

53A-410 BCD INPUT CARD

OPERATING MANUAL

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53A-410 BCD INPUT CARD

OPERATING MANUAL

DESCRIPTION

The 53A-410 BCD Input Card is a printed circuit board assembly for use in the 53A-002 Card Cage. The card enables the 53A System to receive digital data from a variety of instruments, including digital voltmeters and counters.

The card accepts ten BCD digits (40-bits) of TTL data, either high or low true, 8421 code transferring the data to storage on the BCD Input Card in less than a microsecond.

When input is requested from the BCD Input Card by the system controller (calculator or computer), the BCD Input Card transfers the digits from storage, via a BCD to ASCII translator, to the system controller. The most significant digit will be sent first and the last of the ten digits will be followed by a CR, LF (carriage-return, line-feed).

The 53A-410 Card can be used as a 40-bit binary input card by setting all symbol select switches to the binary position and observing the following table.

BCD TO ASCII TRANSLATION

BCD Card Input (from data source)		ASCII Output (to system controller)
8 4 2 1	BCD Character	
0 0 0 0	0	0
0 0 0 1	1	1
0 0 1 0	2	2
0 0 1 1	3	3
0 1 0 0	4	4
0 1 0 1	5	5
0 1 1 0	6	6
0 1 1 1	7	7
1 0 0 0	8	8
1 0 0 1	9	9
1 0 1 0	A	:
1 0 1 1	B	;
1 1 0 0	C	<
1 1 0 1	D	=
1 1 1 0	E	>
1 1 1 1	F	?

Note: BCD A through F is also know as BCD 10 through 15.

ADDRESS SELECT SWITCH

The BCD Input Card has a miniature, ten-position switch labeled ADDRESS. This switch is used to select the BCD Input Card address (0-9). The cover of the switch hinges open to allow access for reselecting the address. A small flat blade screwdriver should be used to turn the cam-action wiper to the desired position.

BIT SWITCH

There are four rockers on the bit switch used to select either high or low true logic for the BCD input data. The four rockers 4, 3, 2, and 1 correspond to the 8, 4, 2, 1 lines of the BCD character respectively. The position labeled 1 on the printed circuit card is low true for the corresponding BCD line and position 2 is high true. Example: depress the top of all four rockers to set the card for low true data.

DATA ACCEPT SWITCH

On the front edge of the BCD Input Card is a Data Accept line (pin #BB) which provides an output level to the data source (voltmeter, counter, etc.) after data has been accepted by the system controller (calculator or computer). The Data Accept Switch is used to set the sense of the output level (high or low true). If the switch is position 1 (the top of the switch depressed), pin #BB will go high after data has been accepted by the system controller. If position 2 is selected, pin #BB will go low at that time.

DATA LOAD SWITCH

The Data Load Switch is a three rocker switch that is used to set one of three conditions under which the BCD Input Card will load data from the data source. Only one rocker is to be closed (top depressed) at any one time.

Rocker 1 Closed - Data is loaded immediately when the Strobe command S is sent from the system controller to the BCD Input Card.

Rocker 2 Closed - Data is loaded after the BCD Input Card has received an A command from the system controller and had the data ready line (pin #A) set high by the data source.

Rocker 3 Closed - Data is loaded after the BCD Input Card has received an A command from the system controller and the data ready line (pin #A) is set low by the data source.

FUSE

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

POWER LED

This LED provides a valuable diagnostic tool. The LED gives the system programmer a visual indication of what action the system is taking. Whenever the BCD Input Card is addressed by the system controller (calculator or computer), the LED will go out. The LED will remain out until another System Card is addressed. Since only one System Card can be addressed at a time, the LED indicates to the system programmer which system Card the controller is communicating with.

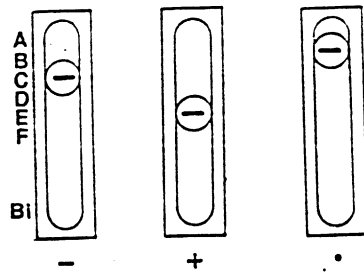
The Power LED being lit is not only an indication that the BCD Input Card is unaddressed but also that all required DC power is being supplied.

SYMBOL SELECT SWITCHES

Instruments with BCD outputs will output the six BCD characters A through F (10 through 15) to represent plus, minus and decimal point. However, there is not an industry standard. The three Symbol Select Switches are used to select a correspondence among the six BCD characters A through F (input from the data source) and the three ASCII characters + - . (input by the system controller from the BCD Input Card).

Example: An ASCII + character will be transmitted to the system controller when the card receives a BCD A, if the + Symbol Select Switch (shown in the following figure) is in position A. The Switches are set in the figure such that - + and. will be transmitted to the system controller for a BCD input of C, E and B respectively.

Binary Input: With the three Symbol Select Switches in the Bi position the card can be used as a 40-bit binary input card.



SPECIFICATIONS

<u>Parallel Data Input Capacity, BCD:</u>	10 digits, High or Low true, 8421 code.
<u>Capacity, Binary:</u>	40 bits.
<u>Logic Levels:</u>	TTL.
<u>Logic Loading:</u>	Each input line has a 2.2K ohm pull-up resistor and can therefore be controlled by contact closure or BCD output from instruments. With the pull-up resistors, the data source must sink 4.0 milliamperes per data line. The pull-up resistors can be removed by the user reducing the sink current to 1.6 milliamperes per data line.
<u>Transfer Time:</u>	Less than a microsecond for all 40 bits from the user's instrument to the BCD Input Card.
<u>Programmed By:</u>	ASCII characters.
<u>Data Throughput:</u>	This is the rate which data can be input <u>continuously</u> by the system controller (calculator or computer) from the user's instrument. The BCD Input Card is capable of a data rate of 7,000 ten-digit transfers per second. In a typical system, throughput will be limited by the user's instrument, the 53A system Communications Card, and the system controller.
<u>Data Accept (output to data source):</u>	High or Low true TTL level (switch selectable). Transition to high or low level occurs approximately 2.8us after data is accepted.
<u>Fan Out:</u>	10 TTL load.
<u>Rise and Fall Time:</u>	25 nanoseconds maximum.
<u>Data Ready (input from data source):</u>	High true, low true or ignored (switch selectable).
<u>Loading:</u>	One TTL load.
<u>Minimum Pulse Width:</u>	30 nanoseconds.
<u>Maximum Rise Time:</u>	5 microseconds.

<u>Power Up:</u>	When power is turned on the card will will go to the following known state: Card unaddressed (Power LED - lit).
<u>Power Requirements:</u>	Power is provided by a 53A-060 power supply located in the 53A-002 Card Cage.
<u>Voltage:</u>	4.75V to 5.25V DC.
<u>Current:</u>	0.65 amperes maximum, quiescent. 0.8 amperes, peak.
<u>Cooling:</u>	Provided by fan in 53A-002 Card Cage.
<u>Temperature Ambient:</u>	0°C to +50°C, operating. -40°C to +70°C, storage.
<u>Humidity:</u>	Less than 95% R.H.
<u>Dimensions:</u>	197mm High, 220mm Deep, 13mm Wide. (7.75" x 8.66" x 0.5").
<u>Dimensions, Shipping:</u>	When ordered with a 53A-002 Card Cage this card will be plugged into one of the Card Cage system slots. When ordered alone the shipping dimensions are: 254mm x 254mm x 127mm (10" x 10" x 5").
<u>Weight:</u>	0.23 kg. (0.5 lb).
<u>Weight, Shipping:</u>	When ordered with a 53A-002 Card Cage this card will be plugged into one of the Card Cage system slots. When ordered alone the shipping weight is: 0.64 kg. (1.4 lbs).
<u>Mounting Position:</u>	Any orientation.
<u>Mounting Location:</u>	Plugs into any system slot of the 53A-002 Card Cage.
<u>Required Equipment (not supplied):</u>	A 53A-780 Hooded Connector or 53A-742 Data Cable is required with this card.

Equipment Supplied:

53A-410 BCD Input Card.
Spare fuse, (Part #42202-52001).
Operating Manual, (Part #00000-14100).
Service Manual, (Part #00000-24100).

OPERATION

The BCD Input Card is programmed by ASCII characters issued from the system controller (calculator or computer) to the 53A system Communications Card. The BCD Input Card is connected to the Communications Card via the 53A-002 Card Cage backplane. The ASCII characters used, along with the actions initiated are listed below.

ASCII Characters

Action

@XYA

This command causes input data from the data source to be read by the BCD Input Card when the Data Ready line, from the data source, goes to the ready condition. The system controller will be held off until the card receives the data ready signal. The data can then be input to the system controller as ten ASCII characters followed by carriage-return and line-feed. The most significant digit will be sent first.

The @ character is a delimiter used by the 53A system. The two characters following the @ are Mainframe and System Card address respectively. Once a System Card is addressed it will remain addressed until the 53A system detects a new @ character.

The X in the command sequence is the Mainframe address (0-9) which has been selected on the Control Card.

The Y in the command sequence is the BCD Input Card address (0-9) selected by the card's Address Select Switch.

The A in the command sequence causes the BCD Input Card to load data from the data source after the Data Ready Line is set to the ready condition by the data source. The ready condition is defined by positions 2 and 3 of the Data Load Switch.

Example - The command @07A causes the BCD Input Card to load data from the data source, upon receipt of a data ready signal from the data source.

The data will be held by the BCD Input Card until the system controller requests input from this card.

ASCII Characters

Action

In this example it was assumed that the BCD Input Card had address 7 and was located in a Mainframe with address 0.

Status:

Power LED - out.

@XYS

This command causes BCD data to be read immediately, without regard for the data read line.

The @XY characters are defined above.

The S or Strobe command causes the data to be loaded from the data source into the BCD Input Card without waiting for a data ready condition from the data source. To use the Strobe command the Data Load Switch must be in position 1.

Example - The command @07S causes the BCD Input Card to load ten digits of data immediately from the data source.

In this example it was assumed that the BCD Input Card had address 7 and was located in a Mainframe with address 0.

Status:

Power LED - out.

@XH

This command is used to Halt all System Cards within a Mainframe. Individual types of System Cards will react differently to the Halt command. However, all System Cards addressed (Power LED-out) will become unaddressed (Power LED - lit) after a Halt command.

The @X character is defined above.

The Halt command H affects only the System cards in the Mainframe defined by X. The effect of the Halt command on the BCD Input Card is to unaddress the card.

Example - Assume the BCD Input Card is addressed and has operated on an A or S command. The command @0H will Halt all System Cards in the Mainframe with address 0. Although the BCD Input Card will be unaddressed, it will still maintain latched data from the data source.

STOP

The STOP command is not a string of ASCII characters but is a hard-wired command from the

ASCII Characters

Action

system controller (calculator or computer) to the 53A system Communications Card located in each Mainframe.

All System Cards in all Mainframes of the system will react as though they had received a Halt command as described above.

The STOP command is typically used to clear a system that has hung up from an illegal operation- i.e., a request for input from a nonexistent System Card.

INSTALLATION

The 53A-410 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-410" is at the top for a 53 Series Chassis and to the left for a 63 Series Chassis.

CAUTION:

The 53A-410 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.

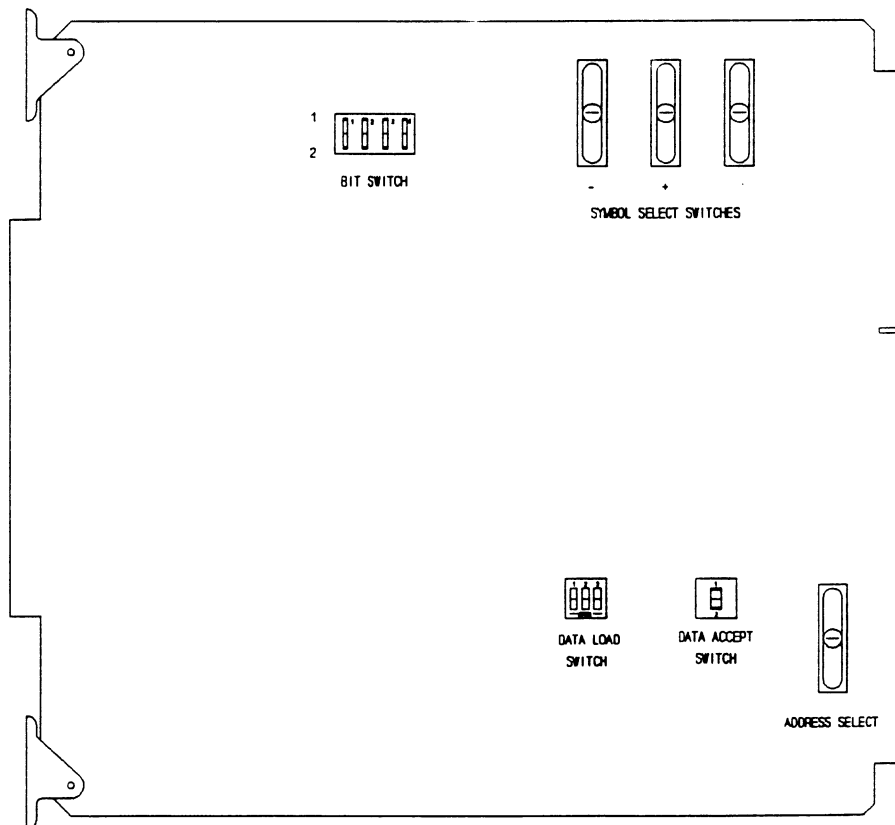


Figure 410-1: 52A-410 Controls and Indicators

53A-410 Wire List

Cable No. _____

+5 V	1	Black of Black/White			
Ground	24	Shield			
Data Accept	BB	Gray of Gray/Brown			
Data Ready	A	White of Black/White			
Encode	P	Black of Yellow/Black			
1	1	C	White of Red/White		
	2	3	Red of Red/White		
	4	B	White of Brown/White		
	8	2	Brown of Brown/White		
2	1	AA	Brown of Violet/Brown		
	2	23	Violet of Violet/Brown		
	4	Z	Brown of Blue/Brown		
	8	22	Blue of Blue/Brown		
3	1	Y	Brown of Green/Brown		
	2	21	Green of Green/Brown		
	4	X	Brown of Yellow/Brown		
	8	20	Yellow of Yellow/Brown		
4	1	W	Brown of Orange/Brown		
	2	19	Orange of Orange/Brown		
	4	V	Brown of Red/Brown		
	8	18	Red of Red/Brown		
5	1	U	Black of Gray/Black		
	2	17	Gray of Gray/Black		
	4	T	Black of Violet/Black		
	8	16	Violet of Violet/Black		
6	1	S	Black of Blue/Black		
	2	15	Blue of Blue/Black		
	4	R	Black of Green/Black		
	8	14	Green of Green/Black		
7	1	M	Black of Red/Black		
	2	11	Red of Red/Black		
	4	L	Black of Brown/Black		
	8	10	Brown of Brown/Black		
8	1	K	White of Gray/White		
	2	9	Gray of Gray/White		
	4	J	White of Violet/White		
	8	8	Violet of Violet/White		
9	1	H	White of Blue/White		
	2	7	Blue of Blue/White		
	4	F	White of Green/White		
	8	6	Green of Green/White		
10	1	E	White of Yellow/White		
	2	5	Yellow of Yellow/White		
	4	D	White of Orange/White		
	8	4	Orange of Orange/White		
			53A-742 Cable	User's Cable	
Digit	BCD	Pin #	<p style="text-align: center;">Wire Color</p> <p>Digit 10 is the most significant digit.</p> <p>When data is input to the computer from the BCD Input Card, digit 10 is sent first followed by digits 9, 8, 7, 6, 5, 4, 3, 2, 1, CR, LF.</p> <p>Encode is not generated by the 53A-410 BCD input Card but is picked up from the backplane and originates on the 53A-331 Scanner Card.</p>		Pin #