53A-354 LOW THERMAL 1x10 MATRIX SWITCH CARD

OPERATING MANUAL

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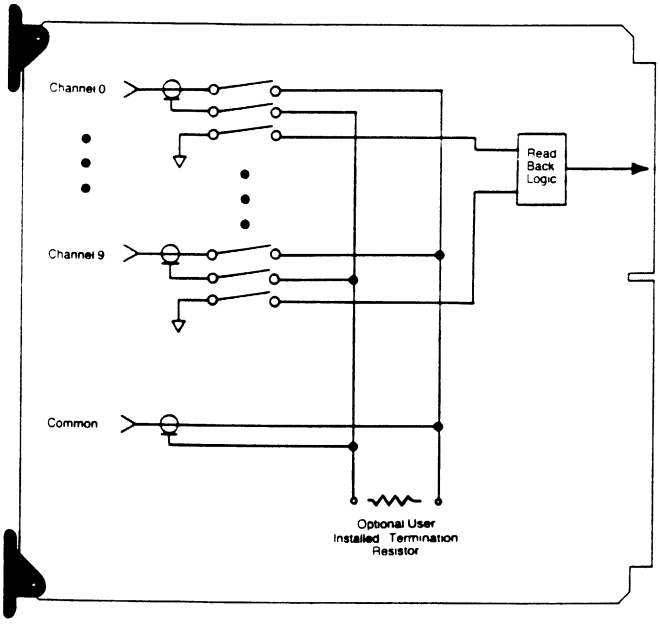
DESCRIPTION

The 53A-354 Low Thermal 1x10 Matrix Switch Card is a printed circuit board for use in a CDS 53A-002 Card Cage. The Card provides ten 2-wire switches organized in a 2-wire 1x10 matrix. One or more switches may be randomly opened or closed by transmitting ASCII characters from the system controller (calculator or computer) to the 53A-002 Card Cage. In addition, commands are also provided to allow opening or closing all relays simultaneously. Built-in diagnostics include LED indicators and a readback feature which allows the user to interrogate under software control individual channels to determine if they are open or closed. The readback feature used a third pole on each relay to ensure complete accuracy.

Access to the switches is provided by gold snap-on SMB connectors located at the front edge of the card. SMB jacks mate with Selectro plug number 51-024-0000, or equivalent, for RG-188 cable. Solder pads are also provided on the card to allow installation of a termination resistor on the common side of the 1x10 switch matrix. Shown below is a block diagram of the 53A-354 Card switching matrix.



CONTROLS AND INDICATORS

The following controls and indicators are provided to select and display the functions of the 53A-354 Card's operating environment.

Address-Select Switch

The 53A-354 Card has a miniature 10-position switch labeled "ADDRESS" that selects the 53A-354 Card's address (0-9) in the 53/63 Series System. The switch's cover opens to allow the address to be reselected. A screwdriver with a narrow, flat blade should be used to turn the cam-action wiper to the desired address position.

Power LED

The Power LED provides a valuable diagnostic tool by giving the system programmer a visual indication of the action which the system is currently taking. Whenever the 53A-354 Card is addressed by the system controller, the Power LED goes out. The LED remains out until another function card is addressed. Since only one function card can be addressed at a time, an unlit Power LED indicates the function card with which the system controller is currently communicating. The Power LED being lit not only indicates that the 53A-354 Card is unaddressed, but that all required dc power (5V dc, ±15V dc) is being supplied.

Fuses

The fuse on the 5 volt power bus protects the system from overload conditions. If the fuse has blown, the Power LED will not light.

Function LEDS and Switches

Switch LEDs

The column of ten LEDs near the front edge connect, labeled 0 through 9, are provided to indicate the specific switch channel(s) closed. A LED lit indicates the associated switch is closed.

Halt Switch

This two-position slide switch is located near the card's backplane edge connector. It selects the state of the 53A-354 Card after an @XH (Halt) or STOP command is received by the 53/63 Series System.

a. When the switch is in the C2 position, the card will reset (open all relays) when a HALT or STOP Command is received.

b. When the switch is in the C1 position, the card will hold its present conditions, when a HALT or STOP Command is received.

Termination Resistor Pads

Two unused 1/8" square solder pads located directly to the rear of the top-most relay are provided to allow user installation of a termination resistor on the common input/output side of the matrix switch.

SPECIFICATIONS

Configuration:	Ten 2-wire switches organized in a 2-wire 1x10 matrix.
Relay Manufacturer:	Coto Model CR-3460-5-70 (Diff. thermal offset less than 500 nV).
Contacts:	Five watts maximum resistive. 150V DC or peak AC; 250 mA switching current; 1.5 amperes maximum carry current. Initial contact resistance, less than 100 milliohms. Contact resistance at end of reed life, less than 1 ohm.
Reed Life:	Greater than 10^7 operations at rated load.
Switching Rate:	Greater than 100 closing or openings per second (including settling time).
Signal Path Specifications:	Differential thermal offset, less than 5 microvolts. Single-line thermal offset, less than 25 microvolts. Initial signal path resistance, less than 250 milliohms. Signal path resistance at end of reed life, less than 1.15 ohms.
Cross-talk Between Channels:	1 KHz Less than - 115 dB 10 KHz Less than - 100 dB 100 KHz Less than - 85 dB 1 MHz Less than - 80 dB Cross-talk measurements made at common output with closed channel terminated in 600 ohms and signal applied to unselected channels.
Signal Connectors:	SMB Jacks (mate with Selectro 51-024-000 snap-on or equivalent for RG-188 cable).
Power-up:	When power is turned on, the Card will go to the following known states: Card unaddressed (Power LED - lit). All relays open (Relay LEDs - out).
	NOTE: Relays will not exhibit bounce on power-up.
Power-down:	When power is turned off, the card will go to the following known states: All relays open.

Power Requirements:	Power is provided by a 53A-060 Power Supply located in the 53A-002 Card Cage. Voltage: 4.75V to 5.25VDC. Current: 0.56 amperes, maximum quiescent (all relays open) 0.75 amperes, peak (all relays closed)
Cooling:	Provided by the fan in the 53A-002 Card Cage.
Temperature:	-10 °C to +65 °C, operating (assumes ambient temperature of 55 ° and airflow to assure less than 10 °C temperature rise). -40 °C to +85 °C, storage.
Humidity:	Less than 95% R.H. noncondensing, -10 °C to +30 °C. Less than 75% R.H. non-condensing, +31 °C to +40 °C. Less than 45% R.H. non-condensing, +41 °C to +55 °C.
Dimensions:	197 mm High, 247 mm Deep, 13 mm Wide. (7.75" x 9.75" x 0.5")
Dimensions, Shipping:	When ordered with a 53A-002 Card Cage this card will be installed in one of the card cage's function-card slots. When ordered alone the shipping dimensions are: 254 mm x 254 mm x 127 mm (10" x 10" x 5")
Weight:	0.46 Kg. (1.0 lbs.)
Weight, Shipping:	When ordered with 53A-002 Card Cage this card will be installed in one of the card cage's function-card slots. When ordered alone the shipping weight is: 0.92 Kg. (2.0 lbs.)
Mounting Position:	Any orientation.
Mounting Location:	Will plug into any System Slot of the 53A-002 Card Cage.
Equipment Supplied:	53A-354 Low Thermal 1x10 Matrix Switch Card Spare Fuse (Part #42202-52001) Operating Manual (Part #00000-13540) Service Manual (Part #00000-23540)

OPERATION

The Matrix Switch Card is programmed by ASCII characters issued from the system controller to the 53/63 System's communications card. The 53A-354 Card is interfaced to the communications card through the 53 Series or 63 Series Card Cage's backplane.

To address a function card for the first time, the system command @XY must be issued. X is the card cage address (0-9) selected on the 53A-171 Control Card in the addressed card cage; Y is the 53A-354 Card's address (0-9) within the addressed card cage. The 53A-354 Card's address is selected using the card's Address-select switch. Once a function card is addressed, it remains addressed until the system receives another @ character. Appendix A fully discusses the @XY command and the other 53/63 Series System commands. After the 53A-354 Card is addressed, the commands listed below may be issued until another function card is addressed.

Command	Description
C	This command is used to CLOSE a single relay on the Matrix Switch Card. Syntax: Cz z represents the number (0 to 9) of the relay to be closed by the C command. Example: Assume all relays are initially open. The command sequence @05C1C4 will close switches 1 and 4 of the Switch Card with Address 5 located in a Mainframe with address 0. Status: Power LED - out. Switch LEDs 1 and 4 lit, all others out.
O	The O Command is used to OPEN a single relay on the Switch Card. Syntax: Oz z represents the number (0 to 9) of the relay to be opened by the O command. Example: Assume relays 4 and 5 are closed. The command sequence @05O4 will OPEN switch 4. In this example it was assumed that the Switch Card had address 5 and was located in a Mainframe with address 0. Status: Power LED - out. Switch LED 5 - lit, all others out.

R

This command is used to RESET (open) all relays on the addressed card.

Example:
The command sequence @05R will open all relays on the Switch Card with address 5 located in the Mainframe with address 0.

Status:
Power LED - out.
Switch LEDs - all out.

S

This command is used to SET (close) all relays on the Matrix Switch Card.

Example:
The command sequence @05S will close all relays on the Switch Card with address 5 located in a Mainframe with address 0.

Status:
Power Led - out.
Switch LEDs - all lit.

Q

The QUERY Command allows the user to interrogate the Switch Card to determine if a particular relay is closed or open.

Syntax: Qz

The z character (0-9) specifies the relay to be interrogated. After issuing the QUERY Command sequence, the system controller should request input from the 53A System. The Switch Card will then return a single ASCI character (0 or 1) followed by Carriage-Return and Line-Feed characters. A 1 will be returned if the interrogated relay is closed and a 0 if the relay is open.

Example:
Assume that relay 2 is closed and all other relays are open. The command sequence @05Q2 followed by the controller requesting input would cause the ASCII character 1 followed by Carriage-Return and Line-Feed to be sent from the Switch Card to the system controller. If the command sequence @05Q4 were issued, an ASCII followed by Carriage-Return and Line-Feed character would be returned since relay 4 is open.

INSTALLATION

The 53A-354 Card is a function card; therefore, it may be plugged into any blue card slot. Setting the Address Select switch defines the card's programming address. To avoid confusion, it is recommended that the slot number and the programming address be the same.

CAUTION:

To avoid plugging the card in backwards, observe the following:

a. Match the keyed slot on the card to the key in the backplane connector. The component side should be to the right for a 53 Series Chassis and to the top for a 63 Series Chassis.

b. There are two ejectors on the card. Make sure the ejector marked "53A-354" is at the top for a 53 Series Chassis and to the left for a 63 Series Chassis.

CAUTION:

The 53A-354 Card is a piece of electronic equipment and therefore has some susceptibility to electrostatic damage (ESD). ESD precautions must be taken whenever the module is handled.

APPENDIX A

53/63 SERIES SYSTEM COMMANDS

Command	Description
@XY	The @XY (Address) command addresses a function card in the 53/63 Series System. @ is a delimiter used by the 53/63 Series System. X is a card cage address (0-9) defined by the Address Select switch on the 53A-171 Control Card in the addressed card cage. Y is a function-card address (0-9) defined by the Address Select switch on the function card. Once a card cage/function-card combination is addressed, it remains addressed until the 53/63 Series System detects a new @ character.
@XH	The @XH (Halt) command halts all function cards within the card cage defined by X. This command does not affect function cards in other card cages. How a function card reacts to the @XH command depends on the particular card. In all cases, an addressed function card (Power LED out) becomes unaddressed (Power LED lit). The effect of a HALT command on the Switch Card is determined by the card's Halt Switch.
STOP	The STOP command is not a string of ASCII characters. This command is hard-wired from the system controller to the 53/63 System's communications card in each card cage. When the system controller issues a STOP command, each function card (including the 53A-354 Card) reacts as if it had received the @XH command described above. How the system controller executes a STOP command depends on the communications card used. For example, when using the 53A-128 IEEE-488 Communications Card, a STOP command is executed whenever the system controller asserts the IEEE-488 bus line IFC (Interface Clear) true. The STOP Command is used typically to clear a system that has hung-up from an illegal operation, for example, requesting input from a nonexistent System Card.

APPENDIX B

INPUT/OUTPUT CONNECTIONS

Access to the ten 2-wire switches is via the SMB connectors at the front edge of the Matrix Switch Card. The bottom-most connector is the common side of the 1x10 switch matrix. Above the common input are ten additional SMB connectors which are the "Switched" inputs/outputs of the 1x10 matrix. The top-most connector corresponds to channel 0, the second connector from the top to channel 1, and so on through channel 9.