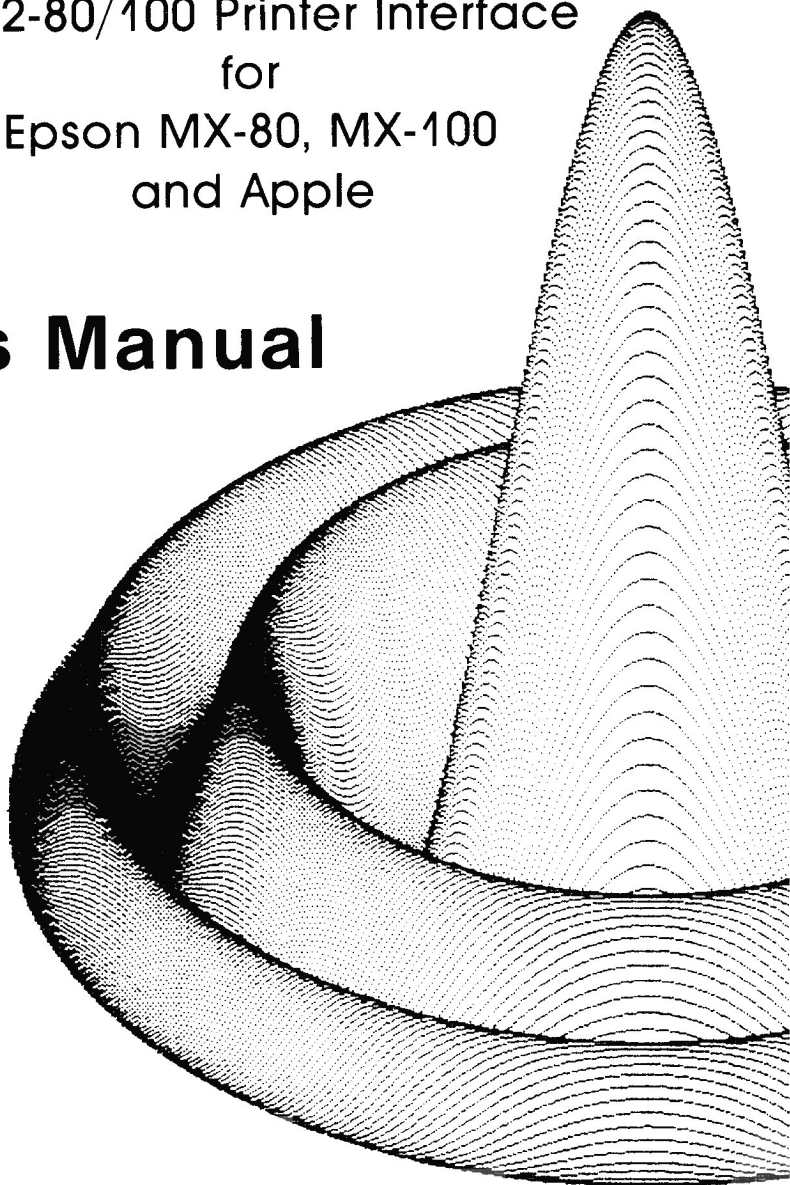


# PKASO<sup>TM</sup>

EP12-80/100 Printer Interface  
for  
Epson MX-80, MX-100  
and Apple

## Users Manual



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*Downloaded from [www.Apple2Online.com](http://www.Apple2Online.com)*

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# PKASO DOES IT ALL!

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**PKASO (TM)**

**EP12-80/100 PRINTER INTERFACE**

**For Apple and  
Epson MX-80 and MX-100 with  
Grafrax Graphics or Type II Graphics**

**Owners Manual**

**EP12-80/100 Firmware Revision 6  
August, 1982**

**IS Interactive Structures Inc.  
146 Montgomery Ave., Bala, PA 19004  
Document # 121-0306**





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# PKASO (T<sub>H</sub>)

## EP12-80/100 PRINTER INTERFACE

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## EP12-80/100 PRINTER INTERFACE

Owners Manual

August, 1982

You are now the proud owner of a PKASO (TM) EP12 Interface, the most powerful interface available for the Epson MX-80 or MX-100 printer and Apple microcomputer. It is designed to make your printer's built-in features easy to use from any software. It also adds new graphics and word processing capabilities in a convenient, flexible and reliable package.

The EP12-80/100 provides full graphics capability on Epson type III printers, Epson printers equipped with the Grafrax 80 or Grafrax Plus option, and it also supports Type II or MX 82 graphics.

Experienced users will find our command structure very easy to use and apply in software. A quick glance at the command summary in the back of this manual may be sufficient for your needs. Set the Epson switches for standard operation, run our demo disk program, then...

**Experiment and enjoy!**

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This manual is printed with an Epson MX-80 printer controlled by a PKASO EP12-80/100. Text formatting is by Applewriter 1.0.

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Grafrax, MX-80 and MX-100 are trademarks of Epson America Inc.

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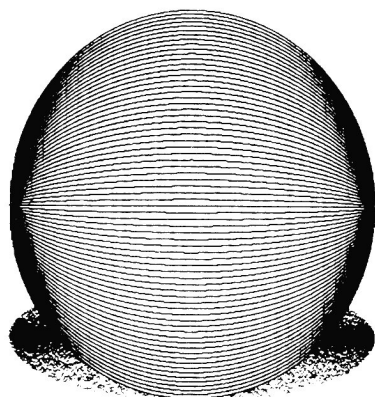
## FEATURES

### OF THE EP12-80/100 SYSTEM

---

- ⌘ All printer modes and functions accessible by simple PKASO commands.
- ⌘ New text and graphics features added by the built-in firmware.
- ⌘ Built-in print of the HiRes graphics screen with complete control over:
  - ⌚ The HiRes page number: 1 or 2.
  - ⌚ Image Size: small, medium, or large.
  - ⌚ Rotation of the image: 90° or 0° .
  - ⌚ Horizontal position on the page.
  - ⌚ Inverse or Direct printing (black-on-white or white-on-black).
- ⌘ Built-in snapshot print of the TEXT screen.
- ⌘ Built-in print of the LoRes graphics screen in 8 different formats.
- ⌘ SuperFont Characters - symbols & fonts definable by software.

- § HalfTone gray scale printing with 16 levels of gray and 192 X 264 pixels per 8" X 11" page.
- § SuperRes Dot graphics with 960 by 792 points on a 8" X 11" page.
- § Visible signal on screen when the printer is off line or out of paper.
- § Versatile built-in Tabs for indentation and column printing.
- § Simple commands to print in all six character widths.
- § Easily integrated into existing software on Apple II or Apple ///.
- § Compatible with all popular languages including Pascal & CP/M.
- § Utility disk included with demonstration and instructional examples.
- § Assistance routines for smooth operation with Visiplot, Applewriter and other software products.



# EP12-80/100

## PRINTER INTERFACE

### \* PKASO COMMAND SUMMARY \*

Command	Description	Page
Ctrl-I n B	Send a Binary code n directly to the printer.	21
Ctrl-I D	Text print, Screen 1.	29
Ctrl-I 10 D	LoRes print, full graphics (40 X 48) in 16 gray levels.	28
Ctrl-I 14 D	LoRes print, mixed graphics (40 X 40) and text (4 lines).	
Ctrl-I E	Eject the page, Skip to the top of the next form.	21
Ctrl-I n F	Set character width to fit n columns on an 8" line.	15
Ctrl-I n G	Grey Scale mode, prints n pixels pairs.	24
Ctrl-I H	Standard HiRes print: Direct, Small, Centered, Screen 1	25
Add for options as follows:		
Ctrl-I 1 H	Screen 2 HiRes print	
Ctrl-I 2 H	Medium Size HiRes print	
Ctrl-I 8 H	90° Rotated HiRes print	
Ctrl-I 16 H	Left-justified print	
Ctrl-I 32 H	Direct, White-on-Black print	
Ctrl-I I	Turn video screen ON, line length to 40.	17
Ctrl-I K	Turn off auto line feed.	21

Command		Description	Page
<code>Ctrl I</code>	M	Set Epson Printer Modes.	22
<code>Ctrl I</code>	n N	Set line length to n characters 17 per line, (40 to 255) Turn video OFF while printing.	
<code>Ctrl I</code>	n S	Switch to SuperFont Characters.	32
<code>Ctrl I</code>	S	Switch back to standard character set.	
<code>Ctrl I</code>	n T	Tab over to column n. (1 to 255)	20
<code>Ctrl I</code>	T	Tab to the next even multiple of 8 columns.	
<code>Ctrl I</code>	n X	Switch to SuperFont Characters using external driver.	39
<code>Ctrl I Ctrl C</code>		Change the Command Character from <code>Ctrl I</code> to <code>Ctrl C</code>	19

(Use `Ctrl Y` instead of `Ctrl I` from Pascal, CP/M.)

## NOTATION

In this manual a letter prefixed by a "`Ctrl`" is used to denote a "control character." Hold the CTRL key down and press the character shown. For example "`Ctrl P`" is a control-P character and is typed by holding CTRL down and pressing P. A small letter "n" denotes a number. If the number is omitted, 0 is assumed. Spaces are shown in the PKASO commands for readability only - DO NOT TYPE THEM!.

## INSTALLING THE PRINTER

First, TURN OFF your Apple and your printer! The PKASO EP12-80/100 interface system consists of an interface electronics card and a cable. The gold edge connector of the card plugs into one of the I/O Expansion Slots located inside the case of the Apple, on the rear portion of the processor board. The PKASO may be installed in any slot numbered 1 through 7. (The leftmost slot is Slot 0 and should NOT be used for the EP12). The customary location for a printer is expansion Slot 1, and the examples in this manual are shown for Slot 1. If you intend to use your PKASO with Pascal or CP/M, you MUST use slot 1.

Before installing your PKASO, look at the component side of your card. The large IC chip (black box with legs!) has a white sticker with our revision information on it. Check to see that this is an EP12-80/100 chip and revision 6.0 or greater. If not, consult your local PKASO dealer for details.

Plug the interface card firmly into the chosen Slot, with the cable extending out one of the openings in the back of the Apple cabinet. Plug the PKASO connector into the 36 pin connector at the rear right of the printer. Turn the printer power on (switch on the right side of the cabinet). The green POWER, READY and ON LINE lights should be lit. If not, consult your Epson printer manual. The printer is now ready to print and is awaiting data from the Apple.



The switches inside the Epson should be set as described in the Epson printer manual. Auto line-feed should be turned off since the PKASO system supplies all line feeds.

---

## ACTIVATING THE PRINTER

---

The PKASO is activated from the Apple II Plus Basic keyboard by typing:

PR#1 (followed by RETURN)

Try this from the keyboard. The screen appears to "go dead" since video display is automatically turned off, however the printer is on and will print when you type a few characters followed by RETURN. (Try LIST and CATALOG here also.)

. From within a BASIC program, under DOS, use  
PRINT CHR\$(4) "PR#1"

. IF you run with only the Apple Monitor,  
without DOS, use 1 ⌘P

. IF you use Pascal or CP/M, the EP12-80/100  
will be recognized as the system printer only  
if installed in slot 1. Put the printer  
on-line before booting.

. From a Pascal program, open the file with  
REWRITE(P,'PRINTER:') where P is of type  
text.

. IF you use any software packages, READ THE  
MANUAL and follow the printer activation  
procedures. For example, use /P1 to print in  
Visicalc. See our hints for use with software  
packages.

## TURNING OFF THE PRINTER

When finished printing from the Apple II Plus Basic keyboard, press

RESET.

Try this, and you will notice that printing stops and video display resumes.

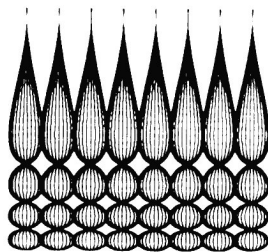
. IF your machine is an Apple II (non-Plus) use PR#0 from the keyboard.

. IF you run with only the Apple monitor, without DOS, use 0  $\uparrow$ PR#P

. From within a BASIC program, under DOS:  
PRINT CHR\$(4) "PR#0"

. If you are in Pascal, close the printer file by CLOSE(P).

. IF you use a software package, READ THE MANUAL. The software probably automatically turns off the printer at the right times without any attention.



## STATUS OF THE PRINTER - IS IT READY?

If you try to print with the printer in Local mode or out of paper, a blinking "L" or "P" will appear in the lower right corner of the video screen. This is a "non-destructive" display, and anything printed in that location will be replaced when the condition is remedied. If you have switched to a full-screen graphics display, you will not see the L or P, since it is displayed on the text screen only. This display will not appear on an 80-column system.

A BASIC program can check status using `READY=(INT(PEEK(49296)/16)=5)`. `READY` is a Boolean variable (true or false) and will return a value of 1 if the printer is ready or 0 if it is not.

## SELECTING OPTIONS USING PRINTER COMMANDS

The options and graphics features of the PKASO system are controlled by "PKASO Commands." These are sequences of characters which are sent to the printer while it is activated. When the PKASO interface card receives a PKASO Command, it interprets it (without printing) and does the requested task.

A PKASO Command usually consists of the "lead-in" `Ctrl-I` followed by the option desired but the `Ctrl-I` lead-in character may be changed to any other character. Because the printer is controlled by characters imbedded in the stream of output data, and because the lead-in can be selected, the PKASO can operate with virtually all existing software.

The first time the PKASO is activated (using PR#1, etc.) after power up it is set up for an 80-column line, with .1" character width, and video display OFF while printing. This is the "default" setting. After power-up, the PKASO does no more resetting or initializing so settings will generally stay the same unless you change them.

- NOTE 1: The language in use (BASIC, etc.) sees PKASO commands before the PKASO does, and may react with a BEEP and a SYNTAX ERR message. If this is objectionable, end PKASO commands with `Ctrl-X` instead of RETURN.
- NOTE 2: When operating with Pascal, CP/M or some other language systems, the PKASO automatically switches to `Ctrl-Y` instead of `Ctrl-I` for the command lead-in character. In this case, the initialization settings occur EACH TIME the printer is selected, not just at power-up. The lead-in may also be changed as described on page 19.

## PRINTING SIZE

### THE WIDTH OF THE CHARACTERS

The F command can request any of six widths: three standard and three doubled or "enhanced".

`ESC I n F` Sets the size of the printed characters according to n

The number n is a simplified way of selecting the size by choosing how many characters will fit in an 8" line of text:

n	chars/inch	Width
0 to 40	5	0.2"
41 to 48	5	0.2" (Graftrax)
	6	0.17" (Type II)
49 to 66	8.2	0.12"
67 to 80	10	0.1"
81 to 96	10	0.1" (Graftrax)
	12	0.08" (Type II)
97 to 255	16.5	0.06"

Example: `ESC I40F` sets .1" characters,  
`ESC I99F` sets .06" characters.

You should always use this, and not the Epson ESC commands, to control character size. On a Type III or Graftrax Plus printer, this command takes effect where you use it, even in the middle of a word. On a Type II printer, most F commands within a line take effect BEFORE printing the line, so the last F command you use in one line will set the width. If the command merely changes between a standard width and its corresponding doubled width, it takes effect when printed, as shown in the example on the next page.

The following shows all 6 print sizes from 5 cpi to 16.5 cpi.

<b>The Quick Brown</b>	<b>5.0 CPI</b>
The Quick Brown	6.0 CPI
The Quick (Type II only)	8.25 CPI
The Quick Brown Fox Jumped Over	10 CPI
The Quick Brown Fox Jumped (Type II only)	12 CPI
The Quick Brown Fox Jumped Over The Lazy Dog.	16.5 CPI

EXAMPLE: changing sizes within a line with F commands:

```

5 REM CHR$(9) IS A CTRL-I.
10 PRINT CHR$(9)"80F": REM SET .1" CHARS
20 PRINT "MIX SMALL & ";
30 PRINT CHR$(9)"40F";:REM SET .2" CHARS
40 PRINT "LARGE";
50 PRINT CHR$(9)"80F";:REM SET .1" CHARS
60 PRINT " LETTERS"

```

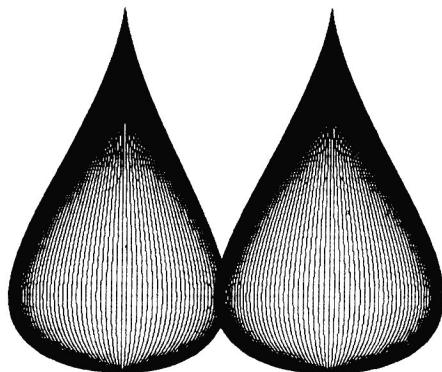
This has the following result:  
MIX SMALL & **LARGE** LETTERS

From Pascal:

```

(* CHR(25) is a Ctrl Y *)
WRITE(P, CHR(25), '80F', 'MIX SMALL &');
WRITE(P, CHR(25), '40F', 'LARGE');
WRITELN(P, CHR(25), '80F', 'LETTERS');

```



## LINE LENGTH & VIDEO DISPLAY CONTROL

These commands are a "shorthand" form which may be used to set the number of characters across the page, and the video display mode, with a single operation.

`Ctrl-I n N` Sets line length to n chars (any number from 40 to 255) with video display OFF while printing

`Ctrl-I I` Sets video display mode ON; Line length returns to 40 characters

EXAMPLE: `Ctrl-I 132 N` sets a 132-character line and video display OFF.

If you use the N command, information will go ONLY to the printer, and nothing will change on the video screen. If you use the I command, information will go to both the screen and the printer. The screen line length is 40, however, and this becomes the printed line length.

Do not think of this as a right margin command. This mechanism was designed originally to format BASIC program listings and is not an all purpose margin system. In general, the enforcement of margins is normally done by the program and not by the interface card. It is the program (word processor, etc.) which can determine intelligent places to break or hyphenate a line.

The line length processing follows conventional practice for Apple printer firmware, and its behaviour requires some explanation. After printing the number of characters specified in an N command, the EP12-80/100 REQUESTS that the language processor or operating system in use perform its end of line operation.

The language or operating system then TYPICALLY inserts a carriage return to start a new line at this point. Note that the PKASO DOES NOT actually do a return or line feed itself. If the language processor ignores the request, no end-of-line may occur, and the printer will continue to print more than n characters on a line.

For example, when BASIC prints a program listing, PKASO line-length requests are obeyed and the PKASO N command controls listing width. When you type characters at the keyboard in immediate mode, however, the requests are ignored and long lines may result.

When a Basic program PRINTs, it checks for an end request AFTER printing each variable or string, so if the request occurs while printing, it is honored at the end of the current number or string, and lines can become longer than n.

- NOTE: You cannot use the `CR I I` command from Pascal. Also, the MX-100 requires a `CR InN CR IMQ CR InB`.



## CHANGING $\text{CTR}_L\text{I}$ TO A DIFFERENT CHARACTER

You may want to use a character other than  $\text{CTR}_L\text{I}$  for PKASO commands. This is useful,

- (A) when listing programs which contain  $\text{CTR}_L\text{I}$  PKASO commands,
- (B) when the program or language you are using has already assigned another meaning for  $\text{CTR}_L\text{I}$ , or
- (C) to disable PKASO commands altogether for software written to drive the printer directly.

To change to another control character, the procedure is simply:

$\text{CTR}_L\text{I}$   $\text{CTR}_L\text{C}$  Change command lead-in character from  $\text{CTR}_L\text{I}$  to  $\text{CTR}_L\text{C}$ . ( $\text{CTR}_L\text{C}$  may be any control character except RETURN)

$\text{CTR}_L\text{C}$   $\text{CTR}_L\text{I}$  Restore command lead-in character back to  $\text{CTR}_L\text{I}$  from  $\text{CTR}_L\text{C}$

To change to a non-control character such as #, poke its ASCII code into location 1145. To disable commands, poke a code that is never printed, such as 255, into 1145. The lead-in character is restored to  $\text{CTR}_L\text{I}$  each time the PKASO is activated (with a PR#1, etc.) in case you forgot or mis-typed the lead-in.

For Pascal, use `WRITE(P, CHR(25), CHR(3))` with the printer file (P) activated. This changes  $\text{CTR}_L\text{Y}$  to  $\text{CTR}_L\text{C}$ , other characters could be used in similar fashion.

## TABS

The EP12-80/100 provides its own tab command plus compatibility with other methods.

```

␣I n T   Tabs directly to column n.
          (If n is 0 then tab to the next
           even multiple of 8 columns.)
          (If n is less than the current
           column no tab occurs)

```

EXAMPLE: to print an "X" at column 25:

```
PRINT "␣I25TX"
```

Most Basic programs implement tabs by POKEing the tab position into the horizontal cursor position location, memory location 36. This is supported by the EP12-80/100. It is similar to HTAB in BASIC, but works beyond column 40.

EXAMPLE: to print an "X" at column 25:

```
POKE 36,25: PRINT "X"
```

- NOTE 1: In Applesoft BASIC, TAB(N) and commas in PRINT statements can be used to control the position of text printed on the video screen. These techniques are only for display on the 40-column screen and do not apply to printing. They are not supported by the PKASO.
- NOTE 2: Do not use the ␣I n T command from Pascal. The PKASO TAB command uses system resources which are not accessible under the Pascal system.

## TOP OF FORM

**␣I E** Skips to top of next page as set by switches on your Epson

## DIRECT BINARY OUTPUT

**␣I n B** Outputs binary code

The PKASO will send a binary character code from 0 thru 255 using the **␣I n B** command. The number *n* is the value in decimal to be sent. For example, **␣I 13 B** sends a carriage return to the printer.

## LINE-FEED CONTROL

**␣I K** Defeats line-feed

The PKASO is equipped to handle the line-feed requirements of the common languages with printer line-feed switched off. If you find that a particular software configuration gives unexpected double-spacing of all text, or if you want to program an application using overstriking, etc., you can defeat the PKASO's automatic line-feed after carriage return by entering the command **␣I K**.

When using the PKASO with CP/M or Pascal, the automatic line-feed is not performed. The language system does this for you.

---

## PRINTER MODE SELECTION

---

The  $\text{ESC} \text{ I M}$  command is designed to make available all of the modes and settings built into the printer by sending an "ESCAPE" sequence. For example  $\text{ESC} \text{ I M A}$  has the same effect as printing an ASCII ESC character followed by an "A", allowing you to set the vertical line spacing. Unlike an ESC sequence, however, M commands can even be sent by programs which prohibit control characters by using the lead-in character change technique. Consult your Epson printer manual for the full description of these and other functions.

$\text{ESC} \text{ InM}$	Send an ESC followed by the character whose ASCII value is n. If n is zero then only the ESC is sent.
$\text{ESC} \text{ IM0}$	Set 8 lines per inch vertical spacing.
$\text{ESC} \text{ IM2}$	Set 6 lines per inch vertical spacing.
$\text{ESC} \text{ IM3}$	* Set vertical line spacing in 1/216" increments. (Graftrax)
$\text{ESC} \text{ IM4}$	Turn on Italics character set. (Graftrax)
$\text{ESC} \text{ IM5}$	Turn off Italics character set. (Graftrax)
$\text{ESC} \text{ IM@}$	Reset the printer to the power up state. (Graftrax)
$\text{ESC} \text{ IMA}$	* Set vertical line spacing in 1/72" increments.
$\text{ESC} \text{ IMC}$	* Set form length in lines or inches.
$\text{ESC} \text{ IMD}$	* Set internal horizontal tab lead-in.

⌈T <sub>R</sub> IME	Turn on emphasized mode.
⌈T <sub>R</sub> IMF	Turn off emphasized mode.
⌈T <sub>R</sub> IMG	Turn on double strike mode. Note: Graphics output does not double strike.
⌈T <sub>R</sub> IMH	Turn off double strike mode.
⌈T <sub>R</sub> IMK	* 60 dots per inch bit image mode lead-in for SuperRes graphics.
⌈T <sub>R</sub> IML	* 120 dots per inch bit image mode lead-in for SuperRes graphics.
⌈T <sub>R</sub> IMN	* Set auto skip over top of form.
⌈T <sub>R</sub> IMO	Turn off auto skip over top of form.
⌈T <sub>R</sub> IMQ	* Set the printer column width.
⌈T <sub>R</sub> IMR	* Select international characters.
⌈T <sub>R</sub> IMS	* Superscripts and subscripts. (Graftrax)
⌈T <sub>R</sub> IMT	Turn off sub- and superscripts.
⌈T <sub>R</sub> IMU	* Unidirectional printing.
⌈T <sub>R</sub> IM-	* Sets underline mode. (Graftrax)

Printer functions which must be followed by parameters are marked with an "\*" in the list above. Refer to your Epson printer manual for explanations of these special features. The ⌈T<sub>R</sub>I B direct binary output command furnishes the ability to send these parameters. For example, to change the vertical spacing to 9/72" per line enter:

⌈T<sub>R</sub>I M A ⌈T<sub>R</sub>I 9 B


## GRAY SCALE MODE

Gray scale mode allows you to print 16 level gray scale graphics. The gray scale processor produces 16 different shades by printing from 0 to 15 dots within each picture element (pixel). The `␣I n G` command enters Gray Scale mode, and the printer will then plot two gray scale pixels, one above the other, for every two characters received.

`␣I n G` Sends n gray scale pixels

Each pixel is 3 dots high and 5 dots wide. The number n is the number of pixel-pairs to follow, with a maximum of 192 per 8" line. The 16 gray levels from white to black are produced by the characters (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, J, K, L, M, N, O). Here is an example:

```
1 D$=CHR$(4): I$=CHR$(9): REM ␣D and ␣I
10 PRINT D$"PR#1":REM OUTPUT TO PRINTER
20 PRINT I$"12G000111222333444555666777";
30 PRINT I$"G":REM RESTORE NORMAL SPACING
40 PRINT I$"PR#0":REM DEACTIVATE PRINTER
```

This prints: 

After n pixel-pairs, the PKASO switches back into text printing mode. Since the `␣I n G` command leaves the printer in 6/72" line spacing mode in anticipation of more gray scale printing, a `␣IG` command (without the n) is needed to restore normal line spacing after the last line of gray scale print. Normal spacing is also restored after a HiRes or LoRes graphics print.

## HIRES SCREEN DUMP

The PKASO offers a selection of 40 ways to print, or "dump", the HiRes screen:

1. Direct or inverse printing may be selected. Inverse is the most useful and prints white lines on the screen as black lines on the paper.
2. The picture may be centered on the page or left justified.
3. The small and medium size pictures may be rotated by 90° or 0°.
4. Print sizes of 3.2" x 3.9", 6.4" x 7.8" and 12.8" x 15.6" when rotated by 90° and sizes of 4.7" x 2.7" and 9.3" x 5.3" when rotated by 0°. The largest size for either rotations may only be printed on 15" paper.
5. HiRes screen 1 or 2 may be printed.

The printing of the HiRes screen may be terminated early by pressing the Space bar.

On H HiRes graphics

The following page is a complete flow chart for quickly locating the right HiRes dump command to suit your needs. Simply start at the upper left-hand corner and proceed to the right, making a decision at each point as to which option you want. When you reach the right side of the page, you will find the PKASO command for the desired format.

## HIRES SCREEN DUMP

\* INVERSE IMAGE \*

POSITION	ROTATION	SIZE	SCREEN	COMMAND
CENTER	0°	SMALL	1	CTR I H
			2	CTR I 1H
		MEDIUM	1	CTR I 2H
			2	CTR I 3H
	90°	SMALL	1	CTR I 8H
			2	CTR I 9H
		MEDIUM	1	CTR I 10H
			2	CTR I 11H
		LARGE	1	CTR I 12H
			2	CTR I 13H
LEFT	0°	SMALL	1	CTR I 16H
			2	CTR I 17H
		MEDIUM	1	CTR I 18H
			2	CTR I 19H
	90°	SMALL	1	CTR I 24H
			2	CTR I 25H
		MEDIUM	1	CTR I 26H
			2	CTR I 27H
		LARGE	1	CTR I 28H
			2	CTR I 29H

If this seems confusing, try the demo program HIRES DUMPER on our utility disk. It will help you associate command numbers with the desired screen dump selection.



## \* DIRECT IMAGE \*

POSITION	ROTATION	SIZE	SCREEN	COMMAND
CENTER	0°	SMALL	1	Ctrl-I 32H
			2	Ctrl-I 33H
		MEDIUM	1	Ctrl-I 34H
			2	Ctrl-I 35H
	90°	SMALL	1	Ctrl-I 40H
			2	Ctrl-I 41H
		MEDIUM	1	Ctrl-I 42H
			2	Ctrl-I 43H
		LARGE	1	Ctrl-I 44H
			2	Ctrl-I 45H
LEFT	0°	SMALL	1	Ctrl-I 48H
			2	Ctrl-I 49H
		MEDIUM	1	Ctrl-I 50H
			2	Ctrl-I 51H
	90°	SMALL	1	Ctrl-I 56H
			2	Ctrl-I 57H
		MEDIUM	1	Ctrl-I 58H
			2	Ctrl-I 59H
		LARGE	1	Ctrl-I 60H
			2	Ctrl-I 61H

For example, to print a 6.4" X 7.8" image rotated by 90°, centered, use Ctrl-I 10 H. To print multiple screens one-after-another without a space between them (a crude "strip-chart"), use:

Ctrl-I H Ctrl-I M A Ctrl-I 1 B Ctrl-I H ... (Type II)

Ctrl-I H Ctrl-I M 3 Ctrl-I 1 B Ctrl-I H ... (Graftrax)

## LORES SCREEN DUMP

The PKASO offers a selection of LoRes gray scale screen print possibilities.

1. LoRes Graphics screen 1 or 2 may be printed in 16 levels of gray.
2. Graphics may be full-screen (40 X 48) or mixed (40 X 40) with text.
3. Graphics modes may be printed in Direct or Inverse.

Ctrl-I n D LoRes text or graphics

A 16 level gray scale is printed with color 0 = black, up to color 15 = white, when using Direct mode. Inverse mode simply reverses these values.

The commands for LoRes graphics are:

POLARITY	FULL/MIXED	SCREEN	COMMAND
-----			
INVERSE	FULL	1	Ctrl-I 2 D
		2	Ctrl-I 3 D
	MIXED	1	Ctrl-I 6 D
		2	Ctrl-I 7 D
DIRECT	FULL	1	Ctrl-I 10 D
		2	Ctrl-I 11 D
	MIXED	1	Ctrl-I 14 D
		2	Ctrl-I 15 D

The Apple II LoRes colors 0 through 15 will not produce 16 gray levels even on a black-and-white monitor. Therefore, when using LoRes for the purpose of designing graphic prints it is best to use a color monitor and the color table in the Applesoft manual to identify the 16 gray levels. With some practice you will very quickly learn to choose the right color numbers for the desired gray scale values.

To help you understand the color/gray scale better, you will find a short program named GRAY SCALE on the PKASO disk that prints out a gray scale and labels the values. LORES DUMP DEMO shows another example.

The LoRes screen dump commands should not be used with Pascal.

---

## TEXT SCREEN DUMP

---

The commands for printing text screens are:

```
CTDQ I      D  Prints text screen 1.
CTDQ I  1 D  Prints text screen 2.
CTDQ I  4 D  Prints only the lower four
              lines of text on screen 1.
CTDQ I  5 D  Prints only the lower four
              lines of text on screen 2.
```

The text screen dump commands should not be used with Pascal because the Apple monitor is not available to the PKASO firmware. Instead, just T)ransfer the desired text file to the PRINTER:(Volume #6:).

## APPLEWRITER 1 AND THE EP12

Here is an example of the ease with which the PKASO can be used to add features to a word processing program.

Applewriter cannot store control characters in its text nor send them to a printer. The PKASO may, however, be set to use a non-control character as its command lead-in character in place of `CR`, allowing full control with Applewriter. A handy character to use is a `~`, having an ASCII value of 254, entered as a shifted N. However, any printable character may be used, but choose a character that won't be used in your text.

1. Before running Applewriter, initialize the PKASO by issuing a `PR#1`, `PRINT` and a `PR#0`. Then `POKE` the ASCII code for the new lead-in character into the PKASO's command character location, `1144 + SLOT`, where `SLOT` is the slot number of the PKASO. A good place to do this is in the `HELLO` program on your Applewriter disk. The `HELLO` program statement for Slot 1 is `POKE 1145, 254`. The PKASO disk includes a sample program `HELLO.APPLEWRITER`, which makes this change (and also loads the SuperFont character set).

2. Set the printer address to `C102` in Applewriter's print constants table. Using `C100` effectively does a `PR#1` each time you print, and sets the command lead-in back to `CR` causing Applewriter to ignore all `~` commands.

3. CAPITALIZE all PKASO command letters in the text, but not the ~ character. Lower case letters are not recognized as valid commands and will be printed. To actually print '^', use <ESC> SHIFT-N.

4. Applewriter sees the PKASO commands as normal printable text. Therefore even though the commands will not be printed, Applewriter will count them when calculating the number of characters on a line. Adjust the right margin accordingly, and use the APPLEWRITER !lj (left justify) mode.

5. Applewriter will count both single and double width characters as one character space. You may, therefore, have to adjust your margins when you mix regular and double width characters on the same line.

6. To use SuperFont Characters, load the special character set after editing your text and before printing. For example, RUN HELLO.APPLEWRITER, then select P to print.

Examples of the commands:

^ 20 T Tab to column 20

^ 66 F a change in character density

<sup>a</sup> 132 F                      another change in character density!

An ^1S<^S a day... An @ a day...  
Embedded Special Characters'

● NOTE: Applewriter 2 is quite different. Just use the `Ctrl-V Ctrl-I` combination as your lead-in character.

## SuperFont CHARACTERS

The PKASO provides a complete facility for defining special characters, symbols and graphics, and then using them as printable characters. The SuperFont characters take much longer to print than normal text and therefore are not recommended as an alternate type font. However, the ability to insert subscripts, scientific symbols and graphic patterns provides an extremely flexible and complete printing facility.

To use SuperFont, all you have to do is load the character set into Apple's memory. A sample SuperFont character set, SPECIAL CHARS.8HI, is provided on the PKASO disk. You may define your own set by referring to the section on designing a SuperFont Character set.

The simplest way to use SuperFont within a word processing program is to BRUN the character set in the HELLO program. This loads the character set and sets up the necessary pointers. A sample HELLO program (HELLO.APPLEWRITER) for use with Applewriter 1 is included on the PKASO disk. To load the set from BASIC, simply

```
BRUN SPECIAL CHARS.8HI, A$8800.
```

SuperFont Character mode commands are:

```
Ctrl-I n S   Enter SuperFont Character mode.
```

```
Ctrl-I      S   Return to standard printing.
```

'n' controls the horizontal spacing as follows:

n = 1	Select 60 points/inch
n = 2	Select 120 points/inch

Once the SuperFont Character mode is enabled, the printing of any standard character (one whose ASCII value is 160 or greater...high bit set!) will cause the PKASO to print a symbol from its SuperFont Character table instead. Here is a sample of what can be done with SuperFont characters:

Using 60 points/inch:

MgCl<sub>2</sub>.4H<sub>2</sub>O .1667πr<sup>3</sup> ⒸII

Using 120 points/inch:

MgCl<sub>2</sub>.4H<sub>2</sub>O .1667r<sup>3</sup> ⒸII

^IS 5 ^S will print the Ⓒ symbol in an Applewriter text file. (See page 30)

From BASIC, Ⓒ would be printed by  
 ⒸⒶIIS 5 ⒸⒶIS.

Below is a complete listing of the SuperFont characters and their corresponding ASCII characters supplied in the file SPECIAL CHARS.BHI on the PKASO disk.

space = ␣

! = 1	" = 2	# = 3	\$ = 4	% = 5
& = 6	' = 7	( = 8	) = 9	* = 0
+ = 1	< = 2	- = 3	. = 4	/ = 5
0 = 6	1 = 7	2 = 8	3 = 9	4 = 0
5 = Ⓒ	6 = Ⓐ	7 = Ⓐ	8 = Ⓐ	9 = Ⓐ
: = π	; = °	< = Ⓒ	= = ±	> = ●
? = Ⓒ	@ = —	A = T <sub>M</sub>	B = T <sub>RL</sub>	C = Ⓒ
D = Ⓒ	E = Ⓒ	F = ≠	G = ~	H = ∞
I = √	J = J	K = J	L = λ	M = σ
N = ε	O = Σ	P = -	Q = -	R = Ⓒ

A listing of the SPECIAL CHAR DEMO program on the utility disk might help!

## SuperRes GRAPHICS

The printer enters SuperRes bit image mode when an ESC (\$9B) is printed followed by a 'K' or 'L'. Escape commands are sent using the `ESC I M` sequence. K mode provides a horizontal spacing of 60 dots per inch with a maximum of 480 dots on a 8" line, or 810 on a 13.5" line. L mode provides a horizontal spacing of 120 dots per inch with a maximum of 960 or 1620 points per line.

`ESC I M K n` Sends n bytes, 60 dots/in.

`ESC I M L n` Sends n bytes, 120 dots/in.

Following the `ESC I M K` or `ESC I M L` the printer expects two characters which will form a 16 bit number(n) representing the number of horizontal dot positions used (the number of bytes printed). The first of these characters is the low order byte and the second is the high order byte.

This is followed by the 8 bit codes specifying the 8 vertical dot positions which will be printed for each horizontal dot position. For each byte sent, a '1' bit will cause a specific print position to be printed as follows:

- . Bit 7 is the top position
- . Bit 6 is the next lower position
- .
- .
- .
- .
- . Bit 0 is the lowest position



With the printer in K or L mode, you must set approximate vertical spacing for graphics. Consult your Epson manual for this. For example, with Grafrax use `ESC IMA` `ESC IBB` to set 8 dot spacing and `ESC IG` to return to text spacing. After the last code has been printed, the printer will return to text printing mode but not text spacing.

The graphics data (bytes) can be sent as hex, decimal or character codes, depending on programming preference. The following byte sequence will print a slash (/):

DECIMAL: 27 75 8 0 1 2 4 8 16 32 64 0  
HEX: 1B 4B 08 00 01 02 04 08 10 20 40 00

The following sequence, will print the Interactive Structures logo (IS):

DECIMAL: 27 75 10 0 110 111 3 115 51 123  
          107 111 102 0  
HEX: 1B 4B 0A 00 6E 6F 03 73 33 7B 6B  
      6F 66 00

- Note: Any graphic printout which runs off the end of the print page will be terminated with unpredictable results.

The PKASO firmware traps out any characters which look like PKASO commands. For example, a byte equal to 9 would be interpreted as a `ESC I`, a command and not a graphic dot pattern. For this reason, SuperRes graphics should not be used through the normal print path. Instead, use the PKASO SuperFont Character feature or the `ESC I n B` command.

Also try the SINE PATTERN program on the demo diskette.

## DESIGNING A SuperFont CHARACTER SET

A SuperFont character set is a list of graphics point information in memory. It may be preceded by a small assembly language routine which "plugs in" the character set to the PKASO by setting up the appropriate pointers. This allows a single BRUN to completely set up the SuperFont Character system.

A custom character set may be created (instead of using our sample) by using a routine on the PKASO disk. Simply RUN PKASO CHAR DESIGN. This routine reads in the sample character set (or any other one you ask for) and allows it to be edited or replaced.

PKASO CHAR DESIGN allows you to select a character by number and display or edit it on the screen. You may also select a new number and create a new character on the editor screen.

The character is displayed as black dots on a white background. A gray cursor is used to draw or move in any of eight directions. The color drawn is changed between black and white by pressing the space bar. When the character is complete, press RETURN to save it.

The program will determine the width in bytes of the character by looking for the rightmost dot, or the cursor. This means you can use the cursor to leave extra spaces to the right of the character. The program is also careful not to lose those spaces, and will ask you to confirm whenever it detects that a character has become narrower.

A printout of your character set using the PKASO CHAR DESIGN print option should make this more meaningful.

[illegible]

7 555 ≠ 5π - 1M<sup>TRL</sup>Ⓢ ≈ Σ Ⓢ 1 2 3 4 5 6 7 8 9 0 8 9 0 Ⓢ μ  
Π ω Δ

The format of the character set is as follows:

1. Assembly language starter routine. (28 bytes in the case of SPECIAL CHAR.8HI)
2. The number of characters in the set minus 1. (1 byte)
3. A list of pointers (each 2-bytes, low byte first) containing the offsets from the byte containing the number of characters to beginning of each character.
4. For each character, the point information in a modified bit image format:
  - a. Length of the character in bytes. (1 byte)
  - b. The bytes of point information.
  - c. A 0 ending byte for spacing, if desired. (1 byte)

The character set is relocatable, and may be placed wherever memory is available. Determine the location you wish this set to reside, and simply BRUN it at that location before use.

A character set may be designed without the assembly routine. In this case the program must BLOAD or POKE the character set into memory in the above format, then set up pointers to it at locations 232 and 233 (\$E8 and \$E9):

```
POKE 233, ADDR/256
POKE 232, ADDR - 256 * INT( ADDR/256 )
```

## WRITING A SPECIAL CHARACTER DRIVER

When SuperFont Character mode is entered by the `CF n X` command, the PKASO uses a driver routine supplied by the user. As each SuperFont character is encountered in printing, control is passed to this assembly language driver program with the following conventions:

1. The PKASO will JSR to location \$3F5. Here it should find a JMP to the driver routine which outputs the special characters.
2. The accumulator will contain the character printed minus 160. Thus printing a space will pass a value of zero to the driver.
3. The X-register will contain the slot number of the printer interface card. This may be used to obtain the printer mode byte at  $\$4FB + \text{SLOT}$ . Bits 1 and 2 of this byte contain the SuperFont character mode settings, from the `CF n X` command. (n=1, 2 or 3)

Note: This X-register value must not be changed by the driver.

4. The main printer output routine is at C903. It is called with the accumulator containing the character to print and the X-register containing the slot number. The Y-register is modified by this routine.
5. If the character printed is not a control character, the printer column count,  $\$578 + \text{SLOT}$ , will be incremented. This column count should be saved before you do any printing and updated to reflect the length of the SuperFont character printed when the driver returns to the EP12.
6. The user's driver routine uses SuperRes graphics mode to print the SuperFont characters. After the proper number of bytes are transmitted, it returns control to the PKASO with an RTS instruction.

## ASSEMBLY LANGUAGE PROGRAMMING

This section describes the EP12-80/100 control interface for applications requiring interrupt driven printing, direct output to the printer, or monitoring of printer status by software.

### STATUS INPUT FROM THE PRINTER

The printer status register is located at hexadecimal address

$\$C080 + n0$  (n is the PKASO slot number)

A byte read from this address is arranged as follows:

Bit:	7	6	5	4
"1" = Int.	Ready	Paper Out	On Line	
"0" = No Int.	Busy	Paper OK	Local	

● Note: Bits 3, 2, 1, and 0 are unused.

Bit 7 is used to denote an active interrupt coming from the EP12, and may be used by an interrupt service routine to identify a PKASO interrupt. Bits 6 and 4 indicate the status of the printer. If bits 7 thru 4 are "0101", the printer is ready to accept data:

READY = ( INT( PEEK(49296)/16) = 5 )

## DATA OUTPUT TO THE PRINTER

Eight bits of data are sent to the printer by writing to location \$C800-C803 as follows:

\$C800	Strobe Down, Interrupts off, Clear IRQ.
\$C801	Strobe Up, Interrupts off, Clear IRQ. Use C801 to acknowledge an IRQ without sending data.
\$C802	Strobe Down, Interrupt on Ack.
\$C803	Strobe Up, Interrupt on Ack.

● Note: To use location C800+M to write to the printer, the C800 to CFFF ROM expansion must be activated. This is done by accessing any memory location between CN00 and CNFF.

For example, a byte is transmitted by the sequence:

```

WAIT LDA $C090      ;SEE IF READY
    ROL A
    BPL WAIT        ;NOT YET
    LDA DATA       ;THE CHARACTER TO PRINT
    STA $C801        ;OUTPUT WITH STROBE UP
    STA $C800        ;OUTPUT WITH STROBE DOWN
    STA $C801        ;OUTPUT WITH STROBE UP

```

## MEMORY USAGE

The following are the memory locations used by the PKASO firmware. Most of these locations are set up upon each call to the printer card, and therefore may be used as temporary location between printer calls. However, care should be exercised in their use.

\$7F8	The slot number plus \$C0.
\$778	The slot number.
\$6F8	The last character recieved.
\$478+SL0T	The command lead-in character.
\$4F8+SL0T	The printer mode.
\$578+SL0T	The current printer column.
\$5F8+SL0T	The last numeric argument.
\$678+SL0T	The serial output data byte.
\$6F8+SL0T	The printer width.
\$778+SL0T	This location contains the printer width mode. It defines which printing mode to use independent of the specified printing width.
\$7F8+SL0T	The slot number times 16.

When a PR#1 is performed, the PKASO looks to see whether its memory area has been set up. If not, it sets the command lead-in to "P", sets character width to 0.1", sets line length to 80, and sets video display mode to OFF. If memory is already set up, PR#1 does a normal activation and clears Gray Scale and Special Character modes.



## ADDITIONAL MEMORY USAGE WHILE PRINTING GRAPHICS

\$6 to \$9, \$19 to \$1B, \$1D	Temporary pointers and counters.
\$1C	HiRes point bit mask.
\$26 to \$27	HiRes line base pointer.
\$30	HiRes page pointer, either \$20 or \$40.
\$2C	Current HiRes Y address.
\$2A	Current HiRes X lo-order address.
\$2B	Current HiRes X hi-order address.
\$E8,\$E9	Special Character table pointer.
\$3F5 to \$3F7	A JMP to the External Special Character Driver routine.
\$478, \$4F8, \$578, \$5F8	Graphics temporaries.
\$678	HiRes pass control.

## FIRMWARE ID BYTE

Location  $-16129 + N \times 256$ , \$CNFF hex, contains a number which identifies the type of firmware installed in your interface card. For the EP12-80/100 this byte contains a value of 3. This byte is provided to allow the user to write software which recognizes and takes advantage of features specific to the printer hardware.

---

## HINTS FOR USE WITH POPULAR LANGUAGES AND SOFTWARE

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APPLE II MONITOR - Use 1  $\overline{\text{TRP}}$  to activate and 0  $\overline{\text{TRP}}$  to turn off. With DOS, use PR#1 and PR#0.

APPLE II INTEGER BASIC - Normal operation.

APPLE /// - EMULATION MODE - Normal operation.

APPLE /// - NATIVE MODE - All printing is controlled by software drivers under SOS. The PKASO Apple /// Driver disk is available from Interactive Structures. Use the SOS program SCP to install the driver.

APPLEWRITER - The PKASO Demo Disk contains a program called HELLO.APPLEWRITER which sets up "^" as the command lead-in. See the section in this manual on Applewriter.

APPLEPLOT - Driver conversion available from Interactive Structures.

CP/M - Normal operation as "LST:" the system printing device. PKASO appears as a serial device. The printer must be powered on and ready to print when CP/M is booted. No auto line-feed.

DB MASTER - In version 3, use interface type 3 when doing printouts.

DOS TOOL KIT - A character set conversion program is included on the PKASO demo disk. Run DOS CHARS TO PKASO CHARS.

LOGO - Open the printer with ".PRINTER 1" and then try "TYPE CHAR 9 PRINT "H" to do a HiRes screen dump of Turtlegraphics. "TYPE CHAR 9" allows the entry of a  $\uparrow$  without a return. ".PRINTER 0" returns you to the console.

PERSONAL FILING SYSTEM - Normal operation under Pascal 1.0

PASCAL - PKASO will be recognized as "PRINTER:", the system printing device. Text screen dump, Lo-Res dump and the  $\uparrow$  T tab functions are not available under Pascal. The printer must be powered on and ready to print when Pascal is booted. No auto line-feed.

VISICALC - /P1 <Return> will select the PKASO in slot 1 for all versions. See the manual for methods of setting up Printer Options.

VISILOT - The PKASO Demo Disk contains a program called VISILOT SETUP which installs a driver on your Visiplot disk. The driver is in a file PKASO.D. It is copied to your Visiplot disk and renamed to VISILOT.DRIVER.

WORD PROCESSORS IN GENERAL - Normal operation. If the software has a use for  $\uparrow$  or will not accept control characters as part of text, then change the lead-in to an unused character such as #.

WORDSTAR - Normal operation. PKASO appears as the list device. Install as a teletype with backspace.

\* When in doubt, hit RESET, activate the printer, and then try normal control commands.

---

## LIMITED WARRANTY

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Parts and workmanship of the PKASO EP12-80/100 interface card only are guaranteed against failure for a period of one year from the date of purchase excepting those failures which, in the sole opinion of Interactive Structures, Inc., were the result of misuse or abuse of the product. Damage to the product resulting from misuse or abuse will be repaired at prevailing service rates. The printer mechanism is NOT INCLUDED in this warranty and may be covered by a separate warranty from its manufacturer.

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## OTHER \$ PRODUCTS

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### PKASO! ...the printing masters...

- \$ Interfaces for Centronics, C.Itoh, IDS, IDS Color, NEC and Okidata printers
  - \$ The only Apple /// compatible printer interface featuring full BASIC, Pascal and graphics support
  - \$ The PipeLine, a versatile text and graphics printing buffer user-expandable to 64K with innovative compression mode
  - \$ HI12, the intelligent interface for Houston Instruments plotters
- 

### DAISI...laboratory and instrumentation...

#### Analog Input (A to D)

- AI02 16 channels, 8 bit(0.39%) precision
- AI13 16 channels, 12 bit(0.024%) precision, program selectable voltages
- SC14 1, 4 or 16 channel Signal Conditioner with stock or custom modules

#### Analog Output (D to A)

- A003 2,4 or 8 channel, 8 bit precision
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#### Digital I/O Systems

- DI09 32 I/O channels, interrupts, counters, timers and handshaking
  - UI16 Optically isolated digital and power interface with a variety of modules
- 

All products are backed by our helpful and capable technical staff and come equipped with cables, utility disks and extensive manuals.

## UTILITY DISK CATALOG

All Applesoft programs are listable examples.  
The marked files (\*) do not pertain to the EP12.

- A 007 HELLO
- A 009 DEMO1
- A 004 DEMO2
- A 009 DEMO3
- A 005 LORES DUMP DEMO
- B 006 LOBALL
- B 006 LONUT
- A 006 HIRES DUMP DEMO
- B 034 GRAPH
- A 005 VISIPLLOT SETUP
- A 007 GRAY SCALE
- A 004 DOLLAR
- B 034 DOLLAR DATA
- B 002 PRDOLLAR.1
- B 002 PRDOLLAR.3
- B 002 PRDOLLAR.6
- B 002 PRDOLLAR.7
- A 012 SINE PATTERN
- B 012 SUPER-RES PLOT
- A 013 SPECIAL CHAR DEMO
- B 008 SPECIAL CHARS.8HI
- A 010 VISIPLLOT INSTRUCTIONS
- \*A 006 K2.SETUP
- B 002 NULLCHAR
- A 007 DOS CHARS TO PKASO CHARS
- B 002 DOS TO PKASO
- A 004 HELLO.APPLEWRITER
- \*B 002 K2.1
- B 002 PKASO.D
- A 003 ERROR
- A 025 HIRES DUMPER
- A 022 PKASO CHAR DESIGN
- \*B 002 K2.2
- \*A 002 STARS
- \*B 004 SPECIAL CHARS.7HI
- \*A 010 PKASO SETUP
- \*A 025 PALETTE DESIGN
- \*A 027 COLOR HIRES DUMPER

## QUICK REFERENCE

### PKASO COMMAND SUMMARY

[T <sub>0</sub> I n B	Outputs binary code n
[T <sub>0</sub> I n D	LoRes text or graphics
+1	Screen 2
+2	Full graphics (40*48)
+4	Bottom 4 lines text
+6	Mixed graphics & text
+8	Direct image (W on B)
[T <sub>0</sub> I E	Top of form
[T <sub>0</sub> I n F	Character size in n/8"
[T <sub>0</sub> I n G	Prints n Gray Scale pixels
[T <sub>0</sub> I n H	HiRes graphics
+1	Screen 2
+2	Medium size
+4	Large size
+8	Rotate 90°
+16	Left justify
+32	Direct image (W on B)
[T <sub>0</sub> I I	Line length 40, video on
[T <sub>0</sub> I K	Turn off auto line feed
[T <sub>0</sub> I n M	Set Epson printer modes
[T <sub>0</sub> I n N	Line length n, video off
[T <sub>0</sub> I n S	SuperFont characters
[T <sub>0</sub> I S	Restore standard characters
[T <sub>0</sub> I n T	Tab to column n
[T <sub>0</sub> I T	Autotab on multiple of 8
[T <sub>0</sub> I n X	SuperFont external driver
[T <sub>0</sub> I [T <sub>0</sub> C	Change lead-in character

\* Use [T<sub>0</sub> Y from Pascal or C/PM \*



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## EPSON PRINTER MODES

### ESCAPE COMMANDS

---

ESC I M	Sends ESC character
ESC I M 0	Sets 8 lines per inch
ESC I M 2	Sets 6 lines per inch
ESC I M 3	* Sets 1/216" vertical spacing
ESC I M A	* Sets 1/72" vertical spacing
ESC I M 4	Turn on <i>Italics</i>
ESC I M 5	Turn off <i>Italics</i>
ESC I M @	Reset to power-up state
ESC I M C	* Sets form length
ESC I M D	* Sets horizontal tab lead-in
ESC I M E	Turn on emphasized mode
ESC I M F	Turn off emphasized mode
ESC I M G	Turn on <b>doudle strike mode</b>
ESC I M H	Turn off double strike mode
ESC I M K	* 60 dot/" SuperRes graphics
ESC I M L	* 120 dot/" SuperRes graphics
ESC I M N	* Set auto skip over TOF
ESC I M O	Turn off auto skip over TOF
ESC I M Q	* Set printer column width
ESC I M R	* Select international characters
ESC I M S	* Superscripts and subscripts
ESC I M T	Turn off sub- and superscripts
ESC I M U	* Unidirectional printing
ESC I M -	* Sets underline mode

\* Consult your Epson manual for parameters!

