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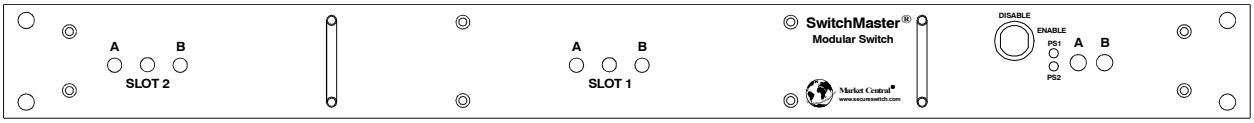
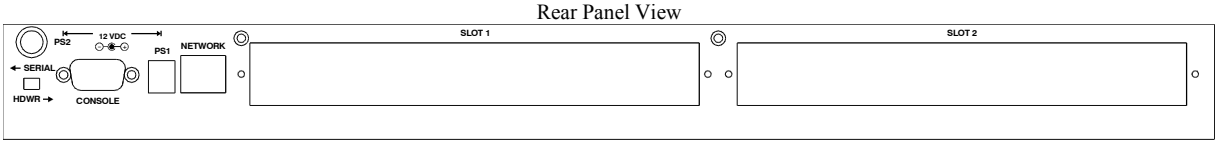
Front Panel View



Rear Panel View



SwitchMaster® 1U TWO SLOT MODULAR SWITCH with R6000 Series switch cards

October 2019

1U Two Slot Rack Mount Chassis	6001335	1U 19" Chassis
Ethernet Controller Card	6001337	Includes MIB file & SwitchCenter GUI
RS232 Controller Card	6001338	
Logic-only Controller Card	6001339	
Independent Dry Contact Control Controller Card	6001340	
RJ45 A/B Switch Card	6000742-BLK	Supports up to 1 GbE
RJ45 CAT-6 A/B Switch Card	6000865-BLK	Supports up to 10 GbE
RJ45 CAT-6 Simultaneous Dual-Port A/B Switch Card	6000866-BLK	Supports up to 10 GbE
Video - F Connector, 75 Ohm A/B Switch Card	6000871-BLK	
DB25 A/B Switch Card	6000745-BLK	Switches All 25 Leads
DB9 A/B Switch Card	6000750-BLK	Switches All 9 Leads
DB15 A/B Switch Card	6000749-BLK	Switches All 15 Leads
Latching Fiber Optic A/B Switch Card with loopback - SC	6000785A-BLK	Full Duplex, Multimode Fiber
Latching Fiber Optic A/B Switch Card with loopback - ST	6000778A-BLK	Full Duplex, Multimode Fiber
Latching Fiber Optic A/B Switch Card - SC	6000776A-BLK	Full Duplex, Multimode Fiber
Latching Fiber Optic A/B Switch Card - ST	6000775A-BLK	Full Duplex, Multimode Fiber
Non-Latching Fiber Optic A/B Switch Card with Auto-Recovery - SC	6000748A-BLK	Full Duplex, Multimode Fiber
Non-Latching Fiber Optic A/B Switch Card with Auto-Recovery - ST	6000760A-BLK	Full Duplex, Multimode Fiber
Non-Latching Fiber Optic A/B Switch Card - SC	6000883-BLK	Full Duplex, Multimode Fiber
Non-Latching Fiber Optic A/B Switch Card - ST	6000884-BLK	Full Duplex, Multimode Fiber
Latching Fiber Optic Dual-Port A/B Switch Card - SC	6000885-BLK	Full Duplex, Multimode Fiber
Latching Fiber Optic Dual-Port A/B Switch Card - ST	6000886-BLK	Full Duplex, Multimode Fiber
Non-Latching Fiber Optic Dual-Port A/B Switch Card - SC	6000887-BLK	Full Duplex, Multimode Fiber
Non-Latching Fiber Optic Dual-Port A/B Switch Card - ST	6000888-BLK	Full Duplex, Multimode Fiber
Blank Rear Panel	6000762-BLK	Covers 1 empty slot in Chassis
Wall-Mount Power Supply, US AC Plug, 100-240 VAC in, 12 VDC out	1827053	1 per chassis, or 2 for redundant power
Wall-Mount Power Supply, UNIVERSAL AC Plug Kit, 100-240 VAC in, 12 VDC out	1827056	1 per chassis, or 2 for redundant power
Desktop Power Supply with IEC input socket, 100-240 VAC in, 12 VDC out, Includes US AC line cord	6001352	1 per chassis, or 2 for redundant power

(leaded solder versions of the above items are also available by changing the part # from 6xxxxxx to 5xxxxxx)
Fiber Optic Switches are available with FC and LC connectors, and for single mode applications.

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Federal Communications Commission (FCC) Statement

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. 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 required to correct the interference.

1. Specifications

Connectors:
RJ45 A/B SWITCH CARDS – 6000742 & 600865 (3) RJ45 connectors; 6000866 (6) RJ45 connectors
FIBER OPTIC A/B SWITCH CARD – (3) Duplex fiber optic SC or ST receptacles
FIBER OPTIC DUAL-PORT A/B SWITCH CARD – (6) Duplex fiber optic SC or ST receptacles
DB25 A/B SWITCH CARD – (3) DB25 female connectors
DB15 A/B SWITCH CARD – (3) DB15 female connectors
DB9 A/B SWITCH CARD – (3) DB9 female connectors
F-TYPE A/B SWITCH CARD – (3) female F type connectors
CONTROLLER CARD – (1) RJ45, (1) DB9 female, (2) DC Power Jacks

Indicators:
A/B SWITCH CARDS – (2) LED, one for A, one for B
CONTROLLER CARD – (2) LED, for power supply status

Switches:
A/B SWITCH CARDS – (1) momentary toggle switch
CONTROLLER CARD – (2) momentary push-button switches, (1) slide switch
1U RACK – (1) key-lock switch

Dry Contact Inputs:
The dry contact inputs drive opto-isolators that are activated by connecting these inputs to the switch's circuit ground. The opto-isolators are activated by about 1 mA of current, which requires that the external dry contact resistance including cabling be no greater than 500 ohms. The dry contact inputs may be used with momentary contacts like a manual switch, or continuous contacts like a relay. If a momentary contact is used, the signal should be held active for a minimum of 100 milliseconds to ensure a switching action. The switching action may occur in less than 100 milliseconds. If a continuous contact is used, the active control signal may cause a conflict or interfere with the operation of other switching commands.

Dry Contact Status Outputs:
The Dry Contact Status Outputs are implemented with Non-Latching Relays and therefore will be OPEN when power is lost or removed, or if a card slot is empty. When active, the dry contact status outputs are connected to signal ground on pin 5 of the DB9 connector. There are no internal pullup resistors connected to these status outputs, so if pullups are required they must be provided by the attached device(s). The Status Relay Outputs should be limited to 0.5 Amp load, at a maximum of 60 VDC.

Ethernet Remote Control Interface (Ethernet Controller Card only):
10BASE-T/100BASE-TX, Full-Duplex and Half-Duplex supported, Auto MDI/MDI-X supported

RS232 Remote Control Interface (Ethernet and RS232 Controller Cards only):
9600 bps, 8 data, no parity, 1 stop bit (Ethernet Controller Card)
1200 bps, 8 data, no parity, 1 stop bit (RS232 Controller Card)

Power:
RJ45, DB9, DB15, F-TYPE & LATCHING F.O. A/B SWITCH CARDS – 12 VDC, 15 mA normal, additional 80 mA while switching.
LATCHING F.O. A/B SWITCH CARDS WITH LOOPBACK – 12 VDC, 15 mA normal, additional 240 mA while switching.
NON-LATCHING FIBER OPTIC A/B SWITCH CARDS – 12 VDC, 15 mA in A position, 95 mA max in B position, additional 20 mA while switching.
LATCHING F.O. DUAL-PORT A/B SWITCH CARDS – 12 VDC, 15 mA normal, additional 160 mA while switching.
NON-LATCHING FIBER OPTIC DUAL-PORT A/B SWITCH CARDS – 12 VDC, 15 mA in A position, 175 mA max in B position, additional 20 mA while switching.
DB25 – 12 VDC, 15 mA normal, additional 200 mA while switching.
CONTROLLER CARD – 12 VDC, 50 mA normal, additional 30 mA while switching, and an additional 250 mA with Ethernet module.

The 1U rack may be powered with one or two external 12 VDC, 1 A, regulated supplies.

Fiber Optic Switch Cards Performance:

Optical Wavelength:	800 through 1600 nm (latching multimode models) 850 and 1310 nm (non-latching multimode models) 1310 and 1550 nm (latching and non-latching single mode models)
Insertion Loss:	2.0 dB maximum (multimode models) 1.5 dB maximum (single mode models)
Optical Isolation:	35 dB minimum (latching and non-latching multimode models) 55 dB minimum (latching and non-latching single mode models)

Environment: (check power supplies)

TEMPERATURE	0° to 40° C operating, -10° to 70° C non-operating
HUMIDITY	up to 80%, non-condensing

Rack Size:
RACK – 1.74" H x 19" W x 6.5" D (not including handles and connectors)
RJ45 A/B SWITCH CARDS – one slot (0.937 inches wide)
FIBER OPTIC A/B SWITCH CARDS – one slot (0.937 inches wide)
DB9, DB15, DB25, & F-TYPE A/B SWITCH CARDS – one slot (0.937 inches wide)
CONTROLLER CARDS – factory installed at time of order

The 1U Two Slot Modular Switch will support one or two R6000 series single slot switch cards in addition to the controller card. The double slot R6000 switch cards will not fit in this chassis.

2. Introduction

The 1U Two Slot Modular Switch is a 1U high 19 inch rack style gang switch that supports one or two R6000 series single slot A/B switch cards in addition to the controller card. The two card slots may contain any mix of A/B switch cards. Each switch card can be individually switched, or the entire system (both switch cards) can be switched from the Controller Card. The 1U Two Slot Modular Switch is intended as a standalone switching solution. If your application requires more than two switch ports, the standard 4U R6000 switching system or another gang switch in the SwitchMaster family may be a more appropriate choice.

Note: The Dual-Port Fiber Optic and Cat6 A/B switch cards switch both sets of ports simultaneously, NOT individually. These switch cards will connect both A ports or both B ports to their respective C ports.

Latching A/B switch cards allow the user to connect port A or port B to port C through latching telecommunication relays or latching fiber optic switching mechanisms. Latching circuitry allows the switch cards to retain their selected connections and maintain data flow even when power is lost or is removed.

Non-latching fiber optic A/B switch cards with Auto-Recovery use latching relays to control a non-latching optical switch. If power is lost, the optical switch will automatically fail-over to connect port A to port C. When power is re-applied, the latching relay will cause the optical switch to reconnect the port selected prior to the loss of power.

Non-latching fiber optic A/B switch cards without Auto-Recovery use non-latching optical switch mechanisms, which will automatically fail-over to connect port A to port C when power is lost or removed. When power is re-applied, the non-latching optical switch will remain in the A state, until a switching action changes the state.

The Controller Card is available in four options: (Logic Only, RS-232, Ethernet, and Independent Dry Contact Control). The features included with each of the four options are listed in the following table. Each of these features is described in more detail below.

1U Two Slot Modular Switch – Features by Controller Card Type

Features	Logic Only Controller Card	Serial Controller Card	Ethernet Controller Card	Independent Dry Contact Control Controller Card
Key-Lock Switch Front Panel Enable / Disable	yes	yes	yes	yes
Switch Card Front Panel Individual Switch Control	yes	yes	yes	yes
Front Panel Power Supply Status LEDs	yes	yes	yes	yes
Individual Switch Card Dry Contact Control	no	no	no	yes
Individual Switch Card Dry Contact Status	no	no	no	yes
Controller Front Panel Gang Switch Card Control	yes	yes	yes	no
Gang Switch Card Dry Contact Control	yes	yes	yes	no
Gang Switch Card Dry Contact Status	yes	yes	yes	no
RS-232 Serial Control – Basic Command Set	no	yes	no	no
RS-232 Serial Control – Extended Command Set	no	no	yes	no
Ethernet Control Telnet, Web Browser, SNMP, & SwitchCenter (Java based SNMP Graphical User Interface)	no	no	yes	no
SNMP traps or syslog messages	no	no	yes	no
Ethernet Auto-Switching	no	no	yes	no

Note: A slide switch on the rear of the rack is used to select between Dry Contact Control Inputs and RS-232 Serial transmit and receive signals on the DB9 connector. This slide switch must be in the SERIAL position to select RS-232 signals, and must be in the HDWR position to select Dry Contact Control Inputs.

The Key-Lock Switch on the front panel is used to enable or disable the front panel switches on the switch cards and the factory installed controller card.

When enabled via the keylock switch, the toggle switch on the front of each switch card can be used to control the switch card's connection state. Hold the switch in the A position to connect the A port to the C port, release the switch when finished. Hold the switch in the B position to connect the B port to the C port, release the switch when finished.

There are two front panel power supply status LEDs to show the status of each power supply input. Only one power supply is required for operation. A second power supply may be used for redundancy.

On the Independent Dry Contact Control version of the controller card, there are four dry contact control inputs and four dry contact control outputs. Two of these inputs and outputs are assigned to each switch slot. See section 3 for DB9 pin-out information and section 5 for signal description / operation.

The Controller Card front panel push button switches (when present) are intended to control both switch ports (cards) at the same time. This is system level ganged switching of both switch ports in one chassis. Hold the A push-button to switch both switch cards to the A state, connecting the A ports to the C ports, release the push-button when finished. Hold the B push-button to switch both switch cards to the B state, connecting the B ports to the C ports, release the push-button when finished.

On the Logic Only, Serial, and Ethernet versions of the Controller Card, the Dry Contact Inputs are intended for System level switching control, and the Dry Contact Status outputs are intended for System level switch status, showing the status of the switch card in slot 1. When controlled as a System, both switch cards should be in the

same state. See section 3 for DB9 pin-out information and section 5 for signal description / operation.

RS-232 Serial Control – Basic Command Set is available on the Serial Controller Card without Ethernet. These commands allow the user to perform get and set operations on the card, rack, and system level. See section 5 for details on the Basic Command Set.

RS-232 Serial Control – Extended Command Set is available on the Ethernet Controller Card. These commands allow the user to perform get and set operations on the card, rack, and system level, but contain additional commands for configuring the Ethernet interfaces and Automatic Switching features. See section 5 for details on the Extended Command Set.

The Ethernet Controller Cards also provide access to the Extended Command Set via Telnet and Web Browser interfaces.

The Ethernet Controller Cards also support SNMP traps or syslog messages (user configurable) for various events and errors, and can send these alerts to as many as 16 different remote monitoring locations.

The Ethernet Controller Cards have an intelligent automatic switching capability. This feature allows the switching system to be used to monitor a specific Ethernet network connection and to automatically switch all ports (performs a system switch operation) based on whether the monitored IP address responds to ICMP echo requests (responds to PINGs) or not. See section 5.5 for additional details.

3. Configuration

The 1U Two Slot Modular Switch is preconfigured at the factory with your choice of controller card and switch cards. There are no internal card guides in the 1U chassis. Special care is required if the controller card and/or switch cards need to be replaced by the customer in the field.

3.1 Controller Card Configuration

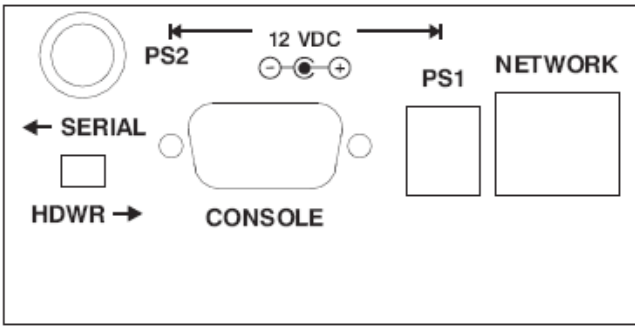


Figure 3.1.1 – Controller Card Rear Panel Outline

Some of the serial commands require a rack address or a switch card address. Since the 1U Two Slot Modular Switch is intended as a standalone system, its rack address is fixed at rack 1 and its switch card addresses fixed at card 1 and 2. There are no internal switches to set the rack address or switch card addresses.

Table 3.1.1 – RJ45 (Optional Ethernet Port) Pin Assignment

Pin	Signal Name	Signal Direction
1	Transmit Pair	Output
2	Transmit Pair	Output
3	Receive Pair	Input
6	Receive Pair	Input

Note: Although the RJ45 port is present on all versions of the Controller Card, this port is only used on the Ethernet version of the Controller Card. The RJ45 pins are numbered 1 thru 8 from left to right in figure 3.1.1.

Table 3.1.2 – DB9 CONSOLE Port Pin Assignment

Pin	DB9 COM port Signal Names	Signal Direction (SERIAL)	Signal Direction (HDWR)
1	Carrier Detect/Control Input	Output to PC (Always Active)	Control Input 1 (A)
2	Received Data/Control Input	Output to PC	Control Input 2 (B)
3	Transmitted Data/Control Input	Input from PC	Control Input 3 (A2)
4	Unused/Control Input	Not Applicable	Control Input 4 (B2)
5	Signal Ground	Not Applicable	Not Applicable
6	Status Output/Status Output	Status Output 1 (A)	Status Output 1 (A)
7	Status Output/Status Output	Status Output 2 (B)	Status Output 2 (B)
8	Status Output/Status Output	Status Output 3 (A2)	Status Output 3 (A2)
9	Status Output/Status Output	Status Output 4 (B2)	Status Output 4 (B2)

Note: The rear panel slide switch is used to select between SERIAL signals or HDWR dry contact control inputs. The dry contact status outputs are always present. Control Inputs 3 and 4 and Status Outputs 3 and 4 are only present on the Independent Dry Contact Control version of Controller Card.

Table 3.1.3 – Controller Card Ethernet Module Configuration Jumper Settings

Jumper	**W1**	**W2**
Ethernet Module Jumper Settings		
No Ethernet module installed	Pin 1 to Pin 2	Pin 1 to Pin 2
Ethernet module installed	Pin 2 to Pin 3	Pin 2 to Pin 3

Jumpers W1 & W2 are preset at the factory and should not be changed. This information is for reference only. Jumpers W1 & W2 should be set as follows:

- Both to position 1-2 if there is no Ethernet module installed.
- Both to position 2-3 if there is an Ethernet module installed.

WARNING: Damage may occur to the Ethernet module and/or Controller Card if these jumpers are set to position 1-2 with an Ethernet module installed.

The Controller Card has two independent power supply entry jacks. When power is applied to the PS1 jack, the PS1 LED on the front panel should illuminate. When power is applied to the PS2 jack, the PS2 LED on the front panel should illuminate.

3.2 Configuring A/B Switch Cards

There are no jumpers or switch settings that need to be configured on the R6000 Series A/B Switch Cards that fit into the 1U Two Slot Modular Switch.

4. Installation

The selected Controller Card and R6000 series A/B switch cards are pre-installed at the factory. There are no internal card guides. The A/B switch cards are installed from the rear of the chassis before the enclosure top is installed to allow proper alignment with the backplane connectors. The enclosure top should be removed if it is necessary to remove or replace one of the A/B switch cards.

4.1. Initial Installation

4.1.1 Apply power to the rack, using the 12 VDC regulated power supply provided with your system. When first installed, each switch should be cycled from A to B and back. It is possible for the latching relays to have changed state during shipping. Cycling the switch will assure that all relays on the card are in the same state.

4.1.2 If you are going to remotely manage the 1U Two Slot Modular Switch over an Ethernet network, you must first set the IP address, subnet mask and gateway address parameters on the Controller Card using the serial port connection. You should set these parameters before attaching a cable to the NETWORK port, as the default parameters may not work or could interfere with the operation of your Ethernet network. See section 6 for more information regarding IP setup.

4.1.3 Connect cables between the A, B and C ports on the switch cards and your devices. The A/B Switch cards provide straight thru connections and are bidirectional, i.e. they have no preference to signal direction. If your application requires a cross-over cable, use only 1 cross-over cable in that path. Use a straight through cable on the other side of the switch card.

5. Operation

When power is applied to the 1U Two Slot Modular Switch, the appropriate Power Supply LED should illuminate. On each A/B Switch Card, either the "A" LED or the "B" LED should illuminate to indicate the currently connected port.

When the Key-Lock switch is OFF, the front panel switches in the rack will be disabled. Note that the rack will still switch in response to switch commands sent to the RS232 port, or to the Ethernet network port, or via an external dry contact closure if using this option. When the Key-Lock switch is ON, the toggle switches in the rack are enabled and will function as described below.

The Toggle Switch on each A/B Switch Card is used to switch only that card. Hold the switch in the “A” position to connect Port A to Port C. The “A” LED will illuminate when the switch operation has been completed. Release the switch when switching has finished. Hold the switch in the “B” position to connect Port B to Port C. The “B” LED will illuminate when the switch operation has been completed. Release the switch when switching has finished.

The Push-Button Switches on the Controller Card are used to switch all cards in the system, and are operated in the same fashion as the individual toggle switches. Hold the A push-button to switch all the cards in the system to the A state, release the push-button when finished. Hold the B push-button to switch all the cards in the system to the B state, release the push-button when finished.

5. 1 Switching Using the Dry Contact Control Signals

The Dry Contact Control Inputs must be enabled by setting the slide switch to the HDWR position. The Dry Contact Control Inputs are activated by connecting them to the signal ground pin on the DB9 connector. The dry contact inputs may be used with momentary contacts like a manual switch, or continuous contacts like a relay. If a momentary contact is used, the signal should be held active for a minimum of 100 milliseconds to ensure a switching action. The switching action may occur in less than 100 milliseconds. If a continuous contact is used, the active control signal may cause a conflict or interfere with the operation of other switching commands. The Status Outputs are implemented with Non-Latching Relays and therefore will be OPEN when power is lost or removed, or if a card slot is empty. The Status Relay Contacts should be limited to 0.5 Amp load, at a maximum of 60 VDC. When active, the dry contact status outputs are connected to signal ground, so the connected load must be DC.

5. 1.1 “SYSTEM” Switching Using the Dry Contact Control Signals

On the Logic Only, Serial, and Ethernet versions of the Controller Card, the Dry Contact Control Inputs are used to perform “SYSTEM” switching, controlling all switch cards in the system – see table below. The Dry Contact Status outputs reflect the state of the A/B switch card in slot 1. It is possible for the state of the two switch cards to be different if performing individual card switching using serial or Ethernet commands, or using the front panel toggle switches.

DB9 Pin (Signal)	System Switch to A	System Switch to B
1 (Control Input A)	Connect to Signal Ground	Open
2 (Control Input B)	Open	Connect to Signal Ground
5 (Signal Ground)		
6 (Status Output A)	Connected to Signal Ground	Open
7 (Status Output B)	Open	Connected to Signal Ground

5. 1.2 "INDIVIDUAL" Switching Using the Dry Contact Control Signals

On the Independent Dry Contact Control version of the controller card, there are four dry contact control inputs and four dry contact control outputs on the DB9 connector. Two of these inputs and outputs are assigned to each switch slot.

DB9 Pin (Signal)	Slot 1 Switch to A	Slot 1 Switch to B	Slot 2 Switch to A	Slot 2 Switch to B
1 (Control Input A)	Connect to Signal Ground	Open	Don't Care	Don't Care
2 (Control Input B)	Open	Connect to Signal Ground	Don't Care	Don't Care
3 (Control Input A2)	Don't Care	Don't Care	Connect to Signal Ground	Open
4 (Control Input B2)	Don't Care	Don't Care	Open	Connect to Signal Ground
5 (Signal Ground)				
6 (Status Output A)	Connected to Signal Ground	Open	Don't Care	Don't Care
7 (Status Output B)	Open	Connected to Signal Ground	Don't Care	Don't Care
8 (Status Output A2)	Don't Care	Don't Care	Connected to Signal Ground	Open
9 (Status Output B2)	Don't Care	Don't Care	Open	Connected to Signal Ground

5.2 RS232 Terminal – Basic Command Set (Not applicable to Logic Only or Ethernet Controller Cards)

This section describes the RS232 commands that are available when using an RS232 Controller Card. Logic Only Controller Cards do not support any serial commands, and the Ethernet Controller Cards support an Extended Command Set – see Section 5.3 and Section 7 for more details on command syntax and responses for terminal commands supported by the Ethernet Controller Cards.

IMPORTANT: The RS232 terminal interface must be enabled by setting the slide switch to the SERIAL position. To start the "terminal" interface on an RS232 Controller Card so that it is ready to accept and respond to commands, set your terminal to 1200 Baud, No Parity, 8 Data Bits, 1 Stop Bit, then connect your terminal to the DB9 CONSOLE port (refer to Table 3.1.2), and press the SPACE KEY.

When the RS232 Controller Card detects a 1200 Baud SPACE character, it starts the "terminal" interface and responds with the ">" prompt character. If you then type "help" and then press the ENTER KEY, the RS232 Controller Card will respond with the rack address, software version, and a list of the available commands – see Table 5.2.1 below.

Table 5.2.1 – RS232 Controller Card response to "help" command (1200, N, 8, 1)

```
Rack 1
Rev. 612.A
Commands:
get system
get rack n  (n = rack addr, 1 to 255)
get card y  (y = card addr, 1 to 4080)
get power n  (n = rack addr, 1 to 255)
get version n  (n = rack addr, 1 to 255)
get types n  (n = rack addr, 1 to 255)
get groups n  (n = rack addr, 1 to 255)
set system X  (X = A or B)
set rack n X  (n = rack addr, 1 to 255, X = A or B)
set card y X  (y = card addr, 1 to 4080, X = A or B)
set groups n string  (n = rack addr, 1 to 255, string up to 16 chars)
help (displays current commands)
SPACE (space character starts terminal mode)
exit (exit terminal mode)
>
```

NOTE: For commands that use a rack address "n", the rack address is fixed at 1. For commands that use a card address "y", the card addresses are fixed at 1 and 2.

Commands are not case sensitive and can be entered as either upper or lower case. The RS232 Controller Card echoes each character it receives back to your terminal, allowing the user to backspace to correct typing errors. Each word on a command line must be separated by a single SPACE character. The command is processed when you press the ENTER KEY. All of the above commands except "help" and "exit" may be abbreviated by using only the first character of each word on the command line. For example:

"g s<CR>" is the same as "get system<CR>".
"s r 1 A<CR>" is the same as "set rack 1 A<CR>".

The following table shows an example of each command along with the expected Response and Action. Please note that each command must be followed by a carriage return (ASCII HEX 0x0D).

Command	Response	Action
"SPACE" char	>	starts terminal mode if not started (1200,N,8,1), otherwise system will echo back a "SPACE" char if already in terminal mode
get system	System Status (A or B)	None
set system B	System Set To B	All A/B switch cards in system will switch to B
get rack 1	Rack 1 Status ABXXXXXXXXXXXXXX	None. In the response shown, switch cards 1 is in state A, 2 is in state B, and the rest are not present. If the selected rack doesn't respond within 3 seconds, the RS232 Controller Card in rack 1 will reply with "No Response".
set rack 1 A	Rack 1 Set To A	All A/B switch cards in rack 1 will switch to A
get card 2	Card 2 Status (A, B or Empty)	None
set card 2 B	Card 2 Set To B	A/B switch card 2 will switch to B
get power 1	Rack 1 Power: Two Supplies	None. In the response shown, the rack is powered with two energized power supplies. If one power supply is down, the status would be One Supply Down.
get version 1	Rack 1 Version Rev. 612.A	None
get groups 1	Rack 1 Groups 111122223333	None. In the response shown, switch cards 1-4 are in group 1, 5-8 are in group 2, 9-12 are in group 3 and switch cards 13-16 are not part of a group.
set groups 1 111111	Rack 1 Groups Set To 111111	None. In the command shown, switch cards 1-6 are set to group 1, the remaining switch cards are not part of a group.
get types 1	Rack 1 Types 1100000000000000	None. In the response shown, switch cards 1-2 are present, switch cards 3-16 are not present.
help	(see Table 5.2.1 above)	None
exit	Good Bye	Exits terminal mode

5.2.1 Programming Tips for Using the RS232 Terminal Commands

This section is applicable to RS232 Controller Cards **WITHOUT** an Ethernet module installed, and is intended for programmers who want to control the 1U Two Slot Modular Switch in an automated environment using a computer.

BACKGROUND:
When first energized, the RS232 Controller Card is initialized at 2400, N, 8, 1, expecting abbreviated SNMP commands from the Ethernet Module. When the Controller Card receives a 1200 baud SPACE character, it detects a framing error with null data. This causes it to enter "Terminal" mode and to automatically change its data rate to 1200 bps. The controller indicates that is has entered terminal mode by displaying a prompt character (">", ASCII HEX 0x3E). It then stays in terminal mode, until it receives the "exit" command, or detects 2400 baud characters.

While in terminal mode, the controller echoes the received characters and collects them into a buffer until it receives a carriage return character. The carriage return is echoed and then the controller begins to process the received command. Any characters received while the controller is processing the command are ignored. When the

command is processed, the controller responds, followed by a prompt character, indicating that it is ready to receive another command. If the controller gets a command that is intended for another controller, it passes that command, and waits up to three seconds for a response. If it does not get a response, it responds "No Response", followed by a prompt.

PROGRAMMING:
First your program must set its RS232 COM port to 1200, N, 8, 1.

Since the RS232 Controller Card may be in abbreviated SNMP mode, your program should then force the controller into terminal mode. This can be done by sending a SPACE character, followed by a carriage return character. If the Controller Card is in abbreviated SNMP mode, the SPACE character will cause the controller to go into Terminal mode, and will then respond with a prompt character. The carriage return will then cause it to respond with "Invalid Command", followed by another prompt character. If the controller was already in terminal mode, the controller will simply respond "Invalid Command", followed by a prompt character.

Now that the Controller Card is in terminal mode, your program can issue other commands, but must wait for the controller to issue the prompt character (">", ASCII HEX 0x3E) before sending each new command.

If the Controller Card looses power, it will reset itself when power is restored and come back up in the abbreviated SNMP mode. As such, you may want to include an error recovery routine in your program that tries to force terminal mode if your program does not receive a response from the Controller Card. In applications where your program will issue commands very infrequently, you may find it useful to force terminal mode before every command in case the controller has lost power since your last command.

5.3 Extended Command Set for Ethernet Controller Cards

This section is applicable to Ethernet Controller Cards. The DB9 CONSOLE interface on the Ethernet Controller Card operates at 9600 bps (rather than at 1200 bps as is the case for an RS232 Controller Card).
IMPORTANT: The RS232 terminal interface must be enabled by setting the slide switch to the SERIAL position.

The Ethernet Controller Card supports an extended set of serial commands that are listed below and described in more detail in section 7. To communicate with an Ethernet Controller Card, set your RS232 terminal to 9600 baud, no parity, 8 data bits, and 1 stop bit. Connect this terminal to the DB9 CONSOLE port using a straight pinned DB9 cable.

When you apply power to the system, the Ethernet module runs a series of internal self tests and configuration steps. This takes approximately 5 seconds. After this process is complete you will see a sign-on message displayed on your serial console, similar to the following:

```
Network Agent Version 4_01G DEC 2018
Copyright (c) 2018
All rights reserved
System starting ...
Rack position A
Console ready

>
```

At this point the Ethernet Controller Card is now ready to receive RS232 serial commands via the DB9 connector. If you type "help" followed by the ENTER KEY, the list of available commands will be displayed as shown below. See Section 7 for a detailed description of each command.

```
CONSOLE COMMANDS:
GET         ALL (display all parameters)
GET         VERSION (display rack 1 software versions)
GET         VERSION N (display rack N software versions)
GET[SET]    SYSTEM [A/B] (control all system ports)
GET[SET]    RACK N [A/B] (control single rack ports)
GET[SET]    PORT N [A/B] (control single port)
GET         EVERYRACK (display status for all racks)
GET         EVERYRACK N (display status for racks 1 thru N)
GET         POWER N (display power status)
GET[SET]    GROUPS N [string] (control single rack groups)
```

```
GET         TYPES N (display single rack types)
GET[SET]    IPADDRESS [X.X.X.X]
GET[SET]    SUBNETMASK [X.X.X.X]
GET[SET]    GATEWAY [X.X.X.X]
GET[SET]    PINGREPLY [ON/OFF]
GET[SET]    SNMPENABLE [ON/OFF]
GET[SET]    READCOMMUNITYNAME [string]
GET[SET]    WRITECOMMUNITYNAME [string]
GET[SET]    WEBENABLE [ON/OFF]
GET[SET]    WEBPASSWORD [string]
GET[SET]    WEBTIMEOUT [N] (seconds)
GET[SET]    WEBPORT [N]
GET[SET]    TELNETENABLE [ON/OFF]
GET[SET]    TELNETPASSWORD [string]
GET[SET]    TELNETTIMEOUT [N] (seconds)
GET[SET]    TELNETPORT [N]
GET[SET]    MONITORIP N [X.X.X.X] (0.0.0.0 to disable)
GET         MONITORIP (display all monitor IP addresses)
SET         MONITORIPRANGE N [X.X.X.S E] (N=Index,S=Start,E=End)
GET[SET]    MONITORMODE [FAILOVER/TOGGLE]
GET[SET]    MONITORDELAYCOUNT [N]
GET[SET]    MONITORINTERVAL [N] (1/10 seconds, 0 to disable)
GET[SET]    MONITORFAILCOUNT [N] (0 = no auto bypass)
GET[SET]    MONITOROKCOUNT [N] (0 = no auto recover)
GET[SET]    MONITORTIMES N HH:MM HH:MM (0:0 0:0 Always ON)
GET         MONITORTIMES (display all monitor times)
GET[SET]    AUTHENTICATIONTRAP [ON/OFF]
GET[SET]    ALERTTYPE [TRAP/SYSLOG]
GET[SET]    ALERTINTERVAL [N] (1 - 255 minutes, 0 for single)
GET[SET]    AUTOSWITCH [NORMAL/BYPASS]
GET[SET]    AUTOSWITCHTRIP [N] (0 - 255, Auto-Switch Trip Point)
GET[SET]    DAY [MONDAY/TUESDAY/…]
GET[SET]    TIME [HH:MM] (HOUR 0 - 23, MINUTE 0 - 59)
GET[SET]    DATE [MM/DD/YYYY] (two digit month and day, four digit year)
GET[SET]    ADMINIP N [X.X.X.X] (0.0.0.0 to disable an entry)
GET         ADMINIP (display all administrator IP addresses)
GET[SET]    MANAGER N [X.X.X.X] (0.0.0.0 to disable an entry)
GET         MANAGER (display all SNMP managers)
PING        X.X.X.X (ICMP ECHO to remote host)
GET[SET]    EVENTLOG (GET to display event log, SET to clear event log)
SAVE        save settings for next startup
RESET       restart (use after SAVE)
SET         DEFAULTS (restore default user settings, save required)
```

5.4 Automatic Switching (for Ethernet Controller Card)

The Ethernet Controller Card can be configured to automatically switch the connection state (all COMMON ports are connected to their respective A ports) or (all COMMON ports are connected to their respective B ports). In order to be able to perform the auto-switching functions, the internal Ethernet module issues ICMP echo request (PING) packets to a user configurable IP address on the network.

The auto-switching function can be configured to operate in one of two modes. In FAILOVER mode (the default mode), the auto-switching function switches to the “failover” or “bypass” connection state (all COMMON ports are connected to their respective A ports) when PING responses are not received, and if configured to “auto recover” it switches to the “normal” connection state (all COMMON ports are connected to their respective B ports) when PING responses are received. In TOGGLE mode, the auto-switching function toggles the connection state from A to B or from B to A when PING responses are not received, and maintains the connection state all COMMON ports are connected to their respective A ports or B ports when PING responses are received. User configurable parameters control the auto-switching functions to allow the switch to be used in a variety of applications.

In FAILOVER mode, if the “normal” network path connections between the Ethernet module and the device being monitored go down for any reason, the Ethernet module will no longer be able to PING the specified IP address, and will then automatically switch from the “normal” connection state (all COMMON ports are connected to their respective B ports) to the “bypass” or “failover” connection state (all COMMON ports are connected to their respective A ports). Once the problems on the primary path have been identified and corrected, the user can issue a

command to cause the 1U Two Slot Modular Switch to switch from the failover connection state back to the normal connection state. If auto recovery is enabled, the Ethernet module will automatically re-connect the normal path connections when it is again able to PING the user specified IP address. When using the auto recovery feature, it is important that the Ethernet network port on the 1U Two Slot Modular Switch be connected to the user's network such that the normal path is continuously being monitored even when the backup path has been selected, otherwise the 1U Two Slot Modular Switch could repeatedly switch (flap) back and forth between the failed primary path and the functioning backup path.

In TOGGLE mode, if the "current" network path connections between the Ethernet module and the device being monitored go down for any reason, the Ethernet module will no longer be able to PING the specified IP address, and will then automatically switch to the "alternate" connection state, trying to restore successful PING responses. In this mode, the auto-switching function will toggle between (all COMMON ports are connected to their respective A ports) and (all COMMON ports are connected to their respective B ports), until it receives responses to its PING requests. The 1U Two Slot Modular Switch will then remain in the current connection state (all COMMON ports are connected to their respective A ports or B ports), until the user issues a command to cause the 1U Two Slot Modular Switch to switch connections, or should the Ethernet module fail to receive PING responses. When in TOGGLE mode, it is important that the 1U Two Slot Modular Switch Ethernet network port be connected to the user's network such that the current path is being monitored.

See the diagrams below for examples of auto switching configurations.

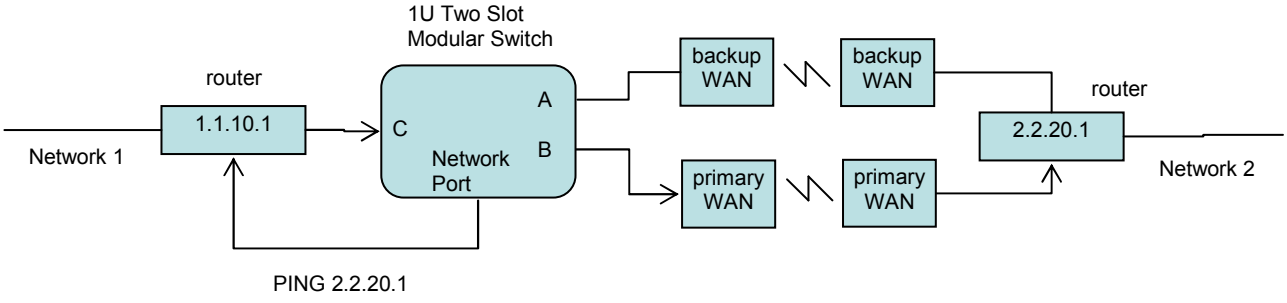
When the auto switching feature is enabled, manual and remote switching can still be performed using the front panel toggle switch or by issuing serial or Ethernet commands, but this can affect the operation of the automatic switching feature. This is because the automatic switching feature is only aware of "system level" commands, i.e. "SET SYSTEM A", "SET SYSTEM B", and manual switching using the controller card front panel push-button switches. If the user initiates any of these "system level" commands, the switching system will execute the command and the automatic switching feature will record the new connection state. The automatic switching feature will then continue to monitor the connection path to the selected IP address and will automatically switch connections as it normally would.

However, if the switching system receives a "SET RACK" command, these commands will not be recorded by the automatic switching feature - it will be unaware that the switching system has changed connection states. Under certain conditions when in this state, the automatic switching feature will not automatically switch connection states as expected, because it "thinks" that it is already in the correct connection state. To recover from this condition the user can either power cycle the Ethernet Controller Card, issue a "RESET" command, or execute a "system level" command. Any of these actions will cause the automatic switching feature to record the current connection state of the switch, which then allows it to again operate normally.

Connection changes made using the "SET PORT" command also are not recorded by the automatic switching feature. Thus under certain conditions, the automatic switching feature will not automatically switch connection states as described above when "rack level" commands are issued.

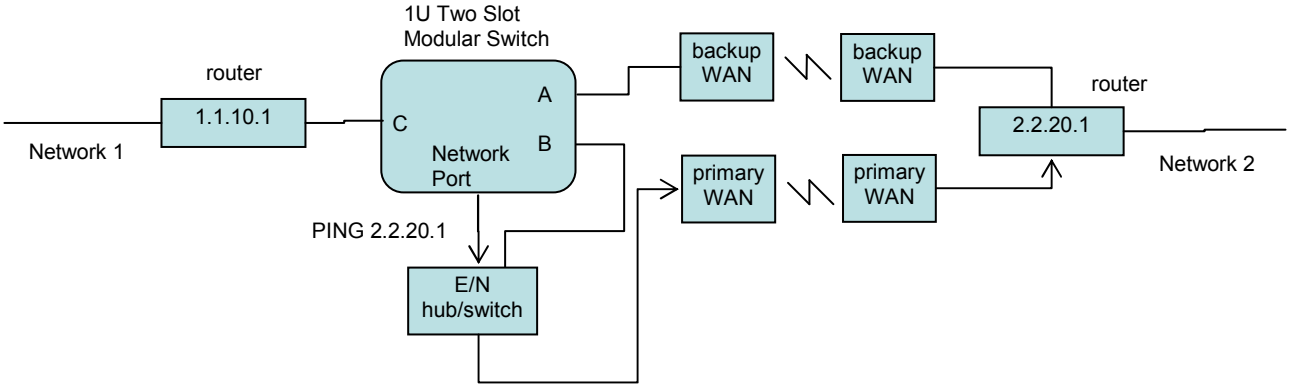
Network Connections for Auto Failover & Manual Recovery (FAILOVER mode) OR TOGGLE mode

Note: The Ethernet Module monitors the WAN connections by PINGing the far side router thru the primary WAN link. In FAILOVER mode, if the primary WAN link fails, the Ethernet Module auto switches to the backup WAN link. Auto recovery is disabled in this configuration to prevent flapping. In TOGGLE mode, if the selected WAN link fails, the Ethernet Module will toggle between the primary and backup WAN until a working link is established.



Network Connections for Auto Failover & Auto Recovery (FAILOVER mode)

Note: The Ethernet Module monitors the WAN connections by PINGing the far side router thru the primary WAN link. If the primary WAN link fails, the Ethernet Module auto switches to the backup WAN link. When the primary WAN link is available again, the Ethernet Module auto switches back to the primary WAN path. This configuration will not function properly in TOGGLE mode, since the connection between the Ethernet Module Network Port and the far side router is not affected by switching the C port connection state.



6. SNMP/Web Setup

To perform the initial setup of an Ethernet Controller Card so that it can be remotely accessed over an Ethernet network, you will need a serial terminal capable of 9600 baud, no parity, 8 data bits, and 1 stop bit in order to configure the required networking parameters. Connect this terminal to the DB9 CONSOLE port. The necessary connections to a standard IBM compatible PC serial port DB9 connector are as follows:

Table 6.1.1 – DB9 CONSOLE Port Pin Assignment

DB9 CONSOLE	SIGNAL	DIRECTION	HOST DB9
2	RECEIVED DATA	TO HOST	2
3	TRANSMITTED DATA	FROM HOST	3
5	GROUND		5

Apply power to the 1U Two Slot Modular Switch. The Ethernet Module requires approx 5 seconds to boot up, while it performs several internal self tests and initialization tasks. After this process is complete you will see a sign-on message similar to the following on your serial console:

```
Network Agent Version 4_01G DEC 2018
Copyright (c) 2018
All rights reserved
System starting ...
Rack Position A
Console ready

>
```

At this point the Ethernet Module is ready to accept the networking related configuration commands necessary before you will be able to communicate with it over an Ethernet network. You will need to enter an IP address, subnet mask, and gateway address as well as read and write SNMP community names, a telnet password, and/or a web password depending on which of these options you want to use. These parameters must be saved into non-volatile memory, and the system then needs to be reset to allow it to reconfigure with the new settings. Any time one or more of these parameters is changed, they must be saved followed by a system reset. The following shows a typical setup session. Change the entered parameters shown below to suit your application requirements. These networking configuration commands are described in more detail in Section 7.

```
>set ipaddress 192.168.1.200
IP Address: 192.168.1.200

>set subnetmask 255.255.255.0
Subnet Mask: 255.255.255.0
```

```
>set gateway 192.168.1.1
Gateway IP Address: 192.168.1.1

>set readcommunityname public
Read Community Name: public

>set writecommunityname private
Write Community Name: private

>save
saving...
Save complete.

>reset
resetting, please wait...
```

After the system reinitializes, you will again be greeted by the sign-on message as before. You can now attach a CAT5 cable between the Network port on the Ethernet Controller Card and an available port on your Ethernet hub or switch/router. The Ethernet Controller Card will now respond to telnet, SNMP and/or HTTP messages at the assigned IP address depending on which options you enabled on the Controller Card. Section 7 describes the commands that are available via the console prompt (telnet, web, or RS-232 interface). Section 8 describes the operation of the web browser interface, and Section 9 provides a MIB Path Summary that lists the supported SNMP variables and their functions.

7. Console Commands

The following list of commands are available from the console prompt (telnet, web, or RS232 interface) of the Ethernet Controller Card. All commands can entered in any mix of upper or lower case (commands are not case sensitive), although several variable parameters are case sensitive (read/write community names, plus telnet and web passwords). All commands must be terminated with a carriage return (ASCII 13 or hex 0x0D) before they will be processed. GET, SET, SYSTEM, RACK, and PORT can all be abbreviated by the first letter of the command, allowing shorthand entry of switching commands.

GET ALL
Displays all parameters and settings. An example output is shown here.

```
System Status: A
IP Address: 192.168.1.30
MAC Address: 00 06 57 00 01 02
Subnet Mask: 255.255.255.0
Gateway IP Address: 192.168.1.1
PING Reply: Enabled
SNMP Enable: Enabled
Read Community Name: public
Write Community Name: private
Web Enable: Enabled
Web Password: mctech
Web Timeout: 300
Web Port: 80
Telnet Enable: Enabled
Telnet Password: dataman
Telnet Timeout: 80
Telnet Port: 23
Monitor Interval: 10
Monitor Fail Count: 5
Monitor Ok Count: 5
Monitor Delay Count: 10
Monitor Mode: FAILOVER
AutoSwitch Mode: NORMAL
AutoSwitch Trip Point: 0
Monitor IP Status: 0 UP, 0 DOWN, 0 ASSIGNED, 256 AVAILABLE
Monitor Times: ALWAYS ON, Current Day: 1 MONDAY
Date: 01/16/2012 Time: 09:25:54
Authentication Trap: Disabled
Alert Type: TRAP
```

```
Alert Interval: 0 - Single
Event Log Count: 1
ADMIN IP Addresses: 0 ASSIGNED, 8 AVAILABLE
SNMP Managers: 1 ASSIGNED, 15 AVAILABLE
Model 2: 4_01G DEC 2018, Rev. 612.A
```

GET VERSION
Displays the software revisions of the Ethernet Module and firmware on the Ethernet Controller Card.

```
Model 2: 4_01G DEC 2018, Rev. 612.A
```

GET VERSION N
Displays the software revisions of the Ethernet module and firmware on the Controller Card in Rack N. If Rack N is not present, the Controller Card firmware will be shown as "no response".

```
Model 2: 4_01G DEC 2018, Rev. 612.A
```

GET SYSTEM
Displays the system status. This is the same as the status returned by the SNMP variable abSystemGangPort. The GET SYSTEM command is meaningful only if you exclusively use the SET SYSTEM command to control the state of all of the A/B switch cards simultaneously. The GET SYSTEM command queries rack 1 for status and assumes that all other racks in the system are in the same connection state. It will report "A" if any cards in the first rack are in position A, "B" if all cards in the first rack are in position B, and "X" if there are no cards installed in the first rack.

```
System Status: A
```

SET SYSTEM A[B]
Sets the entire system (all connected racks) to position A or B.

GET RACK N
Displays status of rack N (1-255). This is the same as the status returned by the SNMP variable abRackCards. It displays a 16 character string showing the status of each card slot. The 1U Two Slot Modular Switch rack address is 1.

```
Rack Status: XXXBXXBXXXXBXAXX
```

SET RACK N A[B]
Sets the entire addressed rack N (1-255) to position A or B.

GET PORT N
Displays the status of A/B switch card N (1-4080). Switch card addresses are assigned using the formula N = 16*(rack address – 1) + slot# The response will be "A", "B", or "X" (if not present). The 1U Two Slot Modular Switch card addresses are fixed at 1 and 2.

```
Port Status: B
Port Status: X
```

SET PORT N A[B]
Sets the addressed A/B switch card N (1-4080) to position A or B. Switch card addresses are assigned using the formula N = 16*(rack address – 1) + slot#

GET EVERYRACK
Displays status of all racks (1 thru 255). This command displays the "Rack Status" for racks 1 thru 255, stopping when it reaches rack 255 or encounters a "no response" from the requested rack. This is the same as the status returned by the SNMP variable abRackCards. It displays a 16 character string showing the status of each card slot.

```
Rack 1 Status: AAAABBAABBBBAABB
Rack 2 Status: AAAABBBBXXXXXXXX
Rack 3 Status: no response
```

GET EVERYRACK N
Displays status of rack (1 thru N). This command displays the "Rack Status" for racks 1 thru N, stopping when it reaches rack N or encounters a "no response" from the requested rack. This is the same as the status returned by the SNMP variable abRackCards. It displays a 16 character string showing the status of each card slot.

```
Rack 1 Status: AAAABBAABBBBAABB
Rack 2 Status: AAAABBBBXXXXXXXX
Rack 3 Status: no response
```

GET POWER N
Displays the status of the power supplies for rack N. If only one power supply is being used to power the rack or if one of the supplies in a dual powered rack is down, the response will be "One Supply Down". If two supplies are used and both are operational, the response will be "Two Supplies".

```
Power Status: One Supply Down
Power Status: Two Supplies
```

GET GROUPS N
Displays the group settings for rack N. One character for each of the sixteen cards in the rack. Any character can be used to label a group, except "0" which indicates independent and upper case "X" which skips a position (retains the previously assigned group character). All cards in a group follow any switching command to any card in the group.

```
Rack Groups: 1111222233334444
```

SET GROUPS N [string]
Set the group settings for rack N. One character for each of the sixteen cards in the rack. Any character can be used to label a group, except "0" which indicates independent and upper case "X" which skips a position (retains the previously assigned group character). All cards in a group follow any switching command to any card in the group.

GET TYPES N
Displays the switch card types for rack N. One character for each of the sixteen cards in the rack.
Type 0 = Empty, or Not Available
Type 1 = A/B Switch

```
Rack Types: 1111111100000000
```

SET IPADDRESS X.X.X.X
GET IPADDRESS
Set or display the current IP address of the Ethernet module on the Controller Card. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET SUBNETMASK X.X.X.X
GET SUBNETMASK
Set or display the current subnet mask of the Ethernet module. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET GATEWAY X.X.X.X
GET GATEWAY
Set or display the gateway router's IP address. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET PINGREPLY ON[OFF]
GET PINGREPLY
Set or display whether or not the Ethernet module will respond to incoming PINGs (ICMP echo requests). Any change will not become permanent until a SAVE operation is performed.

SET SNMPENABLE ON[OFF]
GET SNMPENABLE
Set or display whether or not the SNMP interface on the Ethernet module is enabled. Any change will not become permanent until a SAVE operation is performed.

SET READCOMMUNITYNAME string
GET READCOMMUNITYNAME
SET WRITECOMMUNITYNAME string
GET WRITECOMMUNITYNAME
Set or display the current read or write community name as specified. Any mix of upper/lower case letters (passwords are case sensitive), numerals, and/or printable symbols can be used. The password must be at least 1 char and no more than 23 chars in length. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET WEBENABLE ON[OFF]
GET WEBENABLE
Set or display the current state of web based access. The Ethernet module will not accept any HTTP requests when web enable is off. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET WEBPASSWORD string
GET WEBPASSWORD
Set or display the current web password. Any mix of upper/lower case letters (passwords are case sensitive), numerals, and/or printable symbols can be used. The password must be at least 1 char and no more than 23 chars in length. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET WEBTIMEOUT seconds
GET WEBTIMEOUT
Set or display the current web timeout in seconds. After a period of inactivity of this many seconds, the Ethernet module will request a login. Note that the web timeout cannot be disabled, for security reasons, it can however, be set arbitrarily large.

SET WEBPORT N
GET WEBPORT
Set or display the current web port number. Changing the web port number from the default can be used to provide an additional level of security. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET TELNETENABLE ON[OFF]
GET TELNETENABLE
Set or display the current state of telnet based access. The Ethernet module will not accept any telnet requests when telnet enable is off. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET TELNETPASSWORD string
GET TELNETPASSWORD
Set or display the current telnet password. Any mix of upper/lower case letters (passwords are case sensitive), numerals, and/or printable symbols can be used. The password must be at least 1 char and no more than 23 chars in length. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET TELNETTIMEOUT seconds
GET TELNETTIMEOUT
Set or display the current telnet timeout in seconds. After a period of inactivity of this many seconds, the Ethernet module will disconnect any current telnet session. Note that the telnet timeout cannot be disabled, it can however, be set arbitrarily large.

SET TELNETPORT N
GET TELNETPORT
Set or display the current telnet port number. Changing the telnet port number from the default can be used to provide an additional level of security. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET MONITORIP N [X.X.X.X]
GET MONITORIP N
GET MONITORIP
Set or display the IP address(s) of the device(s) that the Ethernet module is to PING to determine the Link State (UP) or (DOWN). The Ethernet module can monitor several IP addresses. Setting a Monitor IP address to 0.0.0.0 will remove it from the monitored list. If all Monitor IP addresses are set to 0.0.0.0, the auto switch/recovery function and the LINK UP/DOWN alert function are disabled. Any change will not become permanent until a SAVE operation is performed. The Ethernet module will send TRAP or SYSLOG messages when a Monitored Port Link State changes. The Monitor IP addresses can also be used to control an optional auto switch/recovery function. If enabled, the auto switch/recovery function will cause the 1U Two Slot Modular Switch to auto-switch to the normal path (B), connecting port B to the common port when all monitored port links are UP. When any of the monitored port links are DOWN, the auto switch/recovery function will cause the 1U Two Slot Modular Switch to auto-switch to the bypass path (A), connecting port A to the common port. See the AUTOSWITCHTRIP description for an explanation of the auto-switch trip point.

SET MONITORIPRANGE N [X.X.X.S E]
Set a range of Monitor IP addresses with a single command. N is the index of the starting entry in the Monitor IP address table. Valid index is 1 to 256. S is the last octet value of the Starting Monitor IP address, while E is the last octet value of the Ending Monitor IP address. For example to monitor all IP addresses 192.168.1.1 through 192.168.1.150, use the following command SET MONITORIPRANGE 1 192.168.1.1 150. This command will place 150 addresses in the Monitor IP address table. Any change will not become permanent until a SAVE operation is performed.

SET MONITORINTERVAL [N]
GET MONITORINTERVAL
Set or display the time interval between PINGs issued by the internal Ethernet module, measured in 100 msec increments. To issue PINGs every 1.5 seconds, set this value to 15. The valid range is 1 to 255 (0.1 seconds to 25.5 seconds). A value of 0 disables the automatic switch/recovery function. Any change will not become permanent until a SAVE operation is performed.

SET MONITORFAILCOUNT [N]
GET MONITORFAILCOUNT
Set or display the number of successive PING attempts that must fail before the Ethernet module automatically switches to the alternate paths and removes the normal path connection paths. The valid range is 1 to 255. In FAILOVER MODE, a value of 0 disables the automatic bypass function, however automatic recovery will still operate if enabled. The LINK UP/DOWN alert function will still operate, and will report a monitored port Link State as DOWN each time a PING fails if the Link State was previously UP. When automatic bypass is enabled and any monitored port Link State is DOWN, the 1U Two Slot Modular Switch will perform an auto-switch to the bypass path (A), connecting port A to the common port. Any change will not become permanent until a SAVE operation is performed.

SET MONITOROKCOUNT [N]
GET MONITOROKCOUNT
Set or display the number of successive PING attempts that must succeed before the Ethernet module automatically switches back to the normal paths and removes the alternate connection paths. The valid range is 1 to 255. In FAILOVER MODE, a value of 0 disables only the automatic recovery function, however automatic bypass will still operate if enabled. The LINK UP/DOWN alert function will still operate, and will report a monitored port Link State as UP each time a PING succeeds if the Link State was previously DOWN. If auto recovery is disabled the user must manually switch back to the normal path via the front panel toggle switch or by issuing a “set system B” command. When automatic recovery is enabled and ALL monitored ports Link State is UP, the 1U Two Slot Modular Switch will perform an auto-switch to the normal path (B), connecting port B to the common port. Any change will not become permanent until a SAVE operation is performed.

SET MONITORDELAYCOUNT [N]
GET MONITORDELAYCOUNT
Set or display the Monitor Delay Count. This parameter is the number of PING attempts to delay auto-switching action following a “system” switching event or “auto-switching” event. The auto-switch logic uses MONITORFAILCOUNT and MONITOROKCOUNT to determine if a non-zero monitor IP address LINK is UP or DOWN. If the number of non-zero monitor IP LINKs DOWN is greater than the auto-switch trip point or ALL non-zero monitor IP LINKs are DOWN, the auto-switch feature will FAILOVER to the “failover” connection state, or

TOGGLE the connection state, depending on the MONITORMODE setting. The MONITORDELAYCOUNT provides a delay after "system" or "auto" switching to allow the monitored LINK(s) state to change from DOWN to UP or vice versa. The MONITORDELAYCOUNT should be set to a value larger than MONITOROKCOUNT or MONITORFAILCOUNT to allow time for the monitored IP addresses to respond. If monitoring more than one MONITORIP address, the MONITORDELAYCOUNT will need to be adjusted to allow time for ALL monitored IP addresses to respond. The valid range is 0 to 255. Any change will not become permanent until a SAVE operation is performed.

SET MONITORMODE [FAILOVER/TOGGLE]
GET MONITORMODE
Set or display the Monitor Mode. In FAILOVER mode, the auto-switching function switches to the "failover" connection state (all COMMON ports are connected to their respective A ports) when PING attempts fail, and if configured to auto-recover, switches to the "normal" connection state (all COMMON ports are connected to their respective B ports) when PING attempts succeed. In TOGGLE mode, the auto-switching function toggles the connection state (A to B, or B to A) when PING attempts fail, and maintains the connection state when PING attempts succeed. TOGGLE mode is not allowed when AutoSwitch mode is BYPASS. Any change will not become permanent until a SAVE operation is performed.

SET MONITORTIMES N [X.X.X.X]
GET MONITORTIMES N
GET MONITORTIMES
Set or display the Monitor Start and End Times for each day of the week. For N (1 = MONDAY, 2 = TUESDAY, 3 = WEDNESDAY, 4 = THURSDAY, 5 = FRIDAY, 6 = SATURDAY, 7 = SUNDAY). A GET without specifying the N (day) will return the start and end monitoring times for all days. A GET will return a string similar to the following: (Day 3 WEDNESDAY S: 06:30 E: 18:45) which represents WEDNESDAY Start Monitor Time 6:30 AM, End Monitor Time 6:45 PM. To SET the Monitor Times for TUESDAY to Start at 5:00 AM and End at 7:50 PM, enter the following command: "SET MONITORTIMES 2 5:00 19:50". When the MONITORINTERVAL is not zero and there is at least one non-zero MONITORIP, the Network Monitor will monitor the non-zero ports, and maintain the Link State (UP or DOWN) for each non-zero port. The purpose of the Monitor Times is to set a window for reporting (sending TRAP or SYSLOG messages) and for auto-bypass/recovery switching. If the current Time is outside the Monitor Times for the current Day, the Network Monitor will not report on the status of the monitored ports and will not auto-switch. Setting the Monitor Times to 00:00 00:00 will cause the Network Monitor to report status on the monitored ports and auto-switch if enabled, independent of the current Day and Time.

SET AUTHENTICATIONTRAP ON[OFF]
GET AUTHENTICATIONTRAP
Set or display the current state of authentication error traps. Authentication traps will be generated when this parameter is set to ON, and not when OFF. Note that this setting only affects the trap generation, and not how the Ethernet module handles an authentication failure. An authentication failure generally means that an SNMP access was attempted with an incorrect community name. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET ALERTTYPE [TRAP/SYSLOG]
GET ALERTTYPE
Set or display the type of alert messages sent by the Ethernet module when certain events such as a change in switch state occur. The Ethernet module can be configured to issue either syslog messages, or SNMP traps. Note that at least one IP address must be entered using the "SET MANAGER N X.X.X.X" command before either syslog messages or traps will be issued. See section 9 for a list of the supported traps, and see section 10 for a list of the supported syslog messages.

SET ALERTINTERVAL [N]
GET ALERTINTERVAL
Set or display the time interval between Monitored Port status update TRAP or SYSLOG messages, measured in minute increments. The Network Monitor will issue a TRAP or SYSLOG message each time a monitored port Link State changes. Additionally, at the Alert Interval in minutes, it will send a TRAP or SYSLOG message for each monitored port with Link State DOWN. The valid range is 1 to 255 (minutes). A value of 0 sets it to "Single" mode. In "Single" mode, a single TRAP or SYSLOG message is sent for each monitored port Link State change. Any change will not become permanent until a SAVE operation is performed.

SET AUTOSWITCH [NORMAL/BYPASS]
GET AUTOSWITCH
Set or display the Auto-Switch Mode. If Auto-Bypass is enabled, the 1U Two Slot Modular Switch will Auto-Switch to the bypass path (A), connecting port A to the common port when any monitored port Link State is DOWN. If Auto-Recovery is enabled, the 1U Two Slot Modular Switch will Auto-Switch to the normal path (B), connecting port B to the common port when ALL monitored port Link States are UP. In NORMAL Auto-Switch Mode, the Auto-Switch function will continue to Auto-Switch to the appropriate bypass/normal path depending on the Link State of the monitored ports, overriding any user selection. In BYPASS Auto-Switch Mode, the Auto-Switch function will Auto-Switch on changes to monitored port Link State. When in BYPASS mode, if a monitored port Link State changes from UP to DOWN, or if the status changes from one monitored port DOWN to all monitored ports UP, the Auto-Switch function will Auto-Switch as appropriate. However, the user may bypass this Auto-Switch feature and manually force a change in the connection path until another monitored port Link State changes. BYPASS mode is not allowed when Monitor Mode is TOGGLE. Any change will not become permanent until a SAVE operation is performed.

SET AUTOSWITCHTRIP [N]
GET AUTOSWITCHTRIP
Set or display the auto-switch trip point. When auto switch/recover function is enabled, the auto-switch trip point sets the number of monitored ports which can have a Link State of DOWN before auto-switching to the bypass path (A), connecting port A to the common port. If the number of monitored ports which have a Link State of DOWN is greater than the auto-switch trip point, the 1U Two Slot Modular Switch will auto-switch to the bypass path. The valid range is 0 to 255. Any change will not become permanent until a SAVE operation is performed.

SET DAY
GET DAY
Set or display the day of the week. The DAY and TIME are used in conjunction with the Monitor Times for reporting and auto-switching functions. For a SET, enter the text for the desired DAY (MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, or SUNDAY). When a GET DAY is received, it will display a number associated with the DAY string, which corresponds to the number in the Monitor Times list. The DAY is not preserved through a loss of power. If this feature is required for your application, the Ethernet Controller card is available with a battery backed Real-Time-Clock.

SET TIME
GET TIME
Set or display the time of day, using a 24 hour clock from 00:00 to 23:59. To set the time, enter the time in hours and minutes as follows: To set the time for 6:30AM “SET TIME 06:30” and for 5:45PM “SET TIME 17:45”. The TIME is not preserved through a loss of power. If this feature is required for your application, the Ethernet Controller card is available with a battery backed Real-Time-Clock.

SET DATE [MM/DD/YYYY]
GET DATE
Set or display the date, using a two digits for month (1 through 12), two digits for day (1 through 31), and four digits for the year up to 9999. The DATE is not preserved through a loss of power. If this feature is required for your application, the Ethernet Controller card is available with a battery backed Real-Time-Clock. To allow the user to enter the year with only two digits, the “Base Year” is maintained if a SAVE is performed. The term “Base Year” as used here means the year with the last two digits set to zero. For the Year 2012, the “Base Year” is 2000.

SET ADMINIP N X.X.X.X
Set administrator N (1-8) IP address. Up to 8 different administrator IP addresses can be entered. To remove an entry from the list, set the IP address to 0.0.0.0. If all 8 ADMIN IP addresses are 0.0.0.0 (no ADMIN IP addresses are configured) the Ethernet module will allow access via the Ethernet interface from any IP address, subject to the existing password and enable flags for each interface. If one or more ADMIN IP addresses are non-zero, the Ethernet module will only process messages received from the configured (non-zero) ADMIN IP addresses. All other messages will be ignored. This ADMIN IP address filtering feature applies to the telnet, web browser and SNMP Ethernet interfaces and to the PING reply functions. The ADMIN IP address filtering does not affect outgoing PING and ARP messages so the Ethernet module is still able to monitor any IP address for the “auto-switch” features. The administrator IP addresses can be different than the manager IP addresses. Any change will not become permanent until a SAVE operation is performed.

GET ADMINIP N
Display the IP address of administrator N (1-8). If no value is entered for "N", then all administrator IP addresses will be displayed.

```
ADMIN IP Addresses:
1: 192.168.1.113
2: 192.168.1.115
3: 192.168.1.149
4: 192.168.1.100
```

GET ADMINIP
Display all administrator IP addresses.

SET MANAGER N X.X.X.X
Set SNMP manager N (1-16) IP address. Up to 16 SNMP MANAGER IP addresses can be entered for destinations of trap messages. Trap messages will be sent to all enabled MANAGER IP addresses. To remove an entry from the list, set the IP address to 0.0.0.0.

GET MANAGER N
Display SNMP manager N (1-16) IP address. If no value is entered for "N", then all SNMP manager IP addresses will be displayed.

```
SNMP Managers:
1: 192.168.1.113
2: 192.168.1.115
3: 192.168.1.149
4: 192.168.1.100
```

GET MANAGER
Display all SNMP manager IP addresses.

PING X.X.X.X
Causes the Ethernet module to issue a single ICMP echo request packet to the designated IP address. If a response is received, the Ethernet module will display the message "Reply from X.X.X.X". If no response is received within 5 seconds, the Ethernet module will display the message "Request timed out".

GET EVENTLOG
SET EVENTLOG
The Event Log stores the most recent 32 traps. The Event Log is reset if power is lost, or the Ethernet module is reset. The GET EVENTLOG command displays the Event Log in a format similar to SYSLOG messages. The SET EVENTLOG command clears the Event Log.

SAVE
Save settings for next startup. All settings are stored in NV memory and restored upon power on. Changes to parameters will not become permanent unless a SAVE operation is performed.

RESET
Causes the Ethernet module to reboot and reloads all parameters from stored settings. About 10 seconds after receiving the RESET command, the Ethernet module reboots, which then takes approx 5 additional seconds to reboot completely.

SET DEFAULTS
Restore user default settings. A SAVE operation is required to make the changes permanent.

?
HELP
Displays a list of commands.

```
CONSOLE COMMANDS:
GET         ALL (display all parameters)
GET         VERSION (display rack 1 software versions)
GET         VERSION N (display rack N software versions)
GET[SET]    SYSTEM [A/B] (control all system ports)
GET[SET]    RACK N [A/B] (control single rack ports)
GET[SET]    PORT N [A/B] (control single port)
GET         EVERYRACK (display status for all racks)
GET         EVERYRACK N (display status for racks 1 thru N)
GET         POWER N (display power status)
GET[SET]    GROUPS N [string] (control single rack groups)
GET         TYPES N (display single rack types)
GET[SET]    IPADDRESS [X.X.X.X]
GET[SET]    SUBNETMASK [X.X.X.X]
GET[SET]    GATEWAY [X.X.X.X]
GET[SET]    PINGREPLY [ON/OFF]
GET[SET]    SNMPENABLE [ON/OFF]
GET[SET]    READCOMMUNITYNAME [string]
GET[SET]    WRITECOMMUNITYNAME [string]
GET[SET]    WEBENABLE [ON/OFF]
GET[SET]    WEBPASSWORD [string]
GET[SET]    WEBTIMEOUT [N] (seconds)
GET[SET]    WEBPORT [N]
GET[SET]    TELNETENABLE [ON/OFF]
GET[SET]    TELNETPASSWORD [string]
GET[SET]    TELNETTIMEOUT [N] (seconds)
GET[SET]    TELNETPORT [N]
GET[SET]    MONITORIP N [X.X.X.X] (0.0.0.0 to disable)
GET         MONITORIP (display all monitor IP addresses)
SET         MONITORIPRANGE N [X.X.X.S E] (N=Index,S=Start,E=End)
GET[SET]    MONITORMODE [FAILOVER/TOGGLE]
GET[SET]    MONITORDELAYCOUNT [N]
GET[SET]    MONITORINTERVAL [N] (1/10 seconds, 0 to disable)
GET[SET]    MONITORFAILCOUNT [N] (0 = no auto bypass)
GET[SET]    MONITOROKCOUNT [N] (0 = no auto recover)
GET[SET]    MONITORTIMES N HH:MM HH:MM (0:0 0:0 Always ON)
GET         MONITORTIMES (display all monitor times)
GET[SET]    AUTHENTICATIONTRAP [ON/OFF]
GET[SET]    ALERTTYPE [TRAP/SYSLOG]
GET[SET]    ALERTINTERVAL [N] (1 - 255 minuttes, 0 for single)
GET[SET]    AUTOSWITCH [NORMAL/BYPASS]
GET[SET]    AUTOSWITCHTRIP [N] (0 - 255, Auto-Switch Trip Point)
GET[SET]    DAY [MONDAY/TUESDAY/...]
GET[SET]    TIME [HH:MM] (HOUR 0 - 23, MINUTE 0 - 59)
GET[SET]    DATE [MM/DD/YYYY] (two digit month and day, four digit year)
GET[SET]    ADMINIP N [X.X.X.X] (0.0.0.0 to disable an entry)
GET         ADMINIP (display all administrator IP addresses)
GET[SET]    MANAGER N [X.X.X.X] (0.0.0.0 to disable an entry)
GET         MANAGER (display all SNMP managers)
PING        X.X.X.X (ICMP ECHO to remote host)
GET[SET]    EVENTLOG (GET to display event log, SET to clear event log)
SAVE        save settings for next startup
RESET       restart (use after SAVE)
SET         DEFAULTS (restore default user settings, save required)
```

8. Web Interface

The Ethernet Controller Card also provides access to the console commands listed in Section 7 through a web browser interface. When enabled (see SET WEBENABLE command) accessing the default page on the Ethernet enabled Controller Card (by entering the Ethernet module's IP address in the address bar of your web browser application e.g. Internet Explorer, Netscape, etc) will present the following page:

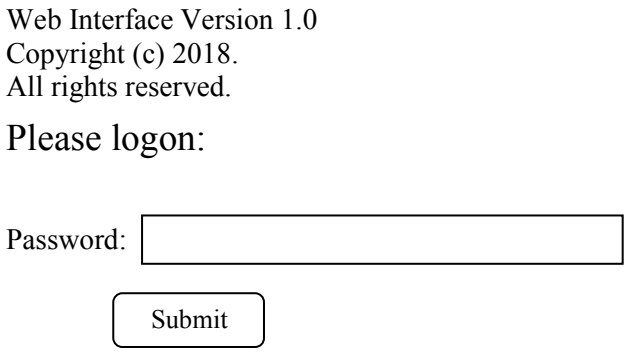


Figure 8.1 Logon Screen

Note: If using a pop up blocker on your web browser, be sure to allow pop ups from the IP address of the 1U Two Slot Modular Switch, otherwise you could experience trouble receiving a response through the web interface.

After successfully entering the correct web password (see SET WEBPASSWORD command) you will get the command console page shown in Figure 8.2.

IMPORTANT: Do **NOT** click on the "submit" button or press the "enter" key on your keyboard multiple times. The web browser interface on the Ethernet Controller Card can take up to 5 to 10 seconds to process a command and return a response. Clicking on "submit" or hitting "enter" multiple times while the Ethernet Controller Card is processing a command can cause it to decide that the interface is not functioning properly. If this happens, the Ethernet Controller Card will become non-responsive until it receives a valid login request i.e. you must re-enter the Ethernet Controller Card's IP address in the address bar of your web browser, and then re-logon when the logon screen appears.

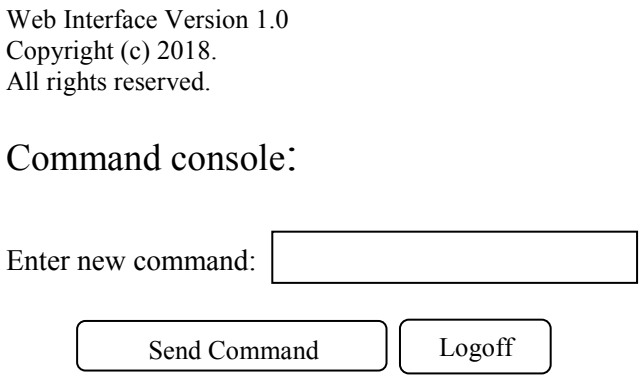


Figure 8.2 Initial Command Screen

At this point you may enter any valid command into the text box and click “Send Command” to execute (see Section 7 for a complete description of the console commands). The following is an example result of the GET SYSTEM command.

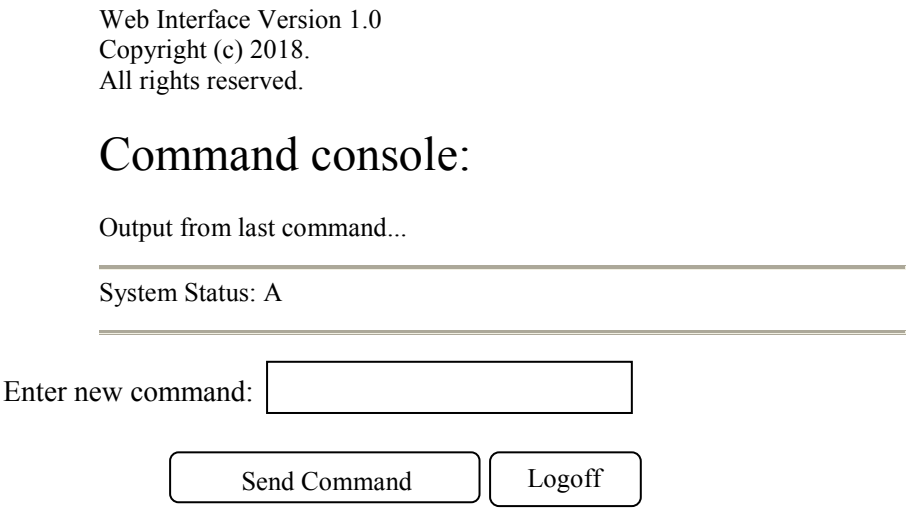


Figure 8.3 Example Command Results Screen for GET SYSTEM command

The Ethernet Controller Card will allow only 1 telnet or web access session at a time. For this reason, the web timeout and telnet timeout parameters should be set to reasonable timeout values. To free up a session without waiting for the web timeout, click “Logoff”. Typing “quit” at the telnet prompt will similarly close a telnet session. Resetting the Ethernet module will also clear any existing web or telnet sessions.

9. MIB Path Summary

*** NOTE: The MIB contains definitions that do not apply to every product.**

[internet] – 1.3.6.1
  [private] – 1.3.6.1.4
    [enterprises] – 1.3.6.1.4.1
      [mctech] – 1.3.6.1.4.1.9477

[mctech] – 1.3.6.1.4.1.9477
        private enterprise number

[mcAgent] – 1.3.6.1.4.1.9477.1
        SNMP Agent

[abSwitchSystem] – 1.3.6.1.4.1.9477.1.4
        A/B Switch System

        [abSystemGangPort] – 1.3.6.1.4.1.9477.1.4.1

        [abRackTable] – 1.3.6.1.4.1.9477.1.4.2
                [abRackIndex] – 1.3.6.1.4.1.9477.1.4.2.1.1.RackIndex
                [abRackGangPort] – 1.3.6.1.4.1.9477.1.4.2.1.2.RackIndex
                [abRackKeyStat] – 1.3.6.1.4.1.9477.1.4.2.1.3.RackIndex
                [abRackPowerStat] – 1.3.6.1.4.1.9477.1.4.2.1.4.RackIndex
                [abRackSoftwareVersion] – 1.3.6.1.4.1.9477.1.4.2.1.5.RackIndex
                [abRackName] – 1.3.6.1.4.1.9477.1.4.2.1.6.RackIndex
                [abRackCards] – 1.3.6.1.4.1.9477.1.4.2.1.7.RackIndex
                [abRackGroups] – 1.3.6.1.4.1.9477.1.4.2.1.8.RackIndex
                [abRackHealth] – 1.3.6.1.4.1.9477.1.4.2.1.9.RackIndex

[abSwitchTable] – 1.3.6.1.4.1.9477.1.4.3
[abSwitchIndex] – 1.3.6.1.4.1.9477.1.4.3.1.1.SwitchIndex
[abSwitchPort] – 1.3.6.1.4.1.9477.1.4.3.1.2.SwitchIndex
[abSwitchSoftwareVersion] – 1.3.6.1.4.1.9477.1.4.3.1.3.SwitchIndex
[abSwitchName] – 1.3.6.1.4.1.9477.1.4.3.1.4.SwitchIndex

[mcIpRequester] – 1.3.6.1.4.1.9477.2
[mcTrapInfo] – 1.3.6.1.4.1.9477.3
[mcGenericTrap] – 1.3.6.1.4.1.9477.3.1
[mcSpecificTrap] – 1.3.6.1.4.1.9477.3.2
[mcManagerTable] – 1.3.6.1.4.1.9477.4
[mcManagerIndex] – 1.3.6.1.4.1.9477.4.1.1.ManagerIndex
[mcManagerIp] – 1.3.6.1.4.1.9477.4.1.2.ManagerIndex
[mcNetworkMonitorObjects] – 1.3.6.1.4.1.9477.6
[mcDay] – 1.3.6.1.4.1.9477.6.1
[mcTime] – 1.3.6.1.4.1.9477.6.2
[mcDate] – 1.3.6.1.4.1.9477.6.3
[mcMonitorInterval] – 1.3.6.1.4.1.9477.6.4
[mcMonitorFailCount] – 1.3.6.1.4.1.9477.6.5
[mcMonitorOkCount] – 1.3.6.1.4.1.9477.6.6
[mcAutoSwitchMode] – 1.3.6.1.4.1.9477.6.7
[mcAutoSwitchTripPoint] – 1.3.6.1.4.1.9477.6.8
[mcAlertType] – 1.3.6.1.4.1.9477.6.9
[mcAlertInterval] – 1.3.6.1.4.1.9477.6.10
[mcAuthTrapEnable] – 1.3.6.1.4.1.9477.6.11
[mcMonitorAlarm] – 1.3.6.1.4.1.9477.6.12
[mcMonitorPortTable] – 1.3.6.1.4.1.9477.6.13
[mcMonitorPortIndex] – 1.3.6.1.4.1.9477.6.13.1.1.MonitorPortIndex
[mcMonitorPortIp] – 1.3.6.1.4.1.9477.6.13.1.2.MonitorPortIndex
[mcMonitorPortLinkState] – 1.3.6.1.4.1.9477.6.13.1.3.MonitorPortIndex
[mcMonitorTimeTable] – 1.3.6.1.4.1.9477.6.14
[mcMonitorTimeIndex] – 1.3.6.1.4.1.9477.6.14.1.1.MonitorTimeIndex
[mcMonitorTimePeriod] – 1.3.6.1.4.1.9477.6.14.1.2.MonitorTimeIndex

Traps generated by the system

coldStart	generic trap 0
authenticationFailure	generic trap 4
abRackKeyLockChange	specific trap 1
abRackGangSwitchChange	specific trap 2
abSwitchCardChange	specific trap 3
abSwitchPortChange	specific trap 4
abSystemGangSwitchChange	specific trap 6
abRackPowerStatChange	specific trap 7
abSystemAutoSwitchChange	specific trap 8
linkStateChangeUP	specific trap 9
linkStateChangeDOWN	specific trap 10

A/B Switch System SNMP Variable Definitions:

[abSystemGangPort] – 1.3.6.1.4.1.9477.1.4.1
A/B Switch System gang port. This variable is used to control all A/B switch cards in the system. A system may consist of up to 255 racks, each rack containing up to 16 A/B switch cards. On a "GET" of this variable, only rack with address 0x01 will respond. If any of the A/B switch cards in rack 0x01 are at position A, the "system" status will be A. If all of the A/B switch cards in rack 0x01 are at position B, the "system" status will be B. If there are no A/B switch cards installed in rack 0x01, the "system" status will be Empty.

[abRackTable] – 1.3.6.1.4.1.9477.1.4.2
A/B Switch Rack variable table. This variable is not directly accessible.

[abRackIndex] – 1.3.6.1.4.1.9477.1.4.2.1.1.RackIndex
Controller Card "Rack" address. The Controller Card address is set via an eight position dip switch on the card. Each Controller Card in the system MUST have a unique address, in the range of 0x01 to 0xFF hex. Address 0x00 is invalid, and must not be used. This is a read only variable.

[abRackGangPort] – 1.3.6.1.4.1.9477.1.4.2.1.2.RackIndex
A/B Switch Rack gang port. This variable is used to control all A/B switch cards in a rack. A rack may contain up to 16 A/B switch cards. On a "GET" of this variable, the addressed rack will respond as follows. If any of the A/B switch cards in the addressed rack are at position A, the "rack" status will be A. If all of the A/B switch cards in the addressed rack are at position B, the "rack" status will be B. If there are no A/B switch cards installed in the addressed rack, the "rack" status will be empty.

[abRackKeyStat] – 1.3.6.1.4.1.9477.1.4.2.1.3.RackIndex
A/B Switch Rack Key-Lock Switch Status. This is a read only variable. This variable can be used to determine if the Key-Lock Switch is in the OFF or ON position. The front panel switches in the rack are disabled when the Key-Lock Switch is in the OFF position. The A/B Switches will still respond to switch control signals and commands from the GANG-IN and GANG-OUT ports.

[abRackPowerStat] – 1.3.6.1.4.1.9477.1.4.2.1.4.RackIndex
A/B Switch Rack Power Status. This is a read only variable.
On the Controller Card, there are two DC power entry connectors. If power is applied to both power entry connectors, the Power Status will report "TwoSupplies". If power is applied to only one of the power entry connectors, the Power Status will report "One Supply Down".

[abRackSoftwareVersion] – 1.3.6.1.4.1.9477.1.4.2.1.5.RackIndex
Controller Card Software Version. This is a read only variable, and is limited to a maximum of 14 characters.

[abRackName] – 1.3.6.1.4.1.9477.1.4.2.1.6.RackIndex
Controller Card Identification String. The string is limited to a maximum of 14 characters.

[abRackCards] – 1.3.6.1.4.1.9477.1.4.2.1.7.RackIndex
A/B Switch Rack Card Status / Control, One character for each of the sixteen cards in the rack. Card slots which are not populated will be represented by an X character. Characters represent Card slots 1 through 16, from left to right. This variable may be used to set any or all cards in a rack with a single command. When setting, enter one character for each card in the rack, up to 16 characters. Valid characters are A, B, or X to leave a card unchanged. When set with a single character, this command functions the same as a set abSwitchPort command. When set with more than one character, this command overrides any group settings in place (see abRackGroups for more information on group settings).

[abRackGroups] – 1.3.6.1.4.1.9477.1.4.2.1.8.RackIndex
A/B Switch Rack Group Status / Control, One character for each of the sixteen cards in the rack. Any character can be used to label a group, except “0” which indicates independent and upper case “X” which skips a position (retains the previously assigned group character). All cards in a group follow any switching command to any card in the group.

[abRackHealth] – 1.3.6.1.4.1.9477.1.4.2.1.9.RackIndex
A/B Switch Rack Configuration Status, One character for each of the sixteen cards in the rack. This is a read only variable is a string of 16 characters. A “1” will be displayed for card slots which are populated, and a “0” will be displayed for card slots which are not populated.

[abSwitchTable] – 1.3.6.1.4.1.9477.1.4.3
A/B Switch Rack variable table. This variable is not directly accessible.

[abSwitchIndex] – 1.3.6.1.4.1.9477.1.4.3.1.1.SwitchIndex
A/B Switch “Card” address. Each A/B switch card address is determined by the position it is installed in the rack and the address of the rack. The formula used to determine the switch card’s address is:
card address = 16 * (rack address – 1) + slot #
For example A/B Switch cards 1 through 16 are in rack 1, and A/B Switch cards 17 through 32 are installed in rack 2, and so on up to A/B Switch cards 4065 through 4080 are installed in rack 255.

[abSwitchPort] – 1.3.6.1.4.1.9477.1.4.3.1.2.SwitchIndex
A/B Switch Card connected port. This variable is used to control which port on the A/B switch card is connected to the common port on the switch card. When set to A, the switch card will connect port A to port C. When set to B, the switch card will connect port B to port C. When queried, the status of the A/B switch card will be reported as A or B if the addressed card slot is populated, or the status will be “Empty” if the addressed card slot is empty.

[abSwitchSoftwareVersion] – 1.3.6.1.4.1.9477.1.4.3.1.3.SwitchIndex
A/B Switch Card Software Version. This is a read only variable, and is limited to a maximum of 14 characters. The Controller Card reports “N/A” for the switch card software version.

[abSwitchName] – 1.3.6.1.4.1.9477.1.4.3.1.4.SwitchIndex
A/B Switch Card Identification String. The string is limited to a maximum of 14 characters.

[mcIpRequester] – 1.3.6.1.4.1.9477.2
The IP address of the remote entity that last accessed branch 1.3.6.1.4.1.9477.1. This variable can be used to identify the last IP address to access any mcAgent variable. It is returned in the authenticationFailure message.

[mpTrapInfo] – 1.3.6.1.4.1.9477.3
Group of trap information variables. This variable is not directly accessible.

[mcGenericTrap] – 1.3.6.1.4.1.9477.3.1
Indication of generic trap events. This variable is bit mapped such that bit 0 is trap 0, bit 1 is trap 1, etc. Write an integer with 1 in bit positions to clear particular trap indications. For example write 17 to clear traps 0 & 4.

[mcSpecificTrap] – 1.3.6.1.4.1.9477.3.2
Indication of specific trap events. This variable is bit mapped such that bit 1 is trap 1, bit 2 is trap 2, etc. Write an integer with 1 in bit positions to clear particular trap indications. For example write 18 to clear traps 1 & 4.

[mcManagerTable] – 1.3.6.1.4.1.9477.4
Table for SNMP Manager IP addresses. This variable is not directly accessible.

[mcManagerIndex] – 1.3.6.1.4.1.9477.4.1.1.ManagerIndex
Index used to identify unique entries in the Manager IP address table.

[mcManagerIp] – 1.3.6.1.4.1.9477.4.1.2.ManagerIndex
SNMP Manager IP address. Destination IP address for TRAP or SYSLOG messages.

[mcNetworkMonitorObjects] – 1.3.6.1.4.1.9477.6
Group of Network Monitor Object variables. This variable is not directly accessible.

[mcDay] – 1.3.6.1.4.1.9477.6.1
Current day identification number, used to identify which monitor times should be used.

[mcTime] – 1.3.6.1.4.1.9477.6.2
Current time. Used with monitor start and end times to determine if action should be taken. Also used to timestamp TRAP or SYSLOG messages.

[mcDate] – 1.3.6.1.4.1.9477.6.3
Current Date. Used to timestamp TRAP or SYSLOG messages.

[mcMonitorInterval] – 1.3.6.1.4.1.9477.6.4
Monitor Interval in 1/10 seconds, 0 to disable network monitor function. Used to specify the time between PING attempts.

[mcMonitorFailCount] – 1.3.6.1.4.1.9477.6.5
Monitor Fail Count, 0 to disable auto-fail switch to A. Also used as successive PING failure count to declare Link State DOWN.

[mcMonitorOkCount] – 1.3.6.1.4.1.9477.6.6
Monitor OK Count, 0 to disable auto-recover switch to B. Also used as successive PING success count to declare Link State UP.

[mcAutoSwitchMode] – 1.3.6.1.4.1.9477.6.7
Auto-Switch Mode, NORMAL will switch to A when ANY monitored Link is DOWN, and will switch to B when ALL monitored Links are UP. NORMAL mode switches continuously. BYPASS will switch to A when a new monitored Link goes DOWN and will switch to B when ALL monitored Links go UP. BYPASS mode switches on Link state changes, allowing the user to BYPASS the Auto-Switch state until a new Link goes DOWN or all Links go UP. BYPASS mode is not allowed when Monitor Mode is TOGGLE.

[mcAutoSwitchTripPoint] – 1.3.6.1.4.1.9477.6.8
Auto-Switch Trip Point, 0 - Auto-Switch when ANY monitored Link is DOWN. For values from 1 - 255, Auto-Switch when the number of monitored Links DOWN is greater than the Auto-Switch Trip Point. Note: when ALL monitored Links are DOWN, Auto-Switching will occur if enabled.

[mcAlertType] – 1.3.6.1.4.1.9477.6.9
Alert Type, TRAP or SYSLOG message.

[mcAlertInterval] – 1.3.6.1.4.1.9477.6.10
Alert Interval, in minutes (1 - 255), 0 = single alert. Reports all Monitored Links that are DOWN.

[mcAuthTrapEnable] – 1.3.6.1.4.1.9477.6.11
Authentication TRAP Enable/Disable. When enabled, an Authentication error trap is sent to the SNMP manager(s) when an SNMP access is attempted with an incorrect community name.

[mcMonitorAlarm] – 1.3.6.1.4.1.9477.6.12
Monitor Alarm state follows auto-switch logic. The Alarm state may drive a LED and/or a set of relay contacts. The user may set the alarm state to test the alarm output or to clear or quiet an alarm while corrective action is taken. Setting the alarm state while auto-switching is enabled in normal mode will cause an auto-switch action.

[mcMonitorPortTable] – 1.3.6.1.4.1.9477.6.13
Table for Monitored Port IP and Link State variables. This variable is not directly accessible.

[mcMonitorPortIndex] – 1.3.6.1.4.1.9477.6.13.1.1.MonitorPortIndex
Index used to uniquely identify a Monitor Port IP and Link State.

[mcMonitorPortIp] – 1.3.6.1.4.1.9477.6.13.1.2.MonitorPortIndex
Monitored Port IP address. Non-zero monitor IP addresses will be monitored using PING requests.

[mcMonitorPortLinkState] – 1.3.6.1.4.1.9477.6.13.1.3.MonitorPortIndex
Monitored Port Link State. When a new monitor port IP address is assigned, its Link state is unknown. After MonitorFailCount successive failed PING requests, the Link state is changed to DOWN. After MonitorOkCount successive successful PING requests, the Link state is changed to UP.

[mcMonitorTimeTable] – 1.3.6.1.4.1.9477.6.14
Table for Monitor Time variables. This variable is not directly accessible.

[mcMonitorTimeIndex] – 1.3.6.1.4.1.9477.6.14.1.1.MonitorTimeIndex
Index used to uniquely identify monitor time period by day.

[mcMonitorTimePeriod] – 1.3.6.1.4.1.9477.6.14.1.2.MonitorTimeIndex
Monitor Time Period Identification String (Enter Start and End Times as follows HH:MM HH:MM to set). The current day selects the monitor period, and the current time is compared to the start and end times to determine if action should be taken.

A/B Switch System SNMP Trap Definitions:

All traps carry the sysObjectId (1.3.6.1.2.1.1.2) variable, whose value is 1.3.6.1.4.1.9477.1.

coldStart – generic trap 0
This trap is sent during a power on initialization and reboot of the internal Ethernet module. It carries the sysDescr variable (1.3.6.1.2.1.1.1).

authenticationFailure – generic trap 4
This trap is sent as a result of an authentication failure in processing an SNMP request. Generally an authentication failure occurs as a result of an SNMP request with an invalid community name. It carries the mcIpRequester variable.

abRackKeyLockChange – specific trap 1
This trap is sent when the key switch is changed on a rack. It carries the abRackKeyStat variable.

abRackGangSwitchChange – specific trap 2
This trap is sent when a rack gang switch occurs. It carries the abRackGangPort variable.

abSwitchCardChange – specific trap 3
This trap is sent when a card is removed from or inserted into a rack. It carries the abSwitchPort variable.

abSwitchPortChange – specific trap 4
This trap is sent when an individual card is switched. It carries the abSwitchPort variable.

abSystemGangSwitchChange – specific trap 6
This trap is sent when a system gang switch occurs. It carries the abSystemGangPort variable.

abRackPowerStatChange – specific trap 7
This trap is sent when the rack power supply status changes. It carries the abRackPowerStat variable.

abSystemAutoSwitchChange – specific trap 8
This trap is sent when a system auto switch occurs. It carries the abSystemGangPort variable.

linkStateChangeUP – specific trap 9
This trap is sent when a Monitored Link State changes from DOWN to UP. It carries the mpMonitorPortIp of the Monitored Port that changed state.

linkStateChangeDOWN – specific trap 10
This trap is sent when a Monitored Link State changes from UP to DOWN. It carries the mpMonitorPortIp of the Monitored Port that changed state.

10. Syslog Messages

The internal Ethernet module can be configured to issue a syslog message rather than an SNMP trap when certain events occur. To configure the Ethernet module to issue syslog messages, you must use the "SET ALERTTYPE" command to select SYSLOG messages, and you need to specify the IP address(es) of the device(s) that will be receiving the syslog messages by using the "SET MANAGER N X.X.X.X" command (see section 7 for details regarding these commands). Once these configuration parameters have been set, the Ethernet module will issue syslog messages for the following types of events:

- power up cold start, or restart using the RESET command
- SNMP authentication failure (access attempted using incorrect read or write community name)
- change in the state of the front panel keylock switch
- change in the state of the A/B switch ports in the rack caused by a user initiated "rack" command
- change in the state of an individual A/B switch port caused by a user removing a switch card from the rack or installing a switch card into the rack
- change in the state of an individual A/B switch port caused by a user initiated "port" command or the front panel individual toggle switches
- change in the state of the A/B switch ports in the rack caused by a user initiated "system" command or the front panel push-button switches
- change in the power ON/OFF state of either power input
- change in the state of the A/B switch ports due to the auto-switch function
- change in the state of a Monitored Link from DOWN to UP
- change in the state of a Monitored Link from UP to DOWN

The syslog messages issued by the Ethernet module conform where possible to the general recommendations as described in RFC 3164. The standard Ethernet module does not have a real-time clock. The Ethernet module uses its internal DATE and TIME to generate a timestamp for the syslog message. Please note that the DATE and TIME are reset to 01/01/2010 and 00:00:00 when the Ethernet module is powered on or reset, which generates a timestamp of Jan 1 00:00:00. Use the SET DATE and SET TIME commands to adjust the date and time as needed. Contact

your supplier if your application requires a battery backed real-time clock. Alternatively, the device receiving the syslog messages can apply a timestamp or other identifier if the generated timestamp is not sufficient. The general format for each syslog message from the Ethernet module is as follows:

Jan 1 00:00:00 [Ethernet module IP address] Switching System: [specific message based on the event that occurred]

Listed below is an example for each type of syslog message that the Ethernet module can issue, followed by the actual syslog message that the Ethernet module will send. This is not an exhaustive list of all possible syslog messages.

power up cold start (or RESET command)
Jan 1 00:00:00 192.168.1.151 Switching System: Switch has been reset.

SNMP authentication failure
Jan 1 00:00:00 192.168.1.151 Switching System: SNMP authentication failure.

keylock switch change disabled to enabled
Jan 1 00:00:00 192.168.1.151 Switching System: Keyswitch change to ON position.

rack gang switch to A via SET RACK 1 A command (or push-button switch)
Jan 1 00:00:00 192.168.1.151 Switching System: Rack switch to A position.

individual switch card removed from the rack
Jan 1 00:00:00 192.168.1.151 Switching System: Port card removed.

individual switch card set to B via SET PORT 1 B command (or push-button switch)
Jan 1 00:00:00 192.168.1.151 Switching System: Port switch to B position.

system gang switch to B via SET SYSTEM B command (or push-button switch)
Jan 1 00:00:00 192.168.1.151 Switching System: System switch to B position.

power supply status change from one supply to two supplies.
Jan 1 00:00:00 192.168.1.151 Switching System: Power supply status changed to two supplies.

system gang switch to A due to the auto-switch function
Jan 1 00:00:00 192.168.1.151 Switching System: Automatic switch to A position.

monitored Link state changed from down to up
Jan 1 00:00:00 192.168.1.151 Switching System: Monitored Link State changed from DOWN to UP. IP: 192.168.1.153

monitored Link state changed from up to down
Jan 1 00:00:00 192.168.1.151 Switching System: Monitored Link State changed from UP to DOWN. IP: 192.168.1.153

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