

PLOT-II

The PLOT-II digitizer operates on a simple principle. A potentiometer is mounted within each cylindrical housing. The housings connect together like a human arm. The clear arm with the dot in the center is called the pointer. As the pointer is moved across the drawing board the potentiometers measure the unique angles of a certain point. The ribbon cable connects the potentiometers to the game I/O port where Apple thinks it is reading paddles. The angles are digitized and mathematically adjusted to represent screen coordinates x,y.

This simple principle has several advantages for the user. PLOT-II does not use RF or electrostatic fields which can accidentally erase diskettes or interfere with TV reception. No interface card is needed which would consume power, occupy a slot, and add cost. Complexity is reduced resulting in a more reliable and rugged digitizer.

With the simplicity and ruggedness it should not be forgotten that PLOT-II is a precision instrument. It must resolve angles to 2 tenths of a degree and select one of about 54,000 screen points to plot. It should be afforded some care and protection. Use the styrofoam pin protector when the unit is unplugged. Do Not position the pointer arm off the drawing board when unattended. Do Not attempt to separate the arm/housing units as it always results in a broken PLOT-II

2. Using a Graphics Printer

PLOT-II creates "standard Apple pictures" on HIRES page 1 (A\$2000,L\$2000). Pictures are not stored as text characters but as a sequence of dots. Therefore special printer routines are necessary to print this information. Many printers contain special drivers or special drivers are available to dump Apples High Resolution pages. There are as many procedures for printing HIRES pictures as there are printers and little commonality exists. To print PLOT-II pictures it is usually necessary to have the picture present on the screen. This may be done by directly executing "BLOAD Name" from APPLESOFT, or use the R (RECALL) function and then CTRL C to stop the program. Now follow the directions for your printer. For example, with the Axiom EX-820 you merely press CTRL R; The Silent Type uses a control character followed by a "1" for HIRES page 1; The Paper Tiger uses a special driver and instructions are present within the routine. Consult the manufacturer of your printer or your dealer for further information about your specific printer.

1. Draw with PLOT-II

Executes the main drawing program and presents a menu of drawing commands.

COMMANDS ARE:

P Point Cursor - Draw Line
 R Recall a Picture from Disk
 T Transfer Picture to Disk
 E Erase Screen
 D Draw with Brush or Edit
 A Point/Line Draw
 X Full/Split Screen
 Z Color Fill Closed Figure
 S Scale of Drawing (.25 to 4)
 C Center Cursor on Screen
 F Smoothing Factor (0 to 5)
 N Normal Drawing
 M Make Shape Table
 I Inspect Shape in Table
 L List of Commands
 Q Quit - End Program

***** COLORS *****

| | | | |
|---|---------|---|---------------------|
| W | White | Ø | Black (That's Zero) |
| O | Orange | B | Blue |
| G | Green | V | Violet |
| H | White 2 | K | Black 2 |

These are functions available to you while drawing. On the left is the key you press to command the function followed by a short description of the function. This list can be recalled for reference while drawing with no damage to your picture by pressing "L" - List of Commands. Below is a description of the main drawing commands. Press the Space Bar to enter the drawing mode. A machine language program of PLOT-II utilities is first loaded and you are ready to draw.

"P" Point Cursor - This command will cause the flashing cursor to appear and the current X and Y coordinates to be displayed. It is used to move the PLOT-II pointer without writing. This function is also used to draw a straight line between the last point plotted and the current cursor position each time the Space Bar is pressed. The Point Cursor mode is also the normal exit for several other commands where drawing would be inappropriate.

COLORS - Drawing in the eight Apple colors.

Press: W for White 1
 Ø for Black 1 (That's Zero)
 O for Orange
 B for Blue
 G for Green
 V for Violet
 H for White 2
 K for Black 2

The colors Green, Violet, White 1, and Black 1 are considered Apple's primary colors. The colors Orange, Blue, White 2 and Black 2 are secondary colors and were not present in early Apple II computers. Placing primary colors next to secondary colors will often cause strange results. This is a result of the method used to store color information within the computer.

"R" Recall Picture From Disk - This command will prompt for the name of a previously saved picture and will transfer it to the High Resolution screen #1. You may cancel the command by entering the name NONE or carriage return. The option described in the "T" command for using Drive 2 is also applicable to the "R" command.

"T" Transfer Picture to Disk - This command will prompt for the name of your picture and will automatically save the High Resolution screen #1 to disk. You may cancel the command by entering the name NONE or carriage return. If you have two disk drives operating on one controller, it is often desirable to use Drive 1 as the program disk and Drive 2 as the data disk. To store pictures on Drive 2 use the format "PICTURE NAME, D2" *** Drive 2 will now automatically be accessed until program material is required. This feature works with all commands which store or recall data.

"E" Erase Screen - This command does exactly what you would expect - erase the screen. Because the "E" key could be accidentally pressed, wiping out your picture, a confirm prompt is added. Answer it "Y" and the screen will self-destruct.

"D" Draw With Brush or Edit - A striking function that imitates the action of a paint brush. Select a color and then press "D" to select brush size - Ø for fine to 5 for broad and paint the screen. This mode is also useful for erasing or editing a picture. Select the color of the background (usually Black) and move the flashing cursor over the undesired line. The command is exited by selecting any other command.

"A" Point/Line Draw - This command is useful for shading in drawings. Pressing "A" once will cause the drawing mode to switch from solid line to closely spaced points. Pressing "A" again will cause output to return to drawing solid lines.

"X" Full/Split Screen - Permits use of the full HIRES screen #1 for drawing. When using this mode some status prompt messages will not be visible. All prompts requiring user input will momentarily switch back to split screen for entry. As the "Z" command uses the lower right area of the screen to display the current color, this area may have to be touched up. It is best not to test the color when using the "Z" function with full screen. Alternately pressing "X" will return to split (text) screen mode.

"Z" Color Fill Closed Figure - This function permits filling in irregular closed figures with 106 different colors. A chart of the 106 colors can be seen using the "R" (Recall) function and then entering the name "COLOR CHART". (This chart is provided for reference only. As it uses the HIRES screen, it will destroy any picture present on the screen.) Colors are made by mixing combinations of the normal 8 HIRES colors. Group 1 is made from Violet, Green, White and Black. Group 2 is made from Blue, Orange, White and Black. Groups 3 and 4 are made from combinations of all 8 colors. Colors are roughly as follows:

***Please use the quote marks around the name and drive.

| Group | Color Numbers | Color Range |
|-------|---------------|--------------|
| 1 | 1-13 | Greens |
| 1 | 14-26 | Violets |
| 1 | 27-32 | Grays |
| 2 | 1-13 | Oranges |
| 2 | 14-26 | Blues |
| 2 | 27-32 | Grays |
| 3 | 1-12 | Browns |
| 3 | 13-21 | Pinks |
| 4 | 1-12 | Blue/Greens |
| 4 | 13-21 | Blue/Violets |
| 4 | 22-up | Strange |

To use the "Z" function first position the point cursor within a figure. The figure must be bounded by either a solid line or the edge of the screen. (NOTE: Do not position cursor on any screen edge.) Now press "Z". Select a color group and then a color number as discussed above and press Return. You will now be asked if you intend to color a white area or a black area. If a black area, then press "N" for no. This step is taken to prevent mistakes when coloring small areas. Next, the question "test color first (Y/N)" is asked. The user may display the color in the lower right of the screen if desired by pressing "Y". Now, pressing the ← and → arrow keys will move the selected color down or up the color group. When the desired color is present in the test area, press the Space Bar. The figure will now be colored in. Try to use only one color group when selecting colors for a picture. Interaction between colors of different groups often occurs due to the way Apple stores primary and secondary colors.

The fill in routine often leaves areas uncolored within the figure. Position the cursor within such an area and press "Z" again. This time merely press Return to continue filling in the previous color.

A third, very striking, feature of the "Z" mode is the reverse function. Select "Z" and then press "R" to reverse the picture image. Black changes to White, Violet to Green, Orange to Blue, etc.

During the selection process the user may exit the "Z" mode by pressing ESC without coloring. Otherwise the command will exit to the point cursor mode after executing the selection.

"S" Scale of Drawing - This command provides independent vertical and horizontal control of the size of your drawing on the screen to that of your original on the PLOT-II. The current position of the PLOT-II will automatically be centered on the screen when the "S" command is executed. The useful range of Scale is from about .25 to 4 although no program restrictions are present.

"C" Center on Screen Current Point - This command will place the current PLOT-II position at the center of the screen. If your original is not centered, this function will do it for you. Use with the "S" command to manipulate drawing area to your liking.

"F" Factor of Smoothing - This command averages several digitizer readings to arrive at the current plotting point. It is useful in removing digitizing errors or jumps when a drawing scale greater than one is used. As it causes the writing speed to be reduced, it is for a particular drawing. Enter zero for no smoothing to five for maximum smoothing. A value of two or three is recommended for drawing scales of three and above. This command is also useful for creating smooth flowing lines in drawings of normal scale.

"N" Normal Modes - This command returns all drawing functions to their default or initial setting.

"M" Make Shape Table - This function allows any portion of the HIRES screen to be automatically converted to a standard Apple shape table. Shape tables are compiled at \$5600 (22016) but may be relocated using the Apple monitor's memory move utility. To use shape tables as compiled in other programs, it is necessary to POKE 232,0 and POKE 233,86. This will tell APPLESOFT BASIC where to find the shape table.

Shape tables are one of the most useful yet least understood features of APPLESOFT. Shape tables represent graphic information by a series of moves left, right, up or down. Such a system, through the use of APPLESOFT commands DRAW and XDRAW, lends itself to animation, rotation and scaling.

Pressing the key "M" from the main drawing program will enter the Shape Maker function. The prompt "LOAD A PICTURE FROM DISK (Y/N)" will appear. The Shape Maker must have an image to compile. The image may already be on the screen (answer prompt "N") or it may be on disk in the form of a picture (answer "Y").

Next the prompt "LOAD A SHAPE TABLE FROM DISK (Y/N) <RTN> IF SAME" is displayed. The user may add shapes to a table existing on disk (answer "Y"), begin a new shape table (answer "N"), or add shapes to the table currently in memory (answer with "RETURN").

The number of shapes in the current table is now displayed and there are 5 sub-commands available.

1. "D" Define Next Shape

Pressing "D" will display the graphic screen point cursor and the user is directed to place the cursor at the upper left corner of the intended shape. After positioning the cursor, press any key. The user is now directed to place the cursor at the lower right corner of the intended shape and again press any key. The shape specified will then be automatically scanned, erased and reprinted from the table.

2. "R" Recall Data From Disk

Pressing "R" allows the user to Recall a picture or shape table from disk. If two disk drives on one controller are present, the user may select Drive 2 for the data disk by entering names as follows: "NAME, D2".

3. "E" Erase Screen

Pressing "E" will prompt for confirmation and then erase the HIRES screen 1 to black.

4. "S" Save Data To Disk

Pressing "S" allows the user to save the currently compiled shape table to disk. This must be done before leaving the Shape Maker function or the compiled shape table may be lost. Disk Drive 2 may be used as the data disk as with the "R" command.

5. "Q" Quit Shape Maker And Return To Drawing

Pressing "Q" will prompt to insure that the shape table has been saved. Control is then passed back to the main drawing program.

"I" Inspect Shape Table - Press "I" to see and use shapes from a shape table. Supply your table's name. (You may select one supplied with PLOT-II such as "ELECTRONIC SHAPES" if desired). The first shape from the table should now be flashing on the screen. The shape will move about the screen in response to the PLOT-II digitizer pointer.

There are several sub-commands now available which manipulate the shapes.

| | | | | |
|--------|---|------------|----|------------|
| PRESS: | S | SCALE = 1 | R | ROTATE = 0 |
| | D | DRAWING #1 | OR | CTRL D |
| | X | FIX X | N | NORMAL |
| | Y | FIX Y | U | UNDRAW |

Press "S" ----- and you may change the scale of the shape from 1 to 5 times normal size.

Press "R" ----- and the shape will rotate 45° clockwise each time "R" is pressed.

Press "D" ----- and sequentially step through your table.

Press CTRL "D" ----- and you may go directly to the shape wanted by entering its number.

Press Space Bar ----- to print your drawing in the current position.

Press "X" ----- to fix the horizontal position of the shape while moving it up or down.

Press "Y" ----- to fix the vertical position of the shape while moving it left or right.

Press "N" ----- to restore normal movement.

Press "U" ----- to undraw or erase shape. Align shape directly over its image and press "U". This command is also useful when shapes are to be printed on a white background.

Press CTRL "X" ----- to switch to full screen graphics. Press again to return to split screen.

Press "Q" ----- select new table or exit program.

The program is intended primarily as an inspect function but is also useful for creating drawings with Shape Tables. The program also facilitates the creation of complex shapes. Many shapes are a mixture of simpler ones. For example the operational amplifier in the table ELECTRONIC SHAPES (drawing #26) is a combination of a triangle, plus and minus symbols, and straight lines. A complex shape can be made by over-printing simpler ones. Then return to the Shape Maker program to copy this new complex shape into a shape table.

In producing architectural drawings or the like, it is often desirable to make perfectly vertical or horizontal lines on the screen. In using the drawing mode for this, an error of less than 1% can cause unsightly jumps in the resulting line. Shape Tables can make perfect vertical and horizontal lines every time. Create a Shape Table containing several short vertical lines. They can be made to represent 1,2,3, etc. units of length. Now return to the inspect mode and use rotate, scale, and fix commands to position and scale the whole line.

It should be noted that shape tables are a collection of shapes and that shapes are a collection of moves right, left, up and down. Color is not stored in the shape. PLOT-II software does make some provision for shape color. If, before entering the "I" function, the drawing color was a primary color (White 1, Black 1, Green or Violet) then the shape will be printed in primary colors. If the color was secondary then the shape will be printed in secondary colors.

"L" LIST Menu - This command recalls the menu for reference. You may use the command at any time without damage to your picture.

"Q" QUIT - The approved method for exiting the program. Entering this command will exit the drawing program and return control to the main menu of functions.

2 Recall a Stored Picture

This utility displays full screen pictures stored on diskette. Enter the picture's name and press Return. The picture will be recalled and displayed in full screen mode. Press any key to return to menu. This function may be used with the format "NAME, D2" if a second drive is present.

3 Catalog This Disk

This utility catalogs the disk and returns to the menu after any key is pressed. If used after the recall function, this command will catalog the last disk drive mentioned.

4 Text Writer

It is often desirable to add text or alphanumeric data to drawings. Pressing the key "5" will enter the text mode. Using the menu, you may select text size, direction, color, and font. Each function is selected by pressing the function's number.

1. EXAMINE CURRENT SETUP

Displays current parameters for printing text. Format, size, color, and font selections are displayed for reference. Pressing any key will return to the menu.

2. FORMAT

Selects direction text is to be written on the screen. Press "L" for left to right, "U" for up to down, "D" for down to up, and "R" for right to left (upside down).

3. SIZE

Selects size of text characters to be written. Enter "1" for normal size text to "5" for text 5 times normal size.

4. COLOR

Selects color of text characters to be written.

W = White 1 (green/violet compatible)
H = White 2 (orange/blue compatible)
Ø = Black 1 (green/violet compatible)
K = Black 2 (orange/blue compatible)
O = Orange
V = Violet
G = Green
B = Blue

5. ERASE-STORE-RECALL-CATALOG

Four utilities for clearing the screen, storing a picture to disk, recalling a picture from disk, or cataloging the disk. Press "E" to erase, "S" to store and then enter name for picture, "R" to recall and then enter previously saved picture's name, "C" to catalog, or Return to cancel this command.

6. FONT

There are two text fonts or character sets supplied. Press "E" to use English or "G" to use Greek letters. Greek letters are alpha through omega and are assigned A thru X keys sequentially.

7. READY TO WRITE

When all parameters for text output have been selected, press "7" to begin writing. Default conditions for text, that is selections made automatically when entering the program are:

Format - left to right
Size - 1
Color - White 1
Font - English

Because these are the most used parameters, it is often possible to begin entering text immediately after entering the program.

After pressing "7", you will see the high resolution picture selected and a flashing cursor. The cursor can be positioned using the PLOT-II pointer. The size of the cursor is the same as that of a text character. When the cursor is positioned where the first character of text is to be placed, simply type your message using the Apple keyboard. Spacing and line advance operate normally. Pressing Return will advance to the next line. If no further space is available, control is returned to the PLOT-II pointer.

It is often possible to erase a mis-typed character by pressing the back arrow key. Pressing the Space Bar will advance the cursor over your picture or other text without disturbing it. Pressing CTRL and "N" will return control of the cursor to the pointer and you may designate a New place to write text. Pressing the ESC key will alternately switch between Upper Case text and Lower Case text.

To work on the full HIRES screen, press CTRL "X". Press CTRL "X" again to return to split screen. To change the parameter selection, press CTRL and "L" to List or return to the menu.

5. Calculate Area and Distance

This program uses the PLOT-II as a planimeter to calculate areas of figures or distances. Detailed instructions are present on the Disk 1 and may be accessed by pressing "H" for HELP.

COMMANDS ARE:

I Initialize ----- Directs the user in defining the scale to which area and distance are displayed.
E Erase ----- Erases the screen of past measurements and sets area and distance to zero.
D Draw ----- Causes trace of PLOT-II pointer to appear on the screen and distance to be accumulated. Alternate pressing of "D" and Space Bar will cause straight lines to be entered.
A Area ----- Stops drawing and closes figure (if not already closed). The area and perimeter is displayed. Pressing "D" will cause closure line to be removed and continue drawing.
T Transfer to Disk - Transfers HIRES screen 1 to disk
R Recall from Disk - Recalls stored screen to disk
N New Place ----- Will stop drawing and permit starting at a new place without affecting accumulated distance.
L List ----- Displays list of available commands.
Q Quit ----- Exits program to PLOT-II

6. Electronic Schematics

This function demonstrates one of the uses of shape tables. Most disciplines use a set of symbols as a shorthand method of writing ideas and plans. Provided on Disk 1 is a shape table of 35 symbols used by electronics technicians and engineers to produce schematics. Symbols for other disciplines may be created by using the Shape Maker function and used similarly to these electronic shapes.

Pressing "7" will display the 35 shapes and proceed to load the "Electronic Shapes" table into memory. The electronic shapes are manipulated and placed with the SHAPE INSPECT function described earlier. All commands apply equally well here.

7. Move Picture

On occasion, it may be desirable to move an entire picture around on the screen. This may be accomplished easily by using function "8". When this option is keyed, a special machine language sub-routine will be loaded from the disk. At the bottom of the screen will appear a shift quadrant. Each character represents a command key. They are:

I Shift picture up one dot. The picture will scroll up one dot and any dots at the top of the screen will wrap around to the bottom of the screen. NOTE: This wrap around works for ALL the keys mentioned here except "Q".
M Shift picture down one dot.
J Shift picture left one dot. Do Not use this key if both primary and secondary colors are present in the picture.
H Shift picture left seven dots.
K Shift picture right one dot. Do Not use this key if both primary and secondary colors are present in the picture.
L Shift picture right seven dots.
Q Quit shifting. Returns to the PLOT-II menu. All shape tables in memory at the time shift was selected are gone and must be re-loaded if they are to be used.

If the picture is shifted, a second display will appear at the bottom right of the screen. It is labeled OFFSET. This shows how many dots away from the original picture location have been done. The original picture is $X=0, Y=0$. Moving the picture up once with the "L" key will cause X to go to $X=-1$. The numbers change with each shift until the upper values of the screen have been reached at which time the numbers revert to zero. For the X this is ± 279 , and for the Y this is ± 191 . So, a display OFFSET $X=-15$ means $Y=+28$ that the picture was moved up fifteen dots and to the right twenty-eight dots.

8. LORES Drawing

An example of how SKELETON may be modified to provide a new function. This program uses PLOT-II with the LORES screen.

COMMANDS ARE:

P Point Cursor for moving without drawing.
Numbers 0 - 15 select LORES drawing color.
T Transfer picture to disk.
R Recall picture from disk.
E Erase screen to LORES color.
M Mirror mode creates kaleidoscope designs.
V Vertical line.
H Horizontal line.
Q Quit program.

9. Digitize Function

Another example of SKELETON in action. This program uses the PLOT-II digitizer to create x,y coordinate pairs from a traced curve, a filter is present to eliminate multiple coordinates by requiring that the value of x (horizontal) be increasing. Output of the program is a matrix of screen coordinate points. This program can be expanded to perform analysis of graphical data.

9 DELETE A PICTURE

Delete a picture from disk.

10 End Session

Returns control back to PLOT-II

FIRST DRAWINGS

This section provides a step by step guide to aid the new user in becoming familiar with several basic PLOT-II commands and techniques.

STEP BY STEP

You are using Disk 1, have pressed key "1" to "Draw with PLOT-II and PLOT-II drawing commands are listed on the monitor. Use the List of Drawing Commands printed in Appendix A for reference until you become more familiar with these commands. At the bottom of the screen it says "Press Space Bar". After doing so, the following should now be on the TV screen:

1. ENTER COMMAND
2. A flashing point that moves with the PLOT-II pointer.
3. x = # These numbers change as the pointer is moved. These are y = # the screen x,y coordinates of the flashing point.

Move the PLOT-II arm around and you will see the flashing point move. To make the PLOT-II draw, select a location where you would like to start. Now, for ENTER COMMAND, select a color such as White by pressing the key "W". The words "Color = White 1" will appear and the point will stop flashing. Now you're ready to draw. Move the pointer and the trace will appear on the screen. Try pressing the keys "G", "V", "B", "O" and the trace will appear in Green, Violet, Blue and Orange. To erase screen press "E" and answer the prompt PLEASE CONFIRM with "Y". Your drawing is erased and the point cursor will appear again.

Now try drawing one of the sample pictures packed with your PLOT-II. Place the picture under the mylar screen. Position the PLOT-II pointer at a convenient starting place on the picture. Select the color White "W" and carefully trace the picture. Press "P" and the flashing cursor will appear. You may now move to a new line. To continue drawing press "W" again. When you have completed your picture, press "P" to stop the trace and return to the cursor.

You can refer to the List of Drawing Commands in the program any time while drawing by pressing "L". This will automatically stop your drawing and print the list for reference. This will not damage your picture and you may return to it by pressing the Space Bar. Move the flashing cursor to the point where you wish to continue and push your color key - "W". Now you can go on drawing as before.

When the picture is complete, it may be saved to diskette by pressing "T". Next type a name for the picture (let's call it FIRST) and press Return. The picture will be saved for recall later. To see how this works press "E" and the "Y" to erase the screen. Now press "R" to recall the picture and then type the name (FIRST) and press Return. The picture will be brought back onto the screen.

The "P" command which we have already worked with has an additional feature which is Point to Point drawing. Move the cursor into the position you want and press color "W" then the key "P". This prints a point on the screen. Now, move the cursor to a new position and press Space Bar. You have now drawn a point to point line. Continue moving the cursor to new places and pressing the Space Bar. To change color, press key of color desired and "P", go to new point and press the Space Bar.

The "S" command (Scale of Drawing) allows you to scale the size of your drawing smaller or larger than the original. Place US Map under the mylar and pick a State to draw. Place the drawing arm pointer at the center of the state. Press the "S" key and you will be asked, "Horizontal Scale (.25 to 4)". Answer with "2" Return to cause the state to appear twice its normal size. Next answer "Vertical Scale (.25 to 4)" with "2" Return. Your cursor will now be automatically centered on the screen. Now trace the State. When finished, press "P" to stop drawing. Erase screen (press "E") and try drawing the State $\frac{1}{2}$ normal size by going through the steps above and pressing .5 for horizontal and vertical scale. The useful range of the Scale function is .25 to 4, however you may experiment with larger and smaller values.

The "C" command puts the current pointer position at the center of the screen. If you are drawing an object from an off-center position on the original and wish it to be centered on the screen, just put cursor on object to be centered and press "C". The cursor will be centered on the screen and you are ready to begin drawing.

To use the Paint Brush command, first select a color for drawing. Example: Press "G" - your flashing cursor is green. Press "D" for Draw with Brush or Edit. You will be asked "Size of Brush (0-5)". Answer by pressing "3". Slowly move the pointer to paint the screen. Press "P" to stop painting and return to flashing cursor. Press "D" and brush size to draw again. The color will remain the same until changed. Try drawing using different colors and brush sizes. By pressing a new color letter you will exit the brush command. So after selecting a new color, you must press "D" and brush size to get back into the Paint Brush mode.

Now let's print your name on the screen using different colors. Erase everything by pressing "E" and "Y". Place the flashing cursor where you want to start the first letter. Select color, press "D" and "3", then carefully draw the letter. When letter is finished, press "P" to return to the flashing cursor. Now position cursor for the next letter and press new color, "D" and "3". Remember that "P" returns you to the cursor when finished. Continue procedure until you've completed your name. NOTE: Draw your printed letters as you would normally with strokes; It is better not to go over a line. For example, C and l would be one stroke, D and b would be two strokes; F and K three strokes, and E and W four strokes. When each stroke is finished, press "P" for flashing cursor and re-position for the next stroke before pressing "D" and brush size.

Now let's take the last letter out of your name. Press color "Ø" then "D" and "3". Move the pointer over the letter and watch it gobble up the color. This feature can effectively erase unwanted parts of a drawing by selection the correct brush size needed and carefully manipulating the pointer.

The "F" (Factor of Smoothing) command may be used in conjunction with the "D" (Draw with Brush) command to cause the brush strokes to be more even. Press "F" and select a factor of 3 and repeat the above exercise. When complete press "N" to reset scaling and smoothing values to their normal values.

The "A" command which is the Point/Line Draw allows you to use dots on your drawing for shading and color fill-in where a solid color might not look appropriate. See the demo picture of the Brain on Disk 2.

Press color key desired and "A". Move the cursor around the screen. Fast movement will space the dots and slow movement will give you a shading effect. If you press "A" again, you will be line drawing. Press "A" and you are back to points. A change of color will automatically give you line draw, so if points are desired you must press "A" after the color key. Practice will help you to become proficient at manipulating the point/line draw in your pictures.

If you wish to quit the program, just press "Q" and answer the prompt "Save Picture First" with "N". This will take you back to the main menu.

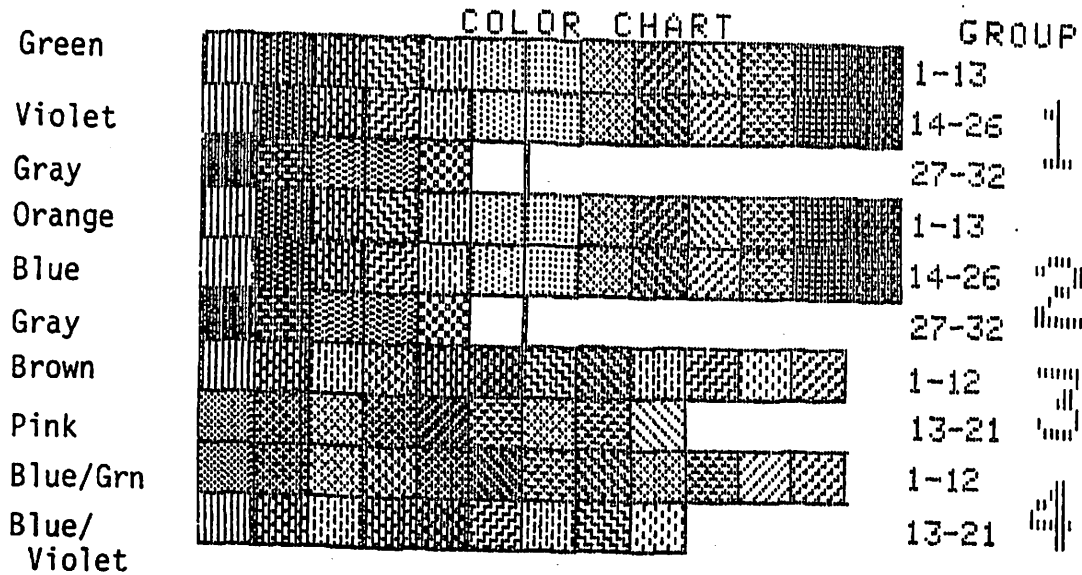
SOFTWARE - DISK 2

The software on Disk 2 primarily demonstrates applications PLOT-II graphics and provides examples.

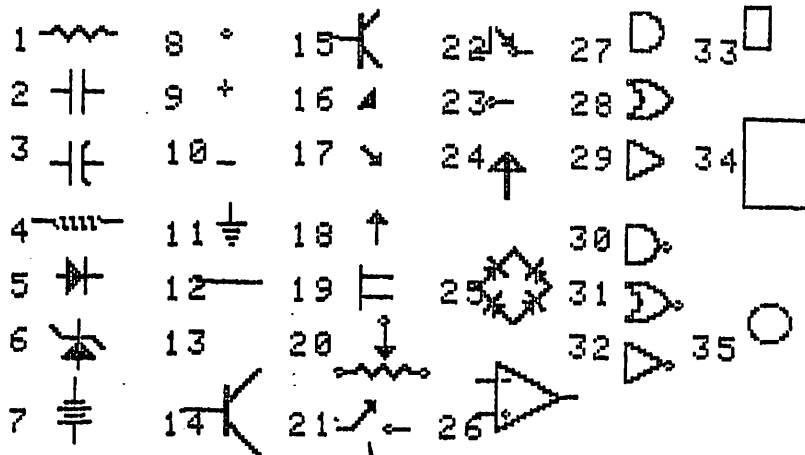
1. Run a Demo Program

1. Animated Examples ----- Two examples of the use of a large graphic combined with shape table animation.
2. Slide Show ----- Six HIRES picture examples.
3. Position Driven Example - Shows how the PLOT-II digitizer may be used to access data from graphic displays.

APPENDIX A



ELECTRONIC SCHEMATIC



PIC ELEC SHAPES

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Resistor 2. Capacitor 3. Capacitor Polar 4. Inductor 5. Diode 6. Zener 7. Battery 8. Terminal 9. Positive 10. Negative 11. Ground 12. Line 13. Point 14. Transistor Large 15. Transistor Small 16. Transistor Arrow 17. Arrow 45 degrees 18. Arrow | <ol style="list-style-type: none"> 19. FET, UJT 20. Potentiometer 21. Switch N.O. 22. Switch N.C. 23. Contact 24. Antenna 25. Diode Bridge 26. Operational Amp 27. AND 28. OR 29. Buffer 30. NAND 31. NOR 32. Inverter 33. Rectangle Small 34. Rectangle Large 35. Circle |
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CALIBRATING PLOT-II

Before attempting to draw, you will need to calibrate your PLOT-II place DICK 1 into the disk drive and boot in the normal manner, the menu reads as follow:

PICK OPTION BY NUMBER

1. drew with PLOT-II
2. recall a stored picture
3. catalog this dick
4. add text to picture
5. calculate area and distance
6. electronic schematics
7. move picture
8. lores drawing
9. delete
10. end session

The calibration program, entered by pressing key "3", creates a table which matches your PLOT³II to the peculiarities of your APPLE as a rule, this need only be done once. you are calibrating this pstyivulst DICK 1 with your APPLE. if you use the PLOT-II on another APPLE with this DICK 1 or use a back up dick, you will want to re-calibrate . take your time and be accurate as the quality of your drawings will depend on the quality of the table produced.

The calibration chart is located under the mylar overlay, instructions are present within the program, line up the chart accorting to arrows and answer "Y". note the four arm positions requ to calibrate PLOT-II be sure that you follow the exact order. now press the "space bar". arrange arm as pef diagram 1 and press " spase bar ". continue until arms have been placed in the four positions. when complete the calibration information will be stored on the diskete.

NOTE: do not write protect PLOT-II diskettes or LOCK the machine routines program because the calibration precess must write information. after calibration must "BREAK IN 3060 ".