A620
THERMAL PRINTER
USER MANUAL

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C O N T E N T S

INTRODUCTION

FEATURES

INTRODUCTION

The A620 is a versatile clamshell thermal printer, designed for desk top or portable use, providing 24 or 40 columns at up to 16 lines/second.

The manual has been divided into three sections for ease of reference.

Part 1 deals with printer installation. Part 2 with general operation & paper loading. Part 3 is for programmers.

By following the guide lines in this manual and with careful handling, a long and reliable operating life can be expected from these printers.

Please note that where the portable printers are despatched from the factory with batteries included, there is no charge in the batteries for safety and storage reasons. Refer to section 3.5 for power supply details.

FEATURES

!
!
!   RS232 or Centronics Parallel and a variety of special interfaces.
Approximately 10,000 text lines with fully charged batteries.
International character set.
Automatic power-off features.
User selectable options stored in non-volatile RAM.
Automatic power up from data line activity.
8K buffer minimum.
Double width printing.
Double height printing.
Underlining.
Built-in tab stops.
Vertical tab.
Form feed.
Self-test facility.
Inverted Printing. (Data Mode)
Graphics.
Reset command.
Diagnostic Mode.
Epson ESC/POS Emulation.
Citizen 560 Emulation.
Bar Code Printing.
24 or 40 column printing.
User defined character set.
!   Label registration feature.

PART 1   INSTALLATION

1.1   Precautions

(1)   The printer is to be used free-standing and should be placed on a stable surface providing easy access to the control panel and to the paper well when the lid is open.

(2)   Do not site the printer in an excessively hot or humid location. Exposure to grease, dust, metal swarf or liquids is best avoided.

(3)   When using the power adapter avoid using a mains outlet which also supplies heavy switching machinery since a noisy supply may impair printer operation.

(4)   Ensure that the adapter provides the correct operating voltage. Refer to section 3.5 for supply details.

(5)   Care must be taken to ensure that any power adapter supplied by the customer meets with national safety requirements and has the correct output voltage and polarity. The manufacturer has no responsibility for equipment operating outside these parameters.

(6)   Do not remove paper by pulling excessive lengths through the top of the printer.

1.2   Default Settings

The A620 printer is supplied with the following default settings:

Data bits	8
Parity	None (Not shown for Parallel Interface)
Baud Rate	9600 (Not shown for Parallel Interface)
Country	USA
Print Mode	Text
Auto-Off	5 minutes
Emulation	Standard
DTR	Normal
Chars/Line	24
Graphics	Standard
Contrast	5
Label	Disabled

Default settings can be restored by pressing both the feed and programme switches together at power up. Releasing the feed button before the programme button will set original defaults.

See section 1.5 to change above parameters.

1.3 Self-Test

Ensure that the printer is switched off. To initiate self test press the "Δ" power on/feed switch until the test starts. This will check all the mechanics and a large proportion of the software and hardware (except that dealing with the data interface) without the need for connection to a host. The software issue is printed in double height, double width text, followed by the character set in normal text and a list of the current settings of the user selectable options. If the settings are correct for your host you are ready to connect the printer to your system, otherwise you will need to re-programme the printer. The self test is repeated until the power is switched off. Power on again for normal operation.

Note: The parity and baud rate settings are not printed on the parallel version.

1.4 Interface Connections

The A620 printers are available as standard with either a Centronics Parallel or RS232 Serial interface. The interface type is printed on the self-test slip.

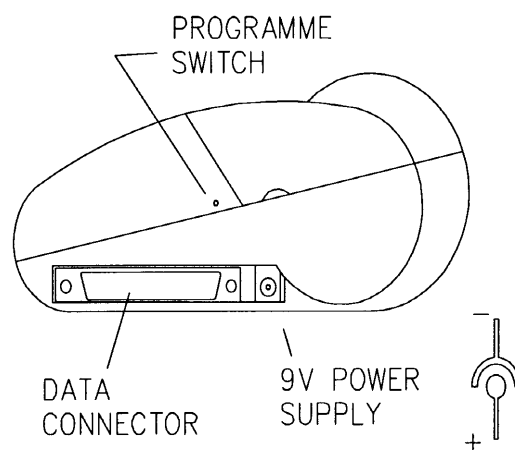The connector is a 25 way D plug for Parallel and a 25 way D socket for Serial.
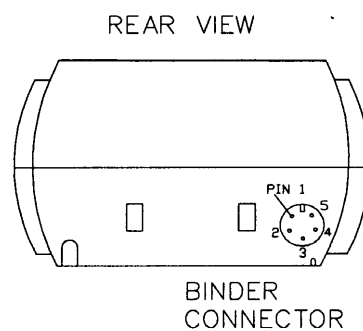

Fig.2 Desktop with D25

Fig.3 Portable with Binder

PARALLEL CONNECTIONS - TTL LEVELS

Function	25 Way D-Plug	Input/Output
STROBE	1	IN
D0	2	IN
D1	3	IN
D2	4	IN
D3	5	IN
D4	6	IN
D5	7	IN
D6	8	IN
D7	9	IN
ACK	10	OUT
BUSY	11	OUT
P END	12	OUT
Select	13 (+5V via 100K)	OUT
Auto Feed	14 (NC)	-
Error	15 (+5V via 100K)	OUT
Initialise Printer	16 (NC)	-
Select Input	17 (NC)	-
GND	18 - 25	-

SERIAL CONNECTIONS - RS232

Function	25 Way D Socket	Binder	Input/Output
RX	3	3	IN
TX	2	2	OUT
CTS	5	5	IN
DTR	20	4	OUT
GND	7	1	-
NC	6, 8-19, 21-25		-
FG	1		
RTS	4 (+10V via 1K)		OUT

Note that on some models, internal links have been factory set in order to allow power input via the serial D25. In these instances power will either be on:

pins 8, 9: GND   OR   pins 14,15: GND
pins 12,13: power in   pins 16,17: power in
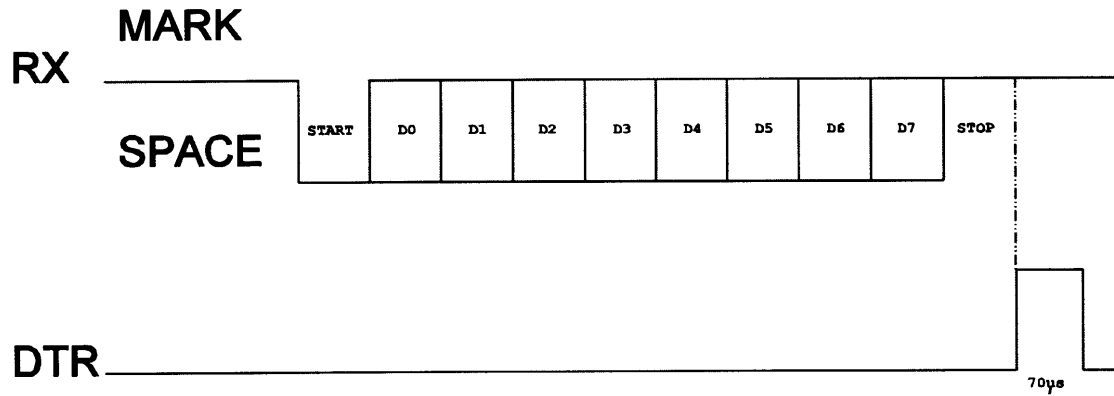
MARK = -10V

SPACE = +10V

N.B : DTR WILL BE SET FOR A MINIMUM OF 70μs AT THE END OF THE STOP BIT ON EACH CHARACTER.

THIS CONDITION WILL BE LONGER FOR BUFFER FULL AND WILL BE SET UNTIL RESET IF A PRINTER FAULT OCCURS.

A620 PARALLEL INTERFACE TIMING

DATA

→| |←—Min 0.25μS

STROBE

→| |←—Min 1μS

BUSY

Max 1μS →| |←   →| |← Min 2μS Max 500μS

ACKNOWLEDGE

→| |←—Min 5μS Max 500μS

1.5   Programme Mode

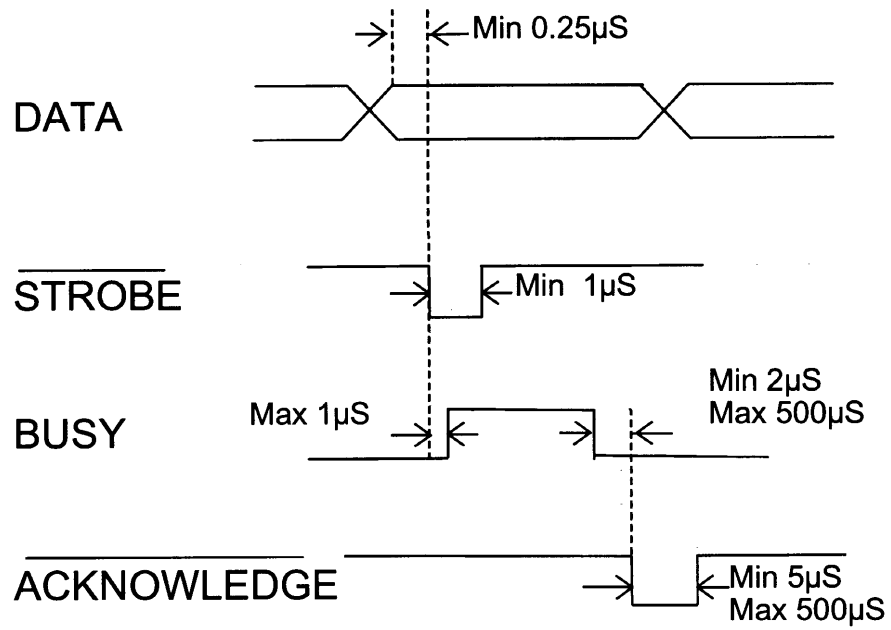The programme switch may be accessed through a small hole on the side of the printer (see Fig. 2). This can be pressed using a small pin eg a paper clip. Press the programme and power-on switch together to initiate the set-up mode. The power-on indicator will flash every second until set-up mode is turned off. The current parameter status will then be printed.

Press and release the "Δ" feed switch to print each parameter status.

Example :-   Data bits : 8   Pressing the programme switch will change the status of a parameter. Each parameter table rotates so "no parity" follows on from "even parity", 300 baud follows on from "19200 baud" and so on.

Example :-   Baud Rate: 300, 600, 1200, 2400, 4800, 9600, 19200, 300...
              Parity : No parity, Odd parity, Even parity, No parity...

When all the necessary changes to the parameters have been made, press the programme and the feed switch together to update the status of the printer. If no switches are pressed for 15 seconds the set-up mode is terminated without changing the original parameters.
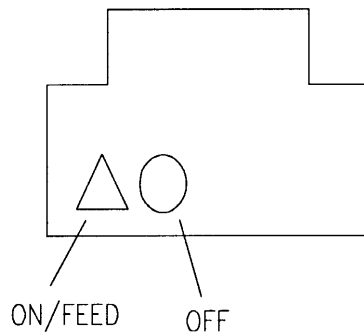
ON/FEED   OFF
Fig.4 Switch Panel

Parameter (FEED Switch)	Status (PROGRAMME Switch)		
(1) Number of data bits	8 bit data 7 bit data	** (** Default Settings)	
(2) * Parity	No parity Odd parity Even parity	**	
(3) * Baud Rate * NB: Not printed for a parallel interface	300 baud 600 baud 1200 baud 2400 baud 4800 baud 9600 baud 19200 baud	** **	
(4) Country	USA ** FRANCE GERMANY UK DENMARK 1 SWEDEN	ITALY SPAIN JAPAN NORWAY DENMARK 2	
(5) Print Mode	TEXT (Normal Print) DATA (Inverted Print)		
(6) Auto POWER OFF	5 minutes 1 minute Disabled	**	
(7) Emulation	Standard Citizen 560 ESC/POS	**	
(8) DTR	Normal ** Inverted		
(9) Characters/Line	24 40	**	
(10) Graphics	Standard Epson High resolution graphics	**	
(11) Contrast	1-10 1 is lightest 10 is darkest	(5 Default)	
(12) Label	Disabled Enabled	**	

An alternative method is to send the "set up" data via the RS232 port to prevent the need for manual programming.

Setup via Data Interface
If the A620 is turned on whilst both the programme and feed switches are pressed and only the programme switch is released, the A620 will print:-

"NVR COMMS READY>"

At this point the printer is waiting to receive data in the following format:-
"PROGRAMME-MODE" + CARRIAGE RETURN + n1 + ...n16 (n1 to n16 are hex numbers)

The "PROGRAMME-MODE" followed by a carriage return indicates that the printer should expect parameter data as shown in Table 1 below.

Note: The data sent to reprogramme the printer is always expected at 9600 baud, 8 data bits, no parity, irrespective of any of the existing printer settings.

Upon receiving information in the correct format the A620 will print:-
"DATA OK, NVR UPDATED!"

If the data received is not in the correct format then the A620 will print:-
"DATA ERROR NVR UNCHANGED"

Note: If no data is received within 15 seconds or the feed key is released before the procedure is complete, then the change of parameters will not take place and the A620 will print:-
"SET ERROR NVR UNCHANGED"

TABLE 1

	Value→	0	1	2	3	4	5	6	7	8	9	10
n	Description											
1	Data Bits	8	7									
2	Parity	None	Odd	Even								
3	Baud Rate	19200	9600	4800	2400	1200	600	300				
4	Country	Denmark 2	Norway	Japan	Spain	Italy	Sweden	Denmark 1	U.K.	Germany	France	U.S.A.
5	Print Mode	Text	Data									
6	Auto Off	5 Minute	1 Minute	Disabled								
7	Emulation	Standard	560	ESC-POS								
8	DTR	Normal	Inverted									
9	Chrs/Line	24	40									
10	Graphics	Standard	Epson	Image								
11	Contrast	1	2	3	4	5	6	7	8	9	10	
12	Label	Disabled	Enabled									
13/16	Reserved	Always 0										

String "PROGRAMME-MODE", 0DH,$n_1,n_2,n_3,n_4,n_5,n_6,n_7,n_8,n_9,n_{10},n_{11},n_{12},n_{13},n_{14},n_{15},n_{16}$

SAMPLE PROGRAMME IN BASIC

```
10     KEY OFF:CLS:
15     LOCATE 2,25:PRINT "NVR TEST ROUTINE FOR A620";
16     LOCATE 3,25:PRINT "-------------------------";
20     LOCATE 5,25:INPUT "(S)erial or (P)arallel ?",A$
30     IF A$="S" OR A$= "s" THEN 60
40     IF A$="P" OR A$= "p" THEN 50
45     GOTO 10
50     WIDTH "lpt1:",255:OPEN "lpt1:" AS #1:GOTO 65
60     OPEN "COM1:9600,N,8,1,RS,CSO,DS65535" AS #1
65     LOCATE 7,5:INPUT "Press prog+feed, power on, release prog on 1000, then press
       any key ...";B$
70     PRINT #1,"PROGRAMME-MODE";CHR$(13);
80     FOR I=1 TO 16:READ A:PRINT #1,CHR$(A);:NEXT I
90     RESTORE
100    PRINT #1,CHR$(13);CHR$(13)
110    CLOSE #1
120    DATA 0,1,2,9,0,1,1,1,1,0,6,0,0,0,0,0
```

The programme sets: 8 data, odd parity, 4800 baud, France, Text mode, 1 minute, 560, Inverted DTR, 40 column, standard graphics, contrast 7, label disabled.

Note that the factory defaults can always be restored by pressing both the feed and programme switches at power up then releasing only the "FEED" switch. Defaults will be restored and a printed message acknowledges that this has occurred.

1.6   Automatic Switch On

As a standard mode of operation, the A620 will "wake-up" in response to activity on the data line. To use this power saving facility, the DTR handshaking must be disabled whilst a string of approximately 50 NUL characters (00H) are sent to the printer. This allows time for the logic to reset and initialise the printer correctly. Any NUL characters that are received as valid data from this string will be discarded as non-printable data. Once the start up sequence is complete, reactivate the DTR handshaking so that normal communications can be resumed.

When used in combination with the auto-off feature, the printer can effectively be switched on when required to print, thus extracting maximum capacity from the battery pack.

1.7   Troubleshooting

(1)   The power light does not come on when the unit is switched on.

Check the batteries are sufficiently charged or that the power adapter is connected correctly. If power resource is satisfactory and the LED still does not illuminate when the power is switched on, refer the unit for repair.

(2)   The power light comes on but does not feed paper.

This is a printer fault condition. Check that there is no paper jammed in the mechanism, the head is down and paper is loaded.

(3)   The paper is not feeding properly.

If the print looks squashed, check that the paper roll is sitting correctly in the paper well and that the roll is the right way up. The paper should be feeding off the bottom of the roll into the back of the mechanism NOT off the top of the roll. Remove paper and reload if necessary.

(4)   No print on the paper.

If the printer is working but no print is visible, check that the paper has been loaded the right way round.

(5)   The printer does self-test but does not print data sent through the interface.

Check interface connections are correct. (See section 1.4).

(6)   The printer does not switch on from the data line.

If the printer does not automatically switch on when the communications channel is active, check that the host is able to send data and the handshaking is disabled. When the printer is off, most host equipment will not be able to send data as the DTR line is inactive. For the switch on procedure, DTR must be disabled, the NUL characters transmitted, then DTR enabled to resume normal communications.

(7)   The printer prints "?" "!" or "*" in place of the transmitted characters or it does not action commands.

Check the handshaking line, parity setting and baud-rate. The different characters denote particular errors: "?" - parity error, "!" - framing error, "*" - over run error.

If a command is not carried out by the printer, it is possible to check for an incorrect control code or character by initiating diagnostic mode.

Diagnostic Mode reveals control codes and characters sent to the printer. Characters 00H to 1FH are translated to characters 40H to 5FH and underlined to indicate a control character.
EXAMPLE: HORIZONTAL TAB (O9H) = CTRL I Printed as I
                           CARRIAGE RETURN (ODH)= CTRL M Printed as M
Normal characters are not underlined.

1.8   Diagnostic Mode

To enter diagnostic mode initiate self-test and keep the feed switch depressed until 'DIAGNOSTIC MODE' is printed. The power-on indicator will flash every two seconds.

An example of diagnostic mode is as follows :

ABC DE FG	...	Normal Print
ABCIDE UFXGM	...	Diagnostic Print Out

In the example the following sequence of characters was sent:

Characters ABC, horizontal tab (I), characters DE, space, underline (U) character F, release underline (X), character G, carriage return (M).

A list of valid control characters is shown in section 3.1.

To reveal the complete information sent, press the "FEED" switch. To terminate diagnostic mode switch off and on again to resume normal operation.

1.9   Accessories

Paper Specification: **NOTE:** PAPER MUST NOT BE STUCK TO THE CORE

Jujo TF50KS-E2C
Mitshubishi F200U9W6

Dimensions: 58mm +0/-1mm (width)

60mm max (Roll diameter)

Paper Thickness: 65 microns

Refer to Appendix 3 for the power adapter specification.

If a power adapter is to be sourced from another supplier make sure that it complies with the specification in Appendix 3.

PART 2   OPERATORS GUIDE

Operation

- **DO** read the operating instructions carefully before you attempt to use the printer.

- **DO** ensure that any electrical connections are properly made in accordance with the instructions.

- **DO NOT** remove any fixed covers unless you are qualified to do so - and even then switch off <u>first</u> and disconnect the power adapter from the socket before you start.

- **DO NOT** continue to operate the printer if you have <u>any</u> doubt about it working normally, or if it is damaged in any way. Refer the unit for repair.

2.1   Power-On Procedure

Check the batteries are sufficiently charged or that the power adapter is connected correctly.

Open the lid, check that paper is present and that there are no foreign objects inside the paper well or mechanism.

Close the lid, ensuring the paper is straight and not trapped under the lid.

Switch on the printer by pressing the "Δ" switch.

The power-on indicator will light and the mechanism will reset. If this does not happen refer to section 1.7.

2.2   Paper Loading

If the paper roll needs replacing open the lid and remove the remaining paper. Reel off a few centimetres from a new paper roll and check that the end is square. Remove the old paper roll core and insert the new paper roll between the spindle clips in the paper well with the paper emerging from the bottom of the roll. Holding the free end of the paper, pull it forward such that it lies centrally between the pillars on the mechanism. Close the lid and press the feed switch to ensure that the paper is moving freely. Tear off any excess paper against the tear bar.
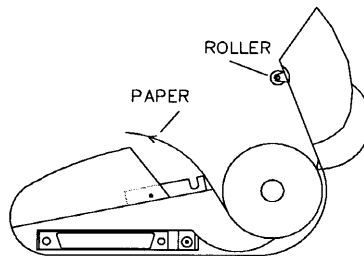

Fig. 5 Paper Loading

2.3   Paper Feed

For a single line paper feed press and release the "Δ" feed switch. For continuous line feed keep the switch depressed. The power indicator turns off when the feed switch is depressed.

2.4   Care Of the Printer

Periodic cleaning will help to keep your printer in good condition.

IMPORTANT: Switch the printer off and disconnect the power adapter before any cleaning operation.

Use a soft brush to remove any dust or foreign particles from the paper well and mechanism. The case may be cleaned with a soft cloth <u>slightly</u> dampened with alcohol. Be careful not to let any liquid enter the printer enclosure.

The print head can be cleaned using special cleaning cards or pens which have an alcohol base. Simply open the lid and wipe the head with the cleaning media.

Do not use the printer if liquid or metal objects have entered the unit. If this happens whilst the printer is in use, switch off immediately and have it serviced.

If the printer is not going to be used for some time, disconnect the power adapter and ensure the unit is switched off.

Do not leave the printer powered up if it is malfunctioning.

NOTE :   To conserve the battery power ensure that the unit is set at 1 or 5 minute auto off. (See section 1.5)

PART 3 PROGRAMMING

3.1 Command Summary for the A620 Printer

Function	Keystroke	Hex	Decimal
Horizontal Tab	CTRL I	09H	9
Line Feed	CTRL J	0AH	10
Form/Label Feed	CTRL K	0BH	11
Vertical Tab	CTRL L, n	0CH, n	12,n
Carriage Return	CTRL M	0DH	13
Double Width	CTRL N	0EH	14
Single Width	CTRL O	0FH	15
Reset	CTRL Q	11H	17
Underline	CTRL U	15H	21
Underline Release	CTRL X	18H	24
Reverse Print	CTRL Y	19H	25
Double Height	CTRL Z	1AH	26
Standard Graphics	CTRL [, n	1BH, n	27,n
Epson Graphics	CTRL [,K,$n1$,$n2$	1BH,4BH,$n1$,$n2$	27,75,$n1$,$n2$
24 Column	CTRL\	1CH	28
40 Column	CTRL]	1DH	29

Command Summary For Citizen 560 Emulation

Function	Keystroke	Hex	Decimal	
Line Feed	CTRL J	0AH	10	
Form Feed	CTRL L	0CH	12	
Carriage Return	CTRL M	0DH	13	
Shift Out	CTRL N	0EH	14	
Shift In	CTRL O	0FH	15	
Reverse Print	CTRL T	14H	20	
Clear Buffer	CTRL X	18H	24	
Graphic Print	ESC K	1BH, 4BH	27,75	
Page length/format	ESC C	1BH, 43H*	27,67	*Commands
Paging Is Off	ESC O	1BH, 4FH*	27,79	acknowledged
2.75 mm Spacing	ESC 1	1BH, 31H*	27,49	but not
5.5 mm Spacing	ESC 2	1BH, 32H*	27,50	executed
Double Width	-	1EH	30	
Single Width	-	1FH	31	

Command Summary For Epson ESC/POS Emulation

Horizontal Tab	CTRL I	09H	9
Line Feed	CTRL J	0AH	10
Form Feed	CTRL L	0CH	12
Carriage Return	CTRL M	0DH	13
Set Print Mode	ESC !,*n*	1BH, 21H, *n*	27,33,*n*
Set print position	ESC $ *n*1,*n*2	1BH, 24H, *n*1,*n*2	27,36,*n*1,*n*2
Set cancel UDC	ESC %,*n*	1BH, 25H, *n*	27,37,*n*
User Defined Character	ESC & *s,n,m,*	1BH, 26H, *s,n,m,*	27, 38,*s,n,m,*
	[a[p]sxa]m-n+1	*[a[p]sxa]m-n+1*	*[a[p]sxa]m-n+1*
Bit image graphics	ESC**m,n*1,*n*2	1BH, 2AH,*m,n*1,n2	27,42,*m,n*1,*n*2
Initialise Printer	ESC @	1BH, 40H	27,64
Set form length	ESC C,*n*	1BH, 43H, *n*	27,67,*n*
Character Set	ESC R,*n*	1BH, 52H, *n*	27,82,*n*
Print & Feed	ESC d,*n*	1BH, 64H, *n*	27,100,*n*
Status Request	ESC v	1BH, 76H	27,118
Inverted Printing	ESC {,*n*	1BH, 7BH, *n*	27,123,*n*
HRI print position	GS,H,*n*	1DH, 48H, *n*	29,72,*n*
HRI character font	GS,f,*n*	1DH, 66H, *n*	29,102,*n*
Bar code height	GS,h *n*	1DH, 68H, *n*	29,104,*n*
Print bar code	GS k *n,d,m,*NUL	1DH, 6BH, *n,d,m,*0H	29,107,*n,d,m,*0
Bar code magnification	GS w,*n*	1DH, 77H, *n*	29,119,*n*

3.2   Command Description for the A620 Printer

TAB (09H)
Tab stops occur at every 8th column. On receipt of this command, spaces are entered into the line up to the next tab stop.

LINE FEED (0AH)
Prints the current line and feeds one line. If LF and CR are sent, the CR is ignored to avoid a double feed.

FORM FEED (0BH)
Will feed 5 fast line feeds in normal mode or will feed to top of label registration mark (See Appendix 4) in label mode.

VERTICAL TAB (0CH,n)
Fast feeds the paper by n lines where n is a single byte hex number in the range $0 < n < 63$. Note that a vertical tab will print the contents of the line buffer before being executed.

CR (0DH)
Prints the current line and feeds one line. If CR and LF are sent, the LF is ignored to avoid a double feed.

On the receipt of the last printable character, the printer will automatically print the data in the buffer. If CR and LF are sent after this condition, they will be ignored.

DOUBLE WIDTH (0EH)
Turns double width printing on. This state continues until terminated by the single width command or completion of the current line.

If the last character in the line buffer is double width but there is only room for a single width character, then it will be printed in single width.

SINGLE WIDTH (0FH)
Reverts to single width printing. Single and double width can be combined anywhere on a line.

RESET (11H)
Causes printer status reset. Printer status is set to single width, normal height, no underline. Note that the buffer remains unaltered to avoid any data loss.

UNDERLINE (15H)
Characters sent after this command will be underlined. Tabs are not underlined. Underlining is terminated by the U/L release command or on completion of the current line.

U/L RELEASE (18H)
Terminates underlining.

REVERSE PRINT(19H)
This command sets the print to white on black. The command will toggle between reverse and normal print wherever it appears on a line, but the condition is always reset at the end of the line.

DOUBLE HEIGHT (1AH)
Prints the line in double height for one line only. Double height and single height cannot be mixed on the same line.

STANDARD GRAPHICS (1BH,*n*)

Standard 1000 Emulation

Graphics command to enter bit image printing. The number of graphic bytes sent will depend on the column selection ie 24 or 40. For each graphic byte sent, 6 bits out of the 8 bits are used to build the graphics string (LSB as the right most dot) and '*n*' is the number of times the string will be repeated for a repetitive pattern. The value of '*n*' is limited to a maximum of 255 lines. The print buffer will be printed first if not empty.

Examples:

To repeat a string of data bytes, d1....d24 over two rows for 24 column printing send : 1BH, 02H, d1....d24.

For a non-repeated string send : 1BH, 01H, d1....d24.

High Resolution Graphics

To make use of the higher resolution on the DP1200 that is not available on the 1000, there is an option in the set up for changing the default graphics. This works in the same manner as the standard emulation but there are 48 characters across the line, rather than 24 or 40. This provides full dot addressable graphics at 8 dots/mm and a true image of the data received.

24 Column (1CH)

Selects 24 column font. ie Sets 24 characters per line printing.

40 Column (1DH)

Selects 40 column font. ie Sets 40 characters per line printing.

Epson Graphics (ESC K, *n1*,*n2*)

Made possible by the higher resolution and memory capability of the DP1200 over the standard 1000. The number of graphic bytes is determined by $n1$ (low order byte) and $n2$ (high order byte). For maximum graphics resolution of 384 printable positions, $n1=128$ and $n2=1$ (representing 256). For 200 graphic bytes, $n1=200$, $n2=0$. That is $0<n1<255$, $0<n2<1$.

Each data character represents 8 dot rows of graphics, the LSB being the lowest dot.

The command and data must be sent for each line of graphics.

3.3 Epson ESC/POS Command Description

TAB (09H)
Tab stops occur at every 8th column. On receipt of this command, spaces are entered into the line up to the next tab stop.

LINE FEED (0AH)
Prints the current line and feeds one line. If LF and CR are sent, the CR is ignored to avoid a double feed.

FORM FEED (0CH)
Prints the current line and feeds the number of lines determined by using the ESC C command.

CR (0DH)
Prints the current line and feeds one line. If CR and LF are sent, the LF is ignored to avoid a double feed.

SET PRINT MODE
ESC ! n (1BH,21H,n)
Sets the print mode according to the following table and n is a single byte in which each bit sets the printing function. Note that underlines cannot be used with a horizontal tab and any combination of double height and width can be used. Double and single height cannot be mixed on a line, however, whereas double and single width can be mixed anywhere on a line. Default is $n = 0$.

Bit	Function	Value	
		0	1
0	Character font	16 x 24	9 x 24
1	Undefined		
2	Undefined		
3	Undefined		
4	Double-height	Cancelled	Set
5	Double-width	Cancelled	Set
6	Undefined		
7	Underline	Cancelled	Set

SET/CANCEL USER DEFINED
CHARACTER SET
ESC %,*n* (1BH,25H,*n*)   The range of n is $0 \leq n \leq 255$. This sets or cancels the user defined character set. **Note:** Once the user defined character set has been cancelled the default character set will be loaded and the user defined characters will be lost.

DEFINE USER-DEFINED
CHARACTERS
ESC & *s n m [a[p] s x a]m-n+1*
(1BH,26H,*s n m [a[p] s x a]m-n+1*)

This allows the user-defined characters to be down-loaded: where:

- "*s*" specifies the number of bytes in the vertical direction. This value must be 3.
- "*n*" specifies the beginning ASCII code for the definition and "m" the final code. If only one character is defined, use $n = m$. The range for *n* is $32 \leq n \leq m \leq 255$.
- "*a*" specifies the number of dots in the horizontal direction. This value must be 16.
- "*p*" is the dot data for the characters. The dot pattern for *a* dots in the horizontal direction from the left side. The amount of data to be defined is *s* x *a*.
- After user-defined characters are defined once, they are available until another definition is made or ESC % *n* is sent.

NOTE: See Appendix 6 for the character cell structure.

The User defined character set (UDCS) and the standard character set are not available at the same time.

Normally, the UDCS will be battery backed. However, if the batteries are left to discharge completely, then the UDCS will be lost and the default character set will be loaded.

ESC @ (1BH,40H)   Initialise printer. Clears the print buffer and resets the printer mode to default values.

**SELECT INTERNATIONAL
CHARACTER SET
ESC R *n* (1BH,52H,*n*)**

The character set from the following table is determined by the value of *n*. The default value is the character set programmed in the printer.

n	Country
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark 1
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark 11

**PRINT AND FEED
ESC d *n* (1B,64H,*n*)**

Prints the data in the print buffer and performs *n* line feeds.

**STATUS REQUEST
ESC v (1BH,76H)**

The current printer status is transmitted to the host computer on receipt of this command. It takes the form of a single byte with each bit representing a specific printer condition. The conditions indicated are "true" when the bit is a logic "1".

Bit 0	Paper out
1	Feeding paper
2	Lid open
3	Low voltage
4	Always zero
5	Not used
6	Not used
7	Buffer full

The byte is sent regardless of the CTS handshaking signal.

**INVERTED PRINT
ESC { *n* (1BH,7BH,*n*)**

When *n* = 1 then print is inverted and text will be printed from right to left. For normal print *n* = 0. The default mode is set by the programmed parameters in the printer.

SET FORM LENGTH

ESC C *n* (1BH,43H,*n*)   When used in conjunction with the form feed command (0CH), the printer will feed *n* lines. Note that if *n* = 0 then there will be no line feeds. The default value is *n* = 0.

PRINT STARTING POSITION

ESC $ *n1,n2*(1BH,24H,*n1,n2*)   Sets the print starting position to the specified number of dots from the margin. The range is from 0 to 384 where *n2* is the high order byte ($0 \le n2 \le 1$) and *n1* is the low order byte ($0 \le n1 \le 255$). The default condition is *n1=n2*=0 which positions print on the left margin. The print position will always be rounded down to the nearest multiple of 8. (eg Print position 45 will be rounded down to 40.)

BAR CODES

SET BAR CODE TYPE
GS k *n,d,m* NUL
(1DH,6BH,*n,d,m*,00H)
The print bar code command selects a bar code, formats the data and prints the bar code according to the variables *n*, *d* and *m*. The type of bar code is defined by "*n*" and valid values are displayed in the table below.

n	Bar Code Type
0	UPC-A
1	UPC-E
2	EAN13
3	EAN8
4	CODE39
5	ITF
6	NOT ASSIGNED
7	CODE128

d is the string of characters to be printed as the bar code.
m specifies the number of characters sent. This must be sent for code128 bar codes but is optional for the others.

This command will always set the print position to that specified by the ESC $ (print position) command. Certain error conditions result in data being ignored and nothing being printed, these conditions are:

- invalid bar code type
- invalid characters (*d*) in bar code
- too many/few characters sent (UPC and EAN bar codes)
- number of characters sent is not equal to *m*
- bar code is wider than paper

Check characters can be sent but are overwritten by the calculated check character and are therefore redundant.

SET BAR CODE MAGNIFICATION

GS w n (1DH,77H,*n*)   Selects magnification (horizontal size) of the bar code. The range is $2 \leq n \leq 4$. The default value is $n=3$.

SET BAR CODE HEIGHT

GS h n (1DH,68H,*n*)   The range is $1 \leq n \leq 255$ and n specifies the number of dots in the bar code height. Default value is $n=162$. Note that if $n=0$, the default height is used.

SET HRI PRINT POSITION

GS H n (1DH,48H,*n*)   The range is $0 \leq n \leq 3$. The default value is $n=0$ and "n" defines the print position as follows:

$n=0$ not printed
$n=1$ above the bar code
$n=2$ below the bar code
$n=3$ above and below the bar code

Guard patterns are not printed in the HRI text.

SELECT HRI FONT

GS f n (1DH,66H,*n*)   The range is $n=0$ or 1 (default 0). If $n=0$, the 24 column font is selected. If $n=1$, the 40 column font is selected.
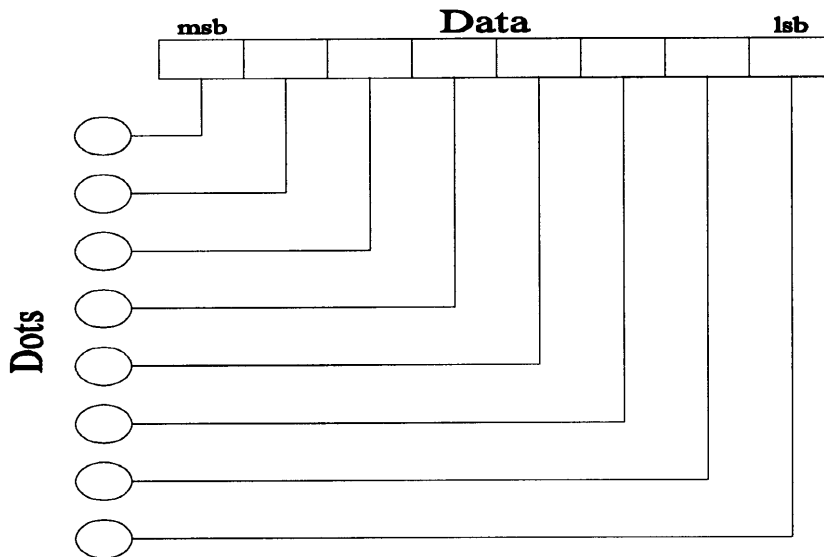
GRAPHICS

ESC *,*m*,*n1*,*n2*,*d*

(1BH,2AH,*m*,*n1*,*n2*,*d*) The bit image graphics command formats and prints a bit image depending on *m*, *n*1, *n*2 and the data. The density of the bit image (*m*) has no effect on the DP1200. All graphics are single density, but ordinarily m=0 for single and m=1 for double density.

n1 and *n2* specify the number of bytes sent (*d*).
n2 is the high order byte ($0 \le n2 \le 1$), *n1* is the low order byte ($0 \le n1 \le 255$). The total number of data bits to send is calculated by the formula *n*2 x 256 + *n*1. For 384 graphic bytes, the maximum per line, then *n*2=1, *n*1=128. The data (d) is formatted as shown below.

3.4   Command Description for the A620 Printer with 560 Emulation

LINE FEED (0AH)   Prints the current line and feeds one line. If LF and CR are sent, the CR is ignored to avoid a double feed.

FORM FEED (0CH)   Will feed 4 fast line feeds.

CR (0DH)   Prints the current line and feeds one line. If CR and LF are sent, the LF is ignored to avoid a double feed.

On the receipt of the last printable character (eg 24th, if characters per line is set to 24) the printer will automatically print the data in the buffer. If CR and LF are sent after this condition, they will be ignored.

SHIFT OUT (0EH)   Access upper half of character set if 7 data bits selected. If 8 data bits selected, then turn DOUBLE WIDTH printing on.

SHIFT IN (0FH)   Access lower half of character set if 7 data bits selected. If 8 data bits selected, then turn SINGLE WIDTH printing on.

REVERSE PRINT (14H)   This command sets the print to white on black. The command will toggle between reverse and normal print wherever it appears on a line but the condition is always reset at the end of the line.

CLEAR BUFFER (18H)   Clears the print data in the buffer. All the previous input data is cleared with this code. However, in case of graphic print mode, this code is treated as data.

DOUBLE WIDTH (1EH)   Turns double width printing on. This state continues until terminated by the single width command or completion of the current line.

If the last character in the line buffer is double width, but there is only room for a single width character, then it will be printed in single width.

SINGLE WIDTH (1FH)   Reverts to single width printing. Single and double width can be combined anywhere on a line.

NOTE:- 560 GRAPHICS COMMAND

ESC K *n*1, *n*2,
(1BH,4BH,*n*1,*n*2)
This command requires special note because all associated data will be ignored. The number of graphics bytes determined by *n*1 and *n*2, will be received but discarded so as not to appear as erroneous text. Note that *n*1 can only be up to 240 and *n*2 will be read as zero as the 560 only allows printing of 240 graphics bytes. If more than 240 graphics characters are sent, then the balance will be interpreted as non-graphic data.

3.5 Specifications

Battery models :	External, replaceable battery pack, Sony NP55 or equivalent. Text can be printed continuously for approximately 10,000 lines when the batteries are fully charged. It will take 14 hours (without printing) to totally charge the battery via the printer. See Appendix 3 for the adapter specification. A power saving feature automatically switches the printer off when the interface has not been used for a 1 or 5 minute (programmable) period. A continuous power-on option is available. (See section 1.5).
Power supplies :	For desktop models, without batteries, a supply of 8 - 12v d.c. is required. The current rating of the supply will depend on the print duty (More black print - more current) but typically a 12v supply at 2A will suffice for most applications. A 1.3 A supply will suffice for typical text only applications. The portable model needs a battery charging supply with a rating of 8-18v d.c. at 0.6A minimum. Charging the battery in the printer will take up to 14 hours. External Chargers are available which are capable of charging the battery in 2-3 hours.
Mechanism :	THTP
Character Set :	Full international character set.
Matrix :	16 x 24 dots. (24 columns) or 9 x 24 (40 columns)
Buffer :	8K bytes minimum.
Line Pitch :	8 lines/inch
Print Speed :	Up to 2 inch/second
Reliability :	50 million head pulses 50 Km abrasion resistance
Interface :	Centronics Parallel or RS232 Serial as standard.
Environment :	Operating Temperature 0 to 50 deg C. Storage Temperature -20 to 60 deg C. Operating Humidity 10% to 85% (Non-Condensing). Storage Humidity 10% to 90% RH (Non-Condensing).
Dimensions :	147mm (l) x 108mm (w) x 72mm (h)

APPENDIX 1

Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	!	.	J	α	≡
1			!	1	A	Q	a	q	ü	æ	í	"	2	L	ß	±
2			"	2	B	R	b	r	é	Æ	ó	#	0	H	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	*	/	F	π	≤
4		DC4	$	4	D	T	d	t	ä	ö	ñ	1	)	B	Σ	⌠
5			%	5	E	U	e	u	à	ò	Ñ	I	3	?	σ	⌡
6			&	6	F	V	f	v	å	û	o	M	C	C	µ	÷
7			'	7	G	W	g	w	ç	ù	°	D	K	O	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	@	9	P	Φ	°
9		CAN	)	9	I	Y	i	y	ë	Ö	⌐	<	6	-	Θ	·
A	LF		*	:	J	Z	j	z	è	Ü	¬	5	=	+	Ω	·
B		ESC	+	;	K	[	k	{	ï	¢	½	7	;	$	δ	√
C	FF		,	<	L	\	l	|	î	£	¼	8	:	(	∞	¶
D	CR		-	=	M	]	m	}	ì	¥	¡	E	4	%	φ	2
E	SO		.	>	N	^	n	~	Ä	.	«	A	>	'	ε	#
F			/	?	O	_	o	⌂	Å	ƒ	»	,	N	&	∩	SP

SP indicates a space character. Blank locations indicate unused codes.

APPENDIX 2

International Character Set

	n	35D 23H	36D 24H	64D 40H	91D 5BH	92D 5CH	93D 5DH	94D 5EH	96D 60H	123D 7BH	124D 7CH	125D 7DH	126D 7EH
U.S.A.	0	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE	1	#	$	à	°	ç	§	^	`	é	ù	è	"
GERMANY	2	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	3	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK I	4	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	5	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	6	#	$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN	7	.	$	@	¡	Ñ	¿	^	`	"	ñ	}	~
JAPAN	8	#	$	@	[	¥	]	^	`	{	|	}	~
NORWAY	9	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK II	10	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

APPENDIX 3

Power Supply Adapter Specification - A620 series

Mechanical

Enclosure manufactured from V0 rated plastic
Shrouded mains pins as part of enclosure
Flying lead for output voltage 2m --> 3m long
Termination by d.c. jack plug, outer diameter 5.5mm, inner diameter 2.5mm, length 9.5mm
(US versions use a 2.1mm inner diameter)
Inner connection - positive supply
Outer connection - negative supply

Standards

Should be VDE, UL or BS415 and BS7002 approved.

Without battery pack

Either 1.   8V - 12V regulated 1.3A supply capable of supplying 5A peaks.
       2.   8V - 10V unregulated 1.3A supply capable of supplying 5A peaks.
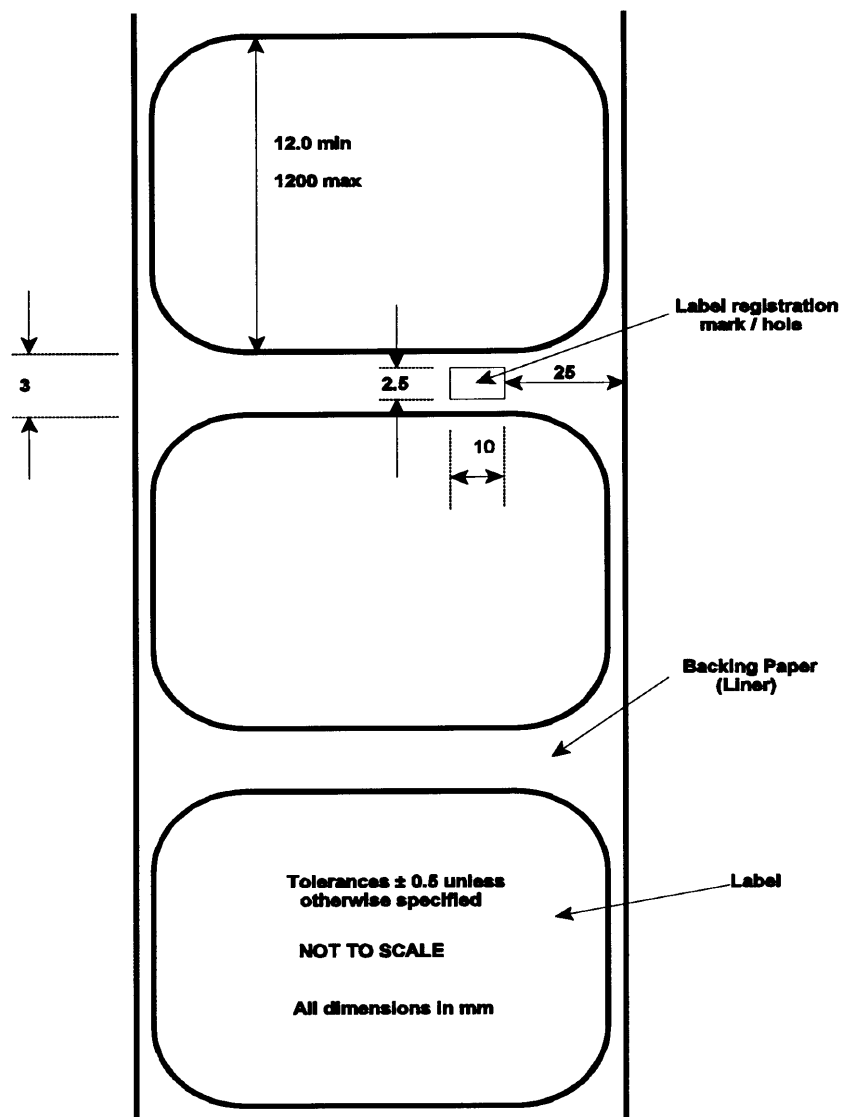
With battery pack

Can use the same supplies as above, but can be extended to 8V - 18V dc at 0.6A
A range of battery chargers and conditioners are available as the battery pack is a standard model, equivalent to a Sony NP55.

APPENDIX 4

A620 Label Specification

12.0 min

1200 max

Label registration
mark / hole

2.5

25

3

10

Backing Paper
(Liner)

Tolerances ± 0.5 unless
otherwise specified

NOT TO SCALE

All dimensions in mm

Label

APPENDIX 5

UPC-A, UPC-E, EAN13 and EAN8
These bar code types only accept numeric characters and require a specified number of characters.

UPC-A, 12 (including check character)
UPC-E, 6 (no check character)
EAN13, 13 (including check character)
EAN8, 8 (including check character)

The bar code has right and left guard patterns which are automatically generated. UPC-A and EAN13 are split into two halves with an automatically generated centre guard pattern. It is not necessary to send a check character as this is automatically calculated.

CODE39
This bar code type will accept any uppercase alphanumeric characters plus - . * $ / + % and the space character. Code39 uses start and stop characters which are * characters and are automatically inserted.

ITF
ITF accepts only numeric characters which are encoded in pairs. If an odd number of characters are received, a 0 is inserted at the start of the bar code. Start and stop characters are inserted automatically.

CODE128
Subsets A, B and C are supported. Subset A includes all uppercase alphanumeric characters and control codes, subset B includes all alphanumeric characters and subset C uses digit pairs.

Start and stop patterns are generated by the printer and the subset is selected automatically unless forced into a particular set. The check character is generated automatically. For those characters that are non-printable and therefore not normally accessible, special codes have been designated using ">". Characters at the top of the table providing functions from "DEL" through to "FNC1" are addressed by commands ">1" to ">8" inclusive.

APPENDIX 6

Character Cell Structure

| | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

P₁ figure showing character cell grid for the number "2", 24 rows by 16 columns.

$P_1 = 00H$ $P_4 = 00H$ $P_7 = 3FH$ $P_{10} = 7FH$

$P_2 = 00H$ $P_5 = 00H$ $P_8 = 00H$ $P_{11} = 80H$

$P_3 = 00H$ $P_6 = 00H$ $P_9 = C0H$ $P_{12} = E0H$

Organisation of a user-defined character cell