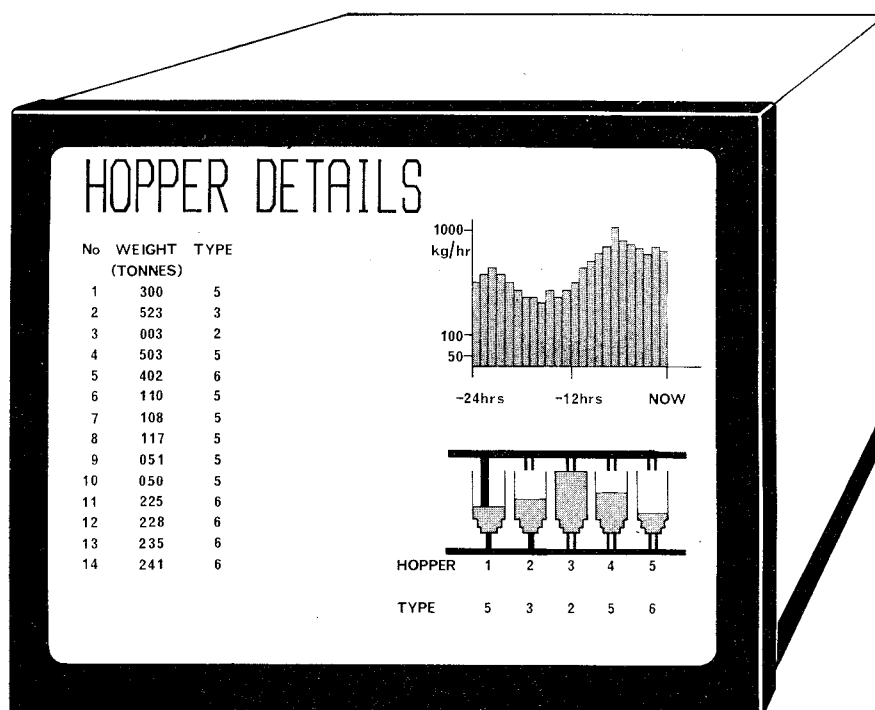




8811-4006

Paged Video



DESCRIPTION

GEM 80 video is supplied as a fully integrated optional extra of GEM 80/200 series controllers. The paged video system offers a low cost colour graphic system.

It comprises a video processor module (with paged video firmware) and RAM memory module or modules, which plug into the central subrack of the host GEM 80 controller. Either colour or black and white video monitors may be connected and the system can be programmed with a standard GEM 80 programmer.

A display 80 cells wide and 24 cells high is produced. Each cell can be any of the 256 symbols in the character set, numerical, alphabetic or graphical and any two colours of the 8 different colours. Up to 25 displays or formats can be stored per 16K bytes of memory and the video format program is stored in 16K "pages" of memory, hence the name "paged video". Depending on choice of controller up to 144K bytes of memory may be available.

The video formats can contain both static and dynamic information. Variable data instructions allow the display of varying numerical values, messages, faults, graphics or trend records from the host controller data tables. The display can be partitioned, if required, to show up to 4 different formats in

one screen simultaneously, such that for example one area may show a plant mimic while another part of the same screen shows a bar graph.

The paged video is very flexible and it can be programmed to offer the following functions:-

- (1) Dynamic plant mimic diagrams
- (2) Interactive operator displays
- (3) Bar graphs for data displays
- (4) Plant alarms and fault diagnosis
- (5) Management data (with facilities for hard copy print out)

FEATURES

- Low cost
- Easy to program
- Fast picture update
- Several video monitors can be driven from one video output
- Up to 4 video processors per controller allows up to 4 simultaneously different pictures
- Hard copy print out of formats by means of screen print facility
- Video program storage on and retrieval from cassette tape

SPECIFICATION

1. Controller/Video Display Relationship

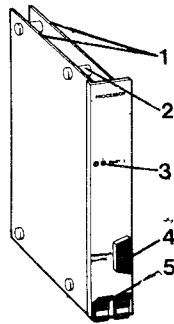
The video display system operates independently of the host controller, except that the video has read only access to the data tables of the host.

The self test, watchdog and status (halt/run) of the host controller are independent of the video system.

The first 16K page of video format memory is supplied as part of the host controller. Subsequent pages are available on optional additional 64K memory modules. Maximum capacities are in the Product Data Sheets for GEM 80/200 series controllers.

Video Processor Module

1. Video processor printed circuit boards.
2. Clamping pillars.
3. Printer transmit activity lamp (screen print or program listing).
4. Socket for programming and monitoring.
5. Withdrawal handle.



2. Video display operation

start up : performs simple self test of video processor executive programs and on-board memory.
: displays test format (zeros) followed by dummy format (GEM 80).
: starts operating cycle.

operating cycle (see figure 1) : reads format requests in host controller L table.
: if any change to format requests, reads format definition(s) from video memory modules into video processor.
: reads variable data for display from data tables of host controller.
: updates displayed picture.

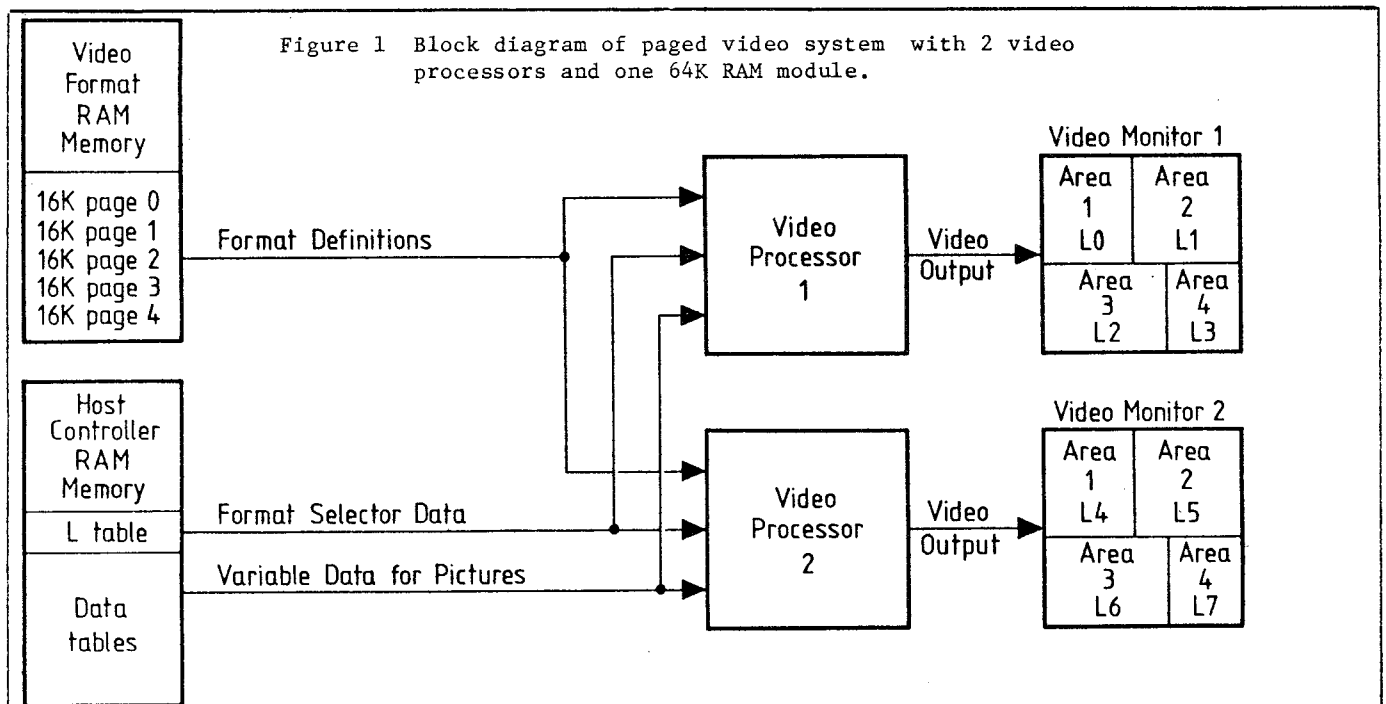
cycle time (typical) : 1 to 2s complete new picture free
: 1/3 to 1s update running full picture independent
: 1/10 to 1/2s of host update small area

multiple video processors : each video processor produces independent video output, displaying different video formats.
: format definition programs are shared between all video processors in a system.

3. Video display program

display : Figure 2 shows display structure.
: format areas may be preset to any size and shape and any number of format areas up to 4 can be created. Data in the video program defines position of partitions.

character set : standard character set as Table 2. Contact GEC for details of special character sets.
: numeric characters are single width/double width/triple size, with/without decimal point, with/without leading zeros.



language : interactive procedure for setting up basic format data.
: text editor for programming format definitions.
: simple instructions for setting up areas of repeated fixed data.
: powerful instructions (DRN's) for display of variable data by change of colour or flashing, or as numbers, symbols text, and bar charts. (Table 4).
: full editing facilities.

editing : display maintained frozen while format editing.

means of programming : standard GEM 80 programmer.
: program archive storage and transport on cassette tape.
: printout of format definitions via video termination panel.

memory capacity : 16K plus optional 64K modules (capacity depends on controller type).
: 8 typical complicated full screen formats per 16K page of memory.
: 25 typical simple formats per 16K page of memory.
: 25 formats maximum per 16K page of memory.

memory support : primary battery (lithium) on each memory module.
: battery life 4 years typical 1.5 years minimum (continuous support with power off).
: shelf life 10 years typical 5 years minimum (battery isolated or main power on).

write protection : video processor write enabled only when programmer lead inserted.

data tables : read only access to host controller data tables for display of variable data (DRN's Table 4).
: read only access to logged data if GEM 80 logging video fitted in same controller.

4. Output from Video Processor

video output : composite video suitable for colour and monochrome industrial monitors.
: 1V into 75 ohm.
: red/green/blue signals (sync. on green).
: independent monochrome signal.
: 320 lines per field, 64 μ s line period.
: 48.8 fields per second.

NOTE: Monitors are often fitted with "loop through" input terminals enabling one video processor to drive more than one monitor by a "daisy chain" connection.

printer output : printout of format definitions or screen contents.
: 20mA current loop.
: ASCII character set (equivalent to ISO-7).
: 1 start bit, 8 character bits, 2 stop bits (last character bit is zero, corresponding to unused parity bit, for ASCII set).
: 300 bit/s; 80 characters per line.

screen print : printout of displayed picture or single format area.
: video displays normally during print.
: suitable only for normal size text and numeric data. See note below.

NOTE: Screen printout of graphics and large characters will substitute asterisks (*) for such characters.

connection : ribbon cable from rear of subrack to video termination panel (2m std. length).
: 75 ohm B.N.C. connectors on termination panel for video output.
: screw clamp connectors on termination panel for printer output.
: 3 video leads are provided each 2 metres long, with B.N.C. connectors on both ends.

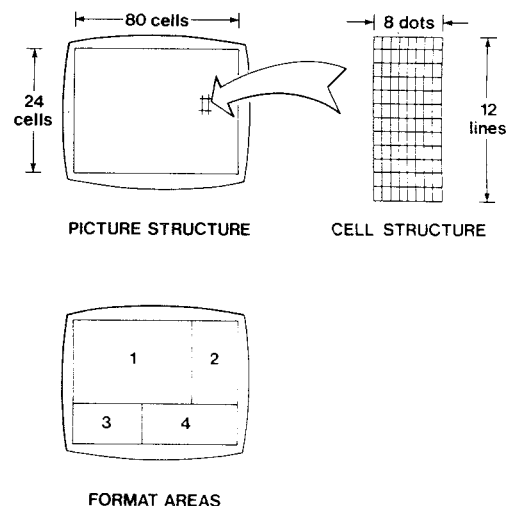


Figure 2 - Display Structure

Characters	Any characters from character set
Text	Text string e.g. shared with printer.
Bar charts	Vertical or horizontal.

APPLICATION NOTES

1. Paging of External Memory

The video format programs are stored in memory modules which are external to the video processor module. The paging facility allows the 16K byte "window" to be moved to cater for up to 8 additional 16K pages of memory, i.e. up to 2 additional 64K byte memory modules.

For program load/dump, each page of memory is treated separately. There will be one side of a cassette tape for each page which is used.

Each page can store up to 25 format definitions. The page number is determined by the format number as follows:-

Page	Format numbers
0	1 to 25
1	26 to 50
2	51 to 75
3	76 to 100
4	101 to 125
5	126 to 150
6	151 to 175
7	176 to 200
8	201 to 225

The video processor automatically switches between pages as required, and any 4 formats can be displayed at any one time, regardless of the pages used.
2. L Table

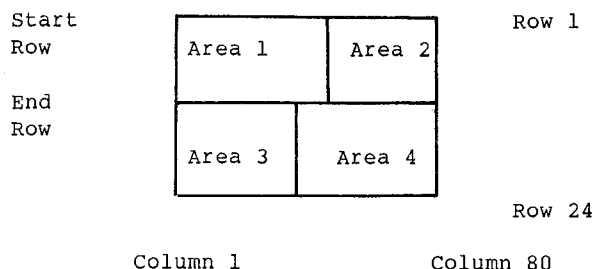
The display is controlled by the host controller L table and values must be programmed into this table, see example below:-

```
--(AND)------(OUT)--
W0                                     L0
```

If, for example, W0 is set to 2 then the video display will display format 2 in area 1 (see figure 1) since L0 controls area 1. Similar rungs of controller program can be used to specify formats for areas 2,3 and 4 through L table locations L1, L2 and L3. Thereby up to 4 formats can be displayed on one screen.
3. Format Sizes

The format sizes are determined by the partition data. The partitions are defined by a width in cells up to 80 cells and a height in lines up to 24 lines. The examples below show some of the possibilities.

Start End
Col. Col.



Examples:-	Area	Start Col.	End Col.	Start Row	End Row
Area 1	1	1	80	1	24
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0
Area 1 Area 2	1	1	50	1	24
	2	51	80	1	24
	3	0	0	0	0
	4	0	0	0	0
Area 1 Area 2 Area 3 Area 4	1	1	50	1	14
	2	51	80	1	14
	3	1	40	15	24
	4	41	80	15	24

4. The Video Format Program

The video format is programmed by defining colours (or attributes) and characters (or shapes) for each cell or a group of cells. This is done using one of the following five methods.

- Fixed instructions - To set up colours and characters that do not change
- Variable instructions - To obtain bar graphs, data displays, switched colour changes etc.
- Control characters - To give double width letters, flashing or inverse video.
- Repeats - to duplicate instructions, text, colours etc.
- Text/Character entry - to type in fixed text from keyboard or characters from the character set.

5. Fixed Instructions

General structure:-

^^type,@code,field width^

where:-

type - a number which defines whether the fixed instruction refers to characters or colours (or attributes) and whether these cells are vertical or horizontal.

@ code - a code for ASCII character or colour (or attribute).

field width - The number of cells over which the fixed instruction appl' .

Example of fixed instruction:-

^^2,@4,80^

The above instruction will set 80 cells across the screen red since

2 = attribute for n cells right.

@ 4 = red foreground, black background.

6. Variable Instructions

Variable instructions are also known as DRN's (Data Reference Numbers) general structure:-

^ field width, type, address, *^

where:-

field width - number of cells over which variable instruction applies.

type - DRN type number. This is a number which can specify bar charts, or control colours of cells according to variable host controller data, or display host controller data tables in signed, unsigned, decimal, or hexadecimal in single width characters, double width characters or triple high characters or output messages etc.

address - host controller data table locations to which variable data instructions relate .

* - additional information see User Information for details.

Example of variable instruction:-

^5,11,G8^

The above instruction will display host controller data table G8 as a decimal value, unsigned, leading spaces, range 0 to 32767.

Figure 3 shows an example of a typical video display and Figure 4 shows the program to produce this.

7. Editor System

The system is semi-interactive and while the portable programmer displays the program the resulting program can be displayed on a video monitor. The programming functions are controlled by the user through a series of editing commands. These enable a number of programming functions such as cursor positioning, entry, deletion and alteration of format instructions and the viewing of altered formats.

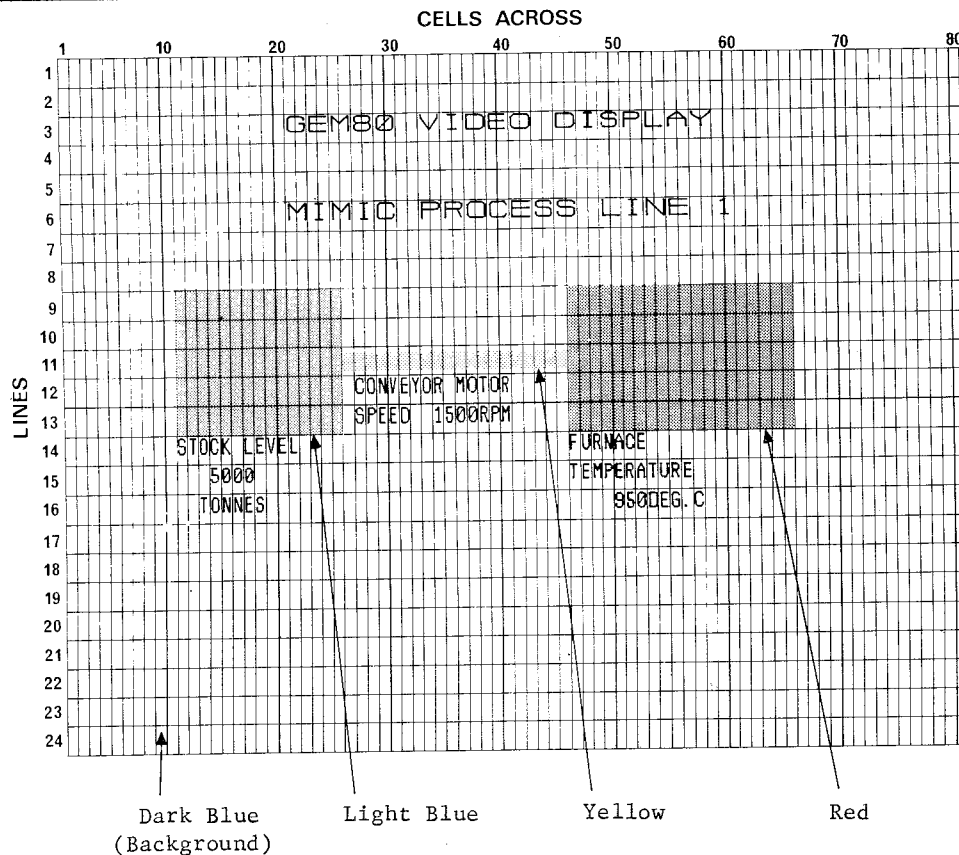


Figure 3 Example of a typical video display

PROGRAM	LINE NO.	EXPLANATION
<pre> ^1,@E,1^ @9,@9,@1E,GGEEM8800 VVIIDDEE00 DDIISSPPLAAYY@1F, @9,@9,@1E,MMIIMMIICC PPRROOCCEESSSS LLIINNEE 11@1F, @9,^2,@19,15^@9,@9,@9, ^2,@20,20^ @9,^2,@19,15^@9,@9,@9, ^2,@20,20^ @9,^2,@19,15^@9, ^12,@8C,20^2,@20,20^ @9,^2,@19,15^@9, CONVEYOR MOTOR ^2,@20,20^ @9,^2,@19,15^@9 SPEED ^5,11,G8,/18^RPM ^2,@20,20^ @9,STOCK LEVEL@9,@9, FURNACE @9, ^5,11,G7,/20^@9,@9,@9, TEMPERATURE @9, TONNES@9,@9,@9, ^5,2,W12,/27^DEG.C ^E </pre>	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Line 1. This fixed instruction sets foreground colour (yellow) and background colour (light blue) for the whole screen (except where defined otherwise). Line 3. Each @9 sets the invisible cursor in 10 spaces from the screen edge and @1E initiates double width letters @1F ends double width letters. Line 4 & 5. These two line feeds move invisible cursor down two lines. Line 6. Move cursor in and puts double width text in (similar to line 4). Line 9. These instructions move the invisible cursor 10 spaces in, set the next 15 cells dark blue, then 20 spaces, then sets the next 20 cells red by fixed instructions. Line 11. These instructions as line 10 and also puts in 20 cells to form a mimic of a conveyor, by fixed instructions. Line 12. As line 10 with additional text/character entry. Line 13,15 & 16. Show examples of variable instructions. Line 14 for example has a variable instruction which obtains a value proportional to motor speed from host controller data table G8 and divides this by an arbitrary scaling factor 18 and displays RPM. Line 18. This is the end instruction.

Figure 4 Example of a video format program for display Figure 2.

8. Display During Edit

When the portable programmer is used to begin video programming, the output from the video processor will freeze, retaining the picture at the instant of entering video edit mode. Provided that the L table was requesting the appropriate format number, the video monitor will display the picture about to be edited.

At any time during editing, the "view" command may be used to update the displayed picture. The effect of the "view" command is to store away the edited format definition, exactly as for the "exit" command, pause for a moment in video display mode, and then re-enter video edit mode for the same format definition. Provided that the L table was requesting the appropriate format number the picture will be updated using the edited format definition and the current variable data from the host controller. The use of the "view" command automatically moves the pointer to the beginning of the format definition.

In a multi-video system, the selection of video edit mode for one of the video processors leaves the other video processors displaying and updating their pictures, provided there is no change to the format numbers requested. Whilst editing is in progress the other video processors are not allowed to read from the format store, so if a different format number is requested, then that video processor will display format zero (screenful of GEM 80s).

9. Screen Printing

A print request in the table location for area 1 (-1 in L0 for video 1) gives a whole screen printout.

A print request in the table locations for areas 2 to 4 (-1 in L1 to L3 for video 1) gives a screen printout of the individual screen area.

Non-printing characters, e.g. semi-graphics, bar charts, triple high characters will print as * (asterisk). A bar chart will therefore appear as a row of asterisks approximately the right length, the approximation arises because the resolution is limited to a whole cell.

If foreground and background colours are identical (i.e. there is a "hidden" message on the screen), the printout will have spaces substituted for the appropriate characters.

There is no interruption of screen updating during screen printout, the printout represents a "snapshot" at the instant of print request.

10. Programming Facilities

10.1 Menu of Options

The display on initial entry is a list of options, similar to the portable programmer initial entry selection.

- 0 EXTERNAL RAM TEST
- 1 TERMINATE
- 2 SET PAGE NUMBER FOR MAGNETIC TAPE DUMP
- 3 SET CONTROLLER TYPE
- 4 EDIT PARTITION DATA
- 5 CHANGE NUMBER OF FORMAT DEFINITIONS
- 6 DISPLAY SIZES OF FORMAT DEFINITIONS
- 7 CLEAR SELECTED PAGE OF MEMORY
- 8 COPY FORMAT DEFINITIONS
- 9 EDIT/PRINT A FORMAT DEFINITION

10.2 Memory Testing Option

"External RAM test" is a facility for testing the memory used for format storage. The user is prompted to choose a page number, and the processor then proceeds to test every location in that page, writing and reading back a test pattern. The original memory contents are automatically preserved. The test results are presented to the user as a message on the programmer screen:-

```
RAM TESTED AND PASSED
or
RAM FAULT AT ADDRESS @xxxx
VALUE WRITTEN @xx VALUE READ @xx
```

10.3 Program Size Measurement Option

"Check the format definition sizes" is a facility for listing all the format definition sizes for a chosen page of memory.

Example:-

```
SIZE OF FORMAT 1      = 2054 BYTES
SIZE OF FORMAT 2      = 28 BYTES
AMOUNT OF AVAILABLE SPACE = 14142 BYTES
```

10.4 Format Copying Option

This option allows a format to be copied. Copying between pages is possible, e.g. format 1 could be copied to format 46. This option can also be used to clear a particular format definition, by copying from a known empty definition.

10.5 Page No. for Magnetic tape

Because each page of format memory is treated as a separate program, it is necessary to use the "set page number for magnetic tape dump" option BEFORE selecting the programmer to the program dump mode.

The dumped program includes information defining the page number, so a tape will automatically reload into the same page number from which it was dumped.

10.6 Set Controller Type

The latest software version is suitable for both 250 series and earlier controllers. The type of controller is set up by the user as part of the programming activity, and is subsequently stored as part of the video program for load/dump purposes.

11. REQUIREMENTS FOR PRINTERS FOR CONNECTION TO VIDEO TERMINATION PANEL FOR VIDEO PRINT OUT

Full details of printers for use with GEM 80 is given in "PRINTERS" Application Note. The essential points are:-

- (a) That the printer should be able to accept a 20mA current loop serial input.
- (b) The printer must be able to accept ASCII character code.
- (c) The printer must be able to receive signals transmitted at 300 bit/s.
- (d) This printer port is not designed to accept handshake signals.
- (e) The printer must be able to accept characters sent as 11 bits, each comprising 1 start bit, 7 code bits in ASCII, 1 even parity bit and 2 stop bits.
- (f) The line length of the printer must be at least 80 characters.

ORDERING CODES

GEM 80 video is normally ordered as part of a GEM 80 controller, and the user should refer to the appropriate controller product data sheet for full details.

The user should note that the 250 series controllers require issue C or later software.

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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