PKASO ™

NE12 Printer Interface
for
Apple and NEC PC-8023A-C
and
C.Itoh Pro/Writer 8510 Printers

Users Manual

PKASO DOES IT ALL!

PKASO (™)

NE12 PRINTER INTERFACE

For Apple and
NEC PC-8023A-C Printers or
C.Itoh Pro/Writer 8510 or
1550 Printers

Owners Manual

NE12 Firmware Revision 6
August, 1982

PKASO (ᵂₕ)
NE12 PRINTER INTERFACE

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NE12
PRINTER INTERFACE

Owners Manual
August, 1982

You are now the proud owner of a PKASO (™)
NE12 Interface, the most powerful interface
available for the NEC or C.Itoh printers 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.

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 NEC or
C.Itoh switches for standard operation, run
our demo disk program, then...

Experiment and enjoy!

FEATURES
OF THE PKASO 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 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 129 X 132 pixels per 8" X 11" page.

- ◪ SuperRes Dot graphics with up to 1280 by 891 points on a 8" X 11" page.

- Visible signal on screen when the printer is off line or out of paper.

- ID byte so the software can recognize the printer type

- 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.
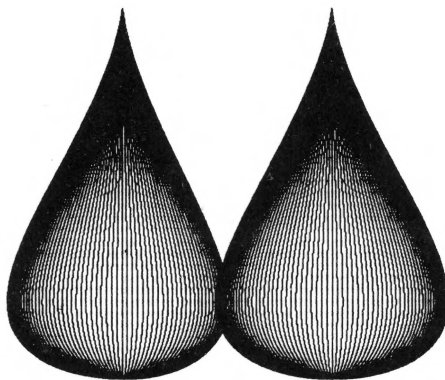
PKASO NE12
PRINTER INTERFACE

━━━━━ ✗ PKASO COMMAND SUMMARY ✗ ━━━━━

Command			Description	Page
[CTRL]I	n	B	Send a Binary code n directly to the printer.	20
[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.	20
[CTRL]I	n	F	Set character width to fit n columns on an 8" line.	14
[CTRL]I	n	G	Grey Scale mode, prints n pixels.	23
[CTRL]I		H	Standard HiRes print: Direct, Small, Centered, Screen 1	24

Add for options as follows:

Command			Description	
[CTRL]I	1	H	Screen 2 HiRes print	
[CTRL]I	2	H	Large 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.	16
[CTRL]I		K	Turn off auto line feed.	20

Command			Description	Page
CTRL I	n	M	Set Printer ESC Modes.	21
CTRL I	n	N	Set line length to n characters per line, (40 to 255) Turn video OFF while printing.	16
CTRL I	1	S	Switch to SuperFont Characters.	32
CTRL I		S	Switch back to standard character set.	
CTRL I	n	T	Tab over to column n.(1 to 255)	19
CTRL I		T	Tab to the next even multiple of 8 columns.	
CTRL I	n	X	Switch to SuperFont Characters using external driver.	39
CTRL I	CTRL c		Change the Command Character from CTRL I to CTRL c	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!.

✳ COPYRIGHT NOTICE ✳

THE SOFTWARE AND DOCUMENTATION CONNECTED WITH THIS PRODUCT ARE COPYRIGHTED AND ALL RIGHTS ARE RESERVED.
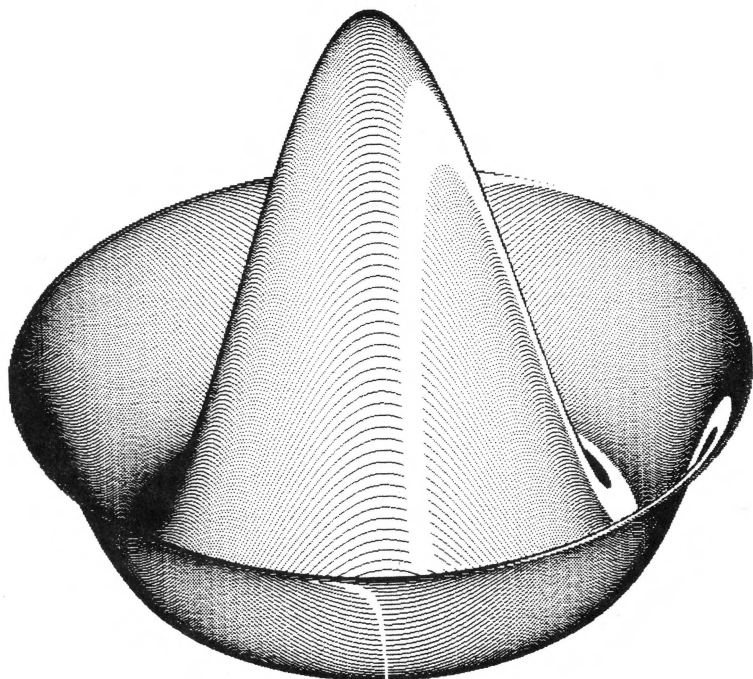
INSTALLING
THE PRINTER

First, TURN OFF your Apple and your printer!
The PKASO NE12 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 PKASO).
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 NE12 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 left side of the cabinet) and press
the SEL button. The green POWER and SEL
lights should be lit. If not, consult your
NEC or C.Itoh printer manual. The printer is
now ready to print and is awaiting data from
the Apple.

The switches inside the printer should be set
for parallel data transmission as described
in the 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.)

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

X IF you run with only the Apple Monitor,
without DOS, use   1 ᶜᵀᴿ·P

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

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

X 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

<div align="center">RESET.</div>

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 ᶜᵀᴿᴸ: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 eight widths: three standard and three doubled or "enlarged" widths, plus a proportional and enlarged proportional width. All the print sizes may be intermixed freely within a line and enhanced (bold print).

> ᴄᴛʀʟ: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
1	enlarged	proportional
2	normal	proportional
3 to 40	5	0.2"
41 to 48	6	0.17"
49 to 68	8.5	0.12"
69 to 80	10	0.1"
81 to 96	12	0.08"
97 to 255	17	0.06"

Example: ᴄᴛʀʟ:I40F   sets .2" characters,
          ᴄᴛʀʟ:I99F   sets .06" characters.

You should always use this, and not the NEC or C.Itoh ESC commands, to control character size.

Printing in 10 and 5 CPI will be done at full speed; other sizes are printed at half speed.

The following shows all 8 print sizes from 5
cpi to 17 cpi.

The Quick Brown 5.0 CPI
The Quick Brown 6.0 CPI
The Quick Brown Fox Jumped 8.5 CPI
The Quick Brown Fox Jumped Over The 10 CPI
The Quick Brown Fox Jumped Over The Lazy Dog. 12 CPI
The Quick Brown Fox Jumped Over The Lazy Dog. 17 CPI

The Quick Brown Proportional 1
The Quick Brown Fox Jumped Over The Lazy Dog. Proportional 2

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 'TRL' 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
PKASO 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 [TRL]I I
   command from Pascal.

CHANGING [CTRL]-I
TO A DIFFERENT CHARACTER

You may want to use a character other than
[CTRL]-I for PKASO commands. This is useful,

(A) when listing programs which contain
[CTRL]-I PKASO commands,

(B) when the program or language you are
using has already assigned another
meaning for [CTRL]-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:

> [CTRL]-I [CTRL]-c   Change command lead-in char-
> acter from [CTRL]-I to [CTRL]-c. ([CTRL]-c may be any
> control character except RETURN)
>
> [CTRL]-c [CTRL]-I   Restore command lead-in char-
> acter back to [CTRL]-I from [CTRL]-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 [CTRL]-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 [CTRL]-Y to [CTRL]-C, other characters
could be used in similar fashion.

TABS

The PKASO provides its own tab command plus
compatibility with other methods.

[CTRL]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 "[CTRL]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 PKASO. 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 [CTRL]I n T
command from Pascal. The PKASO TAB
command uses system resources which are
not accessible under the Pascal system.

TOP OF FORM

> ᴄᴛʀʟ·I E   Top of Form

Skips to top of next page as set by switches
on your printer

DIRECT BINARY OUTPUT

> ᴄᴛʀʟ·I n B   Outputs binary code

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

LINE-FEED CONTROL

> ᴄᴛʀʟ·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 ᴄᴛʀʟ·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 ᴄᴛʀʟ·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 ᴄᴛʀʟ·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 to 6 per inch. 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 printer manual for the full description of these and other printer functions.

ᴄᴛʀʟ·InM   Send an ESC followed by the character whose ASCII value is n. If n is zero then only the ESC is sent.

ᴄᴛʀʟ·I 102M   Forward line feed direction.

ᴄᴛʀʟ·I 114M   Reverse line feed direction.

ᴄᴛʀʟ·IM$ Alphanumeric character set.

ᴄᴛʀʟ·IM!   Enhanced mode (bold print). Graphics data is also enhanced.

ᴄᴛʀʟ·I34M   Clear enhanced mode.

ᴄᴛʀʟ·IMS   ✗ SuperRes bit image gaphics mode.

ᴄᴛʀʟ·I91M   Incremental print mode.

ᴄᴛʀʟ·I93M   Logic Seek print mode.

ᴄᴛʀʟ·IML   ✗ Set left margin.

CTRL:IMA   Set vertical line spacing to
              6 lines per inch (24/144").

CTRL:IMB   Set vertical line spacing to
              8 lines per inch (18/144").

CTRL:IMT   X Set vertical line spacing to
              n/144" per line.

CTRL:IM(X Set internal horizontal tab
              stops.

CTRL:I9B   Move to next internal horizontal
              tab stop.

CTRL:IM)   X Clear selected internal horizontal
              tab stops.

CTRL:IM0   Clear all internal tab stops.

CTRL:IMX   Underline mode. Graphics data is
              also underlined.

CTRL:IMY   Clear underline mode.

CTRL:IMR   X Set C.Itoh character repeat.

CTRL:IMV   X Set C.Itoh dot column repeat.

CTRL:IMF   X Set C.Itoh absolute horizontal
              dot addressing.

Printer functions which must be followed by
parameters are marked with an "X" in the list
above. These parameters are decimal numbers
separated by commas. A list of horizontal
tab stops must end with a period. Refer to
your printer manual for details.

➡ NOTE: Linefeed, formfeed and vertical
     tabs only occur at the left margin unless
     in incremental mode.

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 30 dots within each picture element (pixel).

[TR]·I n G   Sends n gray scale pixels

The printer will plot one gray scale pixel for each character received. Each pixel is 6 dots high and 5 dots wide. The number n is the number of pixels to follow, with a maximum of 129 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 [TR]·D and [TR]·I
10 PRINT D$"PR#1":REM OUTPUT TO PRINTER
20 PRINT I$"24G0001112223334445556667777";
30 PRINT I$"G":REM RESTORE NORMAL SPACING
40 PRINT I$"PR#0":REM DEACTIVATE PRINTER
```

This prints:

After n pixels, the PKASO switches back into text printing mode. Since the [TR]·I n G command leaves the printer in 12/144" line spacing mode in anticipation of more gray scale printing, a [TR]·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 has the built in capability to
print, or "dump", the HiRes graphics screen.
It offers a selection of 32 different ways to
do so. Since this may sound like a very
large number of options to choose from, we
suggest a two-step method of becoming adept
at HiRes printing. First, try it! Load a
picture onto HiRes screen 1 and print it:

    1. Insert your PKASO Diskette
    2. Type 'HGR'
    3. Type 'BLOAD GRAPH,A$2000'
    4. Type 'PR#1' to select the printer
    5. Type 'Ctrl-I H' for a HiRes dump

The printer will start to print a standard,
or default style of dump. The printing of
the HiRes screen may be terminated early by
pressing the Space Bar. Because of the large
character buffer in the printer, it may
continue printing for a few lines after the
space bar has been pressed.

The next step is to try some of the options.
All you do is insert a number between the
Ctrl-I and the H making it:

    Ctrl-I n H   HiRes graphics

On the next page is a description of how to
choose n for the HiRes dump command. Start
with n = 0 for the default format and add
factors to it for each option you change.

⇔ 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. To select Direct, increase n by 32.

⇔ 2. The picture may be centered on the page or left justified. Centered is the default. For left, increase n by 16.

⇔ 3. The small and large size pictures may be rotated by 90° or 0° . 0 is the default. For 90, increase n by 8.

⇔ 4. Print sizes of 2.4" x 3.5" and 4.7" x 6.9" when rotated by 90° and sizes of 3.5" x 2.4" and 6.9" x 4.7" when rotated by 0° . The small size is the default. For large, increase n by 2. The C.Itoh 1550 will only do these sizes even though it has a 13.5" carriage.

⇔ 5. HiRes screen 1 or 2 may be printed. Your choice here will depend on how the picture was drawn or loaded into memory. See your BASIC manual for details on screen use. For HiRes screen 2, increase n by 1.

The following page is a "road map" which graphically shows the same selection process. To use the road map, 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	[CTRL]I H
			2	[CTRL]I 1H
		LARGE	1	[CTRL]I 2H
			2	[CTRL]I 3H
	90°	SMALL	1	[CTRL]I 8H
			2	[CTRL]I 9H
		LARGE	1	[CTRL]I 10H
			2	[CTRL]I 11H
LEFT	0°	SMALL	1	[CTRL]I 16H
			2	[CTRL]I 17H
		LARGE	1	[CTRL]I 18H
			2	[CTRL]I 19H
	90°	SMALL	1	[CTRL]I 24H
			2	[CTRL]I 25H
		LARGE	1	[CTRL]I 26H
			2	[CTRL]I 27H

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.
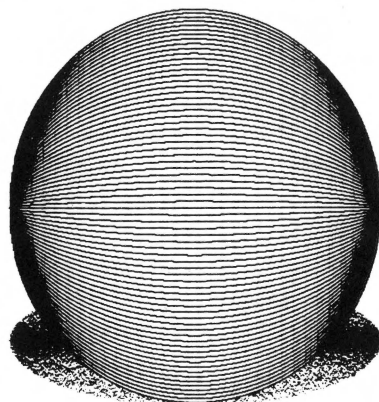
� DIRECT IMAGE �

POSITION	ROTATION	SIZE	SCREEN	COMMAND
CENTER	0°	SMALL	1	[CTRL]I 32H
			2	[CTRL]I 33H
		LARGE	1	[CTRL]I 34H
			2	[CTRL]I 35H
	90°	SMALL	1	[CTRL]I 40H
			2	[CTRL]I 41H
		LARGE	1	[CTRL]I 42H
			2	[CTRL]I 43H
LEFT	0°	SMALL	1	[CTRL]I 48H
			2	[CTRL]I 49H
		LARGE	1	[CTRL]I 50H
			2	[CTRL]I 51H
	90°	SMALL	1	[CTRL]I 56H
			2	[CTRL]I 57H
		LARGE	1	[CTRL]I 58H
			2	[CTRL]I 59H

For example, to print a 4.7" X 6.9" 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 T 00 [CTRL]I H ...
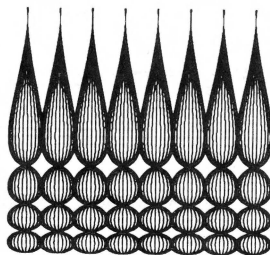
LORES SCREEN DUMP

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:

CTRL-I   D Prints text screen 1.
CTRL-I   1 D Prints text screen 2.
CTRL-I   4 D Prints only the lower four
              lines of text on screen 1.
CTRL-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 PKASO

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

Applewriter 1 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 ᴄᴛʀʟI, 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 ᴄᴛʀʟI causing Applewriter to ignore all commands.

3. CAPITALIZE (using <ESC>) 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

  ^ 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-Vᶜᵀᴿᴸ-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 can be used as an alternate character set printable in 8 different sizes. 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 1 S	Enter SuperFont Character mode.
[CTRL]I S	Return to standard printing.

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 a ᴄᴛʀʟ·I80F character size:

MgCl₂.4H₂O   .1667πr³   &II

Using a ᴄᴛʀʟ·I40F character size:

MgCl₂.4H₂O   &II

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

From BASIC, © would be printed by

ᴄᴛʀʟ·I1S 5 ᴄᴛʀʟ·IS.

Below is a complete listing of the SuperFont characters and their corresponding ASCII characters supplied in the file SPECIAL CHARS.8HI on the PKASO disk.

space = ᵻS				
! = 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 = μ	7 = ∩	8 = ω	9 = △
: = ⊤	; = °	< = ℧	= = ±	> = ●
? = ◆	@ = —	A = ⊤ₘ	B = ᴄᴛʀʟ·	C = ◉
D = ≤	E = ≥	F = ≠	G = ~	H = ≈
I = √	J = ∫	K = ♪	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 an
'S'. Escape commands are sent using the
[CTRL]I M sequence.

[CTRL]IMSnnnn   Sends nnnn bytes

Following the [CTRL]IMS the printer expects
four decimal characters (nnnn) which
represent the number of horizontal dot
positions used. This is the number of bytes
of graphics data to be printed. The maximum
number of positions allowable is 9999.

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 0 is the top position
. Bit 1 is the next lower position
      .
      .
      .
. Bit 7 is the lowest position

The horizontal dot spacing depends on the
printing character size selected. For the
character sizes from 5 CPI to 17 CPI, the
spacings are 40.5, 48, 68, 81, 96 and 136
dots per inch. Also 80 and 160 dots per inch
may be selected using the proportional sizes.
The vertical spacing between dots is 81 dots
per inch.

With the printer in SuperRes mode, you must set approximate vertical spacing for graphics. Consult your printer manual for this. For example, use ᴄ𝚃ᴿʟ·IMT14 to set approximate 81 dot per inch (14/144") spacing and ᴄ𝚃ᴿʟ·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 83 48 48 48 56 64 32 16 8 4 2 1 0
HEX: 1B 53 30 30 30 38 40 20 10 08 04 02 01 00

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

DECIMAL: 27 83 48 48 49 48 102 111 107 123 51 115 3 111 110 0
HEX: 1B 53 30 30 31 30 66 6F 6B 7B 33 73 03 6F 6E 00

Note: Any graphic printout which runs off the end of the print page will be continued on the next line.

The PKASO firmware traps out any characters which look like PKASO commands. For example, a byte equal to 9 would be interpreted as a ᴄ𝚃ᴿʟ·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 ᴄ𝚃ᴿʟ·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.

```
        W E R           U I O      CLEAR:✗
MOVE:  S   D   DRAW:  J   K    DONE: RETURN
        Z X C           N M ,      B/W: SPACE
```

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

You can use these features to create longer
characters, even decorative borders, by
joining successive SuperFont characters
during printing. Remember, the space between
two characters is determined by proper
placement of the cursor during the design
process.

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 X INT(ADDR/256)

WRITING A
SPECIAL CHARACTER DRIVER

When SuperFont Character mode is entered by the ᶜⁿₘⁱI 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 + SLOT. Bits 1 and 2 of this
byte contain the SuperFont character mode settings, from
the ᶜⁿₘⁱI 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 C803. 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 + 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 PKASO.

6. The user's driver routine uses SuperRes gpaphics 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 PKASO NE12 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 PKASO, 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+SLOT	The command lead-in character.
$4F8+SLOT	The printer mode.
$578+SLOT	The current printer column.
$5F8+SLOT	The last numeric argument.
$678+SLOT	The serial output data byte.
$6F8+SLOT	The printer width.
$778+SLOT	This location contains the printer width mode. It defines which printing mode to use independent of the specified printing width.
$7F8+SLOT	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
ᶜᵀᴿₗI, 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 SuperFont 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	SuperFont Character table pointer.
$3F5 to $3F7	A JMP to the External SuperFont Character Driver routine.
$478, $4F8, $578, $5F8	Graphics temporaries.
$678	HiRes pass control.

FIRMWARE ID BYTE

Location -16129 + N*256, $CNFF hex, contains
a number which identifies the type of
firmware installed in your interface card.
For the NE12 this byte contains a value of 8.
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

APPLE II MONITOR — Use 1 ᴄᴛʀʟ·P to activate and 0 ᴄᴛʀʟ·P 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 1. Applewriter 2 has the ᴄᴛʀʟ·V mode for entering ᴄᴛʀʟ· characters.

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 ᶜᵗᴿᴸ⋅I without a return. ".PRINTER 0" returns you to the console.

PERSONAL FILING SYSTEM - Normal operation.

PASCAL - PKASO will be recognized as "PRINTER:", the system printing device. Text screen dump, Lo-Res dump and the ᶜᵗᴿᴸ⋅I 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.

VISIPLOT - The PKASO Demo Disk contains a program called VISIPLOT 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 VISIPLOT.DRIVER.

WORD PROCESSORS IN GENERAL - Normal operation. If the software has a use for ᶜᵗᴿᴸ⋅I 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.

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

LIMITED WARRANTY

Parts and workmanship of the PKASO NE12
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.

NO OTHER WARRANTIES, EXPRESS OR IMPLIED, ARE
EXTENDED BY INTERACTIVE STRUCTURES INC. IN
CONNECTION WITH THIS PRODUCT. INTERACTIVE
STRUCTURES INC. IS NOT AND WILL NOT BE
RESPONSIBLE FOR DAMAGES OTHER THAN THE
REPLACEMENT OR REPAIR OF THE WARRANTED
PRODUCT DURING THE ONE YEAR PERIOD. ANY
MODIFICATIONS OTHER THAN THOSE DONE CAREFULLY
IN ACCORDANCE WITH INSTRUCTIONS PUBLISHED BY
INTERACTIVE STRUCTURES INC. WILL VOID THE
WARRANTY.

DOCUMENTATION AND DESCRIPTIONS

Interactive Structures Inc. has made every
effort to insure that the documentation and
descriptions of this product are correct and
accurately represent its capabilities. S
 assumes no liability for inadvertent
errors in documentation or misconceptions on
the part of the customer.

APPLICABILITY

IS MAKES NO WARRANTIES AS TO FITNESS FOR
ANY PARTICULAR CUSTOMER APPLICATION OR
PURPOSE. The product is sold AS IS and the
customer assumes the full responsibility of
evaluating its applicability to his task.

CHANGES

Interactive Structures Inc. reserves the
right to make improvements and changes in
this product without notice or obligation to
the purchaser.

SERVICE INSTRUCTIONS

If the product develops a problem, return it
to the factory with a clear statement of the
problem encountered. It will be repaired or
replaced and returned to you as quickly as
possible.

TITLE OF PARAGRAPH

Titles of paragraphs are for convenience of
the parties and do not constitute a part of
this contract.

OTHER &S PRODUCTS

PKASO! ...the printing masters...

- &S Interfaces for Centronics, C.Itoh, IDS, IDS Color, NEC and Okidata printers
- &S The only Apple /// compatible printer interface featuring full BASIC, Pascal and graphics support
- &S The PipeLine, a versatile text and graphics printing buffer user-expandable to 64K with innovative compression mode
- &S 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)

   AO03   2,4 or 8 cnannel, 8 bit precision
   DA18   2 channel, 14 bit(0.006%) precision, built-in plotting features

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 (X) do not pertain to the NE12.

```
          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 VISIPLOT 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 VISIPLOT 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

CTRL I	n	B	Outputs binary code n

CTRL I n D   LoRes text or graphics
+1   Screen 2
+2   Full graphics (40X48)
+4   Bottom 4 lines text
+6   Mixed graphics & text
+8   Direct image (W on B)

CTRL I   E   Top of form

CTRL I n F   Character size in n/8"

CTRL I n G   Prints n Gray Scale pixels

CTRL I n H   HiRes graphics
+1   Screen 2
+2   Large size
+8   Rotate 90°
+16   Left justify
+32   Direct image (W on B)

CTRL I   I   Line length 40, video on
CTRL I   K   Turn off auto line feed
CTRL I n M   Set printer ESC modes
CTRL I n N   Line length n, video off

CTRL I n S   SuperFont characters
CTRL I   S   Restore standard characters

CTRL I n T   Tab to column n
CTRL I   T   Autotab on multiple of 8

CTRL I n X   SuperFont external driver

CTRL I CTRL C   Change lead-in character

X Use CTRL Y from Pascal or C/PM X

PRINTER MODES
ESCAPE COMMANDS

_{CTRL}I n M	Sends ESC and n characters
_{CTRL}I M S	✗ SuperRes bit-image graphics
_{CTRL}I M $	Alphanumeric character set
_{CTRL}I 91M	Incremental print mode
_{CTRL}I 93M	Logic Seek print mode
_{CTRL}I M !	Enhanced mode (bold print)
_{CTRL}I 34M	Clear enhanced mode
_{CTRL}I 102M	Forward line feed
_{CTRL}I 114M	Reverse line feed
_{CTRL}I M A	Sets 6 lines per inch
_{CTRL}I M B	Sets 8 lines per inch
_{CTRL}I m T	✗ Set vertical line spacing to n/144" per line
_{CTRL}I M L	✗ Set left margin
_{CTRL}I M F	✗ C.Itoh absolute horizontal dot addressing
_{CTRL}I M (	✗ Set internal tabs
_{CTRL}I 9 B	Move to next tab stop
_{CTRL}I M)	✗ Clear selected tabs
_{CTRL}I M 0	Clear all internal tab stops
_{CTRL}I M X	Set <u>underline mode</u>
_{CTRL}I M Y	Clear underline mode
_{CTRL}I M R	✗ Set C.Itoh character repeat
_{CTRL}I M V	✗ Set C.Itoh dot columnm repeat

✗ Consult your printer manual for parameters!