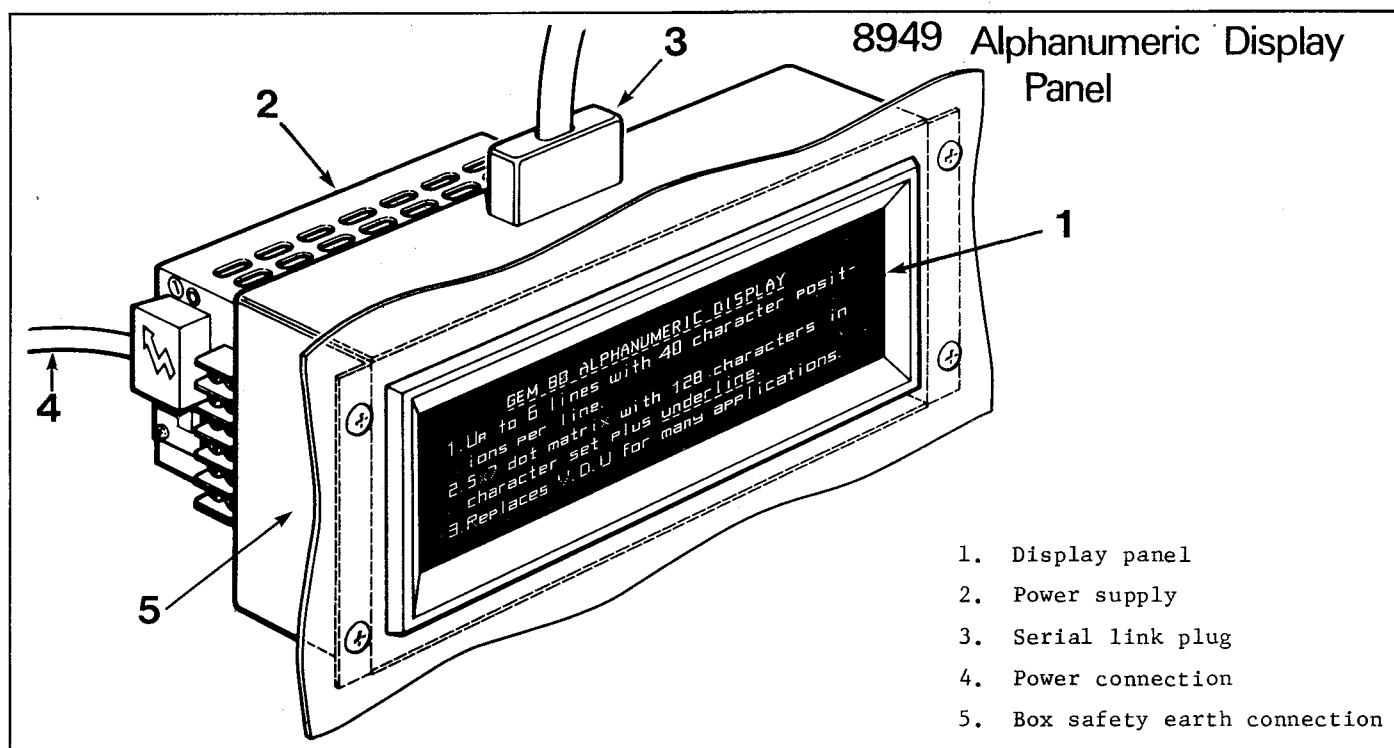




DESCRIPTION

The 8949 Alpha-numeric Display panel comprises a 6-line, 40 character per line, vacuum fluorescent display panel mounted in a box suitable for panel mounting. The box also contains a 5V power supply so that the display can be mains powered independently of other GEM 80 equipment.

Attached to the display is a serial communications printed circuit board such that the display can be driven from a GEM 80 controller printer port.

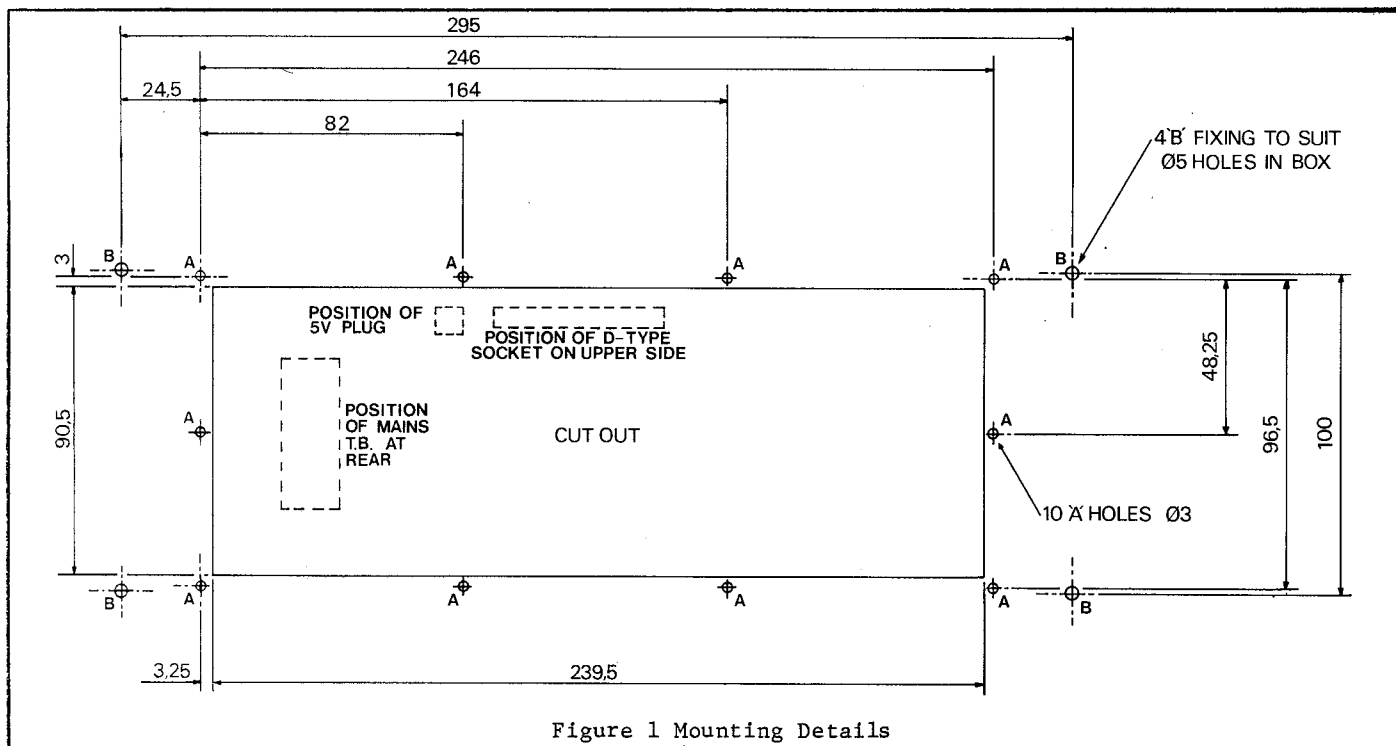
FEATURES

- Small size compared with VDU's for display of short text messages
- Cursor movement facilities as for VDU's
- Full 96 ASCII printing characters plus 32 foreign language characters
- Flashing character and underlined character facilities
- Character and line scrolling facilities
- Built-in power supply

SPECIFICATION

Format : 6 lines, 40 character positions per line

Character Display Area	: 46mm x 188.8mm (1.81" x 7.43")
Character size	: 5.05mm x 3.5mm (0.2" x 0.14") : 6.0mm x 3.5mm with underline
Character set	: 128 characters
Character design	: 5 x 7 dot matrix, plus underline
Coding	: 96 ASCII printing characters : 32 special characters corresponding to ASCII control codes
Signal levels	: RS-232C
Signalling rate	: 300 baud standard : Optionally 110, 600 or 1200 baud (requires unit to be disassembled to gain access to DIL switch)
Signal format	: 10 bit asynchronous, with 1 start bit, 7 character bits, 1 even parity bit and 1 stop bit (except for 110 baud, which is 11 bit with 2 stop bits)



Parity errors	: Character received with a parity error displayed as a chessboard pattern symbol
Size	: 310mm x 140mm x 137mm (width height depth)
Mounting	: See Fig. 1
Weight	: 3.5kg approx.
Supply voltage	: 110V or 220V nominal : Range 96 to 132V, or 192 to 264V
Power dissipation	: 25W typical
Temperature	: 0 to 60°C Operating -20 to 70°C Storage
Environment and Tests	: GEM 80 Standard.

APPLICATION NOTES

INTERNAL SETTINGS

As supplied, the unit will have been set up for a 7-bit word length with even parity. This is set on SW1, the poles of which are as follows:

- 1 : 0 = 7 bit word length
1 = 8 bit word length
- 2 : 0 = Parity disabled
1 = Parity enabled
- 3 : 0 = Odd parity
1 = Even parity
- 4 : Not connected

The setting of SW1 as supplied is therefore 011X (i.e. setting of pole 4 does not matter).

With parity enabled, any character received with a parity error is replaced in the display by an error symbol (a chessboard pattern of dots).

As supplied, the unit will have been set up for 300 baud unless specifically requested otherwise on SW3, the poles of which are as follows:

- 1 : 0 = Full duplex
1 = Half duplex
- 2, 3 & 4 : 0 0 0 = 110 baud
1 0 0 = 150 baud
0 1 0 = 300 baud
1 1 0 = 600 baud
0 0 1 = 1200 baud
1 0 1 = 2400 baud
0 1 1 = 4800 baud
1 1 1 = 9600 baud

When used with the printer port of a GEM 80 controller, SW3 must be set to half duplex, with a baud rate compatible with the controller (e.g. 150 baud cannot be used). Further, it is not recommended to use the unit above 1200 baud, as timing problems might result from operating without a handshake.

CONNECTION DETAILS

The unit is fitted with a 25-pin D-type socket. A mating 25-pin D-type plug and hood is supplied with the unit as a loose item for customer wiring.

Only the following pins need connecting when the unit is driven from a GEM 80 controller via a 20mA to RS232C convertor:

Pin 3 : From TxD (transmitted data)

Pin 7 : From GND (signal ground)
Pin 6 : Link to +5V terminal of power supply
on the rear of the unit

Mains supply connections need to be connected to the power supply on the rear of the unit. Check that the voltage selection is set correctly before switching power on.

Live, neutral and safety earth connections are required to be connected to the power supply on the rear of the unit. (Max. size 1.5sq.mm).

A safety earth connection is also required to the M5 stud fitted on the rear of the left hand side mounting flange.

The power supply safety earth can be connected to the box safety earth stud.

CONTROL CHARACTERS

Transmission between any GEM 80 controller and the display unit makes use of ASCII (American Standard Code for Information Interchange). Each "character" consists of 7 bits, to which the GEM 80 controller adds a start bit, parity bit, and stop bit. Of the 128 different characters available in ASCII, the first 32 (@00 to @1F) are non-printing or "control" characters.

Used with the 8949 display unit, these control characters determine the mode of operation of the unit, e.g. whether input is buffered, whether the display scrolls, etc. Additionally, they may be used for displaying foreign character symbols which are not part of the standard ASCII set.

With GEM 80 controllers programmable in BASIC, control characters may be transmitted to the 8949 display in an LPRINT statement using the CHR\$ function.

With GEM 80 controllers programmable in ladder diagram User Language, both control and printing characters may be transmitted using Special Functions S22 WRTTEXT or S38 PRITEXT, dependent on which of these two functions is available on the particular model of controller. The Special Function T38 PRINT can be used for transmitting all printing characters, but not certain control characters.

With WRTTEXT, four particular characters cannot be transmitted directly; these are @00 (NUL); @03 (ETX); @0A (LF); and @0D (CR). If these are programmed in, following the normal method, then @00, @03 and @0D will be ignored, while @0A will always be sent preceded by @0D (i.e. the WRTTEXT Special Function always inserts a Carriage Return to go with a Line Feed).

PRITEXT operates similarly to WRTTEXT, except that @00 (NUL) and @0D (CR) are transmitted normally, but @03 (ETX) is ignored, and @0A (LF) is always sent preceded by an @0D (CR).

To overcome this problem with WRTTEXT and PRITEXT, on all occasions where it is required to transmit one of the problem characters, they should be entered into P-table with the leading hex. zero replaced by 8 (i.e. as @80, @83, @8A or @8D instead of @00, @03, @0A or @0D respectively). This sets in a 1 for the most significant bit, which is subsequently ignored by WRTTEXT or PRITEXT when the characters are transmitted.

With PRINT, it is not possible to transmit @03 (ETX) or @0A (LF), nor is it possible to define them as @83 or @8A respectively, as these codes mean something different to the text editor. Where it is necessary to transmit these codes, then PRITEXT must be used and not PRINT.

In the description of control modes below, it is assumed that, where WRTTEXT or PRITEXT are being used, the above rules are followed.

MODE CONTROL

Input On/Off

@04 (EOT) turns off the input, i.e. all further characters in the transmission to the display are ignored until the display is turned on again.

@01 (SOH) turns on the input again (this is the only character not ignored following EOT).

Input Buffering

Instead of the display showing each character as it is received from the GEM 80 controller, the characters can be loaded into buffer memory and then transferred to the screen instantly when the transmitted message is complete. This facility is chiefly of use at low signalling rates.

@02 (STX) starts buffering; no further characters are displayed until buffering is turned off again.

@10 (DLE) starts buffering, as for STX, but also clears the display.

@03 (ETX) terminates buffering, and the contents of the buffer memory are displayed immediately.

Cursor Movement

As with a VDU, the 8949 unit has a cursor which can be moved about the display area; any character received will be displayed at the cursor position, and the cursor will move on one space. This cursor can be moved using the following control characters:

@08 (BS) moves the cursor one character to the left.

@09 (HT) moves the cursor one character to the right.
 @0A (LF) (without CR) moves the cursor down one line.
 @0B (VT) moves the cursor up one line.

Note: When the cursor reaches the edge of the screen, the rules for further movement depend on what modes are set, e.g. scrolling. See "Cursor Reaching Edge of Display" below.

@1C (FS) homes the cursor (i.e. moves it to the top left hand character position in the display area).

@0C (FF) homes the cursor, as for FS, but also clears the display.

@0D (CR) moves the cursor to the first position on the particular line it is on. (This is normally used in conjunction with LF to move the cursor to the first position on the next line).

@12 (DC2) can be used to set the cursor directly to any character position on the screen. The DC2 character must be followed in the message by two characters, the first representing the row and the second representing the column. The rows are numbered 0 to 5, and the columns 0 to 39. Numbers greater than these cause a default to 0, regardless of scrolling or carriage return modes (see below). Numbers must be given in hexadecimal equivalents, e.g. to set the cursor to row 4, column 20, the characters transmitted should be @12, @04, @14.

Flash On/Off

@0F (SI) is a toggle; on the first receipt of SI, flashing is turned on, so that all characters received subsequently will be displayed flashing.

On the second transmission of SI, flashing will be turned off again for all subsequent characters received. Hence, any text which needs to stand out on the display by flashing should be preceded and followed by SI characters.

Underline On/Off

@1F (US) is a toggle similar to SI; any text which is to be underlined should be preceded and followed by US characters.

Display of Control Characters

The character set of the display includes symbols for each of the first 32 ASCII codes (@00 to @1F); see Fig. 2. Since these codes are normally used for control purposes as given above, the display unit has to be told when the normal control action is to be ignored and the character displayed. This is done by

preceding each control character with @1B (ESC).

		More significant digit							
		0	1	2	3	4	5	6	7
Less significant digit	0	o	�			0	@	P	p
	1	�	�	!	1	A	Q	a	q
	2	�	�	"	2	B	R	b	r
	3	�	�	#	3	C	S	c	s
	4	�	�	\$	4	D	T	d	t
	5	�	�	%	5	E	U	e	u
	6	�	�	&	6	F	V	f	v
	7	�	�	'	7	G	W	g	w
	8	�	�	(	8	H	X	h	x
	9	�	�	)	9	I	Y	i	y
	A	-	�	*	:	J	Z	j	z
	B	�	�	+	;	K	[	k	{
	C	�	�	,	<	L	\	l	
	D	�	�	=	=	M	]	m	}
	E	�	�	.	>	N	^	n	~
	F	�	�	/	?	O	_	o	�

Figure 2 - Display character set showing character codes in hexadecimal.

Display Test

@1E (US) causes the display to be filled with full set of characters available in ASCII code order, but starting at a random point in the code. As there are 128 available characters but 240 character positions on the display, the character set is displayed almost twice over; where the character set is repeated, the characters are displayed underlined.

INITIALIZATION

There are a number of facilities which can be initialized by transmitting @11 (DC1) followed by a character whose bits switch in or out the particular facilities.

Character Scrolling

This is set by making bit 3 in the character following DC1 equal to 1.

When a line becomes full of characters, any further character received will cause that line to move one character to the left, the leftmost character being lost.

Character scrolling is over-ridden by Auto Carriage Return; see below.

Line Scrolling

This is set by making bit 4 in the character following DC1 equal to 1.

When the cursor reaches the bottom line of the display, any attempt to move the cursor downwards further with LF will cause the display to move up one line, and the topmost line will be lost.

Auto Carriage Return

This is set by making bit 6 in the character following DC1 equal to 1.

When the cursor reaches the end of any line in the display, any further character received will cause it to return to the start of that line.

This facility over-rides character scrolling.

Auto Line Feed

This is set by making bit 5 in the character following DC1 equal to 1.

When a carriage return is generated (either from a CR being received, or from the cursor reaching the end of the line with Auto Carriage Return set), a line feed is generated as well. This will cause the cursor to move to the next line of the display, except that, if the cursor is on the bottom line, it will either return to the top line or else, if line scrolling is set, cause the display to scroll up a line.

Type of Cursor

This is set by bits 1 and 2 in the character following DC1. The cursor type is as follows:

Cursor type	Bit 2	Bit 1
Not displayed	0	0
Flashing block	0	1
Underline	1	0
Flashing underline	1	1

Flashing Display

This is set initially by bit 0 in the character following DC1. Whether the display flashes subsequently can be controlled by transmitting @OF (SI) (see "Flash On/Off" above). Bit 0 must be set to 1 for the display not to flash when first switched on.

Summary of Character Following DC1

Bit 6 : 1 = Auto CR at end of line
Bit 5 : 1 = Auto LF with CR
Bit 4 : 1 = Line scrolling

Bit 3 : 1 = Character scrolling
Bit 2 : } = Cursor type
Bit 1 : }

Bit 0 : 1 = No flashing

If the display is not initialized, the default conditions are:

Auto CR
Auto LF
Line scrolling
Character scrolling
Flashing underline cursor
Flashing display

(Note that character scrolling is over-riden by Auto CR, as given above).

CURSOR REACHING EDGE OF DISPLAY

Right Hand Edge

If neither Character Scrolling nor Auto CR are set, any further character received will cause the cursor to disappear off the right hand edge. It will not re-appear again until receipt of a cursor left instruction (@08, BS character).

Left Hand Edge

If the cursor is at the left hand edge, receipt of a BS character will cause no change.

Top Edge

If the cursor is in the top line, receipt of a VT character will cause no change.

Bottom Edge

If line scrolling is not set, receipt of LF when the cursor is on the bottom line will cause it to move to the corresponding position on the top line.

Line Scrolling

To make full use of the display, text should be transmitted from the GEM 80 controller somewhat differently when line scrolling is to be used than when outputting text to a printer.

If each text string ends with CR/LF, then the first five text strings received will be displayed on the first five lines of the display; however, the sixth text string will appear on the bottom line of the display character by character as it is received but will immediately scroll up to the fifth line when the LF character is received. The lines above it will also move up one line, the first text string being lost off the top of the display. Hence, except transiently, only five lines of the display will be utilised, and the bottom line will be blank. To avoid the problem, text strings should be transmitted with CR/LF at the start of each string, rather than at the end. With the display filled with six lines of text, the CR/LF at the start of the next message will cause the display to scroll up one line, leaving the sixth line blank, ready to display the rest of the message. With no LF at the end of the message, the message will remain displayed on the sixth line, and will not scroll up until a further message is received.

Since GEM 80 controllers only provide a message output when the printer buffer is cleared, it is necessary to force this to happen by ending each message with an ETX (@03) character when using the WRITEXT special function, or by ending any LPRINT statement in BASIC language with CHR\$(0); (including the semi-colon). With WRITEXT, the ETX in P-table must be represented by a genuine @03, not @83.

ORDERING CODES

6-line x 40-character vacuum fluorescent display panel including power supply, with bezel, 25-pin D-type plug and hood (for customer wiring) supplied as loose items. 8949-0000

20mA to RS232C convertor Customer should obtain any suitable commercially available unit.

Note The Company's policy is one of continuous development and improvement and therefore the right is reserved to supply products which may differ in detail from those described and illustrated in this publication. All our products and materials are sold subject to Conditions of Sale available from us on request

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