308-171

USER MANUAL

DATAC 164SB PRINTER CONTROLLER BOARD

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DATAC 164SB PRINTER CONTROLLER BOARD

The 164SB is a controller board to drive the M163, M164 or M170 mini printer mechanism. The board and printer operate from a single 5V, 1.5A power supply. The unit incorporates the 1641 single-chip, mask programmed microcomputer and provides a serial and parallel data interface, at TTL levels plus full 96-code UK ASCII character generation.

As well as upper and lower case text printing, a variety of modes of operation can be selected by sending control codes:

TEXT	or	DATA mode
CHARACTER	or	GRAPHICS mode
SINGLE WIDTH	or	DOUBLE WIDTH
SINGLE HEIGHT	or	DOUBLE HEIGHT

All 16 mode combinations can be selected by sending the appropriate control code.

The following facilities are also provided:

M163 (32 characters/line) M164/M170 (40 characters/line) select input
PARALLEL/SERIAL data select input
BUSY output when printer operating and for data acknowledge
PAPER ADVANCE input
TEST input - for integral self test
PAPER TAKE-UP output to drive paper take up unit

CHARACTER SET & CONTROL CODES

The character set is 96-code UK ASCII; (hex) codes 20 to 7F inclusive. Codes from 00 to 1F are ignored with the following exceptions:

(HEX)	(CODE)	
OA	(LF)	Line Feed - used in character modes causes print out of line buffer contents and advances the paper one line.
OD	(CR)	Carriage return - same action as LF. NOTE: that a data line terminated by CR LF will cause printing plus an extra line feed.
1B	(ESC)	Escape - used to change mode of operation, next character "mode code" defines action.

Mode Codes

After an ESC code bits 0 to 3 of the next code ("mode code") determine the new print mode:

BIT 0	(l.s.b.)	0 for TEXT mode	1 for DATA mode
BIT 1		0 for CHARACTER mode	1 for GRAPHICS mode
BIT 2		0 for SINGLE WIDTH	1 for DOUBLE WIDTH
BIT 3		0 for SINGLE HEIGHT	1 for DOUBLE HEIGHT

All 16 mode combinations are acceptable, e.g.

ESC - 0E (hex) = double width, double height, graphics, text mode. Mode zero is assumed on reset and power up which is also the ESC,00 sequence. BITS 5 & 6 of the "mode code" are not read and can therefore be 1 or 0, thus any ASCII code with bits 0 to 3 in the correct combination for the desired mode code can be used.

ESC - ESC is the software self test command and causes print out of test routine, all eight character modes are printed followed by a graphics pattern.

NOTE: ESC = 1B (hex) therefore "mode code" 1B (hex) cannot be used; if this is required codes 3B, 5B or 7B (hex) can be used instead which will not be interpreted as ESC codes, but are valid "mode codes".

CHARACTER PRINTING

Characters are formed from a 5-wide by 8-high dot matrix, with one dot space between characters. The eighth dot row is used for descenders.

32 characters per line are printed on the M163, 40 with the M164 or M170. Printing is initiated automatically when a complete line has been sent. Shorter lines must be terminated by CR or LF code. The BUSY signal is activated during printing and momentarily after each character sent to acknowledge the data.

In the TEXT mode characters are printed from left to right like a typewriter; DATA mode prints inverted and from right to left for panel mounting applications.

Graphics Printing

Graphics codes are received as 6-bit groups; input data is assumed to be graphics information following the receipt of an ESC sequence in which the "mode code" has BIT 1 set to 1. A complete line of graphics must be received following which the dot line is printed. The BUSY signal is activated during printing and momentarily after each code to acknowledge the data. The graphics mode is automatically cleared after each dot line. It is therefore necessary to transmit the graphics ESC sequence before every dot line.

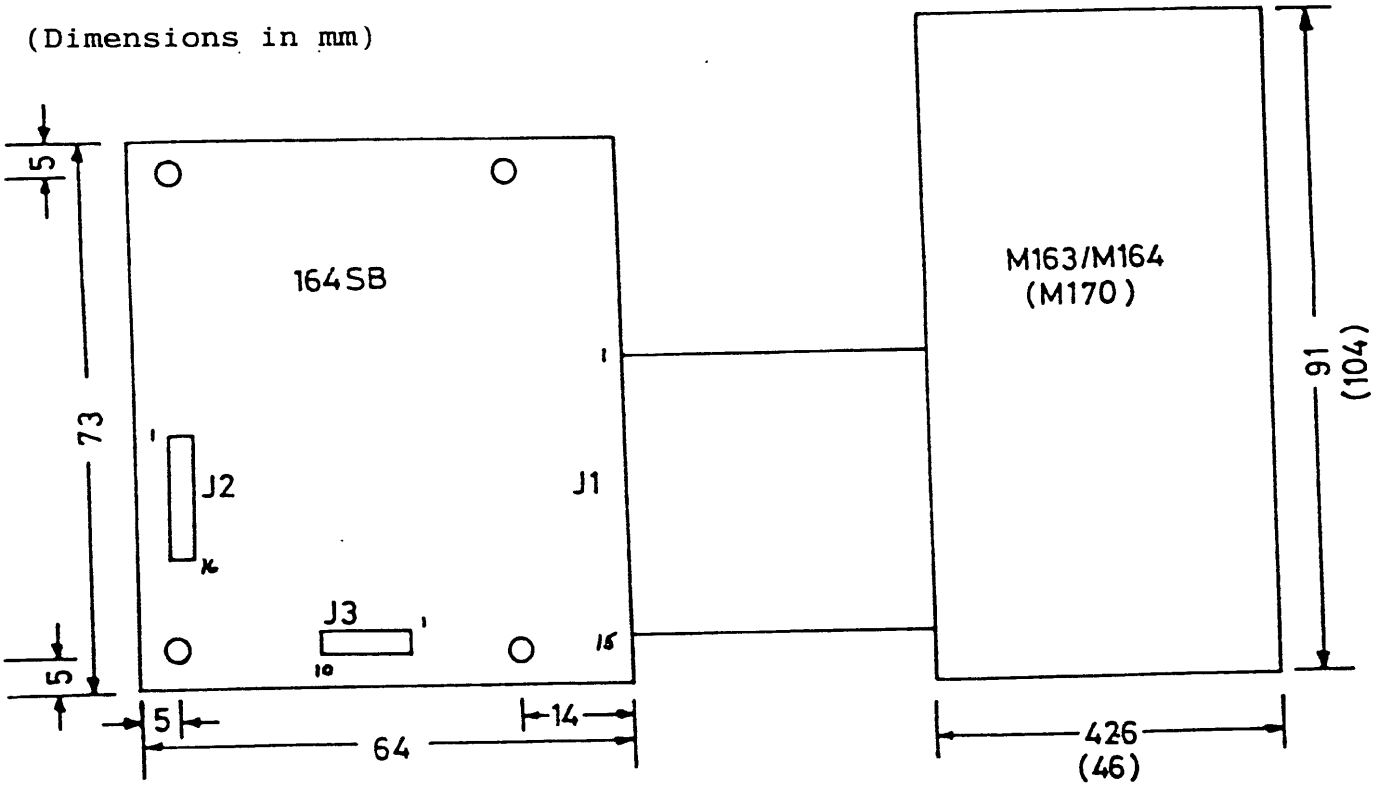
The graphics pattern is built up as a succession of horizontal dot lines, 96 dots per line (16 x 6) on the M150 printer of 144 (24 x 6) on the M160. In each 6 bit graphics code a 1 is "dot on" and a 0 is "dot off", the most significant bit of each code being printed left most of each 6 bit group. Only the 6 least significant bits of each code are printed, so codes in the range 40 to 7F (hex) will be treated as 00 to 3F (hex). The printer will stop after each dot line for more data to be sent.

All eight graphics modes are feasible; double height and/or double width may be used to economise on data coding if only a coarse pattern is required.

Printing large areas of solid dot patterns is not recommended as it may lead to premature wear. If the graphics mode is to be used extensively, the power supply rating should be studied carefully as the voltage must never fall below 4.5V or improper operation and consequential damage may result.

Board Layout

(Dimensions in mm)



The printer mechanism should be wired directly to J3 ribbon cable using the same pin numbering.

CONNECTION DATA (see board layout diagram)

All input signals to J2 and J3 are TTL compatible.

J2: Data input to 16-way connector.

		NOTE			NOTE
1.	STR/DATA	(1)	2.	Data input D0	(6)
3.	RESET	(2)	4.	Data input D1	
5.	+5V	(3)	6.	Data input D2	
7.	+5V		8.	Data input D3	
9.	GROUND		10.	Data input D4	
11.	GROUND		12.	Data input D5/BR1	
13.	PA	(4)	14.	Data input D6/BR2	
15.	BUSY	(5)	16.	PAR/SER	(7)

J3: 10-way connector (use if required)

		NOTE		
1.	NC		2.	+5V
3.	NC		4.	+5V
5.	NC		6.	GROUND
7.	PTU	(8)	8.	GROUND
9.	TST	(9)	10.	NC

LINK: M163/M164/M170 SELECT → link is inserted if driving M164/M170 printer, removed if driving M163 printer.

J1: 11-way Ribbon cable to printer mechanism.

1.	REED SWITCH	7.	SOLENOID C
2.	REED COMMON (GND)	8.	SOLENOID B
3.	MOTOR RETURN (GND)	9.	SOLENOID A
4.	MOTOR	10.	TACHO COMMON (GND)
5.	SOLENOID COMMON (+5V)	11.	TACHO
6.	SOLENOID D		

NOTES:

1. During parallel operation, Data Strobe (STR) must be taken low when BUSY is low and input data are on D0-D6; it must be held low until the BUSY goes high, acknowledging that data has been read in. In the serial mode pin 1 is the Serial Data (SDATA) input, positive true.

2. RESET may be taken low via a 100 ohm resistor to initialise the controller or to clear a fault condition. An automatic reset is performed on power-up.

3. +5V supply (tolerance +/- 10%) must be capable of 1.5A continuous. Typical current consumption is 60mA quiescent and 600mA printing.

4. Paper Advance input (PA) provides continuous paper feed when switched low.

5. The BUSY output (max. 1 TTL load) is active high whilst printer is running and is pulsed high momentarily after each character sent, to acknowledge data input. Any data sent when BUSY is high will be ignored.

6. Data inputs D0 (least significant) to D6 (most significant) are the ASCII code inputs for parallel operation. In the serial mode D5 and D6 are used as Baud rate select inputs (BR1 & BR2) as follows:

D6	0	0	1	1
D5	0	1	0	1
Baud rate	110	300	1200	2400

   All data inputs must be terminated high or low in ALL modes.

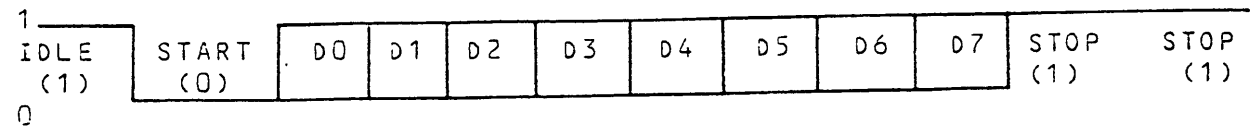
7. Parallel/Serial select input (PAR/SER) must be held low for parallel data input or high for serial operation.

8. PTU is driven high for approx. 40mS after each printed dot line, this can be used to drive a paper take-up unit if required (current source up to 1A).

9. TST is hardware self test input, when taken low a print out of the self test pattern will be initiated.

10. This manual applies to software revision 017C onwards.

SERIAL DATA TIMING



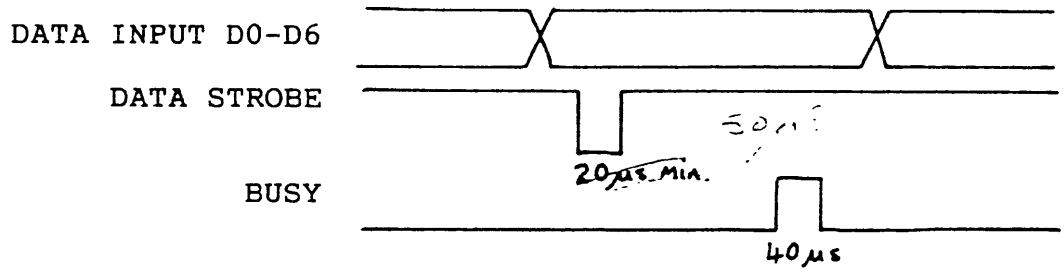
i.e. One start bit (always a zero), 8 data bits (D7 ignored), one or more stop bits.

Baud Rates	110	300	1200	2400	Baud
Bit Times	9091	3333	833	417	S

The BUSY signal will go true momentarily each serial character is received, and will stay true during print cycle.

Data must not be sent whilst BUSY is true.

PARALLEL DATA TIMING

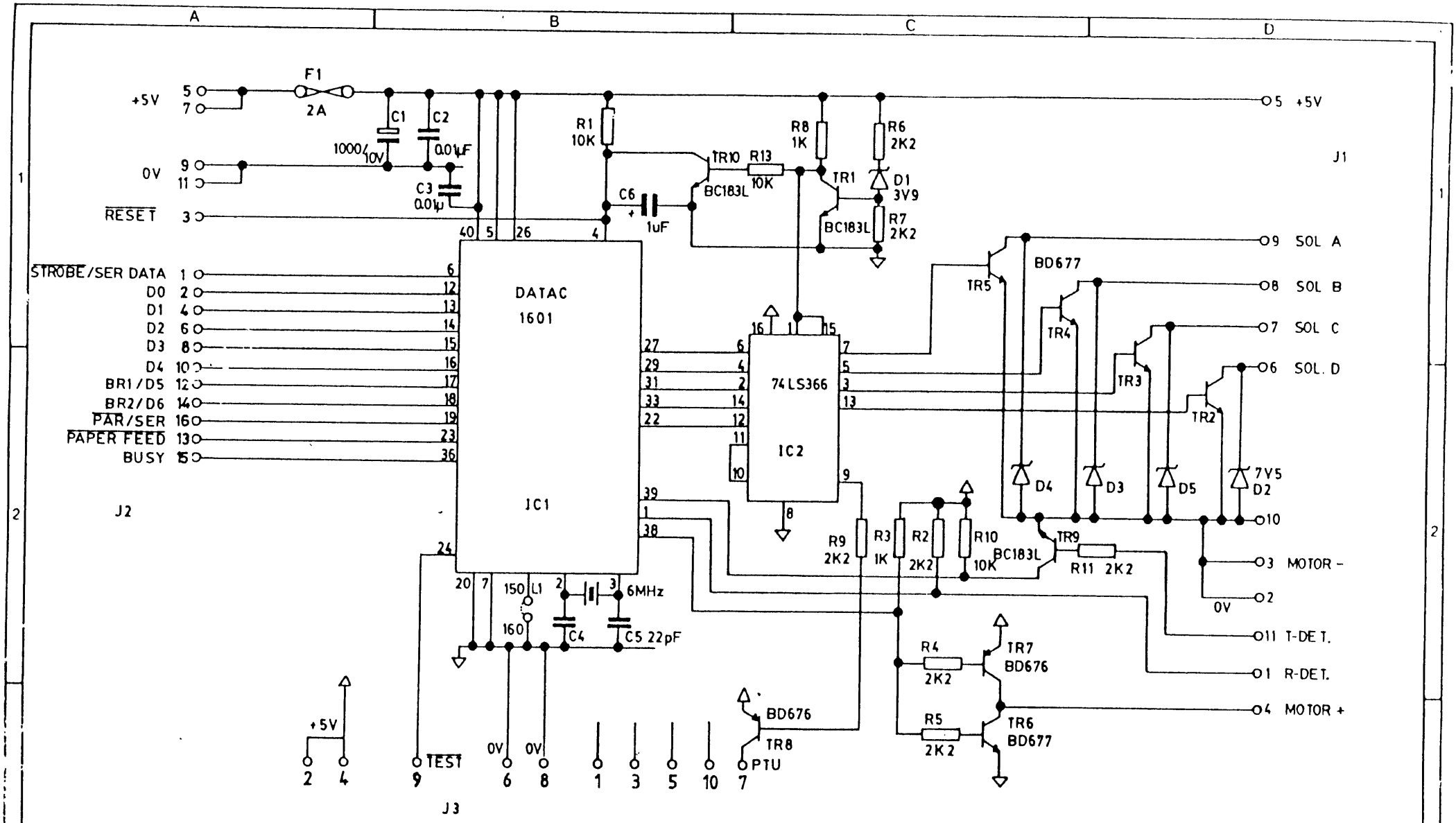


typical timing

The data inputs are sampled when STR is low, and must be held steady until BUSY goes high, acknowledging the data. STR must be held low until BUSY goes high. STR must be removed when or before BUSY goes low again to prevent multiple inputs of the same character.

Note : That this is not a true Cetronics interface as the strobe pulse width is too long for standard Centronics (typically 2uS). The board can be modified however by cutting and linking the pcb such that pins 6 and 39 on the processor are swaped around. i.e. pin 39 becomes the strobe input and pin 6 becomes the T-Det input.

The software must be changed to version 069 to accommodate these alterations and an acknowledge pulse is present on pin 16 of J2 in place of the PAR/SER select as the software is parallel by default.



ISSUE	ALTERATIONS	INITIALS	DATE
A		JSW	20-1-85
B	Pin numbers corrected	JSW	20-10-85

DATAC

TUDOR ROAD, ALTRINCHAM
CHESHIRE WA14 5TN

TITLE
160SB MARK II

NUMBER
C3/375

REF

SHEET No 1 OF 1

P.J166