

DESCRIPTION

The decade display units are intended for operator display of numeric data from a GEM 80 controller.

They mount in the surface of desks or control panels, and connect directly to the GEM 80 basic I/O highway ribbon cable.

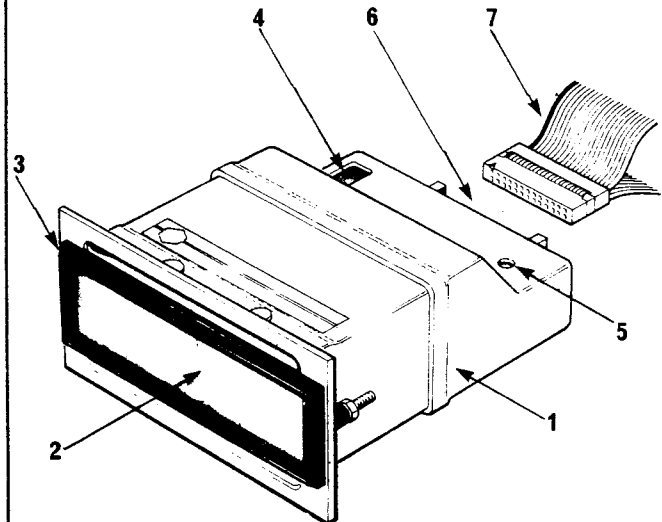
FEATURES

- Simple, low cost wiring.
- No external power supplies.
- User selectable colons and decimal points.
- Self illuminated for low ambient light levels.

SPECIFICATION

Decades	: 4(8933) or 6(8932)
Code	: 8,4,2,1 weighted Binary Coded Decimal (BCD)
Decimal points	: 5 positions between digits.
Colons	: 2 positions between digit pairs.
Control of decimal points and colons	: 8932 variable as part of data output for display. : 8933 preset by switches on rear of unit.
Display type	: liquid crystal (LCD)
Back light	: electroluminescent panel
Colour	: black facia : grey display : green back light
Digit height	: 12.7 mm
Panel area require:	: 64 x 124mm (high x wide)
Front projection	: 4 mm
Rear projection	: 160 mm including clearance for ribbon cable.
Mounting	: facia and gasket inserted from front of panel, remainder of unit from rear

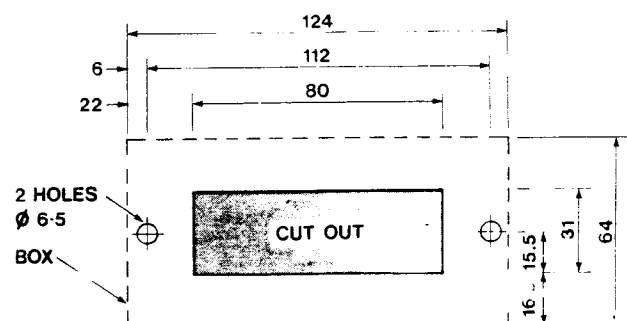
8932 - 8933 Decade Display



1. Plastic moulded case.
2. Display.
3. Facia.
4. Setup switch (4 decade unit only).
5. Unit address setting (rotary switch).
6. Connector fixed to unit.
7. Basic I/O highway ribbon cable.

	: secured by nuts on two studs which are integral with facia.
Connections	: plug/socket to basic I/O highway ribbon cable.
Power consumption	: 60mA @+15V (from ribbon cable).
Temperature	: 0 to 55°C operating : -20 to 60°C storage
Humidity	: 10 to 90% non-condensing.
Weight	: 0.20kg

Mounting details



APPLICATION NOTES

1. UNIT ADDRESS SETTING

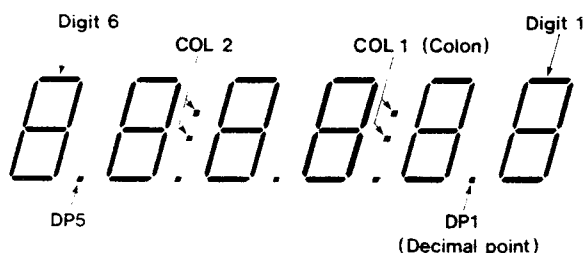
The setting of the decoder switch determines which pair of adjacent data table locations correspond to the unit. The six decade display 8932 uses both locations; the four decade display 8933 uses a single location according to the setting of a sub address switch, leaving the other location available for another unit e.g. a thumbwheel input unit or a second display unit.

Table 1 Decoder switch settings.

First ribbon cable			Second ribbon cable		
Unit references		Decoder switch setting	Unit references		Decoder switch setting
Odd	Even		Odd	Even	
B1	B0	0	B17	B16	0
B3	B2	1	B19	B18	1
B5	B4	2	B21	B20	2
B7	B6	3	B23	B22	3
B9	B8	4	B25	B24	4
B11	B10	5	B27	B26	5
B13	B12	6	B29	B28	6
B15	B14	7	B31	B30	7

Note: If switch position 8 or 9 is used then unit cannot be addressed.
On four decade display 8933 only sub address is set up on pole 5 of set up switch (was set up on 4 pole).
SW2:- OFF for odd reference, ON for even.

2. CONTROL OF DISPLAY



Six decade display 8932 has lower 4 digits controlled by data output to its even reference, upper 2 digits, decimal points and colons are controlled by data output to its odd reference.

Four decade display 8933 uses output data to control the lower 4 digits with upper 2 digits blank (invisible). The decimal points and colons are preset using individual poles on dual-in-line setup switch SW2 at rear of unit.

Table 2 Display selection

Display element	6 decade display		4 decade display	
	Output data		State nos in output data	Pole nos on setup switch
	Unit reference	State nos.		
Digit 1	Even	0 to 3	0 to 3	-
Digit 2	Even	4 to 7	4 to 7	-
Digit 3	Even	8 to 11	8 to 11	-
Digit 4	Even	12 to 15	12 to 15	-
Digit 5	Odd	0 to 3	-	-
Digit 6	Odd	4 to 7	-	-
DP 1	Odd	8 *	-	2 *
DP 2	Odd	9 *	-	1 *
DP 3	Odd	10 *	-	4 *
DP 4	Odd	11 *	-	3 *
DP 5	Odd	12 *	-	8 *
Col 1	Odd	13 *	-	7 *
Col 2	Odd	14 *	-	6 *

* OFF to make invisible
ON for visible display

Table 3 Digit displays

Output data	@0	@1	@2	@3	@4	These codes generated automatically by special function S2 BCDOUT
Display	0	1	2	3	4	
Output data	@5	@6	@7	@8	@9	
Display	5	6	7	8	9	
Output data	@A	@B	@C	@D	These patterns not used for numeric displays.	
Display	L	H	P	A		
Output data	@E	@F	These codes available for user programming of minus sign and blanking of unwanted digits.			
Display	—					

3. CONFIGURATION DATA

Configuration data in the preset data table of the host GEM 80 controller defines which addresses are scanned on the basic I/O highway. A six decade display is equivalent to a whole panel full of logic output blocks. A four decade display is equivalent to a half panel full of blocks. Decade display units will not respond to block presence sensing, so this facility should be suppressed.

4. CODE CONVERSION

The numeric output data for a decade display has to be presented in Binary Coded Decimal (BCD). Special function S2 (BCDOUT) may be used in the control program to convert from standard numerical form.

Program example for four decade display:-



For a six decade display the numeric data comes from two separate data table locations, which have to be handled independently. The data for the upper pair of digits have to be combined with the colon and decimal point data (see example 9.2).

5. USE OF COLON

A colon may be used as a visual separator for a composite display of related numbers on a single display unit. To obtain a composite display it may be necessary to manipulate a pair of numbers in the control program to combine them into the same data table location. The special function S4 (SWAP) is useful for this purpose (see example 9.1).

6. USE OF DECIMAL POINTS

Although the value in a data table location is always an integer, an operator's display may be easier to comprehend if presented in engineering units with a decimal point. (See example 9.2). For the six decade unit it is possible to flash all the decimal points simultaneously to give an alarm indication (see example 9.4).

7. BLANKING OF UNWANTED DIGITS.

The decade displays have no automatic leading zero suppression. The facility can however be achieved by including instructions in the user control program which set the output data to code @F for the appropriate digits (see example 9.2). Several rungs of program will be necessary if the user wishes to suppress a varying quantity of digits according to size of the number displayed.

8. DISPLAY OF NEGATIVE NUMBERS.

The BCDOUT special function produces an unsigned display which is the modulus of the original number in the control program. If the user wishes to display a negative number then it is necessary to include control program to set an appropriate digit to code @E (see example 9.3).

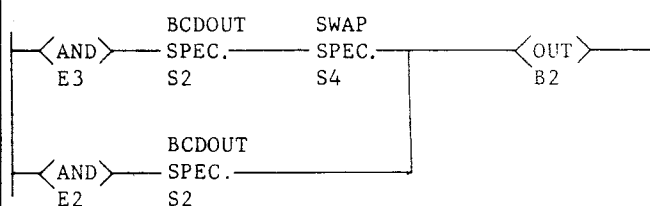
9. EXAMPLES

9.1 Composite display

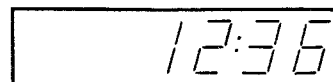
(a) Requirements

Display time on 4 decade display B2. Hours are stored in location E3, minutes in E2.

(b) Program rung



(c) Typical display

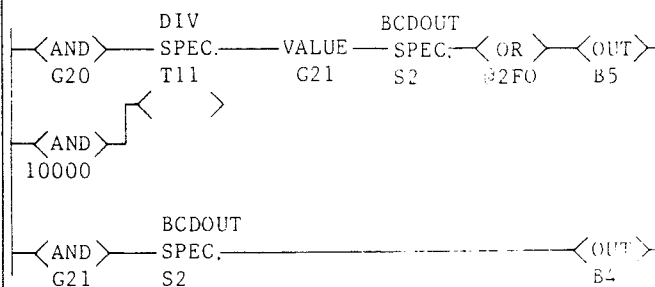


9.2 Display of numbers above 4 digits

(a) Requirements

Display contents of location G20 (range 0 to 32767) on display B5/B4; scaled to give two decimal places.

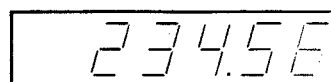
(b) Program rungs.



Note: G21 contains remainder after G20 divided by 10000.

OR instruction blanks unwanted digits and sets decimal point.

(c) Typical display

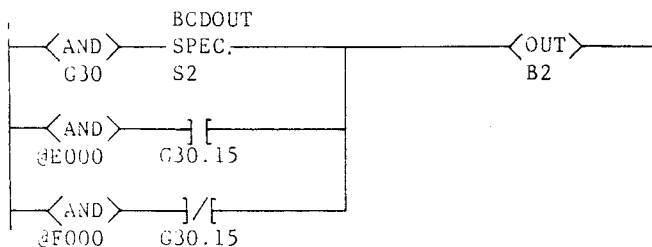


9.3 Display of negative numbers.

(a) Requirements

Display contents of location G30 (range -999 to +999) on 4 decade display B2, including minus sign when negative.

(b) Program rung



Note:- G30.15 is ON when G30 contains a negative number.
@E000 sets minus sign
@F000 blanks unwanted digit.

(c) Typical displays

542

Positive

-542

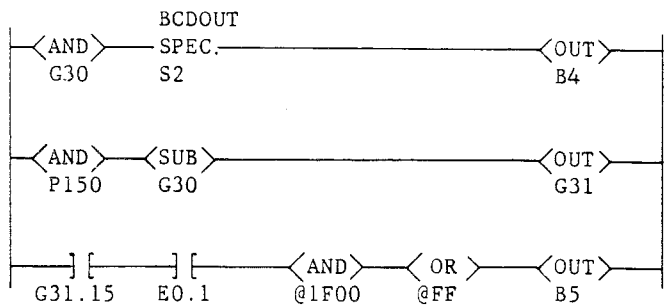
Negative

9.4 Alarm indication

(a) Requirements

Display contents of location G30 (range 0 to 9999) on 6 decade display B5/B4. Flash all decimal points if value exceeds alarm level preset in location P150.

(b) Program rungs



Note:- G31.15 is ON when G30 > P150
E0.1 is ON for one scan every second
@1F00 sets decimal points
@FF blanks unwanted digits.

ORDERING CODES

Six decade display unit	8932
Four decade display unit	8933

CEGELEC

INDUSTRIAL CONTROLS

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Registered in England No. 2259095

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