Nexus RS 232 LED displays Decoder for BxxSC LED Series

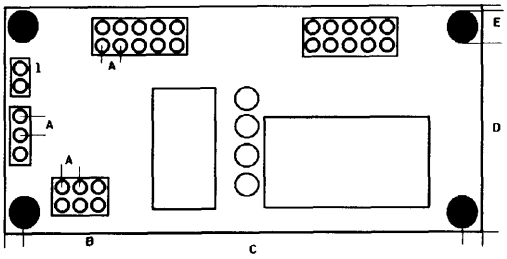
BIFC

General Description

The BIFC decoder provides a simple method of interfacing to the BxxSC family of Led displays that use the Maxim Max7221 serial driver chip. Both decode mode (code B) and non decode mode are supported allowing both standard and user defined characters to be displayed. The decimal points can be individually turned on and off and the display intensity varied in 16 levels. The board features an RS232 input that can also be jumpered to operate at TTL levels. This allows a simple command set of ASCII commands that can access all of the features of the driver chip. The decoder will drive up to 2 drivers allowing a total of 16 digits (by using a BM4xx LED display attached to each driver) to be displayed. A single +5 volt power supply is required.

The decoder provides the necessary formatting of the data and the SPI interface to the driver chip.By connecting the RS232 interface to a PC serial port the displays can be driven by a simple software programme or the keyboard via a terminal emulation programme. A fixed 2400 baud 8 bit ,1 start, 1 stop signalling is employed.

Configuration



Dimensions

Dimensions (mm)	BIFC
A	2.54
B	67.0
C	72.0
D	37.0
E	3.2
Depth	16.0

Pinout - RS232

1	2	3	4	5
Gnd (0V)	+5 volts	Data from host	Data to host	0V

Pinout - LED connector

1	3	5	7	9
+5volt	CS	CLK	0V	n/u
n/u	Data	0V	+5volt	n/u
2	4	6	8	10

Command protocol

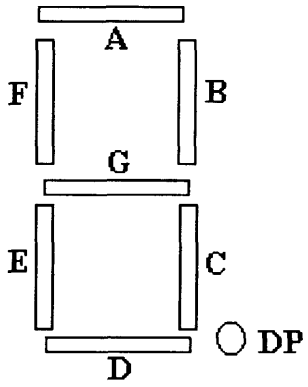
The RS232 interface features a simple non handshake mode of operation. The BIFC will output a prompt character "> " when it is ready to receive the start of a command - all commands are two bytes inlength (except for the undecoded mode) and should be sent in the order command byte, data byte. Once the last byte is receivedby the BIFC it will decode the command and action the request. Data sent to the unit during the time that the unit is actioning the previous request will be ignored and lost. The unit issues the command prompt once the action is complete.

The action/Data commands are as follows:

Command Byte		Data Byte	Action
Binary	ascii	Ascii	**DECODED COMMANDS**
30h	0	0 – F	Display a decoded character in digit position 0 (LHS)
31h	1	0 – F	Display a decoded character in digit position 1
32h	2	0 – F	Display a decoded character in digit position 2
33h	3	0 – F	Display a decoded character in digit position 3
34h	4	0 – F	Display a decoded character in digit position 4 (external LED attached to driver board)
35h	5	0 – F	Display a decoded character in digit position 5
36h	6	0 – F	Display a decoded character in digit position 6
37h	7	0 – F	Display a decoded character in digit position 7
38h	8	0 – F	Display a decoded character in digit position 8 (last in external LED)
39h	9	0 – F	Display a decoded character in digit position 9 (LHS of display diver 2)
41h	A	0 – F	Display a decoded character in digit position 10
42h	B	0 – F	Display a decoded character in digit position 11(last LED)
43h	C	0 – F	Display a decoded character in digit position 12(external LED attached to second driver board)
44h	D	0 – F	Display a decoded character in digit position 13
45h	E	0 – F	Display a decoded character in digit position 14
46h	F	0 – F	Display a decoded character in digit position 15 (RHS of external LED)
Note: If the		Decode mode	Pins are set to Code B data A – F gives code B decodes

Ascii data	Ascii data	**FUNCTIONAL COMMANDS**
I	0 – F	Set display brightness 00=min F=max
S	0 – F	The decimal point addressed by the 2nd ascii character is Illuminated.
R	0 – F	The decimal point adressed by the 2nd ascii character is turned off
W	(0 – F) (0 – F) (0 – F)	Undecoded data sent to digit

Undecoded mode: The undecoded mode takes data in a two byte ascii format representing the segment data. For example 30h, 30h (which is 00 in ascii) will be translated to a single hexadecimal value (00h in this case) which indicates which segments are illuminated. A 1 in the bit corresponds to the LED segment being illuminated.The segment verses bit number are as follows:



D7	D6	D5	D4	D3	D2	D1	D0
Dp	A	B	C	D	E	F	G

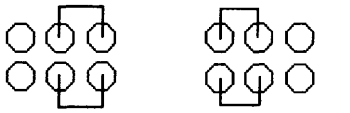
The undecoded mode is triggered by the receipt of the W command. The next character sent is the digit address that the undecoded data is to be written to. This value goes from ascii 0 to ascii F as for all of the other commands. The 2 ascii bytes representing the date bytes are then written.

Prompts: The system gives feedback via prompts are described in the opening paragraphs. Below is a table that shows the prompts output and their meaning. Prompts are not issued by the system until internal processing has finished and this gives the host system a method of timing the sending of the data. Any data sent during internal processing will be lost.

Prompt	Meaning
>	Waiting for 1st byte of a command sequence or 2nd byte in a decoded string
S	A set decinal point command is running. The next byte is the dp to illuminate
R	A reset decinal point command is running. The next byte is the dp to turn off.
W	Undecoded mode command in progress. Next byte is the digit address 0 –F
U	Undecoded mode command. System waiting for the upper ascii nibble of the data
L	Undecode mode command. System waiting for the lower ascii nibble of the data
!	An unrecognised command has been entered.

Communications and connections

Communications: The communications between the host and the BIFC driver unit use a fixed 2400 baud, with no parity, 8 bits and 1 stop and 1 start bit. The board can be strapped via the pin headers to operate at both RS232 levels (when interfacing to a PC for example) or at TTL levels (when connected to a microcontroller directly). The pin header that selects this mode is 2 sets of three pins to the right hand side of the power/comms header. Connections are thus:



RS232 Comms TTL Comms

The BIFC leaves the factory strapped for RS232 coomunications and Hexadecimal Decode. The Decode mode (for standard decode commands) can be strapped between Hexadecimal and Code B. The jumper on the three pin header on the bottom ceneter selects the mode.

Typical Connections: