal loading, the practical limit may be as few as three or four units, depending on the terminal (or modem) driver circuitry.

The rear "Control" port is an 8-wire modular jack that supports 4-wire cabling.

Each Switch requires a modular 25-pin adapter and a six-foot-long 4-wire straight-through modular cable. These items are used for direct cabling from a

DB25 terminal/PC connector to a single Switch. See **Figure 3-2**. If a PC is being used with a 9-pin connector, a special adapter must be constructed. Call Technical Support at 724-746-5500 for more information on cables and adapters.
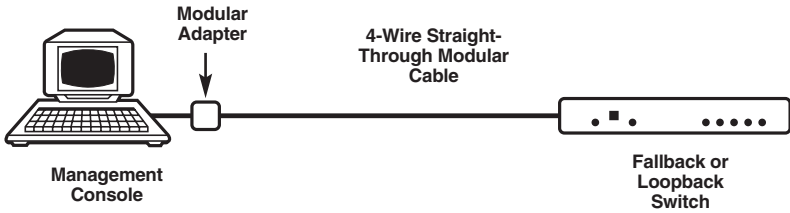
Figure 3-2. Direct cabling from a DB25 terminal/PC to a single Switch.

If a terminal/PC is cabled directly to a group of Switch units, you must use a DB25 ribbon cable. The terminal/PC attaches to one connector on the ribbon cable, and the Switch units connect to the rest of the connectors via adapters. See **Figure 3-3**. For more information, call for technical support.
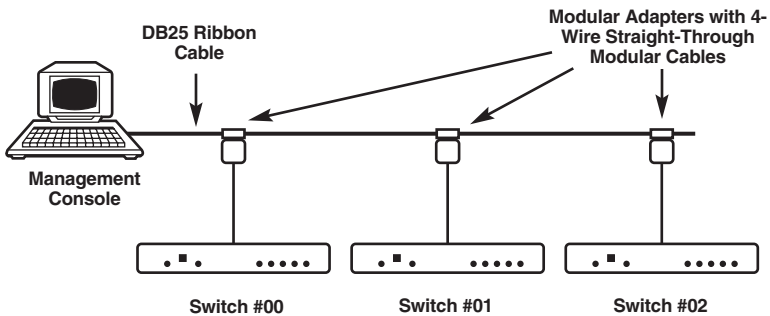
Figure 3-3. Connections between the adapters and Switch units.

3.5 Connecting User Cables

Obtain the correct cable for the supported interface. The Switch connectors are female, and the cable connectors should therefore be male. Alarming and monitoring functions are based on the following pin assignments:

Signal Name	RS-232/V.24 DB25 Pin	RS-530 DB25 Pin	V.35 M/34 pin
SD	2	2 and 14	P and S
RD	3	3 and 16	R and T
RTS	4	4 and 19	C
CTS	5	5 and 13	D
SG	7	7	B
DCD	8	8 and 10	F
SCT	15	15 and 12	Y and AA
SCR	17	17 and 9	V and X
DTR	20	20 and 23	H

4. Configuration

All Fallback and Loopback Switch parameters are set via DIP-switch SW1 on the main circuit board.

You can only change the DIP-switch settings when power is removed from the Fallback Switch or Loopback Switch.

4.1 Switches 1, 2, and 3

Switches 1, 2, and 3 determine the Switch address. A unique address must be assigned to each unit at a location. If only one unit exists at a location, it must be address 0. If multiple units exist, one unit must be address 0.

Position 1	Position 2	Position 3	Unit Address
OFF	OFF	OFF	0
OFF	OFF	ON	1
OFF	ON	OFF	2
OFF	ON	ON	3
ON	OFF	OFF	4
ON	OFF	ON	5
ON	ON	OFF	6
ON	ON	ON	7

4.2 Switch 4

Switch 4 determines if multiple units will be supported.

Switch 4

OFF	This is the only unit at this location. Password entry is enabled. Switch echo will function per the "O" setting.
ON	Other units exist at this location. Password entry is disabled. Addressing is enabled. S(address)<space> must precede every command. Switch will not echo commands. Terminal must use local echo.

Example: BA<CR> switches unit 0 to the "A" position. S1<SP>BA<CR> switches unit 1 to the "A" position.

4.3 Switches 5 and 6

Switches 5 and 6 determine the "Control" port command-signaling rate.

Switch 5	Switch 6	Command Rate
OFF	OFF	1200 bps
OFF	ON	2400 bps
ON	OFF	9600 bps (factory default)
ON	ON	19,200 bps

4.4 Switches 7 and 8

Switches 7 and 8 are set at the factory to match the installed interface type and must NOT be changed.

Switch 7	Switch 8	Interface Type
OFF	OFF	RS-232/V.24
OFF	ON	V.35
ON	ON	RS-530

5. Console Operation

Read this section of the user manual while sitting at the management terminal. Follow the manual by examining the "Help" screen for each command and then entering some test commands.

5.1 Terminal Setup

Configure the ASCII management terminal as follows:

1. No Auto Line Feed after receiving a Carriage Return.

2. A bps rate of 1200, 2400, 9600, or 19,200 (to match the CONTROL bps rate of the Switch).

3. Seven data bits plus a "don't care" parity bit and one stop bit.

NOTE

Some terminal manufacturers might identify this configuration as 7-N-1 (seven data bits plus a "not used" parity bit), while other manufacturers might identify the same configuration as 8-N-1 (eight bits, including a "not used" parity bit). Check the terminal's user manual.

4. Local echo on or off as required to be opposite the echo setting of the attached Switch units (see the "O" command on **page 24**).

NOTE

Local echo must be ON if the Switch's DIP-switch-position #4 is ON.

The Switch will respond to XON/XOFF (DC1/DC3) flow control. If possible, configure the terminal to generate those characters when appropriate.

NOTE

The Switch expects a true XON; transmission will not resume when it receives any other character.

The "BELL" character is sent to the ASCII terminal whenever important or invalid messages are displayed. This character commonly triggers an audible alarm on the terminal. To activate or deactivate the audible alarm, simply press **<Ctrl-G>** on the terminal keyboard while in the main menu.

5.2 Main Command Menu

The Main Menu will appear as soon as power is applied to the Switch. If the terminal was the last item to be powered up, hit **ESC** to display the Main Menu. You can also use the ESC key to return to the Main Menu from other menus.

COMMAND STRUCTURE

Every command consists of a command identifier (one, two, or three characters) followed by a <CR>. If DIP-switch-position #4 is ON, S(address)<space> must precede every command.

PASSWORD

The Switch incorporates password protection. If this protection is not required, retain the default password <CR>.

NOTE
If DIP-switch-position #4 is ON, the password function is disabled.

You must enter the correct password before you can access any of the commands. When the system is in the logged-off state, the words ENTER PASSWORD replace a default path indicator at the bottom of the screen.

When a system is powered up for the first time, the default password is <CR>. Simply enter **<CR>** to access the functional main menu.

THE HELP SCREENS

To enter the Help screen, type **H<CR>**. The system will display a message containing information about how to obtain help for any of the Main Menu commands. If you need help with a particular function, type **H** plus the first character of that function. For example, **HA<CR>** will display a help screen for the "A" commands.

Each available help screen contains information about the use and appropriate entry of all of the alternatives for the command.

FUNCTIONAL COMMANDS

Listed on the following pages are the functional commands associated with the Switch. Except for password commands, the commands are in the sequence listed in the Main Menu. The password commands are described first to ensure that the primary system password is not inadvertently changed to an unknown value.

All configuration-related commands (including switch settings) are stored in battery-backed RAM. The battery is continually being charged during normal operation and will maintain RAM for two months in the absence of power.

"E" COMMAND: PASSWORD/LOGOFF

A Switch uses two passwords: Primary and Operational. Functionally, the only difference is that an operator with knowledge of only the Primary password can change both passwords, but an operator with knowledge of only the Operational password can only change the Operational password.

If both passwords are set identically, a correct response to "ENTER LOGON" provides a logon under the Primary password. Both passwords are set as <CR> at the factory. Therefore, when the system was first powered up, the initial logon (via <CR>) provided system access under the Primary password.

Passwords can be any ASCII character string (including spaces) up to ten characters long. Capital letters and lower-case letters are NOT the same.

NOTE

If you're configuring the system for the first time, you cannot change the operational password from <CR> until after you change the primary password. Write the desired primary password down on paper and enter the change accordingly. Afterward, store the Primary password in a safe location and never use it again except as described below.

After you've changed and properly stored the Primary password, log off from the Switch system and log on using the default <CR> Operational password. Then, change the Operational password and use that for normal operation.

You can change the Operational password back to <CR> (without affecting the Primary) simply by indicating <CR> as the "new password." If, for any reason, the Operational password has been lost or forgotten, log on under the Primary password and issue the password change command. Then, indicate <CR> as the "new password." This will change BOTH passwords to <CR>. That's the only difference between the capabilities of the two passwords.

NOTE

If both passwords has been lost or forgotten, you must temporarily remove the RAM chip from the Switch. All configuration parameters will be lost; you must reprogram the entire system.

Use the "E" command to enter a new password or to log off from the system. To enter a new password, do the following:

1. Type **EN <CR>** to access the command.

2. Enter the current password, followed by **<CR>**; this is the one that was used to log onto the system. When the system is first powered, it will be the primary password.

NOTE
The password will not be echoed to the terminal.

3. Enter the new password followed by **<CR>**.

NOTE
The password will not be echoed to the terminal.

4. Enter the new password followed by **<CR>** again.

NOTE
The password will not be echoed to the terminal.

To log off from the Switch system, type **E <CR>**.

Type **EN<CR>** to enter new password.

Type **Em<CR>** (m=number from 0 to 99) to configure auto logoff (during inactivity). Setting "m" to zero disables auto logoff. Setting "m" greater than zero enables auto logoff after "m" minutes.

"A" COMMANDS: ALARM/SWITCH STATUS DISPLAY, ENABLE, DISABLE, SWITCH

Use the "A" groups of commands to display and configure Switch alarms. Each "A" command will produce the result described below and, if accessed from the main menu, will then display the alarm status screen. (Press <ESC> to return to the main menu.) You can access the "A" commands from both the main menu and the status screen.

There are two groups of "A" commands, one for the Loopback Switch and one for the Fallback Switch. Because the Fallback Switch can be independently alarmed

on either or both the "A" interface and the "B" interface, the Fallback commands include an interface identifier.

The Loopback Switch commands are described below.

- The command A<CR> displays the alarm status screen.

- The command AO<CR> turns on alarm processing (recognition and reporting) for a Loopback Switch unit. AEx<CR> enables the specific alarm number "x" within the unit.

- The command AF<CR> turns off alarm processing (recognition and reporting) for a Loopback Switch unit. ADx<CR> disables the specific alarm number "x" within the unit.

- The command AIO<CR> enables the local alarm indicators (bell and flashing LEDs).

- The command AIF<CR> disables the local alarm indicators (bell and flashing LEDs). Factory default.

- The command AN<CR> adds a new alarm with default parameters. Up to eight alarms can exist in a Loopback Switch unit.

- The command ARx<CR> removes the specific alarm number "X."

NOTE

Alarms are always numbered consecutively. If eight alarms exist and #5 is removed, the remaining alarms will be renumbered #1 through #7.

- The command ASx<CR> modifies the characteristics of alarm number "X." In order for this command to function, it must be entered in its entirety:

ASx<SP>(+/-)y<SP>Ahh:mm:ss<SP>Chh:mm:ss<SP>Sz<RTN>

"x" is the identifier of the alarm that will be modified.

"+" will alarm on signal presence and "-" will alarm on signal absence (do not type the parentheses).

"y" is the alarming signal and can be SD, RD, SCT, SCR, DTR, DCD, CTS, or RTS.

"Ahh:mm:ss" is the hours, minutes, and seconds of the "Time to Alarm" (the delay timer for Loopback Switch to recognize an alarm).

"Chh:mm:ss" is the hours, minutes, and seconds of the "Time to Clear" (the delay timer for Loopback Switch to clear an alarm).

"z" is the automatic switching action (if any) that will result from an alarm. The entry can be "NONE" or "ALT" or "TOA" or "TOB."

The command below will cause alarm #3 to trigger when DTR is low for ten seconds. Once the alarm has triggered, DTR must go high for five seconds before the Loopback Switch will recognize the alarm condition as having cleared. An alarm will not result in any automatic switching.

"A" COMMANDS FOR THE FALLBACK SWITCH: ALARM/SWITCH STATUS DISPLAY, ENABLE, DISABLE

The Fallback Switch commands are identical to the Loopback Switch commands except that an identifier is added for the "A" or the "B" interface. For example, AIO becomes AAIO or ABIO and AN becomes AAN or ABN (the Fallback Switch allows eight alarms on the "A" interface and eight alarms on the "B" interface).

AS3<SP>-DTR<SP>A00:00:10<SP>C00:00:05<SP>SNONE<RTN>

"B" COMMANDS: A/B SWITCH CONTROL

Use the "B" group of commands for switching and switch status display.

• The command B<CR> displays switching status.

• The command BA<CR> causes a Fallback Switch to switch to the "A" position and a Loopback Switch to switch to the "normal" (data pass through) position.

• The command BB<CR> causes a Fallback Switch to switch to the "B" position and a Loopback Switch to switch to the "loopback" position. A Loopback Switch will automatically return to "normal" when the default loopback timer expires.

• The command BX<CR> causes the Fallback or Loopback Switch to switch to the opposite position.

• The command BLyzz<CR> applies only to Loopback Switch units. It causes the Loopback Switch to switch to the "loopback" position with an automatic return to "normal" when the temporary primary timer expires. The timer is set with the yzz operand, where y is D, H, or M for days, hours, or minutes, and zz is 1-99 days, 1-24 hours, or 1-60 minutes.

• The command BMyzz<CR> applies only to Loopback Switch units. It sets the default loopback timer with the yzz operand, where y is D, H, or M for days, hours, or minutes and zz is 1-99 days, 1-24 hours, or 1-60 minutes.

LOOPBACK SWITCH CONSIDERATIONS

If you use a "B" command to place a Loopback Switch in loop mode, the standard loop configurations (illustrated below) assume that the Loopback Switch is connected to a customer DCE interface. The incoming Receive Data is connected directly to the outgoing Send Data with no delay or buffering of any nature. If the data is asychronous (unclocked), this technique will function under all circumstances. However, if data is synchronous, the DCE-supplied Transmit Clock speed and phase must be synchronized to the Receive Clock. Depending on the nature of the attached DCE, you can do this in one of several ways:

• If the attached DCE is a DSU or other device connected to a digital network, both the Transmit Clock and the Receive Clock are typically slaved to a master network clock and are therefore speed-synchronized and usually phase-synchronized to each other.

• If you can't confirm that the Transmit Clock and Receive Clock are both speed and phase synchronized, the attached DCE must be able to accept an External Transmit Clock and, when the loop is activated, must be configured in that mode. The Loopback Switch will loop the Receive Clock output to the External Transmit Clock input, thereby forcing the two clocks to be speed- and phase-synchronized to each other.

Table 5-1. Standard Loopback Switch loop for RS-232 DCE

From Signal	Pin(s)*	To Signal	Pin(s)*
RD	3	SD	2
DSR	6	DTR	20
DCD	8	RTS	4
SCR	15	SCT	24
*Referenced to RS-232 DB25 connector.			

Table 5-2. Standard Loopback Switch loop for RS-530 DCE

From Signal	Pin(s)*	To Signal	Pin(s)*
RD	3 and 16	SD	2 and 14
DSR	6 and 22	DTR	20 and 23
DCD	8 and 10	RTS	4 and 19
SCR	17 and 9	SCT	24 and 11
*Referenced to RS-530 DB25 connector.			

Table 5-3. Standard Loopback Switch loop for V.35 DCE

From Signal	Pin(s)*	To Signal	Pin(s)*
RD	R and T	SD	P and S
DSR	E	DTR	H
DCD	F	RTS	C
SCR	V and X	SCT	U and W
*Referenced to V.35 M/34 connector.			

"D" COMMANDS: DIAL AND HANG-UP STRINGS

You can configure the Switch to automatically dial a remotely located management terminal in case of an alarm or a status change resulting from local pushbutton operation. The unit will also "hang up" the modem when the transmission is completed.

- The command D<CR> will display the current dial and hang-up strings.

- The command DD (dialstring)<CR> will change (store) the dial string to [dialstring]. The "backslash convention" must be used to enter control characters. For example, "\M" is Carriage Return.

  DDATTD5551212\M<CR> will cause "ATTD5551212<CR>" to be stored as the dial string.

- The command DH(escape)<space>(hangup)<CR> will change (store) an escape sequence and a hang-up sequence. A common sequence to hang up a modem is:

  <one second of silence>+++<one second of silence>ATH<CR>

  This would be entered as DH+++<space>ATH\M<CR>

"F" COMMANDS: FRONT PANEL LOCK/UNLOCK

Use the "F" group of commands to lock, unlock, and display the current lock status of the Switch.

- The command F<CR> displays the current front panel lock/unlock status for the Switch.

- The command FL<CR> locks the front panel of a Switch. The switch button is disabled.

- The command FU<CR> unlocks the front panel of a Switch. The switch button is enabled.

"L" COMMANDS: LEAD STATUS DISPLAY

Use the "L" group of commands to turn on or off the lead status display on the management console. The console can continuously monitor the following leads of a single interface.

SD	Data or Idle
RD	Data or Idle
SCT	CLK or Idle
SCR	CLK or Idle
DCD	ON or OFF (+/- while changing)
DTR	ON or OFF (+/- while changing)
CTS	ON or OFF (+/- while changing)
RTS	ON or OFF (+/- while changing)

- The command LO<CR> followed by <ESC> starts the lead status display of the line in a Switch.

- The command LF<CR> disables the lead status display for a Switch.

"O" COMMAND: ECHO CONTROL

- O<CR> displays Switch command echo status (ON or OFF).

• ON<CR> turns echo ON. Factory default.

NOTE

If DIP-switch-position #4 is "ON," the echo will not function.

• OF<CR> turns echo OFF.

"R" COMMAND: READ OR SET CLOCK (MM/DD/YY HH:MM:SS)

• The R<CR> command with no modifiers will display the current date and time. When the R command is followed by date and time (24-hour clock), this becomes the new date and time and is sent to all online units in the system.

Example: R<SP>01/24/2000<SP>22:15:2000<CR> sets the date to January 24, 2000 and the time to 10:15 pm.