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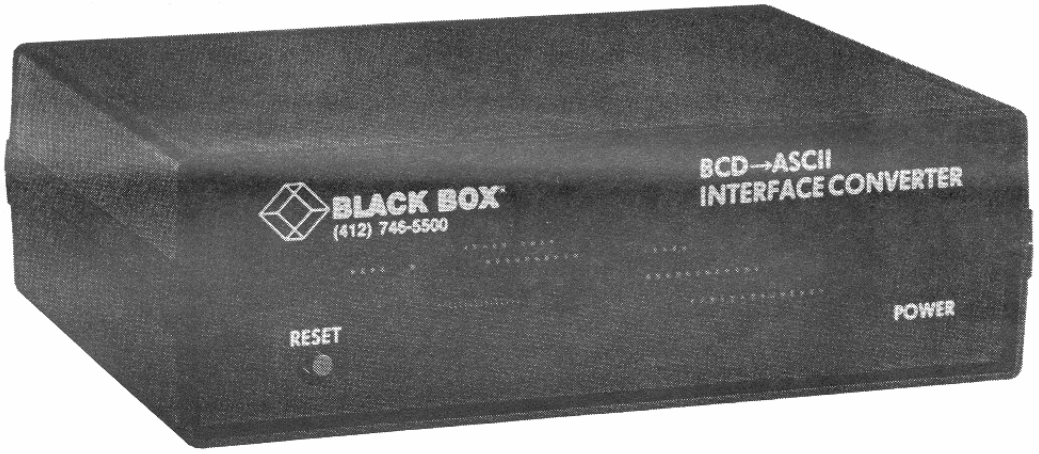
JULY 1990
IC031A

BCD <—> ASCII Converter



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1.Ø SPECIFICATIONS

Speed:	Serial port:	15Ø to 38.4 Kbps
	with:	1 Start bit
		7 or 8 data bits
		1 or 2 stop bits
		Odd, even or no parity
Interface:		One RS-232 serial port
		One BCD parallel port
Connectors:		Parallel: DB-37 female
		Serial: DB-25 female
External switches:		One reset switch
Indicators:		One red power LED
Memory:		8K standard
Power:		9 VDC, 1 amp
Dimensions:		8.ØØ" W x 2.5Ø" H x 6.25" D
Data sense:		Active Low

2.Ø INTRODUCTION

The BCD --> ASCII Converter allows instruments that communicate using up to five BCD digits to supply data directly to devices having RS-232 input ports.

You can configure the serial port for any of eight baud rates; seven or eight data bits; odd, even, or no parity; and one or two stop bits. The unit can be configured as DTE or DCE and supports XON/XOFF character flow control. The Converter also features an 8K buffer for storing data as it is sent to the serial device.

3.Ø INSTALLATION

The following figure shows the board layout of the BCD -> ASCII Converter:

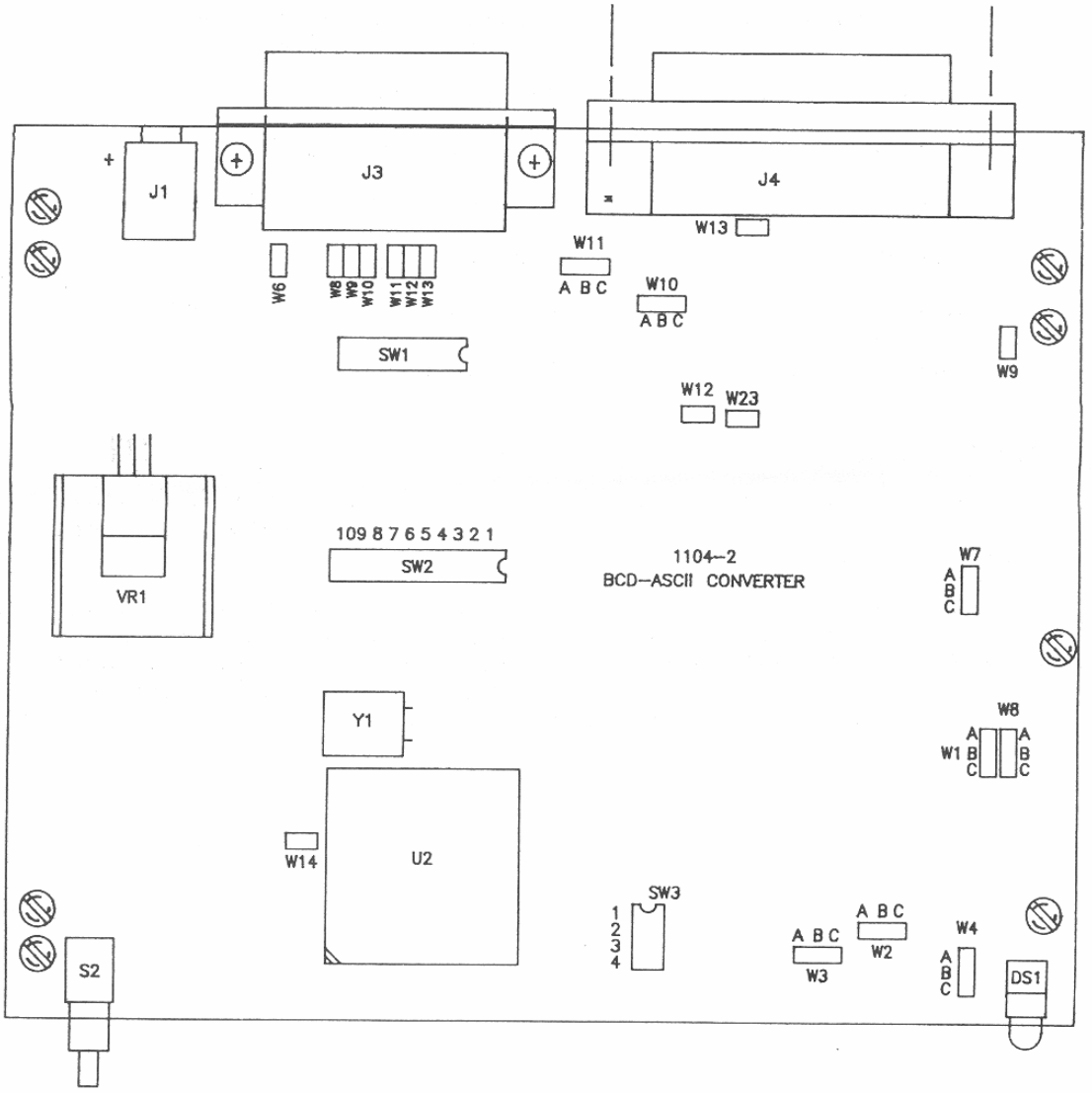


Table 3.1 SW2 SWITCH SETTINGS

Positions 1,2,3 Baud Rate Select

	1	2	3
150	ON	ON	ON
300	OFF	ON	ON
1200	ON	OFF	ON
2400	OFF	OFF	ON
4800	ON	ON	OFF
*9600	OFF	ON	OFF
19.2k	ON	OFF	OFF
38.4	OFF	OFF	OFF

ON =1 (CLOSED)
OFF=0 (OPEN)
*Factory default settings

Position		Setting
4	*	OFF FOR 1 STOP BIT ON FOR 2 STOP BITS
5	*	OFF FOR 8 BIT WORD ON FOR 7 BIT WORD
6	*	OFF FOR NO PARITY ON FOR PARITY ENABLE
7	*	OFF FOR ODD PARITY ON FOR EVEN PARITY
8		ON FOR SELF TEST OFF FOR SELF TEST DISABLE
9	*	ON FOR BCD ONLY OFF FOR HEX MODE
10	*	ALWAYS ON

Table 3.2 SW3 SWITCH SETTINGS

Positions 1 and 2 Select the Number of BCD Digits

	Position 1	Position 2	# of Digits
*	ON	ON	2
	OFF	ON	3
	ON	OFF	4
	OFF	OFF	5

Positions 3 and 4 Select the Mode of BCD Operation

	Position 3	Position 4	Mode
*	ON	ON	A
	OFF	ON	B
	ON	OFF	C
	OFF	OFF	D

ON =1 (CLOSED)
OFF=0 (OPEN)
*Factory default settings

1. Select the mode of operation (BCD or Hex) using position 9 of SW2.

2. Select serial port settings using positions 1 through 8 described in the table above.

3. Select Send Mode as described in the table above and according to the description below.

Proceed as follows to install the unit:

4. Connect the serial device to the DB-25 connector. Note that the Converter is configured as DCE.

5. Connect the BCD device output to the DB-37 connector.

6. Plug in the unit.

7. Connect the wall-mount power supply to the BCD->ASCII Converter and plug it in.

8. When you apply the power, the power light on the front panel should light.

4.Ø SERIAL INTERFACE

4.1 SERIAL PORT CONFIGURED AS DCE

When you receive your unit, the serial port is configured as DCE (Data Communications Equipment). The data rate and word format are selected using DIP Switch SW2 as noted in section 3 above.

The serial port uses the lines listed in the table below to control the flow of data out of the serial port. The converter also uses XON / XOFF protocol.

4.2 SERIAL PORT CONFIGURED AS DTE

The serial port on the BCD->ASCII Converter is factory set for DCE (Data Communications Equipment). The serial port can be configured for DTE (Data Terminal Equipment) by changing the positions of SW1 which is located on the PC board. The following table shows the correct switch positions for both DCE and DTE operation.

Table 4.2 Switch positions for DTE and DCE operation

MODE	SW1 POSITIONS							
	1	2	3	4	5	6	7	8
DTE	ON	OFF	OFF	ON	ON	OFF	OFF	ON
*DCE	OFF	ON	ON	OFF	OFF	ON	ON	OFF

*Factory default settings

Table 4.1 Serial Interface Pinout Chart

Pin	Label	Direction DCE	Direction DTE	Description
1	GND	---	---	Chassis ground
2	TXD	In	Out	Serial data is received.
3	RXD	Out	In	Serial data is transmitted.
4	RTS	In	Out	Must be TRUE for the Converter to transmit data. Internally connected to pins 11 and 20.
5	CTS	Out	In	Converter will set this pin TRUE when it is ready to send data. Internally connected to pins 6 and 8.
6	DSR	Out	In	Internally connected to pins 5 and 8.
7	S. GND	---	---	Signal ground
8	DCD	Out	In	Internally connected to pins 5 and 6.
11	READY	In	Out	Internally connected to pins 4 and 20.
20	DTR	In	Out	Internally connected to pins 4 and 11.

5.Ø BCD INTERFACE

The following table describes the signals in this interface.

Table 5.1 BCD Interface Pinout Chart

Pin	Function
1	Strobe - A low to high transition will cause the BCD digits to be read. NOTE: The high/low sense of this line is determined jumper W1Ø.
2	BCD Digit 1 - 1 bit
3	2 bit
4	4 bit
5	8 bit
6	BCD Digit 2 - 1 bit
7	2 bit
8	4 bit
9	8 bit
1Ø	Ground
11	Busy - A low state on this pin indicates that the unit is busy processing the BCD inputs or that the buffer is full. A high state indicates that new BCD data may be sent. NOTE: The high/low sense of this line is determined by jumper W11.
12 - 18	Normally no connection, may individually be jumpered to ground.
19 - 23	Ground
24	BCD Digit 5 - 8 bit
25	4 bit
26	2 bit
27	1 bit
28	BCD Digit 4 - 8 bit
29	4 bit
3Ø	2 bit
31	1 bit
32	BCD Digit 3 - 8 bit
33	4 bit
34	2 bit
35	1 bit
36	Ground

STROBE INVERT OPTION

The sense of the strobe line is selected using jumper W1Ø. The table below describes the use of this jumper.

Table 5-2. Setting the Strobe Sense Jumper

Position	Function
A-B	Normal -- Low to High
B-C	Invert -- High to Low
Out	MODES B and C

BUSY INVERT OPTION

The sense of the busy line is selected using jumper W11. The table below describes the use of this jumper:

Table 5-3. Setting the Busy Line Sense Jumper

Position	**Function**
A-B	Normal -- Low to High
B-C	Invert -- High to Low
Out	Always high

6.Ø MODES OF OPERATION

Positions 3 and 4 of DIP switch SW4 select the Mode of Operation. Please see also Table 3.2 above. The following details the specific modes.

Mode	BCD Inputs Will be Read and Sent:
A	after strobe
B	continuously
C	after "?" is received (one set of BCD for each "?")
D	after "?" is received, then after strobe (one set of BCD for each "?" + strobe sequence)

7.Ø FLOW CONTROL

The BCD->ASCII Converter has internal memory which holds the data transmitted from the BCD device before sending it to the serial output. Occasionally, this memory, or buffer, becomes full if the BCD device sends data faster than the serial device is accepting the data. The Converter uses two methods to stop the flow of data when its buffer becomes full. These are XON/XOFF character and hardware signals in the serial interface.

The Converter transmits serial data to the serial device's input. If the serial device needs to stop the data flow from the Converter it uses either XON/XOFF character or hardware signals to indicate that the Converter should stop sending data.

When the BCD->ASCII Converter receives an XOFF character (Control-S), it stops sending data. When it receives an XON character (Control-Q), the Converter resumes sending data.

If either the RTS or DTR line of the serial interface drops to the FALSE level, the Converter stops sending data. When both lines return to the TRUE level, the Converter resumes sending data.

8.Ø SELF TEST

The BCD->ASCII Converter has a self test routine which tests the RAM (Random Access Memory) and the output port lines. Use switch 8 of DIP Switch SW2 to enable the self test. The self test routine is executed only once when you power up the interface. Upon completion of the self test, the unit is ready for normal operation and data may be sent to the Converter.

8.1 RAM TEST

The RAM test checks each location in the RAM and sends a message to the serial device indicating either "RAM OK" or "BAD RAM". If the RAM is bad, replace it before using the unit.

8.2 PATTERN GENERATOR

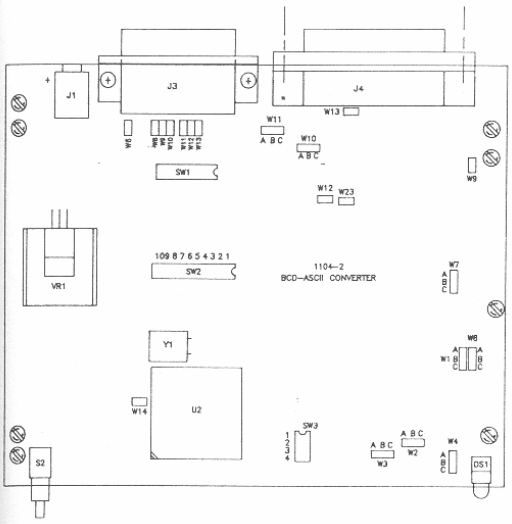
The pattern generator test sends a string of characters to the serial interface to verify the proper operation of the serial connection. The test pattern is a carraige return, two line feeds, then the following pattern:

```
ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz
Ø123456789!"#$%&'()*+,-./:;<=>?@[\]^_"{|}~

ROM PASSED

8K BYTES OF RAM PRESENT. TEST PASSED

SW2=Ø1ØØØØØ1
BCD TO ASCII INTERFACE BUFFER

VERSION 1.8
END OF TEST
```

This is followed by a carriage return and form feed.

Note that the pattern of Øs and 1s shown for "SW2=" above indicates the settings of the first eight positions of the serial port configuration DIP switch. In this pattern, Ø means OFF or OPEN; 1 means ON or CLOSED.

QUICK SET-UP GUIDE FOR IC031



1. Select the mode of operation (BCD or Hex) by setting position 9 of switch 2 ON (for BCD only) or OFF (for Hex mode).

2. Select the serial port settings using positions 1 through 8 as seen in the table below and the diagram to the left.

3. Select Send Mode as explained in the table and description below.

Proceed as follows to install the unit:

4. Connect the serial device to the DB-25 connector.
   NOTE: the converter is configured as DCE.

5. Connect the BCD device output to the DB-37 connector.

6. Plug in the unit.

7. Connect the wall-mount power supply to the BCD->ASCII Converter and plug it in.

8. When you apply the power, the power light on the front panel should light.

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	Position 3	Position 4	Mode
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	ON	OFF	C
	OFF	OFF	D

ON =1 (CLOSED)
OFF=0 (OPEN)
*Factory default settings

ADDENDUM 1

5.1 Organization of BCD Digits

Table 5-2 below shows the manner in which the BCD digits are organized with respect to the BCD connector pins. The serial representation of the BCD digits is output so that the Least Significant Digit will appear at the right side of the digit sequence and the Most Significant Digit will appear at the left side of the digit sequence. As an example, when five digits are selected, they will be presented at the serial output as follows:

Most Significant Digit –> 54321 <-- Lease Significant Digit

	Digit #	Pin #	Bit	NOTE:
Lease Sig. Digit	1	2	1	Least Sig. Bit
"	1	3	2	
"	1	4	4	
"	1	5	8	Most Sig. Bit
	2	6	1	Least Sig. Bit
	2	7	2	
	2	8	4	
	2	9	8	Most Sig. Bit
	3	35	1	Least Sig. Bit
	3	34	2	
	3	33	4	
	3	32	8	Most Sig. Bit
	4	31	1	Least Sig. Bit
	4	30	2	
	4	29	4	
	4	28	8	Most Sig. Bit
Most Sig. Digit	5	27	1	Least Sig. Bit
"	5	26	2	
"	5	25	4	
"	5	24	8	Most Sig. Bit
	Sign	12		

Table 5-2. BCD Digit Organization