PRELIMINARY INSTRUCTION MANUAL

FOR THE DUMPLING-64 BUFFER/SPOOLER

CAUTION: PLEASE READ THIS INSTRUCTION MANUAL COMPLETELY BEFORE ATTEMPTING INSTALLATION OF THE DUMPLING-64. FAILURE TO DO THIS MAY RESULT IN DAMAGE TO BOTH THE DUMPLING-64 AND TO YOUR APPLE COMPUTER.

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INTRODUCTION

The DUMPLING-64 is a multi-purpose buffered parallel interface card designed to interface the Apple computer with a wide variety of parallel printers.

The purpose of any buffered printer interface card is to free up computing time by letting slower printing operation be accomplished off line. The DUMPLING-64 does this by accepting large amounts of data, (either text or graphics) at high speed from the computer and storing it in its memory, and then transferring that data to the printer at a rate acceptable to the printer. This frees up the computer to continue processing additional data while the DUMPLING-64 continues to feed data to the printer.

The DUMPLING-64 offers several distinct advantages over any other buffered parallel card:

* Automatic memory size recognition. 0 KB to 64 KB
* Pause control - Both immediate and delayed print pause
* Resume control for printing
* Remote pause print control
* Insert editing facilities using pause and buffer disable
* DIP switch control for printer selection
* Full graphics command availability for most major printers

The DUMPLING-64, or a smaller memory version will make your computing and printing functions separate. This manual will describe basic installation all the way through upgrading the unit from one memory size to another, and advanced programming techniques.

If you have any questions or problems, please do not hesitate to call your dealer or the service department at Microtek.

BEFORE INSTALLATION OF THE DUMPLING-64

Before you install the DUMPLING-64 in your Apple, follow these preliminary steps to insure correct operation:

1) Inspect the Microtek box, the DUMPLING card and the cable. If there appears to be any PHYSICAL damage at all, contact your dealer or the Service Department at Microtek immediately. DO NOT ATTEMPT TO INSTALL ANY ELECTRONIC COMPONENT THAT IS PHYSICALLY DAMAGED! IT COULD CAUSE ADDITIONAL DAMAGE TO YOUR COMPUTER!

2) Whichever version of the DUMPLING-64 you have, you are provided with two pieces: The actual PC Board and a cable. If you have an IDS printer, the cable should be terminated in a DB-25 connector, just like those used in RS-232C applications. For any other printer, the termination will be a 36-pin Amphenol Centronics-style connector.

3) The first selection on the DIP switch is position #8. There are two choices: UP=ON, and DOWN=OFF. Switch #8 must be in the UP=ON position at ALL times for the DUMPLING-64 to work properly.

4) The selection of strobe signal is OK set on the DIP switch, positions 6.

   POSITION 6: UP=STB, DOWN=STB

   For all graphics applications on the Epson, Anadex, C-Itoh, NEC, and Okidata printers, the Strobe signal should be NOT: Therefore Position 6 of the DIP switch should be set for /STB, in the upper or ON position. You should now have positions 6 and 8 in the up, or ON position.

5) Some printers require different STR and ACK conditions before they will be operational. If your printer is not one of those listed, check your printer manual for the correct STR and ACK signals, and set DIP switch position 6 accordingly. If you happen to set the switche incorrectly, NO DAMAGE WILL RESULT. YOU WILL MERELY GET NO PRINTOUT!

   All Centronics compatible printers require a low going strobe signal (/STR) and provide both a low going Acknowledge (/ACK) and a high true BUSY signal. With SW 6 in the UP position, the DUMPLING provides a low going strobe (/STR) (pronounced 'Strobe Not'). As shipped, the DUMPLING relies upon the BUSY line to determine when to send the next character to the printer, and ignores the Acknowledge line.

Some non-standard printers or other parallel peripherals may require a high going strobe and/or provide only an Acknowledge signal and no BUSY. SW 6 in the down position will cause the DUMPLING to generate a high going strobe (STB). An Acknowledge signal may be supported by selecting a jumper option. There are 3 pads near the center of the top of the board marked E3, E4 and E5. Cut the trace from E4 to E5 on the component side of the board and install a jumper from E4 to E3. Now the DUMPLING will wait for an Acknowledge from the printer to determine when to send the next character. Whether it is a high or low going Acknowledge makes no difference as long as it is a pulse.

6) DIP switch position #7 is for determining the means to effect a reset. When switch #6 is UP or ON, the DUMPLING-64 will recognize a hardware reset to clear buffer and return to initialized default conditions. A Reset to the DUMPLING-64 can be accomplished in two ways:

   a) Hard Reset. If DIP switch #6 is UP or ON, pressing the RESET button on the Apple, both the Apple and the DUMPLING-64 will be reset to initialized conditions and the print buffer will be cleared.

   b) By the soft reset or the command, (CTRL-I) Y. This command will clear the buffer of the DUMPLING-64 only. All data in the buffer is effectively erased, and the space compression mode is disabled. See the BUFFER COMMANDS section for details.

   If DIP switch #7 is DOWN or OFF, then the DUMPLING-64 may be reset only by the soft command (CTRL-I) Y and the Apple Keyboard RESET will not stop printing.

7) Selection of the type of printer on the DIP switch is the next step for you. Follow the chart to properly set the first 5 positions of the DIP switch for your particular printer: These settings are necessary only for printing Hi-Resolution-Graphics.

DIP Switch Selection

APPLE DUMPLING-64 DIP SWITCH PRINTER SELECTION TABLE

	SWITCH POSITIONS				
	5	4	3	2	1
Epson MX70, 80, 100	ON	ON	ON	ON	ON
Okidata 84	ON	ON	OFF	ON	OFF
Okidata 82A, 83A with Okigraph	ON	ON	ON	OFF	OFF
Okidata 80, 82, 83, 82A, 83A for Text and Block graphics	ANY	ANY	ANY	ANY	ANY
Anadex DP9000, 9001, 9500, 9501	ON	ON	ON	ON	OFF
C-Itoh Prowriter 8510A	ON	ON	ON	OFF	ON
Centronics 739	ON	ON	OFF	ON	ON
PMC	ON	ON	ON	OFF	ON
Mannesmann Tally	ON	ON	OFF	OFF	ON
NEC-8023-A	ON	ON	ON	OFF	ON
IDS Prism and Micro Prism	ON	ON	ON	ON	ON
IDS Paper Tiger above Model #455	ON	ON	ON	ON	ON
IDS Paper Tiger up to Model #455	ON	ON	ON	ON	OFF

INSTALLATION OF THE DUMPLING-64

FOLLOW THESE DIRECTIONS CAREFULLY! FAILURE TO FOLLOW THEM MAY RESULT IN DAMAGE TO BOTH THE DUMPLING-64 AND TO YOUR APPLE.

1) The DUMPLING-64 comes in two pieces. The actual PC Card and the Cable. If not already connected, the 34 pin header on the board must be mated to the connector on the supplied cable. With the component side up, and the fingers of the board towards you, gently yet firmly place the female connector of the cable onto the pins of the header. This should be done so that the cable is extended to your RIGHT! The cable SHOULD NOT COVER ANY COMPONENTS ON THE BOARD!

2) CAUTION! Turn the power to both the Apple and the printer OFF! NEVER PLUG ANY PERIPHERAL BOARD INTO THE APPLE WITH THE POWER ON.

3) Remove the Apple computer's cover. Viewed from the front (keyboard side) there are eight (8) slots, (labelled 0-7). Plug the DUMPLING-64 into any slot except Slot 0. The DUMPLING should be gently but firmly seated into its slot, component side to the right, with the cable draping to the rear of the computer, through one of the slits in the case. If the cable covers any components, re-read the instructions and try again. There is only one correct way to install the DUMPLING. If possible, use SLOT #1, as this is the most commonly used slot. If you are using PASCAL or CP/M, you MUST USE SLOT #1.

4) Draping the cable through one of the slits will facilitate replacement of the Apple's cover.

5) Neatly drape the cable to your printer (MAKE SURE THE POWER TO THE PRINTER IS OFF!), and plug the Centronics connector (or DB-25 for IDS's) into the rear of the printer. For those printers with 36 pin Amphenol connector inputs, there are often connector clamps to hold the connector firmly in place. USE THEM!

6) Double check your installation of the DUMPLING. If you are sure that everything has been done correctly, turn the power ON to both the printer and the Apple.

BASIC PRINTER OPERATION WITH THE DUMPLING-64

In the discussion that follows, we will assume that you have placed the DUMPLING-64 into SLOT #1. If you have used some other SLOT, then change all references to SLOT #1 to the SLOT # you have actually used. The term, (CTRL-I) as used throughout the manual signifies typing in the letter "I" while holding down the CTRL key. The term (RET) signifies a single depression of the RETURN key. Type:

```
PR#1 (RET)
```

This command turns on, or initializes the DUMPLING-64. If everything is working correctly, you will see the printer do one or two carriage returns, and print the prompt symbol. From this point on, everything you type on the keyboard will be printed on the printer, and shown on the monitor, until you turn the DUMPLING-64 off by typing:

```
PR#0 (RET), or hitting the RESET key
```

If nothing happened when you typed in PR#1, check to see that all of the DIP switches on the DUMPLING-64 are set correctly for your printer, and that you have carefully followed all of the instructions in the installation section.

REMEMBER: The first SLOT on the left is SLOT #0, not SLOT #1. If you have typed in the incorrect SLOT#, you will "hang-up" the Apple, and have to hit the RESET key. Also, make sure that all 34 pins on the DUMPLING-64's header are inserted into the female connector of the cable. It is easy to miss a pair of pins at either end.

You may use PR#1 and PR#0 commands in your own basic programs to selectively output to the printer portions of your program:

```
100 PRINT "THIS LINE WILL NOT GO TO THE PRINTER"

110 PR#1

120 PRINT "THIS LINE PRINTS ON THE PRINTER"

130 PR#0

140 END
```

The text in line 120 will go to the printer and monitor, while the text in line 100 will only go to the monitor. Text going to both the printer and the monitor is called ECHO. We will be using this term often throughout the manual.

If you are working on a program, and would like to get a program listing on your printer, type in:

PR#1 (RET)

LIST (RET)

This will result in your program listing being sent to the printer. After the listing is done, type in PR#0, which turns off the DUMPLING and kills subsequent output to the printer.

In this mode, the DUMPLING-64 is operating in Default mode, and the printout will be similar to the screen, because the Apple issues a carriage return after 40 characters.

INSTRUCTINS FOR USE OF THE DUMPLING-64

Printer Commands For Text Applications And Block Graphics

Upon initialization of the DUMPLING-64, (PR#1), certain default conditions exist. This allows immediate use of the DUMPLING-64 without any additional commands. This is especially useful when running certain programs which define most or all of the printer parameters required for their own application; ie., Visi-Calc, Word-Pro, etc. The initial default conditions are:

Left Margin = OFF. No limit or definition. 0

Right Margin = OFF. No limit or definition. 0

Page Length = OFF, or not defined.

Eighth Bit = OFF The eighth bit is used to enable block graphics, or alternate character sets in various printers. Some printers will not be affected by 8th bit on.

Auto Line Feed is ON

Bell is OFF

Screen Echo is ON

Remember Mode is OFF

Space-Compression is OFF

Pause is OFF

Buffer is Enabled

Text Features And Commands

PR#n (where n = any number from 1 to 7)

Turns on, or initializes the DUMPLING-64 in the appropriate SLOT#. All subsequent commands will appear on both the Monitor and the Printer (ECHO ON). All other conditions are as described in the Default section above. (Unless Remember Mode is enabled).

PR#0

Turns off the DUMPLING-64. All commands that had been used to the DUMPLING-64 while it was ON previously are now forgotten. Upon reinitialization, any command definitions required must be restated, unless Remember Mode is enabled. (See Remember Mode for methods of remembering).

(CTRL-I) A

Turns on the Auto-Line Feed. This is the normal default condition. If your printer performs a double line feed after each carriage return, then check your printer manual, to see if the printer provides for it's own automatic line feed. If it does, refer to the printer manual to see how the auto line feed may be disabled. Most printers have DIP switches for that purpose.

(CTRL-I) K

Removes, or doesn't allow the DUMPLING-64 to add a line feed command after each carriage return.

(CTRL-I) B

Enables the printer bell, if one is available. The printer bell may be rung by (CTRL-G). Check your printer manual to see if this feature is applicable to you.

(CTRL-I) C

Disables the bell in the printer, if there is one. This is a normal default condition.

(CTRL-I) I

Turns on ECHO to screen. Whatever data is being sent to the printer will also appear on the Monitor. This command must be restated after Line Length is defined, if Screen Echo is desired. Screen Echo on is a normal default condition.

(CTRL-I) D

Turns off echo to screen. This is also accomplished by setting or changing line length.

(CTRL-I) X

Suppresses the eighth bit (Bit 7). This is a normal default condition.

(CTRL-I) H

Enables the eighth bit. (Bit 7). This allows the high order bit to be output to the printer. On some printers this will have no effect. But on others, it permits block graphics (Epson MX80) or alternate character sets. Remember that when Block graphics are being used, the standard alphanumeric ASCII character set is not accessible. You would have to turn off Bit 7, (CTRL-I X) to get back to normal text printing. Check your printer manual for the effects of using the high order bit. Be sure that space compression is disabled [(CTRL-I) ,] if eighth Bit is set.

(CTRL-I) nN (where n = any number from 1 to 255)

This sets the line length to the number of characters (and spaces) from the left side (NOT LEFT MARGIN) until a carriage return is issued. After issuing this command, the Screen ECHO is disabled, so (CTRL-I I) may be used to reinstate Screen ECHO. A carriage return will automatically be sent after "n" characters are printed. If the line length is left undefined, as is the case upon default condition initialization, the DUMPLING-64 will not issue a carriage return until it receives one from the Apple. Many programs have this feature already built in to simplify your set-up.

NOTE: When listing BASIC programs from the Apple, the printing will be automatically formatted for 40 columns, unless otherwise stated: (CTRL-I) 80N. Epsons with Graftax Plus do not respond to this automatic default of 40 columns. Line length must be defined, ie. 80N, etc.

(CTRL-I) n L

Sets the left side margin to the "nth" columns (n=max 255). All printouts will begin "n" spaces in from the left side of the carriage. Can be thought of as a permanent TAB statement. Default condition is zero spaces indented.

(CTRL-I) n R

Sets right margin (or where a carriage return may occur) to "n" spaces from the left side of page, but NOT FROM LEFT MARGIN. If possible the DUMPLING-64 will not cut a word off in the middle, but will wait until the first "space" after "n" characters from left side have passed. If however, the entire length is used without having reached a space to issue a CR, a CR will occur in the middle of a word. A right margin of "0", or the default condition, disables this feature.

(CTRL-I) n P

Sets the number of printable lines per page to "n" lines. The printer will print 6 linefeeds after "n" lines. Continuous form paper typically has 66 lines per page (depending upon your printer - check your printer manual). So the most likely setting is (CTRL-I) 60P. Your printer would then skip over the perforations between pages with 6 line feeds.

(CTRL-I)(CTRL-Y)

Changes the control character from I to Y. Any letter may be used for Y, but you should avoid characters normally used by the printer or text control characters such as CTRL-M.

(CTRL-Y)(CTRL-I)

Returns the command character back to CTRL-I.

(CTRL-I) J

Set Default conditions for CP/M or PASCAL.

(CTRL-I) F

Turns on Format Mode (see below).

(CTRL-I) L

Turns off Format Mode (see below).

(CTRL-I) Z

Bypasses all firmware on the DUMPLING-64. Effectively turns the DUMPLING-64 into a transparent parallel port utilizing hand shaking. Some programs prefer to talk directly to the printer, and bypass DUMPLING software, ie., ZOOM graphics. This feature

is especially useful for software development. In order to reinstate the firmware, the card must be turned OFF, then on again. (PR#0, PR#N). If you are in Remember Mode and have Remembered (CTRL-I) Z, the only way to EXIT from this setting is turn the Apple OFF and then ON again.

Format Mode:

The Format Mode sets the format for listing a BASIC program. It performs two basic functions which will simplify the debugging of programs, and make the listings easier to read.

1) It will cause a CR (carriage return) to occur at each colon it sees. This will permit multiple statements within a program step to be listed separately on sequential lines. The readability is immensely improved.

2) It will follow the cursor of the screen for dumps of the screen when not listing a program.

When performing the formatted LISTING of a BASIC program, the screen should be turned off, because the Format control will also follow the cursor, and create some confusion on a printout. The screen may be turned off by (CTRL-I) D.

Text And Graphics Screen Dump Features And Commands

Text and Graphics Screen Dumps and Listings of programs will take on a new dimension with the DUMPLING-64. All of the features of the DUMPLING-GX are included in the DUMPLING-64, along with some new exciting features.

The first thing that you will notice when you are performing a screen dump, (CTRL-I) S, for example, is the cursor reappears almost immediately. Rather than waiting for the printer to print out the entire screen, the buffer on the DUMPLING-64 has accepted all of the information destined for the printer and is storing it until the printer can accept it and then print it. If you are performing a PRINT and LIST of a program, you will see the entire program go flashing by on the screen very rapidly, and then the READY cursor will appear again. Although the printer may have only printed a few of the program lines, the entire listing is residing in the buffer memory of the DUMPLING-64. You are free to compute while the DUMPLING-64 and your printer are printing out what you have loaded into the DUMPLING-64. There are methods to interrupt the process, and the commands for this are listed in the BUFFER COMMANDS section, immediately following this chapter. If you are running a particularly long listing, or have a shorter buffer, you may overload the buffer capacity. In this case, the cursor READY will not appear until all the dumped material is in the buffer and out of the Apple's memory.

Whether you are rotating or emphasizing any printouts, the DUMPLING-64 will store the data and print it out as required. The following commands will help you perform screen dumps, or manipulate the graphic dumps available to you.

(CTRL-I) S

Dumps the text present on the screen to the printer. The text will be printed 20 spaces in from the left side of the paper, as though (CTRL-I) 20L had been used. Only 40 column screens are printed. 80 column boards are NOT supported.

(CTRL-I) nS

Performs Screen Dump beginning at line #n, where n is any number from 1 to 23. The present screen will be dumped beginning at line #n and ending at line #23.

(CTRL-I) E

Extended Text Screen Dump Command. First Dumps page 1, then continues with page 2. All features of (CTRL-I) S apply.

Graphics Dump Commands

NOTE: In all of the following commands, spaces are not part of the command and must not be typed, they are only used here for clarity.

(CTRL-I) G

Dumps Hi-Resolution screen graphics to the printer from page 1.

(CTRL-I) G 2

Dumps Hi-Resolution screen graphics to printer from page 2.

(CTRL-I) G B

Dumps Hi-Resolution screen graphics to printer: First page 1, then page 2.

(CTRL-I) G 2 B

Dumps Hi-Resolution screen graphics to printer: First page 2, then page 1.

(CTRL-I) G R

Rotates the picture 90 degrees in a clockwise direction on printer. Some printers require the use of this command when printing double-size "D" images.

(CTRL-I) G D

Prints the graphics screen (in this case, page 1) Double Size on the printer. Some printers don't have enough horizontal positions to print a double size image, so the "R" option must be used. If your printer stops printing while using "D", reset the Apple, reset the printer by turning if OFF and ON again, and rerun the dump routine with: (CTRL-I) G D R.

(CTRL-I) G I

Inverts the printer image. Normally, the white dots on the screen appear as black dots on the printed output. For many applications this is fine; graphs, charts, etc. But, if you're printing the picture of a person, it would appear to be the negative of the image you want, so you would want to use the "I" option.

(CTRL-I) G E

Prints an "emphasized" image on Epson, Mannesmann-Talley, NEC-8023A, and C-Itoh-8510A. The printer will print two dots, close together, for every dot normally expected to print. The result is a much denser, high resolution image. The sacrifice is that printing time is doubled. Not available for Anadex or Centronics printers.

(CTRL-I) G L

Print the image beginning at the left margin previously set in text mode by (CTRL-I) n L. Depending upon which printer is being used, the specific print density (CPI) may affect the left margin. If "L" is not used, it is defaulted to print the image in the center of an 8 1/2" page, for all but double-size non-rotated. Double-size non-rotated images are centered for 15" page.

NOTE: 1) Commands may be typed in any order, but remember that each must begin with: (CTRL-I) G before any other options are selected, and followed by a carriage return.

2) Be careful of previously set text options, especially the (CTRL-I) n L, Left margin set. If the "L" specified is too large, a "wrap-around" of the picture could occur, or the printer could crash.

3) When attempting to use the DUMPLING-64 directly from the keyboard, rather than through a program, the screen will give a SYNTAX ERROR, although the DUMPLING will still respond to the command. Apples often don't recognize DUMPLING commands as valid. To get around this problem type and execute the following program:

```
10  PR#1:PRINT CHR$(9); "G":PR#0.
```

This mode allows the Apple to not interpret the commands intended for the DUMPLING-64.

4) Old Epsons without GRAFTRAX Plus don't have a method of clearing their internal printer buffer. When doing a screen dump outside of a program, turn the printer OFF and ON to clear the printer buffer. Otherwise, the BASIC prompt symbol will print on the first line of the dump and shift it over.

Buffer Commands

Other than the standard printer commands and graphics commands, there is a series of commands which manipulates the buffer itself, and allows the user much increased flexibility.

Upon initialization of the DUMPLING-64, (PR#1), a number of these commands are defaulted to. These commands may be rewritten to other convention formats as required and then saved using the REMEMBER Mode.

(CTRL-I) V

Enable Buffer. This is a default condition. The DUMPLING-64 Buffer is ON, and allows however much memory is on board to store data prior to printing. The DUMPLING-64 automatically knows how much memory it has.

(CTRL-I) W

Disables Buffer. Data sent to the DUMPLING-64 is sent directly to the printer bypassing the buffer altogether. The contents of the buffer are bypassed (if there is any memory in the buffer), and the printer will respond to the data directly from the Apple. The buffer may be turned back on and printing resumed, without altering the contents of the buffer.

(CTRL-I) Y

Clears the buffer altogether. Effectively erases the data in the buffer. Space compression is disabled.

(CTRL-I) M

Enables Space Compression. Cannot be used if RAM configuration = 0, 4 or 7. No RAM in buffer; 64K RAM without space compression, ie, only 7 RAM chips; or if buffer is disabled. (See Advanced Techniques for details).

(CTRL-I) O

Disables Space Compression. This is normal default condition.

Space Compression

Space Compression is a unique feature of the DUMPLING-64 . As we all know, any space between characters, or words is counted as an ASCII character. Typically the ASCII equivalent for a space is counted as many times as it appears. Thus if you have a TAB of 10 spaces, or many spaces like this between words, a separate byte is required to store each of those spaces. In spread sheets, word processing, assembly language, or any printer intensive applications, or wherever a very large buffer is required, it is desirable to minimize the amount of memory required to store the data.

The DUMPLING-64 does just that. When space compression is enabled, any group of spaces (up to 128) one right after the other sent to the DUMPLING to be printed will be internally compressed and stored in only one byte. This is done by using the eighth bit of the byte (normally zero for all ASCII codes) as a flag to indicate a group of spaces. The other 7 bits of the byte are used to count how many spaces are in thr group. One space is represented internally by the binary code 1000 0000, or 80 Hex. 2 spaces = 1000 0001. 128 spaces = 1111 1111.

When the FIFO controller pulls a byte out of the buffer with the top bit set, it recognizes it as a group of spaces and sends the appropriate number of spaces to the printer.

If space compression is on and a byte is sent to the DUMPLING with the top bit set, it will be interpreted as a group of spaces, one more than the value contained in the bottom 7 bits.

Effectively the DUMPLING-64 could store many times as much data as other spooler/buffers not utilizing this mode.

DO NOT USE SPACE COMPRESSION IN THE GRAPHICS MODE.

(CTRL-I) Q

Pause-Immediate. All printing immediately stops. The contents of the buffer are not changed.

(CTRL-I) T

Pause-Delayed. All data in the buffer prior to the execution of this command will be printed. All data sent to the DUMPLING after this command will be accepted and stored in the buffer, but not printed until a resume command is given. The resume command (CTRL-I) U will effect a resumption of printing. The resume command will only be effective when printing has actually stopped.

(CTRL-I) U

Resume Printing. This command may be issued after the Pause Immediate or the Pause Delayed command. This command will not be effective unless the Pause status bit has been set. (See ADVANCED TECHNIQUES).

(CTRL-I) , (comma)

Remember Mode Off. This is a normal default condition.

(CTRL-I) . (period)

Remember Mode On.

Remember Mode (For Apple System BASIC only)

Enabling the Remember Mode saves much programming time and eliminates potential sources of errors when turning the DUMPLING-64 ON and OFF through the use of PR#1 and PR#0. When PR#0 is entered, all of the formatted parameters, such as line length, page length, etc. are effectively erased from the DUMPLING-64. When you turn on the DUMPLING-64, (PR#1), all conditions return to their defaults. By enabling the Remember Mode, even if the DUMPLING-64 is turned off, the formatted parameters will be remembered and will still be in effect when the card is turned on again. This means that all of the defined variable parameters will be saved until power is turned off or the Remember Mode is turned off by (CTRL-I),(comma).

(CTRL-I) nB

Send Binary Data. The number 'n', entered as decimal number from 0 to 255, will be translated to Binary, (00 to FF) and sent to the printer as a character. The printer will respond to the character if programmed to do so.

(CTRL-I) nC

Changes the Control Code Character to a new Code from 0 to 255. This is similar to (CTRL-I)(CTRL-Y) but not limited to control characters.

Chart Recorder Mode

A chart recorder is a device which prints on a continuous roll of paper over extended periods of time, i.e., EKG readouts, seismographs, spectral analysis, etc. If you need to print more information than can be fitted on a single page, or if your program calls for a printout on specific external events, (as when using A/D I/O ports, event timers, etc.) a chart recorder mode may be simulated.

By using a series of successive screen dumps, either immediately successive or under external event control until a page is full, your printer will behave like a chart recorder.

Depending on your printer, you may have to rotate the images to accommodate this feature. In general, IDS, Centronics 739, Anadex 9500 series do not require rotation, but Epsons, NEC, and C-Itoh do require 90 degree rotation.

Test Program

Try this program just for fun to test out your DUMPLING-64 and printer interface. Modify the commands, sequences, etc. to become familiar with their operation:

```
    SAMPLE PROGRAM TO TEST DUMPLING-64 GRAPHICS CAPABILITIES

    NOTE:   LOAD PAGE 1 AND 2 WITH HI-RES PICTURES. N = SLOT #
            DUMPLING IS IN.

10  PR#N: REM USE THE SLOT # INSTEAD OF 'N'

20  C$ = CHR$(9): REM THIS IS CONTROL I

25  PRINT C$; "80N": REM FOR GRAFTRAX PLUS, LINE LENGTH MUST BE
        DEFINED.

30  PRINT "THIS IS NORMAL PRINT"

40  PRINT "THE NEXT LINE WILL HAVE THE HIGH BIT SET"

50  PRINT

60  PRINT C$; "H"; "THIS IS PRINT WITH HIGH BIT SET"

70  PRINT

80  PRINT C$; "X"; "NOW WE ARE BACK TO NORMAL"
```

```
90  PRINT C$; "10L"; "THIS LINE STARTS AT THE TENTH POSITION"
100 PRINT "WE WILL NOW LIST THE PROGRAM WITH A LINE LENGTH OF 80
          CHARACTERS, A RIGHT MARGIN OF 70, AND PAGE LENGTH OF 10"
110 PRINT C$; "70R"; C$; "10P"; C$; "80N"
120 LIST
130 PR#0
140 PR#N
150 PRINT "HERE IS PAGE ONE OF TEXT"
160 PRINT C$; "S"
170 PRINT "HERE IS PAGE ONE AND TWO OF TEXT"
180 PRINT C$; "E"
190 PRINT "HERE IS BELLS TO PRINTER"
200 PRINT C$; "B"; CHR$ (7); CHR$ (7)
210 PRINT "HERE IS NO BELLS TO PRINTER"
220 PRINT C$; "C"; CHR$ (7); CHR$ (7)
230 PRINT C$; "K"; "NOW THERE IS NO LINE FEED"
240 PRINT C$; "A"; "NOW THERE IS"
250 PRINT C$; "D"; "THIS WILL NOT BE ON THE SCREEN"
260 PRINT C$; "I"; "BUT THIS WILL"
270 PRINT "HERE IS PAGE ONE OF THE HIGH-RES SCREEN . . ."
280 PRINT C$; "G"
285 PRINT
290 PRINT "HERE IS PAGE TWO, ROTATED, DOUBLE-SIZE, EMPHASIZED,
          INVERTED, AND STARTING AT THE LEFT SIDE OF THE PAGE"
300 PRINT C$; "G2RDEIL"
310 PRINT "HERE ARE BOTH PAGES WITH A 'B' COMMAND"
320 PRINT C$; "GB"
330 PRINT "THIS FINISHES THE TEST. WHAT DO YOU THINK?"
340 END
```

Dumpling-64 Command Summary

PR#n	Turns on the DUMPLING in Slot #n
PR#0	Turns off the DUMPLING
(CTRL-I CTRL-Y)	Changes Control Code Prefix to CTRL-Y
(CTRL-Y CTRL-I)	Returns Control Code Prefix to normal

ALL SUBSEQUENT COMMANDS ARE PREFIXED BY (CTRL-I)

A	Turns on Auto Line Feed (Default)
K	Turns off Auto Line Feed
B	Enables the printer Bell
C	Disables the Printer Bell (Default)
I	Turns on ECHO to Screen (Default)
D	Turns off ECHO to Screen
X	Suppresses 8th Bit (Default)
H	Enables 8th Bit
nN	Sets Line Length
nL	Sets Left Side Margin
nR	Sets Right Side Margin
nP	Sets Page Length
S	Text Screen Dump. Page 1
E	Text Screen Dump. Page 1 and 2
Z	Bypasses all on board firmware
G	Hi-Res Graphics Screen Dump. Page 1
G2	Hi-Res Screen Dump from Page 2
GB	Hi-Res Graphics Screen Dump. First Page 1, then Page 2
G2B	Hi-Res Graphics Screen Dump. First Page 2, then Page 1
GR	Rotates the picture CW by 90 degrees
GD	Prints Doubles Size Image. Hires Graphics
GI	Black/White Inversion
GE	Emphasized Print
GL	Prints Graphics beginning at Left Margin
J	Soft Reset to return to Default. CP/M and PASCAL
F	Enables Format Mode
L	Disables Format Mode
nS	Screen Text Dump from line #n
nB	Send Binary Data 'n'
nC	New Control Character = 'n'
M	Space Compression Enable
O	Disable Space Compression
Q	Pause Immediate
T	Pause Delay
U	Resume Printing
V	Enable Buffer
W	Disable Buffer
Y	Clear Buffer
(,) comma	Disable Remember Mode
(.) period	Enable Remember Mode

All commands may be sequenced together to perform multiple function simultaneously. This command summary is for reference only. See the specific command descriptions and rules for their use to be sure that the printer will be doing what you want.

The Centronics 739 and the DUMPLING-64

READ THESE DIRECTIONS COMPLETELY BEFORE BEGINNING MODIFICATION.

If you are using a Centronics 739 printer, you will notice that the standard 36 pin Amphenol connector is not used. A 40 pin edge connector is required. To modify your cable to work with the 739, follow these instructions:

1) Remove the cable from the Apple Dumpling card (CAREFULLY).

2) With a pair of SHARP scissors, cut the cable off within 1" of the Centronics connector. Make sure that no frayed wires are hanging on. Trim as necessary so the cable is neat on the cut end.

3) Purchase from your local electronics supplier, computer store, or mail order house a 40 pin edge connector. Typical part is #53-40-D Robinson Nugent.

4) Locate pin 1 of the 40 pin connector. Locate pin 1 of the 34 pin connector on the Dumpling end of the cable.

5) Place the cable, layed out flat from left to right (pin 1, wire #1 should be away from you) with the 34 pin connector on the left, and the 40 pin connector on the right.

6) Place the 40 pin connector in a vice (not too tight) and insert the cable into the opening between the two halves. The cable edge corresponding to pin 1 should be placed next to edge of the 40 pin connector corresponding to its pin 1. Insert the cable until it just comes through the other side.

7) Holding the wire firmly in place, close the vise slowly until the cable is firmly clampled between the two halves. There may be a "click" or final "snap" on some connectors.

8) Remove from vice, and trim the wire protruding from the connector.

9) Plug the 34 pin connector into the DUMPLING-64, and the 40 pin connector into the Centronics 739 with power OFF.

10) Plug the DUMPLING-64 into the Apple with power OFF.

11) Turn on printer and Apple and try the test program on page 10.

PASCAL And CP/M Compatability

The DUMPLING-64 is compatible with both CP/M and PASCAL 1.0 and 1.1. In both CP/M and PASCAL, all the print control functions except right margin are available.

NOTE: The Command Control character is (CTRL-Y) rather than (CTRL-I).

Technical Information

To insure compatibility with CP/M and PASCAL, the Apple DUMPLING has its signature bytes at Cn05 and Cn07 configured to make it appear to the system as an Apple Serial Interface Card.

For compatibility with other software it also supports the two standard parallel card firmware entry points: Cn00 for initialization and Cn02 for data output.

Advanced Technicques

The DUMPLING-64 uses RAM locations set aside for its particular slot. The various entry points to corresponding RAM locations are listed below.

Memory Locations:

N = SLOT NUMBER

COLD ENTRY = $CN00

WARM ENTRY WITH FIRMWARE = $CN1D

WARM ENTRY WITHOUT FIRMWARE = $CN02

```
LINE LENGTH = $0478 + $ON
PAGE LENGTH = $04F8 + $ON
TEXT FLAGS = $0578 + $ON
     BIT 0 = ECHO TO SCREEN
     BIT 1 = LINE FEED AFTER (CR)
     BIT 2 = HIGH BIT ENABLE
     BIT 3 = BELL ON
     BIT 4 = EXTENDED TEXT PAGE
CHARACTER CNT = $05F8 + $ON
CURRENT ESC CHR. = $0778 + $ON
LEFT MARGIN = $06F8 + $ON
RIGHT MARGIN = $0678 + $ON
LINE COUNTER = $07F8 + $ON
```

Custom Drivers

Y = $N0 where N = SLOT #

Printer Status = $C081,Y (READ)

BIT 1 = BUSY STATUS = DUMPLING BUSY

OUTPUT LATCH = $C080,Y (WRITE)

EXAMPLE:

```
          PHA               ; SAVE CHARACTER ON STACK
          LDY SLOT#         ; SET Y-REGISTER TO CORRECT SLOT
CHKBSY:   LDA $C081,Y       ; CHECK STATUS FOR READY
          AND #02           ; CHECK BIT 0
          BNE CHKBSY        ; IF BUSY, RECHECK
          PLA               ; GET CHARACTER FROM STACK
          STA $C080,Y       ; LOAD OUTPUT LATCH
          RTS
```

NOTES:

1) When you see (CTRL-I), enter it as explained in the text features section. Control characters do not appear on the screen, so as you enter,

```
10      PRINT "CTRL-D"; "PR#1"
```

the screen will read

```
10      PRINT ""; "PR#1"
```

2) When tabbing past 40 columns, you must set line length greater than 40 with (CTRL-I) nN.

STATIC DISCHARGE

Integrated circuits and, in particular, the memory chips used in the DUMPLING-64 are very susceptible to damage from static discharge. Static discharge is the result of a large build-up of electric potential. When a suitable load is placed near the buildup, the result is a very high voltage spark which can severely damage many electrical components. For example, if you can remember walking across a carpet on a dry day, touching a doorknob and feeling a shock -- that's static discharge.

When performing upgrades, and in the handling of the DUMPLING-64 and the upgrade chips themselves, a couple of precautions will insure that the chips will not be subject to the stress of static discharge:

1) Make sure YOU are discharged. People can build up quite a charge (as in our carpet example). Discharge yourself by touching the chassis of your Apple, a typewriter, anything handy that's grounded.

2) Avoid touching plastics when handling IC's. Vinyl, styrofoam, and other plastics are also carriers of electrostatic buildup.

3) When handling the DUMPLING-64, or other printed circuit cards, handle by the edges of the card only. The edges of the card are non-conductive.

4) Handle IC's, when at all possible, by the ceramic or plastic cases and NOT BY THE PINS THEMSELVES. This is sometimes difficult when actually inserting the chips into their sockets, but by being careful, you can avoid damage.

5) Touch the surface the IC is laying on before picking it up, and touch the surface the IC will be put on before setting it down.

6) When removing or storing chips, place them in the conductive foam supplied in the upgrade kits.

7) When upgrading the DUMPLING-64, either place it on a sheet of conductive foam or on a soft surface with a piece of aluminum foil on top. The foil will eliminate chances of accidental static discharge.

INSERTING CHIPS INTO SOCKETS

When you decide to upgrade your DUMPLING-64 to increase its memory capacity, you will have to handle IC's and to insert them into sockets.

1) Note that the IC's on the DUMPLING-64 have either little "U" shaped notches at one end or dots in one of the corners. The dot indicates that that corner represents Pin #1 of the chip. The "U" shaped notch indicates the end of the chip with Pin #1 on it.

2) Note that the memory chips on the DUMPLING-64 are all positioned in the same way. All of the memory chips have their "U" notches going in the same direction. On some varieties of memory chips, there is an arrow or dot at Pin #1. On others, there is a colored line that extends towards the Pin #1 side of the chip.

3) Also note that around each IC socket, there is a white silkscreened line, and at one end of the chip the proper orientation of the chip is shown.

4) Select the chip you need to insert and, holding it by it's case with PIN #1 properly oriented over the socket it will be plugged into, gently place the chip legs into the socket. You will meet with some resistance -- that is normal. It insures good electrical contact and trouble free operation.

5) Firmly depress the chip into the socket, making sure that ALL OF THE LEGS ON THE IC ARE ACTUALLY GOING INTO THE SOCKET, AND NOT BEING BENT UNDER THE IC OR AROUND THE SOCKET.

IMPORTANT: Make absolutely sure that all chip insertions are done slowly and with care. Because all chips are pre-formed, if you install them according to these guidelines, you should have no problems.

6) After the chip is correctly installed, it will look just like all the others seated in their sockets.

UPGRADING THE DUMPLING-XX

(Before upgrading the DUMPLING-XX, please make sure that you have thoroughly read and understand STATIC, DISCHARGE and CHIP HANDLING).

The DUMPLING-XX comes in 5 configurations:

The DUMPLING-0, the DUMPLING-8, the DUMPLING-16, the DUMPLING-32, and the DUMPLING-64. If you have a DUMPLING-64, there should be no empty sockets on the board, your memory is at full capacity, and you do not need this section. However, if you have any of the other versions, and wish to upgrade the DUMPLING-XX, this section will tell you which sockets to fill for which upgrade.

The memory chip used in upgrading the DUMPLING-64 is a 4164 64X1 DRAM. There are many cross references available, but Microtek recommends that you remain consistent within chip board. If there are OKI chips present, use OKI to fill in the remaining memory. If you are upgrading from a DUMPLING-0 then use the same chips throughout.

The DUMPLING-0 has 8 empty sockets. If you are upgrading it to:

DUMPLING-8	Put chip in U15
DUMPLING-16	Put chips in U14 and U15
DUMPLING-32	Put chips in U6, U7, U14, and U 15
DUMPLING-64	Fill all 8 sockets with chips.

If you have a DUMPLING-16 and wish to upgrade it to:

DUMPLING-32	Put chips into U6 and U7
DUMPLING-64	Put chips in the remaining 6 sockets.

If you have a DUMPLING-32 and wish to upgrade it to a DUMPLING-64, fill the 4 empty sockets with chips.

Recommended memory chips for the DUMPLING-64:

4164's by Micron Technology or Mitsubshi

REMOTE PAUSE

Remote Pause functions like the Pause - Immediate command, except that it is hard switched by contact closure. (See FIG.1) There are a number of different ways that Remote Pause may be hooked up as described at the end of this section.

Remote Pause will find uses in almost every environment when the accoustic interference from the printing function can be disruptive; such as when a phone near the printer is answered. By attaching a pair of wires in the contact closure mode, when the phone is answered, the printer will stop printing. When the phone is hung back up, the printing function will resume automatically. There are endless possibilities for this function, limited only by your imagination.

To hook up Remote Pause:

1) At the top edge of the board near the center, there are two empty device locations labled R9 and CR1. On the back of the board cut the trace connecting the two pads on CR1. Install CR1, a germanium diode and R9, a 10K resistor.

2) A length of two conductor wire, or single conductor shielded cable is required. The length is up to you, but lengths approaching 50 feet or more may require some signal buffering to insure accurate Pause actuation.

3) On the DUMPLING-64, there are two pads marked E6 and E7 at the top edge of the board in the center where the wires must be hooked up. Hook the 'hot' wire to E6 and the 'cold' wire to E7.

4) On the other end of the cable, provide either a switch, a relay, or some form of contact closure to make the DUMPLING-64 actually go into the Pause mode.

5) Test the DUMPLING-64 by spooling data into the memory, and actuating the switch or relay. The printer should stop printing with the switch in one position, and resume printing with the switch in another position.

NOTE:

IF YOU ARE UNSURE OF YOUR SOLDERING ABILITY, OR OF YOUR KNOWLEDGE OF WIRING, PLEASE REFER THE INSTALLATION OF THE REMOTE PAUSE TO YOUR DEALER OR A QUALIFIED TECHNICIAN. ALTHOUGH MISWIRING THE POLARITY OF THE REMOTE PAUSE CANNOT DAMAGE THE DUMPLING-64, POOR SOLDERING AND/OR WIRING CAN! DO NOT OVERESTIMATE YOUR WIRING SKILLS IF YOU ARE A NOVICE TECHNICIAN.

Examples Of Contact Closure

1 - Toggle Switch
2 - Rotary Switch
3 - Mechanical Relays NC/NO SP, DP, etc.
4 - Electro-Magnetic Contacts a la Door Switch, Alarms, etc.
5 - Telephone Receivers
6 - Photo Sensors

For longer lengths of wire, or for hook up into other automatic equipment, a comparator output can be used to pull the NAND gate on the DUMPLING-64 low. As long as the 'hot' wire is pulled low, the Remote Pause will operate correctly.

DO NOT apply any positive voltage greater than 5 volts DC or any negative voltages down the remote pause wires. This can cause severe damage to the DUMPLING-64 and may cause it to fail completely.

ADVANCED TECHNIQUES

DUMPLING-64 01510 FIFO Controller

The heart of the DUMPLING-64 is the 01510 FIFO Controller Chip, IC4, the 40 pin device. Normally the user need not worry about how to access the 01510 chip since the on board firmware does all that. But for some applications you may wish to bypass the firmware and access the 01510 chip directly. So for you, here is how it is accessed.

The 01510 FIFO controller has 4 registers accessible from the interface: 2 input and 2 output. Table 1 illustrates.

ADDRESS	READ	WRITE
CONO	Status 0	Data
CON1	Status 1	Command

Where N in the address is equal to 8 + the slot #, eg. N=9 for slot 1 (address = C090 or C091).

All data to be printed is sent to the 01510 by writing to address CONO. All commands to the 01510 are sent to the 01510 by writing to address CON1. The status 0 register is accessed by reading addres CONO. The status 0 register has this configuration:

STATUS REGISTER 0

BIT	7	6	5	4	3	2	1	0
	SW5	SW4	SW3	SW2	SW1	RAM CONFIGURATION		
	PRINTER CODE							

The printer code is a bit for bit representation of the setting on the printer select switches. See "Switches".

The memory configuration values have the following meanings:

Value	Meaning
0	No RAMS installed, 0K Buffer
1	1 RAM installed, 8K Buffer
2	2 RAMS installed, 16K Buffer
3	4 RAMS installed, 32K Buffer
4	7 RAMS installed, 64K Buffer, No graphics or packing
5	8 RAMS installed, 64K Buffer
7	Buffer disabled; see command #7

The status 1 Register has this configuration:

STATUS REGISTER 1

BIT	7	6	5	4	3	2	1	0
	PAUSE	PACK	RSEL	FIFO FULL	X	FIFO EMPTY	BUSY	X

PAUSE: 1 = 01510 is in a pause mode
0 = 01510 is not pausing

PACK: 1 = Space packing is enabled
0 = Space packing is disabled

RSEL: Reflects the condition of the RSEL pin on the 01510

FIFO FULL: 1 = The Buffer Memory is completely full of data to be printed. 01510 will not accept new data until some or all of the data is removed from the Buffer: eg. when the next character is sent to the printer.
0 = The Buffer is not full and can hold more data.

FIFO EMPTY: 1 = The Buffer Memory holds no data.
0 = The Buffer Memory holds some data.

IBF: 1 = The last character sent to the 01510 (either data or command) has not been processed and the 01510 is not ready to accept another write.
0 = The 01510 is ready to receive data or a command.

COMMANDS

0	Clear Buffer
1	Pause Immediate
2	Pause Delayed
3	Resume
4	Enable Space Compression
5	Disable Space Compression
6	Enable Buffer
7	Disable Buffer
8	Set RSEL Low
9	Set RSEL High

WARRANTY

MICROTEK, INC. warrants the DUMPLING-64 to be free from defects in material and workmanship for a period of TWO (2) YEARS from date of purchase. During the warranty period, MICROTEK will, at its option, repair or replace, at no charge, any defective components, provided that the defective board is returned freight prepaid to MICROTEK, INC., 9514 Chesapeake Dr., San Diego, California 92123. All returned items must be accompanied by an R.A. (Return Authorization) number on the outside of the shipping carton. This number may be obtained by calling MICROTEK's Service Department at (619) 278-0633. Unless the warranty has been registered with MICROTEK, a dated proof of purchase must be included with the defective board. This warranty does not cover damage caused by accident, misuse, misapplication, or unauthorized service or modification.