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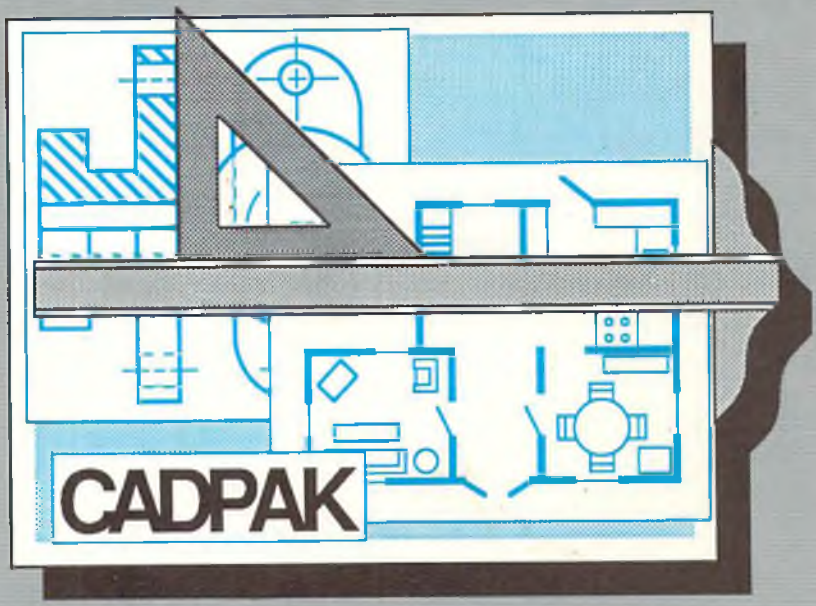
CADPAK-64

FOR THE COMMODORE 64®

ENHANCED VERSION

The full-featured design and drawing program



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CADPAK-64

Computer Aided Design Package with Dimensioning for the C-64 & C-128

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1.0 WHAT IS CADPAK-64?

CADPAK-64 is a program for the Commodore-64 which helps you draw pictures and graphic designs easily and accurately. The pictures have a resolution of 320 points wide by 200 points high. When completed, the pictures are printed using a dot matrix printer in either a small or large size. The pictures may also be saved on diskette for later recall.

Unlike other drawing systems, CADPAK allows you to get an exactly scaled printer output on your dot matrix printer. It also allows you to operate in the units of your drawing problem (feet, miles, etc.) and all dimensions you see during the drawing process are those external dimensions. The scale factor is set up when the screen is initialized. The printer distortion is compensated for so that circles are printed as true circles.

There are three versions of CADPAK 64 included in this package. The first is a light pen version which uses a light pen for selection of functions and options, and uses the light pen in the drawing process. The second version operates without a light pen and uses the cursor control keys on the keyboard to move the drawing cursor on the screen. The third version uses the 1351 Mouse (see Appendic C for mouse instructions). Except for a few minor differences, these three versions are identical. (The light pen or mouse versions are better if your uses for CADPAK consist of a lot of freehand drawing and/or widely spaced points on the screen.)

All of the functions of the CADPAK program are selected from a master menu of functions.

You have two graphic screens to work with. A menu function permits copying areas from one screen to another. Copying may include rotation in 90 degree steps, upsizing in multiples and/or reflection of the image. This allows a final design or picture to be developed by copying sections from one or several other screens. Text in four sizes may be placed anywhere on the picture.

For even greater design capability, CADPAK includes an object management system of 16 x 16 pixel objects, which are designed on the screen. Up to 104 objects are available at a time. Once objects have been

defined, they can be saved onto disk and recalled for CADPAK drawing. When an object is to be displayed on the screen, it may be precisely positioned anywhere on the screen and its SIZE, ROTATION in 90 degree increments, and REFLECTION (mirror image) are easily and precisely controlled. The object editor is also used to develop type faces for special printing applications. The special font may be used for text on a drawing instead of one of the Commodore character sets.

You can use any of seven patterns to fill an area of the picture. A pattern editor is included to allow you to easily design your own 8x8 pixel fill patterns. Other sets of patterns can be created, saved on disk and recalled.

A "TRY AGAIN" function is provided which corrects any mistake. The picture on the screen is restored to the state it was immediately prior to the last main menu function selected.

The SIZE.PRG (located on the reverse side of the diskette) is provided to configure CADPAK to your printer. Please see the section concerning printer setup (Section 5) before running CADPAK

2.0 WHAT'S INCLUDED IN THIS PACKAGE

Three versions of CADPAK-64 (Lightpen, 1351 mouse and keyboard versions)

Three tutorials which lead you step by step through many CADPAK capabilities.

A set of objects including electronic and math symbols.

Pictures for the tutorials.

A USA and states outline which you can use for making filled in maps, such as for sales territories.

3 special fonts for lettering - Old English, 3-D and Tech.

A SIZE.PRG (located on the reverse side of the diskette) to configure CADPAK to your printer. Please see the section concerning printer setup (Section 5) before running CADPAK

3.0 HARDWARE REQUIRED

Commodore 64 Computer

1541 Disk Drive or MSD disk drive

OPTIONAL 1351 Commodore mouse

OPTIONAL Good quality light pen (such as Madison Computer McPEN)

OPTIONAL Graphic printers (and interface if needed)

BLACK & WHITE Printers

Epson MX or FX

C. Itoh Prowriter 8510A

Commodore 1525 or MPS 801

Commodore 1526

Star Gemini series

Siemens PT88/89

Okidata Microline

Okimate 10

A special user port interface version of the EPSON printer module is also included allowing connection with only a cable.

COLOR Printers

Okimate 10

C. Itoh Prowriter 8510SC

See APPENDIX B - PRINTERS/INTERFACES for details of interfaces and secondary address options.

4.0 BEFORE GETTING STARTED

Because the three versions are so similar, this manual will use the terms "function selection" and "point setting" instead of detailed instructions about using the light pen or cursor control keys. (Please see Appendix C for 1351 mouse instructions.)

4.1 LIGHT PEN VERSION

In the light pen version, function selection means pointing the light pen at the word describing the function or option you want and pressing the CTRL key (twice to get off the main menu).

Setting a point using the drawing cursor means pointing the light pen at the screen, pressing and holding the CTRL key and moving the light pen to move the cursor to the position you want.

The **ACCUPOINT** feature provides precise positioning and is activated when you release the CTRL key. This is indicated by a light blue border on the screen. You can move the cursor one position in any direction by putting the light pen on one of the four borders and pressing the CTRL key. When you have finished moving the cursor to the position you want, put the light pen back on the main screen area (not the borders) and press the CTRL key. At this point the drawing cursor has been set on the point that you want to indicate to the computer.

4.2 KEYBOARD VERSION

In the keyboard version, function selection means keying the first two letters of the function name on the main menu or the first letter of the option you want on the option menu.

Setting a point means pressing the CTRL key to establish the drawing cursor in the center of the screen and using the cursor control key (with and without shift) to move the drawing cursor to the position you want. The drawing cursor moves in steps of 8 pixels at a time for speed.

The **ACCUPOINT** feature provides precise positioning. The Accupoint feature is activated by pressing the <RETURN> key after the drawing cursor has been moved with the cursor keys. The border turns light blue, and from that point onward the cursor keys are used to move the drawing cursor one pixel in any direction. When it is properly positioned, press the <RETURN> key again to lock it in place.

4.3 LIGHT PEN OPERATION

The light pen can sense its position only if the area of the tv or monitor screen is lighted. Therefore the normal drawing mode uses a white screen with black color for the lines. The screen border is light green so the light pen can properly sense when it is on the border. Some light pens may react differently to different colors (most light pens don't see red very well). A screen reverse function is provided to change colors on the entire screen. This allows generating a very dark picture by doing it with black lines on a white screen and then reversing the colors in the whole picture.

Light pen triggering is through the tip switch (if the light pen includes one) or by pressing the CTRL key. Throughout this manual we will call this "pressing the CTRL key". We will also refer to a press and release of the light pen tip switch or the CTRL key as "cycling the light pen".

4.4 SCREENS

At all times there is the BASIC screen (used for menus and keyed input) and one of the two graphic screens available. Press the F5 key to see the BASIC screen or the F7 key to switch to the graphic screen. Switching between these screens is automatically controlled by CADPAK, so you shouldn't have to use these keys except to "peek" at the graphic screen during menu selection. Cycling the light pen on the right border of the screen will also switch between the BASIC and graphic screens.

4.5 RESTART

The STOP key is disconnected to prevent accidental stopping of the program (since the STOP key is so near the CTRL key). If the program stops due to an error, type GOTO 999.

4.6 COLORS

The graphic screens are set up in '64 high-resolution mode which normally implies only two colors (black and white). However, ANY color can be used to draw on the screen. The only restriction is that only one drawing color can be used in each 8x8 pixel cell on the screen. If a second color is used in cell, all the points in the cell will show in the last drawing color. As long as there is an adequate amount of space between different color cells, many colors can be used on a screen. The table of colors and color numbers is included as APPENDIX A. Note that the first 8 colors correspond to the numbers on the keys.

4.7 DRAWING MODES

There are three modes for the drawing functions. The normal mode is WRITE which puts lines onto the screen. You may select ERASE mode which erases the points displayed, or RVS mode which switches each point. This shows the new drawing line by reversing the point were it is written over the original drawing. It is used when you want to see a line whether it goes over black or white areas. The default mode is WRITE.

4.8 POSITION

There are various ways you can position lines, boxes, etc, on the screen.

First, you select the function you want from the main menu, and select options under that function. After all the options have been selected, you will then have to move the drawing cursor on the screen to set the first point.

MOVE DRAWING CURSOR

In the light pen version, this is accomplished by pressing the light pen to the screen and pressing the CTRL key and holding it down. You may move the light pen anywhere on the screen and the cursor will follow the tip of the light pen until you release the CTRL key.

In the keyboard version, you must press the CTRL key to indicate to CADPAK 64 that you want to show the drawing cursor and move it (instead of the other point setting options below). When you release the CTRL key, the drawing cursor will appear in the center of the screen or on top of the last point you set. Use the cursor control keys (lower right corner of the keyboard) to move the cursor either down or to the right of its present position. Press and hold the SHIFT key, and use those cursor control keys to move the drawing cursor up or to the left of its present position. The cursor will move in steps of 8 pixels at a time to allow you to get to any area pretty quickly. When you are as close as you can get to the point you want, press the <RETURN> key.

The drawing cursor will probably not be exactly where you want it to be either because of the light pen accuracy or because the cursor keys move in 8 point steps. Hence, the Accupoint feature is automatically activated. The border of the screen will turn cyan (light blue). During Accupoint, the position of the cursor in your external dimensions is shown on the BASIC screen (press the F5 key). For a second point in a function (such at the second corner of a box), the change in x and y (DX, DY) is also shown, along with the straight-line distance (DIST) to the last point.

In the light pen version, to move the cursor up by one pixel, touch the light pen to the top border (cyan area) and press the tip or CTRL. To move the cursor one pixel to the sides or the bottom, do the same with the corresponding cyan border area. This step may be repeated as many times as necessary to precisely position the cursor. To exit Accupoint, put the light pen anywhere on the main screen area (NOT the cyan borders) and press the tip or CTRL key.

In the keyboard version, use the cursor keys to move the cursor as before, only now the cursor moves in 1 point steps. Press <RETURN> when it is where you want it. The border will change back to its normal color and the function will proceed.

The ZOOM and COPY BLOCK functions operate on groups of 64 pixels at a time (8x8 cells). With these functions, Accupoint moves the cursor 8 pixels at a time. Accupoint does not operate with the DRAW or RUBOUT functions.

KEY IN COORDINATES

You can specify a point by keying its coordinates in. Press the Commodore key (C=). This shows your dimensions, the x and y positions of the last point you entered, and asks you if the values to be keyed in are either absolute (A) or relative (R) to the last point. (A third option (L) is included which takes you back to lightpen input in case you press the C= key in error).

If you press A for absolute positioning, you are then asked to input the x and y coordinates of the point. Simply key these in as two numbers with a comma separating them in your external dimensions.

If you select the relative option (R), you are asked to key in the x and y change you want to make from the last point. Simply key in the values and press <RETURN>. The graphic screen is shown and the cursor is positioned at the point you specified.

DIVIDE MODE

The third option for point specification is the divide mode. This allows you to specify a point any fraction of the distance between two other points. The most frequent use is to put a point halfway between two other points. To use this, you do the following:

Press the left-arrow (<-) key. The border of the screen will turn purple to indicate that the divide mode is in effect. Now specify the first of the pair of points by using either the drawing cursor, or the Commodore key and the keyboard.

After you have set the first point, the screen border turns purple again, and now set the second point.

After the second point has been specified, you will see the X and Y coordinates of the first and second point to be used in the division. Then CADPAK prompts you with the word RATIO and shows (1/2 = 1,2). This means you are to enter the fraction but instead of using the normal /, put a comma between the numerator and denominator.

The system will compute the position of the new point using the fraction of the distance you specified, display its value and then move the cursor to the point on the screen. If you just press <RETURN>, the default ratio will be 1/2 of the distance.

To help you know that CADPAK is expecting light pen or drawing cursor input, the '64 will make a tone.

If you want to turn all sound off (or back on again), go to the UTILITIES function and select SOUND.

4.9 DISK FILES

In order to separate the different types of files on disk (pictures, objects, and patterns), each has been designated with a unique prefix in the file name. All picture files are saved with a "P." as the first two letters, all object files are saved on disk with "O." as the first two letters, and all patterns are saved on disk with "Z." as the first two letters. These prefixes are automatically added to your filename if not already there whenever you READ or WRITE on disk.

4.10 DIRECTORY DISPLAY

A special directory display feature is included in CADPAK. This allows easy selection of a file to be used in a subsequent READ or SAVE command. When you select the DIRECTORY option at various places in the system, the size, and name of all files on disk OF THAT TYPE are shown, following an entry number along the left side of the screen. You may temporarily stop the display by pressing the space bar. Press the F5 key to resume the display. Key the entry number of the file you wish to select and press <RETURN> or key 0 (zero) to re-display the entire list. If you select a number larger than the largest shown, you will be returned to the CADPAK menu without selecting a file. The filename of the entry you selected is automatically available to the next READ or SAVE operation (including prefix). To see all entries on disk there is a ALL-DIRECTORY option in the DISK/SAVE/RESTORE function.

4.11 DISK DRIVE NUMBER

The normal (default) disk device is 8. To use another drive for objects, pictures, etc. go to the DISK/SAVE/RESTORE menu option and select the UNIT CHANGE option. The CADPAK diskette must be in device 8 when using the pattern editor. There is a reminder message when loading the pattern editor in case other diskettes are inserted into device 8.

4.12 FUNCTION KEYS

In addition to the F5 (BASIC screen) and F7 (graphic screen), function keys are used for:

F1 Press this key to indicate end of text input (TEXT function). Press this key to return to main menu in the keyboard version.

F2 (press and hold SHIFT and F1) - Light pen recalibrate. Use this at any time if you can't use the light pen to select the the LP ADJ menu option. The current graphic screen will be preserved.

F3 Change cursor priority. Normally the many cursors on the screen are displayed IN FRONT of the drawing lines. Pressing F3 temporarily puts the cursors BEHIND the lines. Pressing it again will move them in front again. For a permanent change, go to the UTILITIES function, TARGET and the CURSOR PRIORITY option.

F4 (press and hold SHIFT and F3) - TRY AGAIN! This key will erase the results of the last function and allow you to continue without having to go back to the main menu.

5.0 CADPAK SETUP (PRINTER DIMENSIONS)

While there are many programs which let you draw on the Commodore screen and make a printout of your drawing, CADPAK is the first program to allow precise **dimensioning** of the printouts. In addition, scale conversions are performed automatically so you can draw and specify things in real world dimensions and CADPAK converts these automatically to a properly scaled printout.

The maximum size and exact proportions of the printout will depend on your printer which is why a **sizing program** is included. The process takes only a few minutes and prepares both a small and a large size printout on your printer. You must measure the dimensions and then key them into the Commodore. CADPAK saves these on disk and reads them automatically whenever you run the CADPAK program. You will also notice that the ratios of the width to the height of the two sizes of printouts are different. Again, these are different depending on the printer. Whenever you start a drawing you must select either a small or large size printout. The dimensions you keyed in the sizing step are used by CADPAK in the scaling calculations. They are also used in modifying the circle so that it will be a true circle on the printout (even though it may be oval-shaped on the screen.) The only limitation of this method is that the dimensions will be correct only for the printout in the size you selected. You can print out your drawing in either size, but only the size you selected when you started the drawing will be correct. As a reminder, the size selection you made at the start of the drawing is indicated on the printout function option screen.

You may save a drawing to disk and bring it back again. The scaling will not be correct unless you clear the screen before recalling the drawing with the same printout size and dimension scaling as you had when you saved the picture.

It is probably easiest to understand with an example. Suppose you wanted to lay out a room which was 12 feet by 16 feet in size. You probably want a large size final printout, so select the large size when the screen is cleared. The default paper size will show: the width as 8.875 inches and the height as 6.6 inches (inside an 8 1/2 x 11 sheet of paper turned sideways). These are dimensions from an Epson FX-80 in the sizing step. Next, you enter the external dimensions as "feet". The next question is the number of feet per

inch to the drawing. Since our room is 16 feet long, and we want to fit it in inside an 8 3/4 inch paper, select 2 feet per inch. The next step is to go into CADPAK and draw the box to define the room. All that is necessary to do this is to select the box function. Press the C= key to allow you to key co-coordinates and then one corner will be at the coordinates 0,0 (feet) and the other corner will be at coordinates 16,12 (feet). The box will be drawn on the screen. From this point on the computer will automatically show you where you are in feet from the origin (lower left corner) whenever you move the lightpen on the screen. You can measure straight line distances in feet on the screen (even at angles) by using the MEASURE function. You can key in the positions of things, such as a table, and specify one corner of the table in feet from the walls and then specify the other corner of the table using relative foot measurements from the first point. You must use decimals, even with feet and inches.

Another place the dimensioning is incorporated is in the drawing cursors. Normally when you move the cursor on the screen a blue target is shown. There are four gray cursors located above and to the sides of the blue target. The distance between these gray cursors and the blue cursor is automatically set at either 1 inch or 1 centimeter on the paper. This can be changed by going to the cursor positioning screen (UTILITIES function). If you do so in the example above it will show the current cursor spacing at two feet because 2 feet is one printout inch. You can decrease this or increase this (in quarters of a foot) to provide a handy relative measurement around the cursor at all times on the screen.

5.1 SETTING THE DIMENSIONS FOR YOUR PRINTER

In order to adapt CADPAK exactly for your printer, you must run the following program steps. If you want to bypass this temporarily to run the demonstration you may. The distribution diskette has been set up for an Epson FX80 printer using inches as the dimensions.

The steps to adapt this to your printer are as follows:

1) Reset your Commodore 64 by turning the power off and then on again or type "SYS 64738".

2) Make sure your printer is attached to the system, turned on and READY. Insert the CADPAK distribution diskette UPSIDE DOWN into the disk drive. The "SIZE.PRG" is located on the reverse side of the distribution diskette.

3) Type LOAD"SIZE.PRG",8. This will load in the sizing program.

4) When the computer prompts READY, type RUN.

5) The SIZE.PRG is continually updated to include new printers, please follow the instructions displayed on the screen.

6.0 LOADING CADPAK-64

1) If you are using the lightpen, plug it into joystick port 1 on the right side of the '64.

2) Make sure your printer is connected to the '64, turned on and READY.

3) Reset the '64 by turning the power off and then on again or type "SYS 64738". The system will not load if the DOS wedge is active in the '64.

4) Insert the distribution diskette into the disk drive (#8).

5) For the light pen version, type LOAD "LP*",8 and press <RETURN>, or LOAD "LPCADPAK-64",8.

6) For the keyboard version, type LOAD "KB*",8 and press <RETURN>, or LOAD "KBCADPAK-64",8.

7) For the 1351 mouse version, type LOAD "MO*",8 and press <RETURN>, or LOAD "MOUSECADPAK-64",8.

8) When "READY." shows, type RUN and press <RETURN>. The Copyright will appear.

9) You are next asked for the printer type. Key the number which corresponds to your printer type and press <RETURN>. If you don't have a printer, select any of the numbers. The disk drive will run for about 65 seconds.

10) In the light pen version, the screen will turn white with two black squares in the center for light pen alignment. Place the light pen directly between the squares and press it (if it has a tip switch) or press the CTRL key. The light pen cursor consisting of a center target and 4 surrounding targets will appear and move toward the squares in the center as alignment takes place. Hold the light pen in that position until the screen changes. Then release the pen (or key).

11) The next prompt asks for the size of printout you wish to set up. Press either the S or L keys.

12) The next prompt asks you for the paper size in the dimensions you specified in the sizing program. The default sizes (measurements a and b you keyed in) are shown for the size you selected. If you wish to select these (the maximum size) simply press <RETURN> for the width and height prompts. If you want a smaller, specific size printout, key the height, press <RETURN> and key the width and press <RETURN>.

13) The graphics screen will be cleared and a black border will be shown around the screen in the size you specified.

14) The next prompt asks for the external dimensions you want to use. If you press <RETURN> (the default) it will be the same as the paper size dimensions. Here you may specify feet, miles, etc. Key the name. The next prompt asks how many of these per (inch or centimeter) on the paper. The default is one. Key the number and press <RETURN> or only press <RETURN> to accept the default (1). The main menu will appear.

7.0 CADPAK-64 MAIN MENU

The main menu lists 22 functions which can be selected.

In each of these functions, you can return to the main menu from any selection by moving the light pen to the right border of the screen and pressing the CTRL key or press F1 in the keyboard version.

The main menu also shows the screen number of the screen being displayed (SCREEN 1), the current drawing color number (COLOR 1) and the mode setting (WRITE, ERASE or RVS).

A reminder is shown at the bottom of the menu that you can input with the C= (Commodore key) or the <- key for divide. Also the name of the file in screen 2 is shown or the word "GRAPHIC" if you are using it as a second graphic screen (it's blank to start).

Again, function selection means:

(Lightpen version) - pointing the lightpen at the word describing the function or option you want and pressing the CTRL key twice.

(Keyboard version) - keying the first two letters of the function name on the main menu or the first letter of the option you want on the option menu.

For many functions, one or more option menus will appear before the function is executed. You select these in the same way, by cycling the light pen over your choice or by keying the FIRST LETTER in the keyboard version.

7.1 DRAW

FUNCTION - This function provides free-hand drawing of lines on the screen as long as the light pen is depressed. Although the drawing usually appears as a series of points, the points are actually connected by short lines so the FILL function will work properly.

LIGHT PEN OPERATION - Put light pen on screen at start point and press CTRL. Move light pen to end of line and release CTRL. The smoothness of the lines will depend on the precision of your light pen and how fast you move it. It can be improved by increasing the value of the smoothing control in the UTILITIES function, drawing cursor option and/or moving your hand slower.

KEYBOARD OPERATION - The keyboard version of the DRAW function is slightly different. The first step is to set the first point in the normal way (use the cursor control keys to move to the general area, press <RETURN>, and then use the cursor control keys to move to the specific starting point of the line you want to draw, then press <RETURN>. This sets the first point of the line.

Next, use the cursor control keys to move the drawing cursor one pixel at a time in any direction. When you get to the end of the first line segment, press the <RETURN> key to draw the line from the first point you set to this current point. Then use the cursor controls keys to move the cursor some more, press <RETURN> to draw the line, and so on. When you have drawn the last segment, press the F1 key to return to the main menu.

Although this is slightly more time-consuming than free hand drawing using the light pen, the results can be similar. The curve you are drawing will be connected so it can be filled without bleeding out of the area. If you need to go large distances for each segment, use the JOINTED option of the LINE function.

7.2 LINE

FUNCTION - This function draws lines by defining the endpoints.

OPTIONS - (TWO)

LINE TYPE

You can draw either a **SOLID** line or a **DASHED** line.

LINE SLOPE

JOINTED - This lets you draw a series of connected straight lines.

ANY - Lets you draw a line at any slope on the screen.

HORIZONTAL - This allows you to draw only horizontal lines.

VERTICAL - This forces the line to be vertical.

PARALLEL TO LAST - This constrains the line you are drawing to be parallel to the last line you drew.

RIGHT ANGLE - This draws a line at a right angle (perpendicular) to the last line drawn. (The angle on the screen may look odd because of the printer compensation, but it will be correct on the printout.)

OPERATION - The graphic screen is shown.

Set the first point of the line.

Set the point for the other end of the line.

The line will be drawn.

In the jointed option, the beginning of the second line will automatically be the end of the first. For all others, you must specify both ends of the next line. To go back to main menu, cycle the light pen on the right border or press F1.

7.3 RAYS

FUNCTION - This draws a series of straight lines from a starting point.

OPERATION - Set the first point (start point, common for all lines).

Set end point of first line.

The line will be drawn.

Set end point of second line or return to main menu.

7.4 BOX

FUNCTION - This function draws rectangular boxes on the screen.

OPERATION - Set point for one corner.

The other corners of the tentative box are shown by 3 red targets and moved by the drawing cursor.

Set point for opposite diagonal corner.

The box is drawn.

Set point for first corner of next box or return to main menu.

7.5 CIRCLE

FUNCTION - The circle function draws one or more circles with the same center. It is purposely distorted on the tv screen so the printout will be a true circle.

OPERATION - Set point for center of circle.

The left, top and bottom points of tentative circles of a radius equal to the distance of the drawing cursor from the center are shown.

Set radius by setting point at the 3 o'clock position.

The circle will be drawn.

Set point for second radius or return to main menu.

7.6 ELLIPSE(OVAL)

FUNCTION - An ellipse requires three points to specify it. The ellipse can be at any angle and any shape. Because of the large number of calculations involved after the second point is set, cursor positioning is slower than other functions.

OPERATION - Ellipses are specified as follows:

Set the point which is the end of the long dimension of the ellipse, (either end).

Set the point which is one side (short dimension) of the ellipse.

Set the center of the ellipse. As you position the center, cursors will mark the first two points and the other end of the long dimension of the ellipse.

The ellipse will be drawn.

Go back to main menu or step 1 above.

7.7 FILL

FUNCTION: - The fill function fills in an area, either in a solid color or a pattern from a set of pre-developed patterns on the screen or disk.

OPTIONS:

SOLID - fills in the area with the current drawing color.

Set a point inside the area to be filled.

The area will be filled with the proper color.

PATTERN - fills in the area with a selected pattern.

For the pattern option, another menu is shown. Select the USE option to use one of the patterns in memory. The other options are described after the operations.

OPERATION - Light Pen - The current set of seven patterns is shown on the right edge of the graphic screen. Select the one you want. Put the light pen over the desired one and cycle it. The patterns will be removed.

OPERATION - Keyboard - Use the cursor down and up key to move the marker up or down to the one you want. Press <RETURN> and the patterns will be removed.

The graphic screen is displayed. Set a drawing cursor at a point INSIDE the area to be filled.

If for some reason, you missed an enclosed area and the fill bleeds out to the whole screen or starts to fill an area you don't want, press the SPACE BAR to stop the fill operation. Then you can undo the bad filling by pressing the F4 key (SHIFT and F3). The graphic screen will be restored to the picture as it was prior to the fill function.

With patterns, the area will first be filled with solid color, then the pattern will be copied into the area.

OTHER PATTERN OPTIONS:

READ

The filename from the last disk or DIRECTORY command is shown. Press <RETURN> to read that file or key in another pattern file name and press <RETURN>. You will be returned to the main menu. Now select the fill pattern option and a new pattern will be shown.

DIRECTORY

The size, name and type of all pattern files on disk are shown, following an entry number along the left side of the screen. You may temporarily stop the display by pressing the space bar. Press the F5 key to resume the display. Key the entry

number of the file you wish to select and press <RETURN> or key 0 (zero) to re-display the entire list. If you key a number higher than the highest on the list, you will be returned to the options menu.

EDITOR

The current screen will be saved, and if the CADPAK disk is not in drive 8, the message "CADPAK DISK INTO DEV 8 - ANY KEY" will appear. Insert the disk and press any key. The pattern editor program will be read in from device 8. See the PATTERN EDITOR section for details on creating your own fill patterns.

7.8 TEXT

FUNCTION - This function permits writing text or graphics character strings on the screen in various sizes using either the standard Commodore characters or a special font. For a special font, it must be loaded into screen 2 BEFORE this can be used.

OPTIONS - Character Set

1. UC/(symbols) = Uppercase & Graphics
2. RV UC/(symbols) = Reversed Uppercase & Graphics
3. UC/LC = Upper & Lower Case
4. RV UC/LC = Reversed Upper & Lower Case
5. SPECIAL FONT

SIZE OPTION - [except special font]

Normal

Height x 2 - Double height

Width x 2 - Double width

Large - Double height and width

OPERATION - Commodore fonts

Set point at upper left corner of the first character.

Type text. Use the <RETURN> key to go to a new line. Press the F1 key to exit back to the main menu. The DELETE key erases incorrect letters within a line. The two cursor control keys (CRSR) and with SHIFT on the keyboard will move the letter placement cursors around in one pixel increments. This is useful for super and subscripts.

Press F1 to exit and return to main menu.

OPERATION - Special fonts

If you have not loaded any thing into screen 2, the message "LOAD OBJ/FONT" will appear. Press any key and then use OBJECT/FONT MGR. option to load it.

Set point at lower left corner of 1st character.

Four size cursors will show minimum size.

Set point at upper right corner of first character to set size.

Type text. Use the <RETURN> key to go to a new line. Press HOME key to exit back to the main menu. The DELETE key erases only the last letter. The two cursor control keys [CRSR] and with SHIFT on the keyboard

will move the letter placement cursors around in one pixel increments. This is useful for super and subscripts.

7.9 ZOOM

FUNCTION - This function lets you "zoom in" on an area of the screen and see/change individual pixels. This permits fine adjustment of pictures, beyond the resolution of the light pen and tv systems.

OPERATION - Put drawing cursor at lower right corner of area to be zoomed. Four cursors outline the area.

When the point is set, the expanded area is shown. Use light pen to point to pixel to change (light pen version) or use cursor keys to move white pixel (keyboard version).

Edit the pixels by:

<- (left arrow)-force pixel OFF

C= (Commodore key) force pixel ON

CTRL key =flip pixel.

Move light pen or white dot to border to scroll.

Put light pen over EXIT word and cycle to exit, or press F1 in keyboard version.

7.10 USE OBJECTS

FUNCTION - This copies objects from the object workarea on screen 2 to your drawing.

OPTIONS:- See FIGURE A for comparison of the results of different options.

NORMAL - This copies an object in normal form to screen (you can control the size).

MIRROR - This copies an object with mirror reflection.

TURN - This copies an object with rotation.

OPERATION - You must create or load a set of objects. [Use the OBJECT/FONT MGR function]. Choose normal, mirror, or turn option.[This determines what happens when you move the light pen for the second point below, or to the left of the first point.]

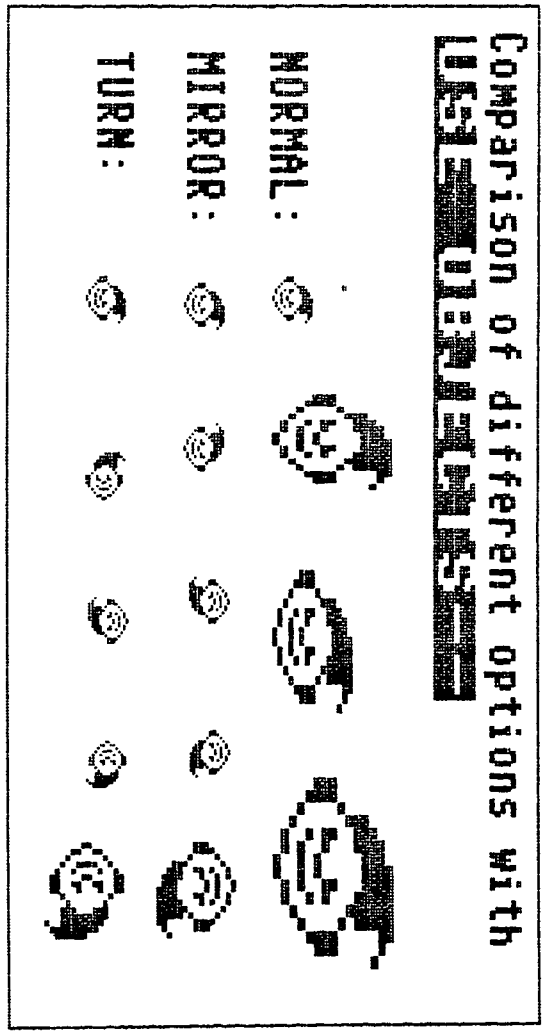
The set of objects on screen 2 is shown and you use the light pen or cursor keys to move the target over the one you want. You are automatically returned to screen 1.

Set a point where you want the LOWER LEFT corner of the object to go.

Set a point where you want the upper right corner of the original object to be. This also sets the sizing in increments of 16 pixels in the x, y, or both directions. The object is copied to the screen.

Another copy of the same object may be made without having to re-select it by simply setting the point for the lower left corner of the next copy.

FIGURE A



7.11 RUBOUT

FUNCTION - This function works like an eraser on a pencil. When pressed, the light pen erases 8x8 areas.

OPERATION - LIGHT PEN - Put the light pen where you want to erase and press CTRL.

Use the right border and cycle the light pen to return to the main menu.

OPERATION - KEYBOARD - Move cursor to first position to be erased. (Will erase upper right cell from drawing cursor).

Press <RETURN> to erase the point.

Move cursor to next point and press <RETURN>.

Press F1 to return to main menu.

7.12 POINTS

FUNCTION - You can place single dots or a spray of dots on the screen using this function.

OPTIONS:

SINGLE POINT - This option places a single dot on the screen.

OPERATION - Set point

Point is drawn

Set next point or go to main menu

SPRAY - (Light Pen Only) - This is like the DRAW function only it sprays a series of single dots as long as the CTRL key is held down.

OPERATION - Put the lightpen on the screen where you want to start.

Press the CTRL key to start spray.

Move lightpen to direct spray of points.

Release CTRL key to stop.

Place pen on right border to return to main menu.

7.13 ARC

FUNCTION - This allows you to draw a smooth curve between two points. The curve is actually a segment of an ellipse, and one end of the major axis (long axis) touches one of the two points.

OPERATION - Set the one end point of the arc.

Set the point at the other end of the arc.

Specify the center of the ellipse you wish. NOTE: The closer you move the center to the line between the two ends, the flatter the curve between the ends will be. The closer the center is to one of the end points, the smoother will be the curvature around that end point.

After the third point has been set, the arc will be drawn.

7.14 MEASURE

FUNCTION - This function operates just like a box, the only difference is that after the second point has been specified, the graphic screen is not changed, but instead the distances are shown on the BASIC screen. This is used primarily to measure straight line distances between points on the screen. It is useful because the distance is computed in your external dimensions.

OPERATION - Set point at one end of the distance to be measured.

The other corners of a box are shown by 3 red targets and moved by the drawing cursor.

Set point for the other end of the distance to be measured..

The coordinates of the second point are shown along with the x distance (DX) the y distance (DY) and the straight line distance between the points.

Set point for the 1st point of the next distance or return to main menu.

7.15 CLEAR

FUNCTION - This function clears the current display screen and sets up the screen colors and screen dimensions for drawing.

OPTIONS:

1) YES - Continue to clear the screen and erase anything on it.

2) NO - Returns you to the main menu.

OPERATION - Light Pen - You must choose the writing color. Note that there are 16 color choices (the cyan box is there but doesn't show against the background. Put the light pen under the box for the color desired (on the row with PEN- > and trigger it. A block of the selected color and the color number (see keys and table) are shown around the PEN ->. Cycle the pen at the right border if you don't want to change the color shown.

Select the background (screen) color the same way.

You must specify the printout size, width, height and dimensions, as when you startup the system.

OPERATION - Keyboard - The 16 color choices are shown. Key the color number of the drawing color and press <RETURN>.

Key the color number of the background color and press <RETURN>.

Specify the printout size, width, height, and dimensions as when you start up the system.

7.16 TRY AGAIN!

FUNCTION - This function fixes all your mistakes and problems with the most recently executed function. It "erases" the results of the last graphic function (all steps since last main menu).

OPERATION - The graphic screen is restored.

7.17 UTILITIES

FUNCTION - These utilities help you manage the light pen, drawing cursors, drawing colors, etc.

OPTIONS:

COLOR/MODE

This option allows you to select the color and mode to be used for drawing.

OPERATION - LIGHT PEN : Note that there are 16 color choices (the cyan box is there but doesn't show against the background. Put the light pen under the box for the color desired (under the row with PEN- > and trigger it. A block of the selected color and the color number (see keys and table) are shown around the PEN - >. Cycle the pen on the right border if you don't want to change the color shown. When you return to the main menu, the color number is shown next to COLOR in the upper right corner.

The mode select function allows you to select the mode for the plotting functions (BOX, LINE, CIRCLE, etc). The normal mode is WRITE which moves the points to the screen. You may select ERASE mode which erases the points displayed, or RVS mode which switches each point (exclusive-or). The default mode is WRITE. Place the light pen over the mode you want and cycle it. Note that the mode is shown on the main menu in the upper right corner.

OPERATION - Keyboard : Another list of options is shown:

CHANGE COLOR- Selects drawing color like screen clear

WRITE - Select write mode

ERASE - Select erase mode

RVS - Select RVS mode

DRAWING CURSOR

OPTIONS - This option lets you control the drawing cursor.

CALIBRATE [Light Pen only] - This option goes through the same calibration process as at program startup. Before doing the alignment, the current graphic screen is saved.

(CURSOR) SPACING

FUNCTION - This option lets you adjust the spacing of the four gray cursors used with the light pen on the screen. The initial spacing is the external dimension for 1 inch or 1 CM on the printout.

For example, if you want a number of lines spaced 2 feet apart, set this spacing for that amount. Then use the side cursors to position the pen cursor that far away from the last.

OPERATION-LIGHTPEN - The dimensions are shown at the top of the screen.

Place the lightpen over the + or - to increase of decrease the spacing.

Place lightpen on right border to return to main menu.

OPERATION-KEYBOARD - The dimensions are shown at the top of the screen.

Press the I or D key to increase of decrease the spacing.

Press F1 to return to main menu.

(CURSOR) PRIORITY

FUNCTION - Normally the many cursors on the screen are displayed IN FRONT of the lines. This function permanently puts the cursors BEHIND the lines. Pressing it again will move them in front again. For a temporary change, press the F3 key.

SMOOTHING [Light Pen Only]

This option lets you control the light pen responsiveness. Because light pens have some "jitter", especially in the horizontal direction, CADPAK-64 reads the light pen twice every time and compares the second reading to the first and selects the x and y values closest to the last ones used. Even with this double reading, some light pens give erratic readings. The smoothing function lets you force the system to take additional pairs of readings and average the results. Of course, additional readings will slow down the response of the system. The current setting (1 at first) is shown in the middle of the screen. Put the light pen over the word and trigger it.

REVERSE SCRN (SCREEN)

FUNCTION - This function allows you to reverse the colors on the screen. It switches the

background and foreground colors in each screen cell.

SOUND

FUNCTION - This option toggles the sound on and off.

7.18 COPY [AREA]

FUNCTION - This function lets you take a rectangular area of one screen and copy it to another area on the same screen or the other graphic screen.

The copy function operates in one of two modes. The first mode is the block mode. It operates using 8x8 cells of the screen and allows you to copy a section of the screen, including color, to the same screen or to another screen.

The second mode is point mode. The point mode allows you to copy any rectangular area, and also has the advantage that when you copy it back, you can change its size, turn or mirror image it.

When this function is selected, you must also choose the EXTRACT or COPY IN functions. The EXTRACT is the one which copies the picture area to the save area in the computer. The COPY IN option copies the save area to the screen (you may swap screens in between these steps to copy images from one screen to another).

OPTIONS:

EXTR-BLK [Extract Block]

OPERATION - Set point at one corner of area to be copied.

Set point at opposite diagonal corner.

Area is copied to save area and you are returned to main menu.

NOTE-Due to memory limitation, you cannot copy more than 90% of the screen at a time. If the area you selected exceeds this limit, you will get the message "TOO BIG-any key". Press any key and then define a smaller area. It may be necessary to copy a picture in two parts.

COPY IN-BLK

FUNCTION - This option moves the save area to the current screen.

OPTIONS:

REPLACE - The image is moved into the screen (overlaying anything in the area before).

COMBINE - The image is added to the screen area, adding to the points already turned on, but not deleting any other on-points.

GHOST - This shows the new pattern, as a "ghost" on the old screen. This option can also be used to erase a copy pattern by displaying it a second time (it reverses itself).

MATCH - This option leaves only those points which exactly match in the two images.

MOVE COLOR & IMAGE - This option moves both the image and the associated color to the screen. This would normally be used with the REPLACE option above.

IMAGE ONLY - This option moves the image but not the color information. Therefore the image will take on the colors of the new area. COMBINE, GHOST AND MATCH are normally used with the options above.

OPERATION - Set point at the LOWER RIGHT corner of the area where the saved image is to go.

The image is copied and the cursors will show the other corners where the area will be copied into.

For another copy, repeat above steps or go to mainmenu.

PT EXTR (Point Extract)

FUNCTION - To use this function specify the two corners of the rectangular area to be copied as with the box.

OPERATION - Set point for one corner

Set point at opposite diagonal corner.

The border of the screen turns red to indicate that the computer is copying the pixels to the save area. For large areas it takes some time.

You are returned to main menu.

MIRROR COPY IN-PT &

TURN COPY IN-PT

FUNCTION - These are the two copy back functions for the point mode. The only difference between the two is that the turn option allows the image to be

rotated in 90 degree increments and the mirror option instead makes mirror images in either the horizontal, vertical, or both directions.

OPERATION - Set the point where the LOWER LEFT corner OF THE ORIGINAL IMAGE is to go.

Set point where upper right corner of original should be. If no rotation or reflection is desired, simply move the light pen to the UPPER RIGHT the amount desired to scale the copy back image in its x and y dimensions. NOTE that the scaling is only done in integer multiples of the original size. After the second point is set, the image is copied to the screen. If you want to rotate or reflect the image, move the second point to the left or below the first point and the image will be rotated and sized in the same way.

The image is combined with the screen image.

You can make a second copy by simply positioning the light pen at the lower left of the area where you want the second copy to be.

7.19 DISK/SAVE/RESTORE

FUNCTION - This function selects whether the current screen is to be written to disk, if an image is to be read from disk or if other disk utility functions are to be performed:

OPTIONS:

NEW - This option lets you initialize a disk, WHICH WILL ERASE EVERYTHING ON IT - BE CAREFUL! You will have to key in the disk name (up to 16 characters) and press <RETURN>. Then

you will be asked for a two character identification. Key it and press <RETURN>. There will be some noise from the disk drive. The process will take about 3 minutes.

FILE SCRATCH - This option lets you erase a single file from disk. The filename can be keyed in or selected from a directory function before this option.

VALIDATE - This option performs the disk validate function, checking the disk directory and Block Availability Map. Most important, Validate removes any incompletely written files from the diskette (those with an * in the directory listing).

UNIT CHANGE [DEV] - This option is used to select another disk drive for all disk operations except program loading. Key in the new drive number and press <RETURN>. The default is drive 8.

ALL-DIRECTORY - This shows the complete directory of the disk (all types of files).

CHANGE NAME - This lets you rename a file on disk. The filename from the last disk or directory is shown. The the prompt "NEW=OLD". Key the new filename, then an "=" and then the present name of the file you wish to change.

SAVE - This option saves the current picture screen to disk. The filename of the most recently executed disk command is shown. You must key in a different filename or press <RETURN> to accept the one shown. Note-to replace a picture file on disk, use a SCRATCH, then SAVE.

DIRECTORY - This option displays the directory of all picture files on disk (P.) and makes the selected filename available to the next disk operation.

RESTORE - This option restores a picture from disk to the screen. The filename from the last disk operation (usually DIRECTORY) is shown. Press <RETURN> to use the name shown or key a different name and press <RETURN>.

If any disk drive errors occur, they will be displayed on the screen.

7.20 SWAP [SCREENS]

FUNCTION - This function moves the current screen to its save area in memory (not disk) and moves the other screen to the display.

7.21 OBJECT/FONT MGR

FUNCTION - Objects and Fonts are 16 x 16 pixel images. The second screen area of CADPAK is used to hold and manipulate these objects so they can be copied into screen 1 easily in the TEXT or USE OBJECTS functions. There are a total of 104 objects per screenful. Underneath each object is its key letter designation (this is used when designing fonts).

Manipulation of the two screens is completely automatic. The first step is to read an object file in from disk or create it using this function. Objects are stored in the same format as a picture image, only the file prefix is "O." instead of "P." This object "picture" is read into screen 2. If you happen to be on screen 2 when you select the READ or OBJECT functions, you are reminded of this fact and you have three options:

1) To scratch (ignore) whatever you had on screen 2.

2) To copy whatever you have on screen 2 to screen 1 and continue.

3) To save whatever you have on screen 2 to disk as an object file ("O." prefix).

The object/font image is read into screen 2.

OPTIONS:

READ - This option reads a set of objects from disk.

OPERATION - The filename from the last disk or directory command is shown. Key in another name or press <RETURN> to use the one shown.

DIRECTORY - The filenames of all objects files ("O." prefix) on the disk will be shown.

OPERATION - Select the number corresponding to the set of objects file you want and press <RETURN>.

EDITOR - The objects are created and changed through the object editor. The object editor allows you to completely clear an object screen and/or to select which object you want to change.

OPTIONS:

MODIFY - This option lets you modify one or more objects.

OPERATION -Light Pen - The current set of objects is shown.

Place the lightpen over the one you want to change and cycle the lightpen. The object selected is shown in a zoom format and it is edited using the same control keys (left-arrow for erase, CTRL for flip the point, and Commodore key to force a point on.) When all changes to an object are completed, use the right border of the screen to get back to the complete set of objects and thenanother object may be selected or using the right border of that screen you will return to the object menu.

OPERATION - Keyboard - The current set of objects is shown.

A blue cursor is shown in the middle of the screen. Use the cursor control keys to move it over object you wish to change and press <RETURN>.

The object is shown in ZOOM format with a white dot near center. Use cursor keys to move the white dot around. Use left arrow to force point off, C= to force it on and CTRL to flip point.

Press <RETURN> to select next object.

READ - You will be asked for the filename of the set of objects to read. These will be read into memory and then you will be returned to this object editor menu.

DIRECTORY - The filenames of all objects files ("O." prefix) on the disk will be shown. Select the number corresponding to the set of objects file you want and press <RETURN>.

SAVE - The current set of objects is written to disk under the filename you select.

CLEAR - This option completely resets and clears out the object workarea.

7.22 PRINT

FUNCTION - This function initiates the printing of the current screen.

OPTIONS:

SMALL - This will give printout approx 1/4 of an 8-1/2 x 11 inch sheet.

LARGE - This will print the screen approx full size (8-1/2 x 11 inch sheet).

The size you chose when the screen was cleared is marked by a ">". If you don't select the same size, the dimensions will not be correct.

Ready the printer and select your choice of size. To abort the printout, press the SPACE BAR.

See APPENDIX B - PRINTERS/INTERFACES for secondary addresses, etc. for various printers and interfaces.

8.0 CONFLICTS

The DISK I/O function, the FILL (pattern only), DIRECTORY, COPY, USE OBJECT and SPECIAL FONT functions all share the same workspace. This means that you cannot copy an area out of one screen, load another screen in from disk and still have the copied area available. Likewise a pattern fill will overwrite the COPY AREA function.

9.0 PATTERN EDITOR

At any one time there are 7 patterns which may be selected in the FILL function. The set of patterns may be changed. Each set of patterns is stored as a small program file on disk. The standard pattern set loaded when CADPAK is started has the name "Z.FILL.P". From the pattern option of the FILL function you can select the pattern editor program. This will be loaded from device 8 (the CADPAK disk must be in the drive).

Each pattern is made of an 8x8 set of dots (pixels). Each of the 64 pixels can either be on or off. In order to see how adjacent rows and columns of the same pattern fit together, four patterns are displayed together when you select them during this editing process. Only the lower right pattern is active. The other ones are automatically made to be identical copies of it.

9.1 PATTERN EDITOR MENU:

MODIFY

This option allows you to select one of the seven patterns and edit it using the same kind of technique as with the zoom function, as follows:

The screen is cleared and the seven patterns are shown at the right hand side of the screen. Place the light pen over the pattern you want to change and cycle the light pen, or use the cursor up/down keys to move in the KB version. The pattern will be presented to you in zoom format. Place the light pen over the pixel in the lower right corner that you wish to change and press the CTRL key to flip that pixel (if its on turn it off, if it's off turn it on), press the left-arrow key to turn off the pixel or press the Commodore key to turn the pixel on. Do the same with other pixels in the pattern to achieve the pattern

you wish. When finished, use the right hand border of the screen to get back to the pattern editor menu.

READ

This option allows you to read in a pattern file from diskette. Simply key in the pattern file name.

DIRECTORY

This option lets you display the directory of all pattern files on the diskette drive, and lets you select the one you want for the next READ or SAVE.

SAVE

This option lets you save the pattern file to diskette. Simply key the file name (up to 14 characters) and it will be saved on disk with an automatically added Z. prefix.

CLEAR

This option lets you completely clear out a single pattern so you can create a new one. After the pattern is cleared, proceed to create the new one as with the MODIFY function above.

To return to the CADPAK main program, use:

RIGHT BORDER- Lightpen version

F1 KEY - Keyboard version

The CADPAK program will be read and the screens will be restored.

10.0 CADPAK TUTORIAL-LIGHTPEN VERSION ONLY

The easiest way to learn is by doing. This tutorial will acquaint you with many of the functions of CADPAK.

STARTUP

First, load "LPCADPAK-64" into the computer (See LOADING CADPAK).

Make sure the light pen is plugged into CONTROL PORT 1 (on the right side).

You should see the alignment screen and hear the tone. Place the light pen over the two squares in the center and press it (or the CTRL key if light pen doesn't have switch built in). While you hold the key the five cursors will appear and move toward the two squares in the center. When they are exactly over the center, the screen will change.

The next prompt asks you which size printout you desire, small or large. (You can select the either size at print time but circles may be distorted and the dimensions will be wrong unless it is the same one you select at this prompt.) For this demonstration select S for small. The next prompt shows you the paper size dimensions you selected during the sizing programs (inches or centimeters). It shows the width of the small size you measured. To select that size, simply press <RETURN> to accept the default value shown. If you wish to change it to some other smaller size, key the size here and press <RETURN>. Next, you get a chance to adjust the height. Again, the value you entered in the sizing program is shown. If you wish to change it, key the value, otherwise press <RETURN>. At this point the screen is initialized and a box put around the area of the width and height you just specified.

The next prompt asks you for the external dimensions. The numbers above refer to the paper size and the size the image will be when printed. Now you get a chance to tell the computer the dimensions you want to work in and also give it the scaling factor to use. You can simply default to the same CM or inches size you selected above. Or, for example, you might choose to represent a twenty foot room on a five inch width piece of paper. In this case, your external dimensions would be feet, and so you simply key the word FEET at this prompt and press <RETURN>. The next question is the number per inch. In this example you would key four (feet) per inch. Now everything that you do in this drawing could be based on the foot measurements and not the inches. See the CADPAK SETUP section.

For this example, simply press <RETURN> to accept the default (1 INCH=1 INCH).

LIGHTPEN TESTING

To get a feel of the light pen, put it over the word DRAW on the screen and cycle it. The word DRAW marked with a ">". (If not, try moving the pen slightly up or down. If that doesn't help, try adjusting the sensitivity of the pen or the brightness of the screen.) When the ">" is shown, cycling the pen again at the same word will select the function. If the pen is not at the same place, the main menu will be redisplayed.

DRAW

We want to select the DRAW function, so after the second cycle over the word DRAW, the graphic screen (white with green border) will be displayed. This is what you write on. Put the pen at the screen to write your name. To write, press the switch or CTRL. To skip over an area, release the pen or switch. Write your first name about 1/4 of the size of the screen in the center. This will also show you how stable your light pen is. To make the light pen

less jittery, go to the smoothing adjustment in the UTILITIES function. To get there, put the pen on the right border of the screen and cycle it. The main menu reappears. Place the pen over the UTILITIES words (middle left) and cycle twice. Then put pen over DRAWING CURSOR words and cycle it. Then put the pen over the SMOOTHING word and cycle. The current smoothing value (1) will be shown in the center of the screen. Increase it by placing the pen over the + or lower the value by placing the pen over the - and cycling it. If the line from your pen was jittery, try increasing the value to four. Return to the main menu by placing the pen over the right border and cycling it.

Now view the screen (cycle pen at the right border of main menu or press the F7 key). You should see what you wrote before. Let's erase and try again with new smoothing. Go back to main menu (cycle pen on right border). Select CLEAR option (cycle twice). The color selection screen will be shown. Select the dark blue foreground color by placing the pen under the dark blue block and cycling it. You will see the block next to the word PEN change color. Keep the pen cycled until the block turns blue and the number 7 appears to the left. Then release the pen and the next color to be selected is the background (screen) color. Keep it white. You will have to select size again. Press S and accept all defaults. You will be returned to the main menu. Note that the pen color you selected (COLOR 7) is shown in the upper right corner of the main menu. Select DRAW again and write your name. If you set the weighting factor large (over 8) the pen response will be sluggish, but very precise.

BOX

Go back to the main menu. Select the BOX option to enclose your name. When the screen appears, press the pen to the place where you want one corner to go, say lower left. Press the pen to the screen and the five cursors which were at the alignment screen reappear (You can

adjust the distance them on the LP ADJ function. They can help align points some distance apart quite accurately.) When you release the pen switch the border will turn cyan (light blue). This is the ACCUPOINT function. To see it work, place the pen on the left border (cyan area) and cycle the pen. The cursors all move one pixel to the left. In the same way, you can move it up, down or to the right, point by point. You can see the actual x and y coordinates by pressing the F5 key. When the cursor is exactly where you want it, put the pen on the main screen area and press it. The border will turn green to let you know the ACCUPOINT feature is released.

Now move the pen to the other corner of the box on the screen and a lot of things move too! First the main cursor and the four surrounding ones always follow the light pen. There is a red cursor at the corner of the box you just set. Then there are two other red cursors which show where the other two corners of the box are. They move to show you where the box will be drawn. When you cycle the light pen next, you will be setting the box by fixing its other diagonal corner. Press the switch and ACCUPOINT is activated. Use it to position the corner exactly where you want it. Note that the other two corners move to stay coordinated. When you press the pen on the main screen, you exit ACCUPOINT and the box is drawn.

TRY AGAIN!

To see how the last function can be erased, go to the main menu (right border and cycle). Select the TRY AGAIN! function (cycle 2 times). If you now view the screen you will see it erased the box only, not your name. The TRY AGAIN can also be done while you are drawing on the screen in MOST functions by pressing F4 (SHIFT and F3).

CIRCLE

Let's put a circle around your name instead. Select the CIRCLE function from the main menu. The first point to define is the center. Put the pen in the center of your name and cycle it. ACCUPOINT will be activated, but if you keep the pen on the main screen (not border) and press the pen, you will bypass ACCUPOINT. Now put the pen at the approximate 3 o'clock position on the circle. You will see three red cursors moving to show the 12, 6 and 9 o'clock positions of the circle. When you cycle the pen, ACCUPOINT will be activated and you can precisely set the circle size. When you exit ACCUPOINT, the circle will be drawn. To draw another with the same center, simply put the light pen at the new radius and press it to start the process over. To quit drawing circles, put the pen on the right border and cycle the pen.

LINE

The LINE function operates similar to the BOX in that you must define with the light pen the two points for the two ends of the line. Before you get a chance to specify the end points of a line, you must select the line type (either solid or dashed). You must also select whether a line can have any slope (drawn in any direction on the screen) or if you wish the line to have either horizontal, vertical, or a slope parallel or at right angles to the last line you drew. After you select these options, then use the light pen, cursor, and ACCUPOINT, the same as with the box.

RAYS

The RAYS function operates in a similar fashion. The cursor is shown, then ACCUPOINT, then the line is drawn. Use the right border to exit.

Try LINE, RAYS, and CIRCLES now. Use the TRY AGAIN! function or the F4 key to erase your mistakes. It

restores the screen to the last FUNCTION. If you drew three circles after coming from the main menu, the TRY AGAIN will erase all three. When you have to draw a number of copies of the same shape, go back to the main menu after a few, so they will be saved in case the last one is bad.

CALL UP SAVED PICTURES

Now let's get down to a real drawing. Clear the screen, setting the foreground color to black and the background to white. Load in the starting space shuttle picture. Use the light pen to select DISK/SAVE/RESTORE. Select the DIRECTORY option. The list of all picture filenames on disk will show. Key the number corresponding to "P.START SHUTTLE". You will be returned to the disk option menu. Select the RESTORE option. The filename "P.START SHUTTLE" will appear. Since you want this, press <RETURN>. In about 30 seconds the picture will be loaded. (See it by cycling the pen on the right border of the main menu). Since we will want to add some other drawings to the shuttle picture, we must get them into the computer on the other screen. Do this by SWAP SCREENS (the new one should be blank with a green border). Now go to the DISK/SAVE/RESTORE function, read the DIRECTORY and RESTORE the picture called "P.TUTOR PARTS".

Use the right border to view the images from TUTOR PARTS (a moon and star).

COPY IMAGES

Copy the moon as follows:

Select the COPY function from the main menu and then the EXTR-BLK (extract block) option. Use the light pen just as you did in the box. When the second corner is placed you are returned to the main menu. To try the copy back, select COPY and then COPY IN-BLK option. Select

COMBINE and then IMAGE ONLY. Now the light pen is the BOTTOM RIGHT corner of the image. Move the pen around until its where you want (on a clear area of the TUTOR PARTS image). When cycled, the moon image will be copied. Move the pen to another area on the screen and cycle it to write another copy. Press the F4 to erase these copies, and then cycle the pen on right border to exit. Now SWAP and use the COPY IN-BLK to place the moon on the shuttle picture (upper left corner). SWAP to go back extract the star and then put several stars on the shuttle picture.

OBJECTS

Now add an object:

The Object function is one of the most powerful in CADPAK. In addition to being somewhat like the COPY function where one copy can be copied into another area, it permits sizing and rotations and precise positioning. Each object must be defined as a 16 x 16 pixel image in the OBJECT EDITOR. For now, call up a set of objects from disk as follows. Put the pen over the OBJECT/FONT MGR function and press twice. Then put pen over DIRECTORY and cycle. Key in the number corresponding to "O.TUTOR OBJECTS" and press <RETURN>. The name selected will be shown for you to confirm by pressing <RETURN>. The set of objects will be read in. You will be returned to the main menu. Select the USE OBJECTS function. Select the NORM option. To put one on the screen, place the light pen over the one you want (the satellite in the upper left corner) and press and hold the CTRL key. Release the key. The regular graphic screen will show. Press the light pen to the screen and put the pen where you want the LOWER LEFT corner of the object to go. ACCUPOINT will position it precisely. Then use the light pen to position the upper right corner. Cycle the pen to set the size. The F4 key will correct a mistake and you can draw another copy of the object without going back to the main menu.

FILL

Complete the shuttle picture by using the FILL function filling the lower nose area, the wing, the engines with solid color. Fill the earth with another fill pattern down and put a box around the title. You can fill the whole picture with the first fill pattern.

PRINT

Print the picture out by selecting the PRINT function. Then select either the small or large picture.

11.0 CADPAK TUTORIAL- KEYBOARD VERSION ONLY

The easiest way to learn is by doing. This tutorial will acquaint you with many of the functions of CADPAK.

STARTUP

First, load "KBCADPAK-64" into the computer (See LOADING CADPAK).

The first prompt asks you which size printout you desire, small or large. (You can select the either size at print time but circles may be distorted and the dimensions will be wrong unless it is the same one you select at this prompt.) For this demonstration select S for small. The next prompt shows you the paper size dimensions you selected during the sizing programs (inches or centimeters). It shows the width of the small size you measured. To select that size, simply press <RETURN> to accept the default value shown. If you wish to change it to some other smaller size, key the size here and press <RETURN>. Next, you get a chance to adjust the height. Again, the value you entered in the sizing program is shown. If you wish to change it, key the value, otherwise press <RETURN>. At this point the screen is initialized and a box put around the area of the width and height you just specified.

The next prompt asks you for the external dimensions. The numbers above refer to the paper size and the size the image will be when printed. Now you get a chance to tell the computer the dimensions you want to work in and also give it the scaling factor to use. (You can simply default to the same CM or inches size you selected above. Or, for example, you might choose to represent a twenty foot room on a five inch width piece of paper. In this case, your external dimensions would be feet, and so you simply key the word FEET at this prompt and press <RETURN>. The next question is the number per inch. In this example

you would key four (feet) per inch. Now everything that you do in this drawing could be based on the foot measurements and not the inches. See the CADPAK SETUP section.

For this example, simply press <RETURN> to accept the default (1 INCH=1 INCH).

To get a feel of the way CADPAK works, try something you're familiar with putting text on the screen:

Go to the TEXT function by keying "TE". You should see the menu with the font selections (1= UP/GR, 2=RV UP/GR etc). Press 3 to select the Upper/lower case option.

The next menu shows the size options. Press H to select height x2.

Press the CTRL key. The blue cursor appears near the center of the screen, surrounded by 4 gray ones. Press and hold the SHIFT key and press the left/right cursor control key (lower right of the keyboard) to move all 5 cursors to the left (to about halfway from the left edge).

Press the <RETURN> key and do this again and notice how the cursors move only 1 position at a time. This is ACCUPOINT mode.

Press <RETURN> to set the cursors for text.

Now type your name, using the SHIFT key for capital letters (like a typewriter).

When you have finished, press the F1 key to go back to the main menu.

BOX

Go back to the main menu. Select the BOX option (key BO) to enclose your name. When the screen appears, press CTRL to move the cursor to the place where you want one corner to go, say lower left. The five cursors which were at the alignment screen reappear (You can adjust the distance between them on the DRAWING CURSOR function. They can help align points some distance apart quite accurately.) When you press <RETURN> the border will turn cyan (light blue). This is the ACCUPOINT function. The cursors all move one pixel at a time. You can see the actual x and y coordinates by pressing the F5 key. When the cursor is exactly where you want it, press <RETURN>. The border will turn green to let you know the ACCUPOINT feature is released.

Now press CTRL. It seems nothing changes, (but that's because the cursors are on top of each other). Use the cursor control keys to move the drawing cursor to the other corner of the box on the screen and a lot of things move too! First the main cursor and the four surrounding ones always follow your commands. There is a red cursor at the corner of the box you just set. Then there are two other red cursors which show where the other two corners of the box are. They move to show you where the box will be drawn. When you press <RETURN> next, you will be setting the box by fixing its other diagonal corner. ACCUPOINT is activated. Use it to position the corner exactly where you want it. Note that the other two corners move to stay coordinated. When you press <RETURN> again, you exit ACCUPOINT and the box is drawn.

TRY AGAIN!

To see how the last function can be erased, go to the main menu by pressing F1. Select the TRY AGAIN! function by keying TR. If you now view the screen you will see it erased the box only, not your name. The TRY AGAIN can

also be done while you are drawing on the screen in MOST functions by pressing F4 (SHIFT and F3).

CIRCLE

Let's put a circle around your name instead. Select the CIRCLE function from the main menu by pressing CI. The first point to define is the center. Press CTRL and put the cursor in the center of your name and cycle it (notice how the gray side cursors help center it). ACCUPOINT will be activated, but just press <RETURN>, you will bypass ACCUPOINT. Now press CTRL and put the cursor at the approximate 3 o'clock position on the circle. You will see three red cursors moving to show the 12, 6 and 9 o'clock positions of the circle. When you press <RETURN>, ACCUPOINT will be activated and you can precisely set the circle size. When you exit ACCUPOINT by pressing <RETURN>, the circle will be drawn. To draw another with the same center, simply press CTRL and move the cursor to the new radius. To quit drawing circles, press <RETURN>.

LINE

The LINE function operates similar to the BOX in that you must define with the cursor the two points for the two ends of the line. Press LI and before you get a chance to specify the end points of a line, you must select the line type (either solid or dashed). You must also select whether a line can have any slope (drawn in any direction on the screen) or if you wish the line to have be either horizontal, vertical, or a slope parallel or right angles to the last line you drew. After you select these options, then use the cursor keys and <RETURN> key, and ACCUPOINT, the same as with the box.

RAYS

The RAYS function operates in a similar fashion. The cursor is shown, then ACCUPOINT, then the line is drawn. Use the FI key to exit.

Try LINE, RAYS, and CIRCLES now. Use the TRY AGAIN! function or the F4 key to erase your mistakes. It restores the screen to the last FUNCTION. If you drew three circles after coming from the main menu, the TRY AGAIN will erase all three. When you have to draw a number of copies of the same shape, go back to the main menu after a few, so they will be saved in case the last one is bad.

CALL UP SAVED PICTURES

Now let's get down to a real drawing. Clear the screen, setting the foreground color to black and the background to white. Load in the starting space shuttle picture. Key DI to select DISK/SAVE/RESTORE. Select the DIRECTORY option (D). The list of all picture filenames on disk will show. Key the number corresponding to "P.START SHUTTLE". You will be returned to the disk option menu. Select the RESTORE option. The filename "P.START SHUTTLE" will appear. Since you want this, press <RETURN>. In about 30 seconds the picture will be loaded. (See it by pressing F7). Since we will want to add some other drawings to the shuttle picture, we must get them into the computer on the other screen. Do this by SWAP (key SW) (the new one should be blank with a green border). Now go to the DISK/SAVE/RESTORE function, read the DIRECTORY and RESTORE the picture called "P.TUTOR PARTS".

Use F7 to view the images from TUTOR PARTS a moon and star).

COPY IMAGES

Copy the moon as follows- Select the COPY function from the main menu and then the EXTR-BLK (Extract block) option. Use CTRL, the cursor keys and <RETURN> just as you did in the box. When the second corner is placed you are returned to the main menu. To try the copy back, select COPY and then COPY IN-BLK option. Select COMBINE and then IMAGE ONLY. Now the blue cursor is at the BOTTOM RIGHT corner of the image. Move the cursor around until its where you want (on a clear area of the TUTOR PARTS image). When <RETURN> is pressed, the moon image will be copied. Press CTRL and move the cursor to another area on the screen and press <RETURN> to write another copy. Press the F4 to erase these copies, and then press F1 to exit. Now SWAP and use the COPY IN-BLK to place the moon on the shuttle picture (upper left corner). SWAP to go back and extract the star and then put several stars on the shuttle picture.

OBJECTS

Now add an object:

The Object function is one of the most powerful in CADPAK. In addition to being somewhat like the COPY function where one copy can be copied into another area, it permits sizing and rotations and precise positioning. Each object must be defined as a 16 x 16 pixel image in the OBJECT EDITOR. For now, call up a set of objects from disk as follows. Select the OBJECTS/FONT MGR function. Then select DIRECTORY. Key in the number corresponding to "O.TUTOR OBJECTS" and press <RETURN>. The name selected will be shown for you to confirm by pressing <RETURN>. The set of objects will be read in. You will be returned to the main menu.

To use objects select the USE OBJECTS function. Select the NORM option.

The complete set will be shown. To put one on the screen, use the cursor keys to move the blue cursor over the one you want (the satellite in the upper left corner) and press and then press <RETURN>. The regular graphic screen will show. Press the CTRL key and move the cursor where you want the LOWER LEFT corner of the object to go. ACCUPOINT will position it precisely. Then press CTRL to position the upper right corner. As you move this corner, you are setting up the size of the copied object. The F4 key will correct a mistake and you can draw another copy of the object without going back to the main menu.

FILL

Complete the shuttle picture by using the FILL to fill the lower nose area, the wing, the engines with solid color. Fill the earth with another fill pattern and put a box around the title. You can fill the whole picture with the first fill pattern.

PRINT

Print the picture out by selecting the PRINT function. Then select either the small or large picture.

12.0 CADPAK TUTORIAL #2 (BOTH VERSIONS)

This tutorial will familiarize you with some the special font capabilities of CADPAK . If you do not have CADPAK loaded, do so. If you have been using the system, clear screen 1 and make sure you are on it (SCREEN 1 in the upper right corner of main menu).

1. Select the DISK/SAVE/RESTOR function.

2. Select the DIRECTORY option and look for file P.USA OUTLINE. Key that entry number (3).

3. Select RESTORE and then press <Return> to load it in. This is an outline of the USA and states which will find many uses.

4. Use the BOX function to put two legend boxes under the southern tip of TEXAS.

5. Select the FILL function and SOLID. Fill the one of the legend boxes and then the orginal 13 states: Vermont, New Hampshire, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia. (you don't have to go back to the main menu, just set points at each state:

6. Return to the main menu and select FILL.

7. Select PATTERN.

8. Select USE then the diagonal bars. Use this to fill the other states admitted to the Union by 1850. Fill: the second legend box and Maine, Ohio, Indiana, Illinois, Michigan, Wisconsin, Iowa, Missouri, Arkansas, Louisiana, Texas, Mississippi,Alabama, Florida, Tennessee, Kentucky and California.Go back to the main menu.

9. Select the TEXT function. Select UP/LO and normal size. Place the cursor next to the solid filled legend and enter: "13 Original Colonies". Next to the pattern filled legend box enter "Admitted by 1850".

10. Return to the main menu and select the OBJECT/FONT MGR function. Select the DIRECTORY option and find the 3-D FONT. Key the number (2) press <Return> and then Select READ and press <RETURN> to load it in.

11. Select the TEXT function and select the SPECIAL FONT option. Set one point at the upper left corner, but leave some room above it for the letters. Then set another point above and to the right of it to select the minimum size special lettering. Then enter the text, something like "The United States by 1850". Note that in special font mode you can only delete one letter, so type slowly and carefully!

You can use this map for a state shape by using the point mode copy of a rectangle including the state. Then copy it into a blank screen setting the lower left in the lower left corner of the screen and then putting the upper right corner up and to the right enough to expand it. Then use RUBOUT and/or ZOOM to eliminate neighboring state lines.

13.0 CADPAK TUTORIAL #3 (BOTH VERSIONS)

This tutorial will acquaint you with some of the precision caling features of CADPAK-64.

Suppose you have your home on a lot, which is 150' wide by 100' deep. Your home is roughly in the center, and you want to see if you can fit a swimming pool onto your property (see illustration).

First, layout the lot. Clear the screen and select the Large size printout. A scale of 1"=20' will mean the drawing of the plot will be 7.5" (150'/20) x 5" (100'/20). This will fit into the large size paper (8.875 x 6.875 on the EPSON FX-80). Therefore select the default paper size and then make your external dimensions FEET and key 20 (feet) per inch on the paper.

Now to draw your plot, use a BOX. Set the first corner at coordinates 10,10 by pressing the Commodore key, pressing A (absolute coordinates) and then keying 10,10 and press <RETURN>. The cursor moves to 10,10 (feet) on your drawing.

Now press the Commodore key again and press R for relative distance input. Key the size of the plot (150,100) and press <RETURN>. The box is drawn. The lower left corner is 10,10 and the upper right is 160,110.

Go to the main menu text option and label the top as 150' and one side as 100'.

To draw the house, we need a rough outline (see below) which gives the outline in feet and we must know how far in it is from the lower left corner.

The easiest way to draw the house will be with the JOINTED lines option of the LINE command. We will use the Relative keyed input option so we can simply enter the distances in feet. The only trick is getting started. If we want to calculate the position of the lower left corner of the house, we could add the plot lower left corner (10,10) to the distance the house is from the corner (30,40) and start the house at 40,50.

Since that requires a calculator, lets try another way. The divide function lets you set one point relative to two others, at one or the other endpoints (0/1 or 1/1 fraction of the distance). For our house let' start this way:

Select the LINE function, SOLID lines and JOINTED lines options. Press the <- (left-arrow) key to start the divide function. Now key the first of the two points by pressing the Commodore key, then A then 10,10 and <RETURN>.

The border will turn purple again for the second point. Press the Commodore key, then R (relative) then key the relative distance 30,40 and press <RETURN>. Now you will see the divide screen showing both points and asking you for the fraction. Since we want to start at the second point, key 1,1 (meaning 1/1) of the distance. The cursor will move to the start point 40,50.

Now use the Commodore key and the R option for the following moves to outline the house:

R 0,30 up 30' for left side

R 70,0 back wall

R 0,-40 down right side

R -20, 0 garage front

R 0,10 jog back to front wall

R -50,0 front wall

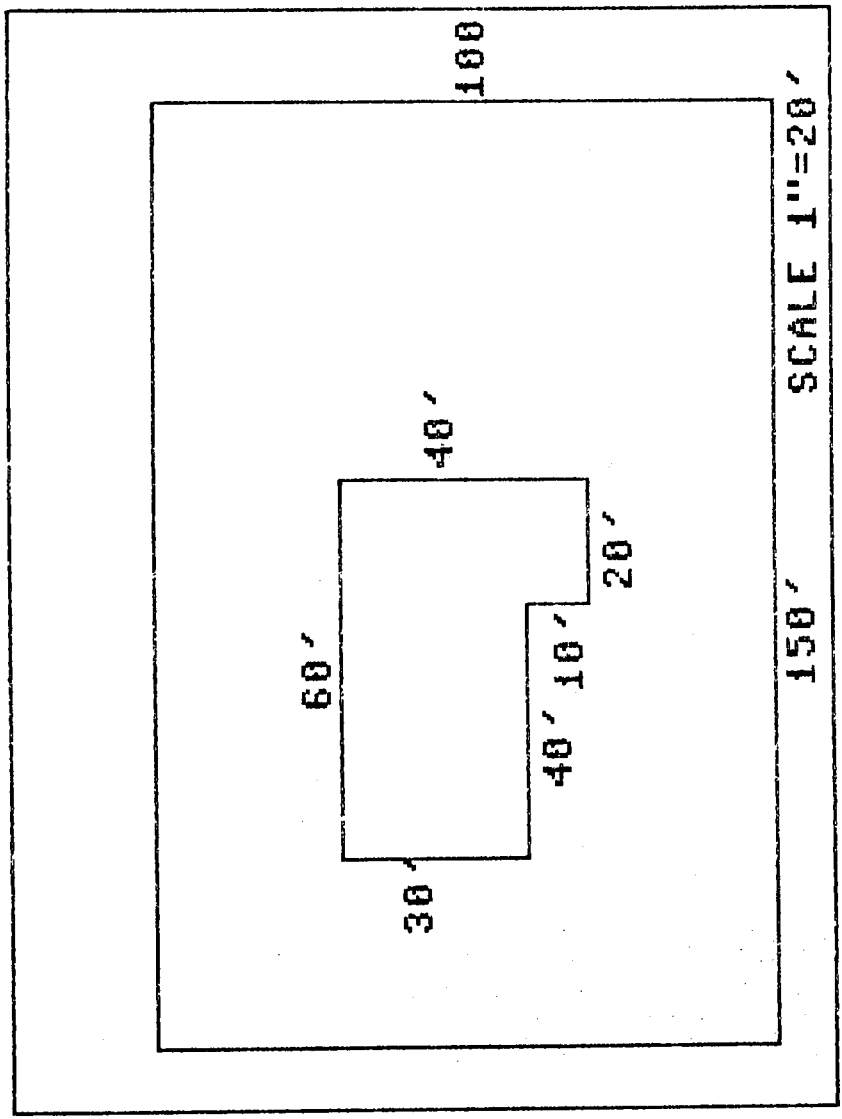
Return to main menu.

Use text to mark lengths on house (probably best to put these inside house).

Now you should add sidewalks, driveways, major trees, etc.

If you want to see if you can squeeze in a 20x40 pool, simply pick a starting point, with lightpen or drawing cursor, and use the Relative distance input of 20,30 to draw the box. If it looks bad, simply press F4 to erase it only and reposition the corner of the rectangle until it fits. You can then use the measure function to find out the distance from the house, etc.

Print this out and use a ruler to check the scaling (remember 1"=20'). If it doesn't check out, you may have selected the wrong size drawing (it should have been large) or you may have forgotten the sizing program or done it incorrectly. See "CADPAK SETUP".



14.0 TIPS ON USING CADPAK

14.1 DEFINING OBJECTS

It is very tempting to design four copies of an object, each in a different rotation (such as marker arrows for a drawing). The problem is that the only good reference point you have on any object when you are positioning it in a picture is the lower left corner. Therefore, if you design something such as a right pointing arrow and the positioning of the RIGHT END of the arrow is important, it will be almost impossible to do because the positioning of an object is based on the LOWER LEFT corner of the object. Instead, design it so that the arrow is pointing to the left and is as far down in the object as possible. Then when you go to use the object, choose either the reflection or rotation option and position the LOWER LEFT corner of the object (the point in this case) at the significant position on the diagram. Then move the light pen to the lower left of that point to set the sizing of the object and reflection or rotation, but this way the significant part of the object will be positioned properly. See the tutorial for an example of this.

Objects are not specifically dimensionable. An object is nothing more that a pixel pattern, and although it can be scaled up in multiples of its size, you can not make it a true exact sizing. Therefore if you wanted to have office furniture as a set of objects, you would have to accept the fact that these are only approximate sizes and not exact. Instead, you could use the 2nd screen to define specific sized shapes and the copy these onto your drawing and the size will be correct.

14.2 DESIGNING FONTS

When designing fonts, keep in mind that a special font is automatically proportionatly spaced. CADPAK automatically senses the right most significant columns of each character and positions the next character against that row. (There is a minimum character size of 6 pixels) If you want the characters to flow together, such as in a script text, start each character against the left edge of the object block. If you do not want the characters to ever flow together, leave the left most column of pixels blank (such as on the OLD ENGLISH font included).

In designing fonts, remember that you will normally leave one or two blank rows under each character for descenders (such as under the g, y, q, etc.).

14.3 CURSORS

CADPAK was designed using sprites for the cursors used in drawing. This occasionally presents problems when you try to draw a very short line or very small box, etc. The cursors simply overlap and often cover- up your reference point. The cursor priority adjustment was designed to get around this problem by moving all the cursors behind your screen reference point instead of in front of it. This can be done either with the F3 key or with the cursor priority adjustment on the utilities menu. Even with this, it is sometimes easier to go to the zoom function to draw very small things on the screen.

14.4 MAKING T-SHIRTS

You can use Cadpak-64 to make T-Shirts of various designs. The procedure is as follows:

Draw your design on screen 1.

Perform a COPY [AREA] function using POINT EXTRACT. Set both corners of the COPY OUT areas just inside the black border.

SWAP the screen.

Select MIRROR COPY IN-PT then perform COPY BACK function. Set first point in LOWER RIGHT corner of screen and second point in the UPPER LEFT corner of screen.

DUMP to printer using an image transferring type ribbon.

APPENDIX A - COLOR NUMBER TABLE

COLOR NUMBER	COLOR
1	BLACK
2	WHITE
3	RED
4	CYAN
5	PURPLE
6	GREEN
7	BLUE
8	YELLOW
9	ORANGE
10	BROWN
11	LIGHT RED
12	DARK GRAY
13	MEDIUM GRAY
14	LIGHT GREEN
15	LIGHT BLUE
16	LIGHT GRAY

APPENDIX B - PRINTERS / INTERFACES

BLACK & WHITE PRINTERS

Printer:	Commodore 1525 / 801 select CBM 1525 printer
Interface:	none needed
Printer:	Commodore 1526 select CBM 1526 printer
Interface:	none needed
Printer:	Okimate 10 Black & White select Okimate 10 B&W printer
Interface:	none needed
Printer:	Epson FX-80 Epson MX-80 Epson MX-100 Star Gemini 10 & 15 All work using EPSON printer
Printer:	Okidata Microline 92 select OKIDATA printer
Printer:	C Itoh 8510 Prowriter (Switch 1-7 open & 1-8 closed) select PROWRITER printer
Printer:	Siemens PT88 Inkjet select SIEMENS PT/88 printer

INTERFACES:

Cardco '64 to Centronics model A
Secondary address 5
Printer Translate 0

ECX Inc C-6401
Switches- all 3 ON
Secondary address 0
Printer Translate 0
Microworld Electronics MW-302
Switches 3 & 4 ON
Secondary address 0
Printer Translate 1

Microworld Electronics MW-302
Switch 3 ON
Secondary address 0
Printer Translate 0

MSD Inc CPI
Switches 1,3,5 ON
Secondary address 0
Printer Translate 0

EPSON USER PORT INTERFACE

A special printer module is included which allows you to connect an EPSON printer (or lookalike) to the parallel user port on the '64. You will need only a parallel cable and appropriate connectors. The connections are:

'64 PIN	USE	CENTRONICS CONNECTOR PIN
A	GND	16
B	FLAG-BUSY	10
C-L	DATA	2-9
M	STROBE	1

COLOR PRINTERS

Printer: Okimate 10 Color
select Okimate 10 Color printer
Interface: none needed

Printer: C. Itoh Prowriter 8510SC
(SW 1-7closed and 1-8 open)
select Prowriter color printer
Interface: same as Prowriter 8510 above.

Printer Installation Reference Guide

Our technical support staff finds that the most frequently-asked questions are those having to do with printer installation for the popular Abacus package CADPAK-64.

CADPAK-64 uses custom printer driver routines to achieve the highest quality output possible on a wide variety of printers. Your printer interface should be locked into *transparent* mode when running CADPAK-64. You can do this by using a specific secondary address or by sending a command in BASIC before starting CADPAK-64. Please refer to your printer interface manual for instructions to place the interface into *transparent* mode.

CADPAK-64 will work with a large number of printers not listed on the start-up screen. If you printer is not listed on the start-up screen, check your printer manual to see if it is EPSON graphics compatible or has a Commodore printer emulation mode. Many printers not listed will work correctly if they emulate an EPSON or Commodore printer.

The following information details the installation of most commonly-used printers/interfaces with CADPAK-64. If you have any other questions or suggestions, please contact our Technical Support department.

MPS801, 803, 1000 (Commodore inter-face only); Comrex CR-220; Epson Homewriter 10; Seikosha models ending with VC; any Star 10C or Star Gemini II	Load and run `SIZE.PRG` Select CBM 1525 Printer Printer Number=4 Secondary address=0 ASCII translate=0
MPS1000/non-Commodore interface	Select Epson Printer
MPS-802	Select CBM1526 Printer
Gemini 10x/Cardco G-Wiz	Select Epson Printer Printer - DIPs 1 & 2 on, 3 & 4 off Interface - all DIPs off

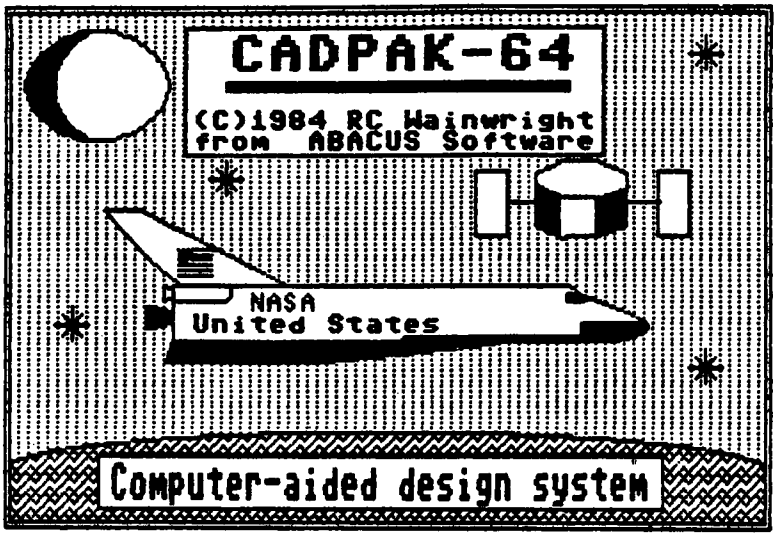
Panasonic KXP 1080/Cardco G+	Select Epson Printer Interface switch #7 off Secondary address=7 ASCII translate=0
Panasonic KXP 1080/Uprint	Enter OPEN 1,4,1 from BASIC (locks printer in transparent mode) Load `SIZE.PRG` Select Epson Printer Secondary address=1 ASCII translate=0
Star SG10/Tymac Connection	Lock interface into transparent mode Load `SIZE.PRG` Select Epson Printer
Star SG10/MW-350	Select 1525 Printer Set interface to emulate 1525 (switch #1 on) Secondary address=7
Star SG10/Xetec	Select Epson Printer Secondary address=5 ASCII translate=0 (or N)
Epson FX-85/Xetec	Lock interface into transparent mode Load and run `SIZE.PRG` Select Epson Printer Secondary address=5 ASCII translate=0 (or N)
Gemini 15X/Cardco G+	Select Epson Printer Secondary address=5

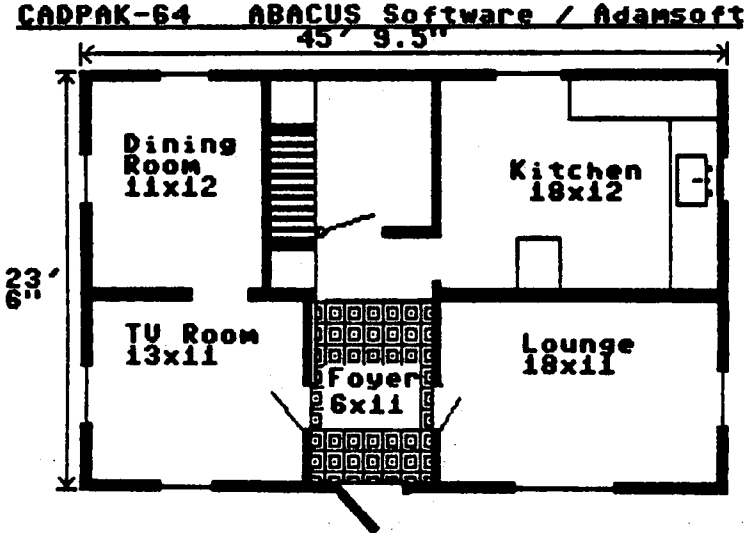
Okimate 192/Tymac Connection	Lock interface into transparent mode Load and run `SIZE.PRG` Select Okidata Secondary address=4 ASCII translate=1 (or Y)
SP1000A/Cardco G-Wiz	Select Epson Printer Interface - DIPs 1 & 6 on, the rest off

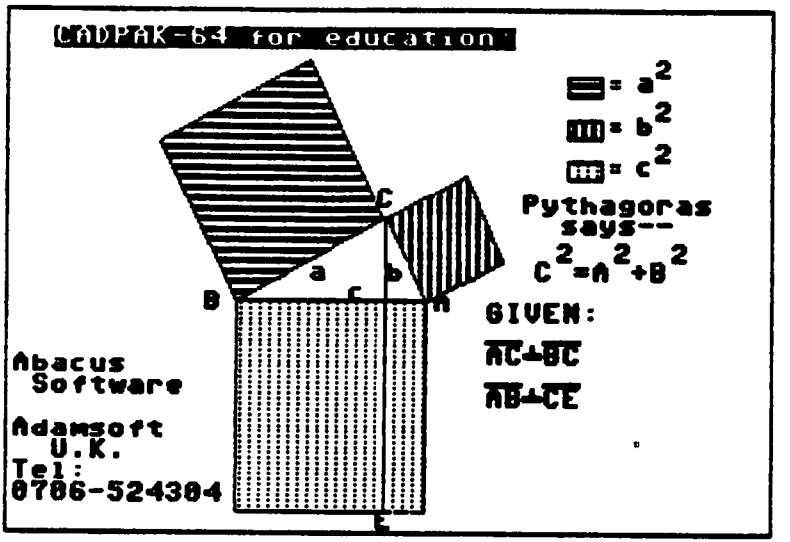
If you have found any difficulties or have found solutions for interfaces and printers not listed here, please contact Abacus' Technical Support Department.

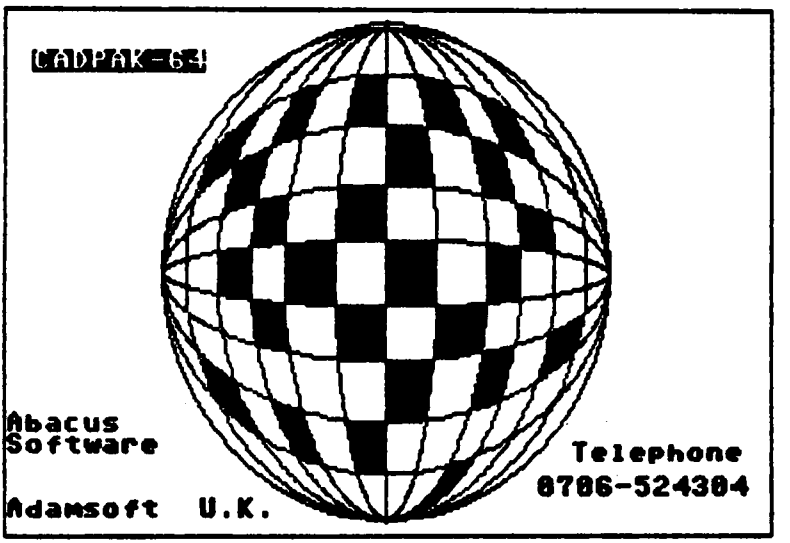
Abacus Software
Technical Support
5370 52nd Street, SE
Grand Rapids, MI 49508

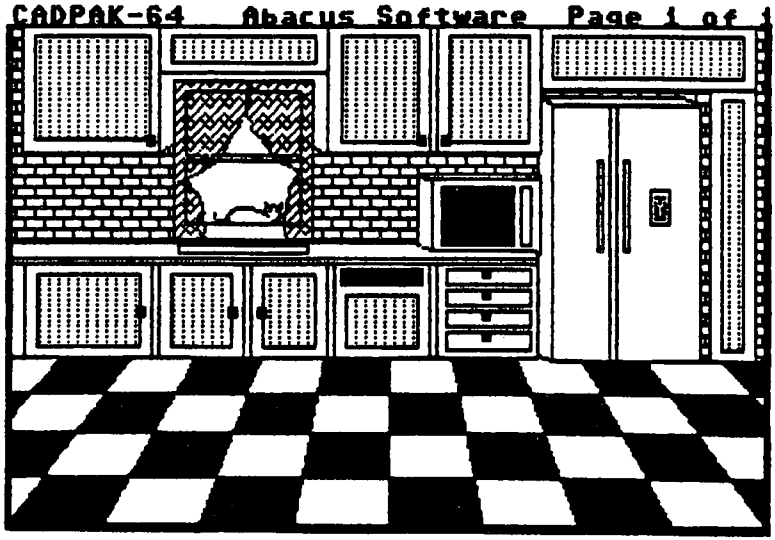
NOTE: Some printer configurations may still print circles as ovals (e.g., MPS801).

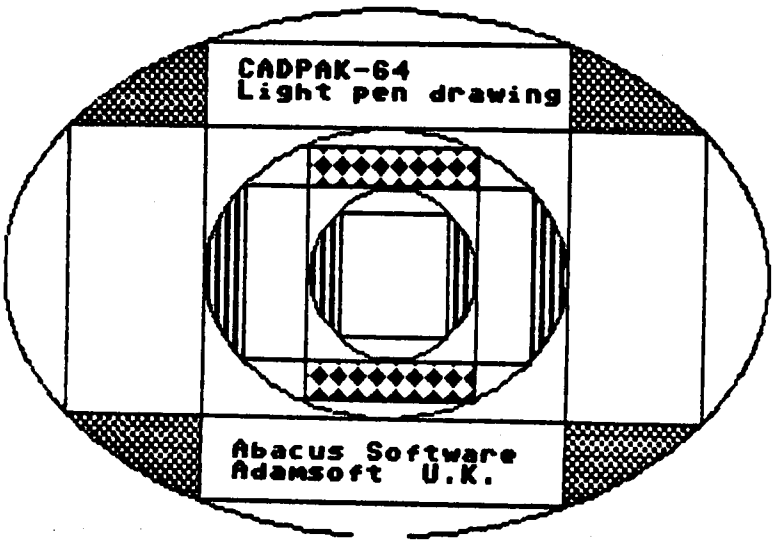

CADPAK-64
(C)1984 RC Wainwright
from ABACUS Software
NASA
United States
Computer-aided design system


CADPAK-64 ABACUS Software / Adamsoft
45' 9.5"
23' 6"
Dining Room 11x12
Kitchen 18x12
TV Room 13x11
Foyer 6x11
Lounge 18x11


CADPAK-64 for education
= a2
= b2
= c2
Pythagoras says--
C2=A2+B2
GIVEN:
AC=BC
AB=CE
Abacus Software
Adamsoft U.K.
Tel: 0706-524304
C
a
b
B
c
m
E


CADPAK-64
Abacus Software
Adamsoft U.K.
Telephone 0706-524304


CADPAK-64 Abacus Software Page 1 of 1


CADPAK-64
Light pen drawing
Abacus Software
Adamsoft U.K.

APPENDIX C - 1351 MOUSE INSTRUCTIONS

CADPAK-64 now includes a version which works with the Commodore 1351 mouse.

Please note the following changes:

FOR ALL VERSIONS (Lightpen, Keyboard and Mouse):

The program SIZE.PRG for determining the dimensions for your printer is now on the "reverse" side of the diskette (the side WITHOUT the CADPAK-64 label).

To run it:

- insert the diskette into the disk drive with the label DOWN and close the drive door
- Type `LOAD "SIZE.PRG",8` <Return>
- Type Run <Return>

The program operates exactly as described in the manual (Section 5.1-Setting the dimensions for your printer) through step 11. In step 12 you will be asked to remove the diskette and TURN IT OVER (so the label is UP) before re-inserting it. The dimensioning information must be written on the "front" side of the diskette.

All of the other CADPAK-64 programs, fonts, objects, and pictures are on the labelled side of the diskette, so you will always have the diskette in the drive with the label UP.

There are no other changes to the lightpen or keyboard versions.

Commodore 1351 Mouse Version;

The mouse should be connected to joystick port 1 on the right side of the '64. Port 1 is the connector that is closest to the front of the computer.

Insert the diskette with the label up and type:

```
LOAD "MOUSECADPAK-64",8 or simply
LOAD "M*",8.
```

Follow the remaining steps 7-13 of section 6.0 LOADING CADPAK-64.

On the menu screen, the cursor appears as a small white arrow. You move the cursor by moving the mouse over your desktop. The cursors on the drawing screens operate with the mouse in the same way as with the keyboard version, except you move them by moving the mouse instead of the cursor keys.

You select a CADPAK function with the mouse by moving the arrow over the name of the function and then pressing the LEFT mouse button.

Setting a point with the mouse is similar. Move the mouse to position the cursor where you want it, then press the LEFT mouse button. This activates the ACCUPOINT mode. The border of the screen turns light blue to indicate ACCUPOINT mode. In ACCUPOINT, the mouse speed is reduced to make it easier to position the cursors accurately. When the point is where you want it, press the LEFT mouse button to set the point.

In the DRAW, POINT/SPRAY, and RUBOUT functions the cursor moves with the mouse. When you press the LEFT mouse button, writing (or erasing) begins and continues as you hold the button, and move the mouse.

The RIGHT mouse button is used to exit from a function. This is equivalent to pressing the F1 key in the keyboard version or pointing to the right screen border in the lightpen version.

On the main menu, pressing the RIGHT mouse button displays the current drawing screen as long as you hold the button.

On a secondary menu (such as the type of line), pressing the RIGHT mouse button returns you to the main menu.

In a drawing function (on the graphic screen) pressing the RIGHT mouse button ends the function and returns you to the main menu.

The only exception is in ACCUPOINT mode where the RIGHT mouse button displays the dimensions coordinates as you move the mouse, for cases when you need to set a point a certain distance from or at a specific point.

In addition to TRY AGAIN! on the main menu, you can press BOTH mouse buttons at the same time while in a drawing function to TRY AGAIN!

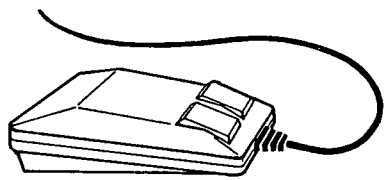
On the color selection screen, position the mouse pointer beneath the desired color and then press the LEFT mouse button to select the color.

In the ZOOM, OBJECT EDIT and PATTERN EDIT functions, the LEFT mouse button cause a point to be "flipped" as with the lightpen. If you press the C= key, at the same time as the LEFT mouse button, the point is FORCED ON. If you press the <- key at the same time as the LEFT mouse button, the point is FORCED OFF.

Note - Pressing and holding the LEFT mouse button during functions requiring text input (such as dimensions, filenames, and values) can insert spaces or other unwanted characters.

All other functions of CADPAK-64 work as described for the lightpen or keyboard versions.

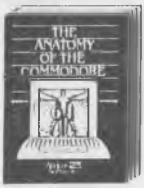
The SOUND and sound commands have been disabled from the mouse version.



Commodore 64 Reference Library

Authoritative, Comprehensive, Definitive

The Anatomy of the C-64



This complete guide unveils the lesser-known features of the Commodore 64. Chapters include: graphics, sound synthesis, I/O control, sample programs using the kernal routines, inside BASIC, assembler language programming, music synthesizer programming. Also contains the complete disassembled and documented ROM listing. This book has been so popular that it's now in its fourth printing. The authoritative reference guide to the user's C-64. 300 pages.

Suggested Retail Price: **$19.95**

The Anatomy of the 1541 Disk Drive
REVISED

New Edition. We significantly increased our coverage of the 1541 in this revision of our all-time best-selling book. **The Anatomy of the 1541** will take the mysteries out of working with the popular Commodore 1541 disk drive. Details the use of program, sequential, relative and direct access file. Includes many sample programs—FILE PROTECT, DIRECTORY, DISK MONITOR, BACKUP, MERGE, COPY, and others. Describes the internals of the DOS with completely disassembled and commented listings of the 1541 ROMS. 520 pages.

Suggested Retail Price: **$19.95**

Tricks & Tips for the C-64

Here's a collection of easy-to-use programming techniques for the '64. It's a perfect companion for those users who have run up against hard-to-solve programming problems. Covers advanced graphics, easy data input, BASIC enhancements, CP/M cartridge on the '64, POKEs, user-defined character sets, joystick and mouse simulations, data transfer between computers, and much more. 275 pages.

Suggested Retail Price: **$19.95**

Peeks & Pokes for the C-64

This book contains dozens of useful "quick-hitters" for the BASIC programmer. You'll see how easy it is to control the '64 and its programs from zero-page using simple POKEs. Describes the video display, graphics, sprites, sound chip, keyboard, joystick, game paddles, lightpen and user port. Also explains the BASIC interpreter and operating system with an introduction to machine language. Includes many quickly-entered programming examples. 200 pages.

Suggested Retail Price: **$14.95**

Machine Language on the C-64

If the C-64 user wants to progress beyond BASIC and write programs that run faster, use less memory and perform functions not available in BASIC, this is the book they need. It's filled with examples of machine language routines so the user can learn from working programs. Included are listings of three full-length programs: a working assembler so the user can create his/her own machine language programs; a disassembler so the user can inspect other machine language programs; and an amazing 6510 simulator that allows the user to "see" the operation of the processor right on the screen. 215 pages.

Suggested Retail Price: **$14.95**

Optional program diskettes are available for every C-64 book

Commodore 64 Reference Library

Authoritative, Comprehensive, Definitive

Advanced Machine Language for C-64

This is an in-depth look at topics never covered anywhere else: programming the video controller, timer and real time clock; performing serial and parallel input and output at machine language speed; extending BASIC with new commands and functions; handling interrupts from the CIA. It's packed with dozens of tips and tricks for the machine language programmer. An excellent companion to our **Machine Language Book for the Commodore '64**—and a must if the user is serious about machine language programming. 210 pages.

Suggested Retail Price: **$14.95**

Graphics for the C- 64

This book takes the user from the fundamentals of graphics to advanced areas, including computer aided design. Subjects include: creating new character sets, sprite design and movement, hi-resolution and multicolor graphics, programming for the light pen; VIC Chip control, IRQ handling, shifting the screen memory; 3D graphics, animation and much more. The easy to follow format makes learning by example easy and straightforward. Most comprehensive guide to '64 graphics available. 350 pages.

Suggested Retail Price: **$19.95**

Science & Engineering for the C-64

An introduction to the use of the C-64 computer in scientific applications. Describes variable types, computational accuracy, computers in science; POKEs useful in solving scientific problems; various sort algorithms; bubble, quick and shell sorts. Topics include linear and nonlinear regression, CHI-square distribution, Fourier analysis, matrix calculations, more. Programs from chemistry, physics, biology, astronomy and electronics. Includes many program listings. 340 pages.

Suggested Retail Price: **$19.95**

Compiler Design &Implementation

This book shows the user how a computer can transform a high-level language into machine-executable code. The user also learns how to design a language suited to his specific problem and write the corresponding compiler. This book is not only for those who want to understand or write compilers, but for those who want to know more about how the computer works. Includes a working compiler, complete assembler and disassembler, and an introduction to various 6510 machine language instructions. 280 pages.

Suggested Retail Price: **$19.95**

Printer Book for the C-64 & VIC-20

Here's an in-depth handbook that explains all of the things that the user can do with his/her '64 (or VIC-20) and a printer. Topics covered include: interfacing the user's printer to the computer, using secondary addresses for various printers, using printer ports and the principles of printing graphics; utilities and programs for text and graphics hard-copy, formatting program listings, and more. 340 pages.

Suggested Retail Price: **$19.95**

Optional program diskettes are available for every C-64 book

Commodore 64 Reference Library

Authoritative, Comprehensive, Definitive

Cassette Book for the C-64 & VIC-20

The most complete guide to using the DATASETTE. While learning how to store programs and data on the cassette, the user is given examples that demonstrate cassette programming and file handling. Teaches everything the user needs to know about Commodore's cassette recording techniques, and the operating system routines that service the DATASETTE. In addition, we include a new "operating system" for the DATASETTE that enables high-speed loading, saving and finding of files. 260 pages.
Suggested Retail Price: $14.95

1541 Repair & Maintenance Handbook

Here's the book no C-64 user should be without. It describes the 1541 drive's hardware, including all the maintenance and repair information the user needs to keep his/her disk drive operating smoothly. Included are schematics, alignment testing, quick realignment tips, error-correction hints, and electronic and digital techniques. The user will be able to repair the 1541 disk drive with ease using this excellent handbook. 106 pages. Large format.
Suggested Retail Price: $19.95

Adventure Gamewriter's Handbook

This is a step-by-step guide to designing and writing exciting adventure games. The user will learn the strategy behind programming adventures: motivating the players, using text and/or graphics, "saving" a game for later play, and more. Included is the complete listing for an automated adventure game generator with editor and interpreter. 225 pages.
Suggested Retail Price: $14.95

Ideas for Use on your C-64

This book presents dozens of helpful and fun things to do with the versatile Commodore '64. It's written for the novice and reads like a novel, and contains program listings that prove the '64 to be *the* home computer. Some of the projects covered are: recipe card filer, auto expense minder, electronic calculator, store window advertising, strategy games, computer poetry and more. Includes many programming examples that the user can enter quickly. 200 pages.
Suggested Retail Price: $12.95

Optional Program Diskettes

Optional program diskettes are available for all of our C-64 book titles in Commodore format. The diskettes contain most of the programs found in the C-64 books and will save the user the time and trouble of typing them in on the keyboard.

Each diskette: $14.95

Optional program diskettes are available for every C-64 book

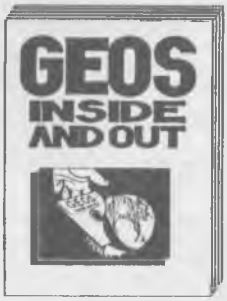
Commodore 64 Reference Library

Authoritative, Comprehensive, Definitive

*The new Commodore 64C, bundled with Berkely Softworks' GEOS™ and QuantumLink™, is selling in large numbers, and our distributors have reported that GEOS is also selling quickly to longtime '64 users. Abacus leads the way by publishing two great new companion volumes for GEOS—**GEOS Inside and Out** is already an Abacus bestseller.*

GEOS™

GEOS Inside and Out



GEOS Inside and Out is the most comprehensive guide available for effectively using GEOS (Graphic Enviroment Operating System). **GEOS Inside and Out** is aimed not only at the beginning user of GEOS, but at the advanced user and software developer as well. The book gives the beginner a gentle introduction to operating GEOS. Later chapters acquaint the reader with the geoWrite and geoPaint applications, in addition to the GEOS accessories. One chapter is dedicated to practical uses for GEOS by running step by step through applications. One of many programs listed in the book is **FILEMASTER**, a utility program that converts '64 programs into the GEOS format quickly and easily. Additional features of **FILEMASTER** allow users to design their own icons and info screens. **GEOS Inside & Out** also contains a single-step simulator program for observing GEOS memory locations and various system registers. **GEOS Inside and Out** also includes a useful Tricks and Tips section, explains the construction of custom windows and their uses, details GEOS file structure, and much more. The authors spent hundreds of hours working and dissecting GEOS to bring you this comprehensive book. Because of the number and length of the program listings they included with the book, we suggest that the optional diskette be sold with every book. 293 pages.

GEOS Inside and Out Suggested retail price: **$19.95**
Optional diskette Suggested retail price: **$14.95**

GEOS Tricks & Tips

Continuing the tradition established by our famous C-64 reference library, **GEOS Tricks & Tips** is a collection of helpful techniques for anyone who uses GEOS with their Commodore. It's easy to understand without talking down to the reader, and detailed in the applications of the routines. **GEOS Tricks & Tips** includes tips and tricks for the user interface, deskTop, geoPaint and geoWrite, a quick BACKUP program, a print notes program, and a hardcopy program. **GEOS Tricks & Tips also feature listings for new GEOS accessories, including a font editor that lets the user create custom fonts up to 64 points in size, a machine language monitor, and a modifier program that allows alteration of GEOS messages. GEOS Tricks & Tips** is the perfect companion volume to **GEOS Inside & Out**. Because of the number and length of the program listings they included with the book, we strongly suggest that the optional diskette be sold with every book.

GEOS Tricks & Tips Suggested retail price: **$16.95**
Optional diskette Suggested retail price: **$14.95**

GEOS™, deskTop™, geoPaint™ and geoWrite™ are trademarks of Berkely Softworks
QuantumLink™ is a trademark of Quantum Computer Services.

Optional program diskettes are available for every C-64 book

Selected Abacus Products for Commodore computers

Chartpak

Professional charting & graphing package for the C-64 or C-128

Charts and graphs are the most effective method of representing statistical data from business and science in a comprehensible, easy to digest format that quickly and accurately conveys numerical information.

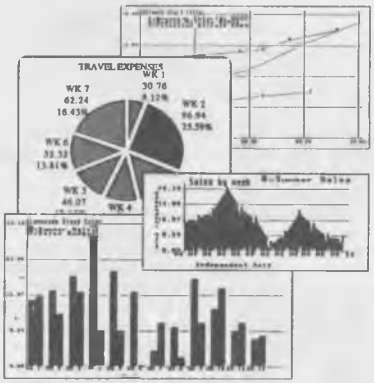
Chartpak 64 or 128 makes it simpler than ever before for the professional who wants to easily create high-quality charts and graphs without any time-consuming programming. **Chartpak**'s defaults let the user build professional quality charts or graphs right off the bat, or charts and graphs can be built to specification by selecting from **Chartpak**'s easy-to-use menus. Every option is menu-driven—all the user has to do is enter the required data, choose the chart format and then watch the chart as it's drawn.

Chartpak quickly draws any one of 8 different formats of pie, bar, line and scatter graphs. Since **Chartpak** is an interactive software tool, changing a feature in the **Chartpak** graph .is no problem. The user can immediately change the scaling, labels, axis, colors or bar-filling options at any time. **Chartpak** also has built-in features for statistical functions: least squares, regression, mean and exponential smoothing, and can be added to chart and graphs.

The 140-page manual contains several tutorials to walk the user through the easy process of building charts and graphs using extensive examples and sample charts. In addition, the screen menus are identified and cross-referenced to the user's guide for added convenience and ease of use.

When the user's created a chart or graph to satisfaction, they can get a hardcopy of it with most popular dot-matrix printers in either of two sizes. Many **Chartpak** users have reproduced these charts and graphs for reports and presentations.

The C-128 version that takes advantage of the added features and extra memory of the Commodore 128 computer. More data can be entered to build charts, and charts and graphs can contain more detail. In addition, **Chartpak-128** gives 3 times the resolution of the 64 version. This permits an entire chart or graph to be previewed on the screen, or it can be scrolled to show the higher resolution detail.



Chartpak 64 and Chartpak 128 Features:

- Enter data manually, or use data straight from Busicalc 1, Multiplan and Calc Result
- Draws pie charts, vertical or horizontal line charts, vertical or horizontal grouped, mixed or stack bar charts, scatter diagrams
- Statistical routines include average, standard deviation, least squares, two-dimensional data, exponential smoothing
- Easy to use menu operations
- Handles up to four data sets totaling 200 points (more with C-128 version)
- Saves data and/or chart specifications separately
- Complete manual with **Chartpak** data reduction tutorials
- Printout in two different sizes
- **Chartpak 128** has 3X the resolution of the '64 version

Hardware requirements:
Chartpak 64:
Commodore 64
1541 disk drive (or MSD disk drive).

Chartpak 128:
Commodore 128 with 40- or 80-column monitor
1571/1541 disk drive (or MSD disk drive)

Printers:
Commodore 1525 and 1526, MPS 801, Epson, Star Gemini, Okidata, Okimate, Siemens, others.

Suggested retail price:

C-64 version	$39.95
C-128 version	$39.95

Abacus Inc.
5370 52nd Street SE • Grand Rapids, MI 49512
Phone: (616) 698-0330 • Fax: (616) 698-0325
Toll Free Order Line: 1-800-451-4319

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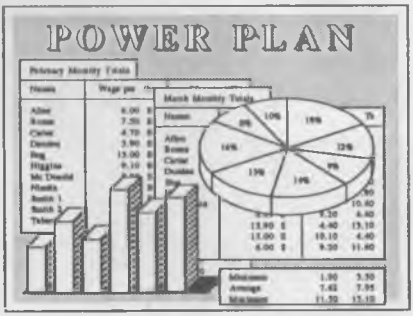
Selected Abacus Products for Commodore computers

PowerPlan-64

Spreadsheet and Graphics package for the C-64

"PowerPlan is one of the best programs ever written for the Commodore 64, giving Lotus 1-2-3® a run for the money... It was a pleasure to work with this amazing product. I strongly recommend PowerPlan to anyone interseted in using spreadsheet programs for business."

—Al Willen
Commodore Magazine



Ever since VisiCalc and Lotus 1-2-3 stormed the personal computer market, the computer has become an important financial planning tool. By using an electronic ledger, you can perform hundreds of calculations and "what-if" analyses quickly and easily, and reduce reams of data into meaningful information.

PowerPlan-64 offers the '64 user a software tool that combines spreadsheet operations with a powerful built-in graphics program to display data in graphs as well as numbers. **PowerPlan-64** can handle up to 255 rows by 63 columns—a total of 16,065 individually protected cells. This outstanding package includes all major math functions, manually controllable calculation mode, and built-in disk commands. The integrated graphics program, PowerGraph, has eight different windows —you can select bar charts, curve graphs, point charts, pie charts, or min-max charts in two or three directions.

PowerPlan-64's menus make it easy to use for the first-time spreadsheet user. All of **PowerPlan-64**'s selections are clearly displayed on the screen for the user to choose from. In addition, online HELP screens are available at the touch of a key.

PowerPlan-64's complete 200-page handbook has a plain-speaking tutorial that gently introduces the user to spreadsheets.

Hardware requirements:

Commodore 64
1541 disk drive (or MSD disk drive)

Printer optional

Self-running demo available

PowerPlan-64 Features:

- Menus make PowerPlan-64 easy to learn
- Large capacity spreadsheet serves all the user's analysis needs
- Convenient built-in notepad documents user's important memos
- Flexible online calculator gives access to quick computations
- Powerful options such as cut, copy and paste operations speeds the user's work
- Integrated graphics summarize hundreds of data items
- Draws pie, bar, 3D bar, line and area charts automatically (8 chart types)
- Multiple windows emphasize the analyses

Printers:
PowerPlan-64 works with the following printers:
- Commodore 1525, 1526
- Epson MX, FX, Homewriter 10 and compatibles (Star Gemini SG-10, 10x, 10C, 15x, Panasonic KXP 1080)
- MPS 801, 802

Suggested retail price:
C-64 version **$39.95**

Abacus Inc.
5370 52nd Street SE • Grand Rapids, MI 49512
Phone: (616) 698-0330 • Fax: (616) 698-0325
Toll Free Order Line: 1-800-451-4319

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'64 or '128 Software
Take your Pick!

BASIC Compiler
Complete BASIC compiler and development package. Speed up your programs 3x to 35x. Compile to machine code, compact p-code or both. A great package that no software library should be without. '128 version: 40 or 80 col. monitor output and FAST mode operation, extensive 80-page programmer's guide. **C-64 $39.95 C-128 $59.95**

COBOL
Now you can learn COBOL, the most widely used commercial programming language, on your 128 or 64. COBOL Compiler package comes complete with syntax-checking editor, interpreter and symbolic debugging aids. New '128 version works with 40/80 column monitors and is quicker than the '64 version. **C-64 $39.95 C-128 $39.95**

Super C
For software development or school. Learn the C language on the '64 or '128. Compiles into *fast* machine code. Combine M/L & C using CALL; 51K available for object code; Fast loading; Two standard I/O librarys plus math & graphic libraries. Added '128 features: CP/M-like operating system; 60K RAM disk. **C-64 $59.95 C-128 $59.95**

New C-128 Version!
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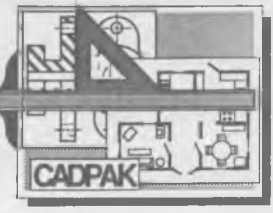

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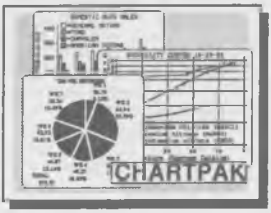

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C-64 Software

Super Pascal 64 is a complete development system for your C-64. It implements the full Jensen & Wirth compiler plus extensions for graphics - has a complete source file editor, a full assembler, and a comprehensive utility package. Features high-precision 11-digit arithmetic; a very fast compiler; overlays; automatic loading of editor and source program; exact error messages and localization during compilation; high speed DOS; free run-time package.

Suggested retail price $59.95

Super C 64 package produces 6502 machine code, so it's very easy to transport C programs from one computer to another. Includes an editor, compiler, linker and thorough handbook. Source programs can be up to 41K in length, 53K in object code. Linker lets you combine up to seven modules fro later execution. Run-time library may be called from ML or included as a BASIC look-alike program. Includes graphics and math libraries and more.

Suggested retail price $59.95

COBOL 64 features syntax-checking editor, interpreter, compiler, and a number of symbolic debugging aids; a crunch function to reduce memory size of programs; a print on/print off feature and much more. Includes sample programs to help you learn as you go with a complete 150 page manual.

Suggested retail price $39.95

Fortran 64 features; linker/loader; generates relocatable machine code; program to sequential file translator; creates fast, saveable, runable program; EXEC statement allows access to 6502 registers and Kernal routines and user written machine language routines; free-field statement entry to allow indention of structures and allows for low overhead by linking only the systems routines required; string manipulation library and intrinsic library included; allows up to 50K available for user programs and more.

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CadPak 64 - A best-seller for over 2 years! A superb tool for computer aided design and drawing on the C-64. Use the keyboard, an optional lightpen, or the Commodore 1351 mouse to draw directly on the screen. Create and edit any pictures, mechanical drawings, layouts, renderings - quickly, accurately, and creatively. Dimensioning feature gives you exact scaled output of your designs on your printer. With the improved object editor, you can define and save furniture, electronic circuitry, machinery, etc. as intricate as the screen resolution permits. Hardcopy to most dot matrix printers.

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Technical Analysis System C-64 - TAS-64 analyzes and charts technical indicators to help the investors determine when to buy and sell securities. You can automatically download your indicators from the Dow Jones News Retrieval Service or Warner Computer Systems, or manually enter, edit, review, save and then recall the information. Track high, low, close, volume, bid and ask by date. Place 300 periods of information for up to 10 different issues on a data disk; formatting more data disks are possible for larger portfolios. Build a variety of chart types on the split screen; 7 moving averages, 3 oscillators, 5 volume indicators, comparison charts for 2 different issues, trading hands, and least squares. For the serious stock market investor. Hardcopy to most dot matrix printers.

Suggested retail price $39.95

BASIC Compiler 64 - A complete compiler for speeding up your BASIC programs. Included as a bonus with each is a free run-time module that lets you develope programs for sale with no royalty payments. Compile programs in speedcode (pseudo-code), machine language or a mixture of both. Will compile a series of programs using the overlay feature and BASIC extensions. Use integers to optimize FOR NEXT loops, send commands to the disk drive, change compiling parameters, and more.

Suggested retail price $39.95

BeckerBASIC 64 - Now you can write your own G.E.O.S. applications in BASIC - easily. It's a complete development package that adds the power of over 270 new commands and functions.

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PowerPlan 64 is not only one of the most powerful and flexible spreadsheet packages available, but it gives you built-in graphics that let you display your valuable data in graphs was well as numbers.

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Datamat 64 is a flexible database system - you design it in freeform using the full screen editor.

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XPER 64 is the first expert system for the C-64.

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XREF BASIC Cross Reference for the C-64 is an indispensable tool for BASIC program authors. Suggested retail price $17.95

MASTER 64 is a comprehensive application development package that gives you powerful commands to BASIC, and is indispensable for developing your business programs.

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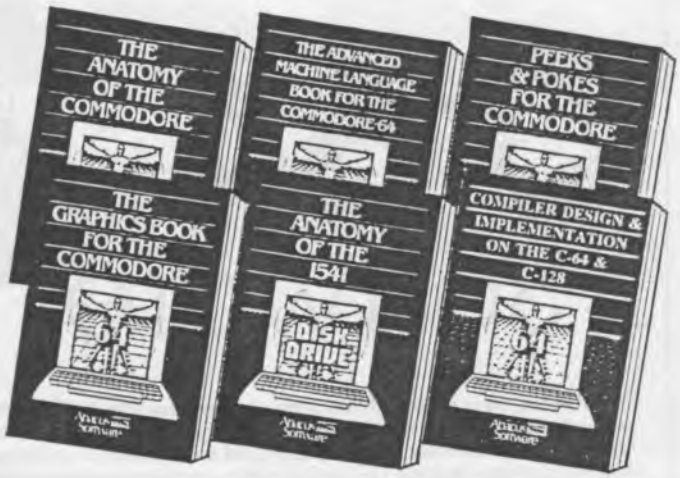
Video BASIC 64 adds more than 50 powerful commands to BASIC - commands that let you create dazzling graphics, accompanying music and sound effects. Suggested retail price $39.95

C64 Books



The Anatomy of the C-64 - Unveils the lesser-known features of the C-64. Includes: graphics, sound synthesis, I/O control, sample programs using Kernal routines, inside BASIC, assembler language programming, music synthesizer programming. Contains the complete disassembled and documented ROM listing.

300 pp $19.95

The Anatomy of the 1541 - Details the use of program, sequential, relative and direct access files. Includes many sample programs - FILE PROTECT, DIRECTORY, DISK MONITOR, BACKUP, MERGE, COPY and more. Describes internals of the DOS with complete disassembled/commented listings of the 1541 ROMs.

324 pp $19.95

Tricks & Tips for the C-64 - A collection of easy-to-use programming techniques for the C-64. Covers advanced graphics, easy data input, BASIC enhancements, CP/M cartridge on the C-64, POKEs, user-defined character sets, joystick/mouse simulations, data transfer, more.

275 pp $19.95

Peeks & Pokes for the C-64 - Contains dozens of useful 'quick-hitters' for the BASIC programmer. Describes the video display, graphics, sprites, sound chip, keyboard, joystick, game paddles, lightpen and user port. Many quickly-entered programs included.

200 pp $14.95

1541 Repair & Maintenance Handbook - Describes the 1541 drive's hardware including: all the maintenance and repair information you need to keep your disk drive operating smoothly. Included are schematics, alignment testing, quick realignment tips, error-correction hints, and electronic and digital techniques.

106 large format pages. $19.95

Machine Language for the C-64 - Filled with examples of machine language routines so you can learn from working programs. Included are listings of three full-length programs: a working assembler, a disassembler and an amazing 6510 simulator that allows you to 'see' the operation of the processor on the screen.

215 pp $14.95

Advanced Machine Language for the C-64 - In-depth look at programming the video controller; timer and real time clock; performing serial and parallel input and output at machine language speed; extending BASIC with new commands and functions; handling interrupts from the CIA. Packed with dozens of tips & tricks for the machine language programmer. 210 pp $14.95

Graphics for the C-64 - Teaches you by example the fundamentals of graphics to advanced areas, including computer aided design. Subjects include: creating new character sets, sprite design and movement, high resolution and multicolored graphics, VIC Chip control, IRQ handling, shifting the screen memory; 3D graphics, animation and much more.

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Adventure Gamewriter's Handbook - A step-by-step guide to designing and writing your own adventure games. Included is the complete listing for an automated adventure game generator with editor and interpreter. 225 pp $14.95

Ideas for Use on your C-64 - Presents dozens of helpful and fun things to do with your C-64. Contains program listings that prove the C-64 to be the home computer: recipe card filer, auto expense minder, electronic calculator, store window advertising, strategy games, computer poetry and more. Includes many programming examples that you can enter quickly. 200 pp $12.95

Science & Engineering for the C-64 - Describes variable types, computational accuracy, computers in science; POKEs useful n solving scientific problems; various sort algorithms; bubble, quick and shell sorts. Topics include linear and nonlinear regression, CHI-square distribution, Fourier analysis, matrix calculations and more. Includes many program listings. 340 pp $19.95

Compiler Design & Implementation - You'll learn to design a language suited to your specific problem and write the corresponding compiler. Includes a working compiler, complete assembler and disassembler, and an introduction to various 6510 machine language instructions.
280 pp $19.95

Printer Book for the C-64 - Explains all the things you can do with your C-64 and a printer. Topics include: interfacing your printer to the computer, using secondary addresses for various printers, using printer ports and the principles for printing graphics, utilities and programs for text and graphics hardcopy, formatting program listings and more.

340 pp $19.95

Cassette Book for the C-64 - The most complete guide to using the DATASETTE. Learn the operating system routines that service and record with the DATASETTE. Includes a new 'operating system' for the DATASETTE that enables high-speed loading, saving and finding of files. 260 pp $14.95

GEOS Inside & Out is the most complete guide to effectively using GEOS. Contains many programs: FILEMASTER, a single-step simulator and a constant display digital clock.

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