

QUALITY 99 SOFTWARE

Draw 'N Plot (tm)

GENERAL DESCRIPTION-

THIS SOFTWARE CONTAINS NINE ASSEMBLY LANGUAGE SUBPROGRAMS DESIGNED TO BE USED WITH THE EXTENDED BASIC CARTRIDGE AND LANGUAGE. THEY INCORPORATE HI-RESOLUTION GRAPHICS CAPABILITIES FOR THE TI EXTENDED BASIC PROGRAMMING LANGUAGE.

WITH THESE ROUTINES YOU MAY INITIALIZE AN AREA OF MEMORY TO BE USED AS A PLOTTING SURFACE, CLEAR IT, MOVE AN IMAGINARY 'PEN' WITH OR WITHOUT DRAWING A LINE, AND ADD LABELS TO CREATE YOUR OWN CUSTOM PLOTS, CHARTS AND GRAPHS FOR YOUR PROGRAMS. INCLUDED IS A SUBPROGRAM THAT PERMITS YOU TO DIRECTLY EDIT PLOTS WITH A JOYSTICK.

FOUR OTHER UTILITIES ARE INCLUDED TO ENABLE YOU TO EASILY INITIALIZE AND LOAD THESE ROUTINES, DUMP YOUR PLOT TO A PRINTER AND SAVE OR LOAD GRAPHICS TO, OR FROM OTHER STORAGE MEDIUMS. (DISK, RS232 OR OTHER DEVICES.)

MINIMUM SYSTEM-

THIS SOFTWARE REQUIRES THE TI99/4A CONSOLE (99/4 WILL NOT SUPPORT THESE ROUTINES), MEMORY EXPANSION, EXTENDED BASIC CARTRIDGE AND ONE OR MORE DISK DRIVES. (RS232, COMPATIBLE PRINTER AND JOYSTICKS ARE OPTIONAL.)

BASIC PRINCIPLES-

THESE SUBPROGRAMS CREATE AND MAINTAIN A 'PLOTTING SURFACE' IN THE MEMORY EXPANSION FOR DISPLAY ON THE SCREEN. THE PLOTTING AREA IS 256 DOTS HORIZONTALLY BY 192 VERTICALLY. THIS MAY BE THOUGHT OF AS A COORDINATE SYSTEM WITH THE ORIGIN (0,0) AT THE LOWER LEFT-HAND CORNER OF THE SCREEN. THUS, THE HORIZONTAL RANGE (X-AXIS) IS FROM 0 TO 255 AND THE VERTICAL (Y-AXIS) FROM 0 TO 191. EACH DOT CAN BE ACCESSED BY USING IT'S TWO COORDINATE VALUES (X,Y).

THESE ROUTINES UTILIZE THE BIT-MAP MODE OF THE TMS9918A VIDEO PROCESSOR. BECAUSE OF THE LARGE AMOUNT OF MEMORY THAT IS REQUIRED BY THE 9918A IN THIS MODE, AND THE OPERATION OF EXTENDED BASIC, A FEW COMPROMISES HAD TO BE MADE. YOUR PLOT OR GRAPH CAN ONLY BE VIEWED WITH THE 'SHOW' OR EDIT SUBPROGRAMS AND NO MORE THAN TWO FILES CAN BE OPEN AT ANY ONE TIME THROUGHOUT YOUR PROGRAMS. FOLLOWING ARE DESCRIPTIONS OF EACH SUBPROGRAM AND IT'S SYNTAX, PARAMETERS AND RESULTS.

GCLEAR- SUBPROGRAM

THIS SUBPROGRAM CLEARS THE GRAPHICS AREA AND MOVES THE 'PEN' TO THE ORIGIN (0,0) AT THE LOWER LEFT-HAND CORNER. THIS ROUTINE ALSO LOADS THE ASCII CHARACTER SET INTO MEMORY FOR USE IN THE LABEL SUBPROGRAM. THUS, THIS SHOULD ALWAYS BE USED BEFORE OTHER OF THE PLOTTING ROUTINES ARE CALLED.

SYNTAX: CALL LINK("GCLEAR")

MOVE- SUBPROGRAM

THIS COMMAND MOVES THE IMAGINARY 'PEN' FROM ITS PRESENT LOCATION TO THE LOCATION SPECIFIED WITHOUT DRAWING A LINE. THE LOCATION IS GIVEN IN THE PARAMETERS THAT ARE PASSED WITH THE SUBPROGRAM CALL.

SYNTAX: CALL LINK("MOVE", X-POSITION, Y-POSITION)
WHERE X AND Y ARE NUMERIC EXPRESSIONS OR VARIABLES.

NOTE: IF THE POINT SPECIFIED IN THE MOVE OR DRAW ROUTINES IS OFF THE SCREEN, THE 'PEN' MOVES OFF THE SCREEN BUT A LINE IS DRAWN ONLY TO THE EDGE OF THE SCREEN. ALTHOUGH THERE IS NO RISK OF DESTROYING DATA BY DRAWING OFF THE SCREEN, THERE ARE DANGERS OF NUMERIC OVERFLOW.

DRAW- SUBPROGRAM

THE DRAW COMMAND WILL MOVE THE 'PEN' AND DRAW A LINE FROM IT'S PRESENT LOCATION TO A POINT SPECIFIED IN THE PARAMETERS PASSED. THE RESTRICTIONS ARE THE SAME AS FOR THE MOVE COMMAND. (SEE NOTE ABOVE)

SYNTAX: CALL LINK("DRAW", X-POSITION, Y-POSITION)

LABEL- SUBPROGRAM

THIS COMMAND ALLOWS THE USER TO PLACE LABELS MADE UP OF ASCII CHARACTERS FROM 32 TO 127. THESE MAY BE THE STANDARD ASCII CHARACTERS OR OTHERS THAT HAVE BEEN DEFINED WITH THE CALL CHAR SUBPROGRAM PRIOR TO THE USE OF THE GCLEAR SUBPROGRAM. THE STRING IS PLACED STARTING AT THE CHARACTER BLOCK IN WHICH THE 'PEN' IS CURRENTLY LOCATED. THIS COMMAND DOES NOT ALTER THE 'PEN' POSITION.

SYNTAX: CALL LINK("LABEL", STRING-EXP)

SHOW- SUBPROGRAM

THIS COMMAND IS USED TO BRING THE PLOTS TO THE SCREEN. TO EXIT SIMPLY PRESS 'E'.
SYNTAX- CALL LINK("SHOW")

THE USE OF THIS AND THE FOLLOWING ROUTINES HAVE SOME LIMITATIONS AND RESTRICTIONS THAT SHOULD ALWAYS BE REMEMBERED:

1. THESE COMMANDS MUST NOT BE LOCATED WITHIN THE BOUNDS OF ANY SUBROUTINES OR SUBPROGRAMS. IF THIS HAPPENS AN ERROR MAY BE ISSUED.

2. THESE COMMANDS OVER-WRITE 12,000 BYTES OF UDP MEMORY. THEREFORE, THERE MAY BE A LOSS OF STRING DATA.

3. DUE TO THIS EXTENSIVE USE OF UDP MEMORY THERE IS ROOM FOR ONLY TWO I/O FILES TO BE OPEN AT ANY ONE TIME THROUGHOUT PROGRAM EXECUTION.

THESE ROUTINES HAVE SOME RESTRICTIONS, HOWEVER, THEY DO NOT ALTER THE PLOTTING AREA AND CAN BE USED IN THE COMMAND MODE. FOR EXAMPLE, AFTER A PROGRAM HAS RUN OR AT A BREAKPOINT.

EDIT- SUBPROGRAM

THIS ROUTINE LETS THE USER CHANGE THE PLOTTING AREA DIRECTLY WITH THE JOYSTICK AND THE KEYBOARD. WHEN THIS SUBPROGRAM IS CALLED A FLASHING DOT WILL APPEAR. THIS IS THE 'PEN'. THIS FLASHING DOT, WHICH IS A CURSOR OF SORTS, CAN BE MOVED IN ANY ONE OF EIGHT DIRECTIONS. IF YOU DESIRE TO DRAW A LINE WHILE MOVING, SIMPLY PRESS THE FIRE BUTTON ON THE REMOTE UNIT. THE KEYBOARD PLAYS AN IMPORTANT ROLE WHILE EDITTING BECAUSE THIS IS A FULL FUNCTION GRAPHICS EDITOR CAPABLE OF NOT ONLY DRAWING BUT ALSO ERASING. THE FOLLOWING ARE THE KEYS OF THE EDITOR AND THEIR USE:

'C'- THIS CLEARS THE PLOTTING SURFACE.

'W'- THIS IS THE WRITE/ERASE TOGGLE. WHEN THE USER ENTERS THE EDITOR THIS IS ALWAYS IN THE WRITE MODE. TO ENTER THE ERASE MODE PRESS 'W' AND USE THE JOYSTICK #1 AND FIRE BUTTON TO ERASE. TO RETURN TO THE WRITE MODE PRESS 'W' AGAIN. THUS, IT WILL CHANGE MODES EACH TIME 'W' IS PRESSED.

'M'- THIS KEY MARKS THE PRESENT POSITION OF THE CURSOR AND STORES IT AS THE FIRST POINT OF A LINE THAT MAY BE DRAWN USING THE 'D' KEY.

'D'- DRAWS A LINE FROM A PREVIOUSLY MARKED POINT (HAVING USED THE 'M' KEY) TO THE PRESENT CURSOR POSITION. THIS ALSO MARKS THE PRESENT POSITION IN ORDER TO DRAW CONNECTING LINES WITH EASE.

'L'- THIS COMMAND WILL DISPLAY A QUESTION MARK(?) AT THE CURRENT POSITION AND PERMIT THE USER TO ENTER ASCII CHARACTERS ONTO THE SCREEN. IN THIS MODE BOTH UPPER AND LOWER CASE ARE ACTIVE ALONG WITH THE RIGHT AND LEFT ARROW KEYS (FCTN-S, FCTN-D). WHEN YOUR LABEL IS COMPLETE SIMPLY PRESS ENTER TO RETURN TO THE EDITOR.

'F'- THIS KEY MAKES THE PEN MOVE FASTER.

'S'- THIS KEY RETURNS THE PEN TO IT NORMAL SPEED.

'E'- THIS KEY IS USED TO RETURN TO THE MAIN PROGRAM AND EXIT FROM THE EDITOR.

FIRE BUTTON- USE THE FIRE BUTTON TO DRAW OR ERASE LINES ON THE SCREEN. THIS IS ACHIEVED BY MOVING THE JOYSTICK CONTROLLER AND PRESSING THE FIRE BUTTON SIMULTANEOUSLY. MAKE SURE THAT THE ALPHA LOCK IS OFF SO THAT THE JOYSTICK UNIT OPERATES CORRECTLY.

BECAUSE OF THE SIMILARITY TO THE SHOW COMMAND, THE SAME RESTRICTIONS APPLY TO THE EDIT COMMAND. PLEASE READ THE NOTES CONTAINED IN THE DESCRIPTION OF THE SHOW COMMAND, THEY ARE VERY IMPORTANT.
SYNTAX: CALL LINK("EDIT")

GDUMP- UTILITY

THIS UTILITY SENDS YOUR PLOT TO A PRINTER VIA THE RS232 OR PIO PORTS. THE UTILITY UTILIZES THE DOT ADDRESSABLE GRAPHICS MODE OF YOUR PRINTER. IT IS DESIGNED TO WORK WITH THE TI IMPACT PRINTER OR ANOTHER COMPATIBLE PRINTER CAPABLE OF DOT-ADDRESSABLE GRAPHICS.

SYNTAX CALL LINK("GDUMP", "DEVICE")

THE DEVICE MUST BE A STRING EXPRESSION AND INCLUDE ALL THE SOFTWARE SWITCHES NECESSARY FOR THAT PARTICULAR DEVICE. FOR EXAMPLE "PIO" OR A\$, WHERE A\$ IS EQUAL TO "RS232.PA=0.DA=8.BA=9600"

GSAVE- UTILITY

THIS UTILITY PERMITS THE USER TO SAVE HIS PLOT TO THE DEVICE SPECIFIED. ON DISKETTES THE FILE WILL USE EXACTLY 25 SECTORS.

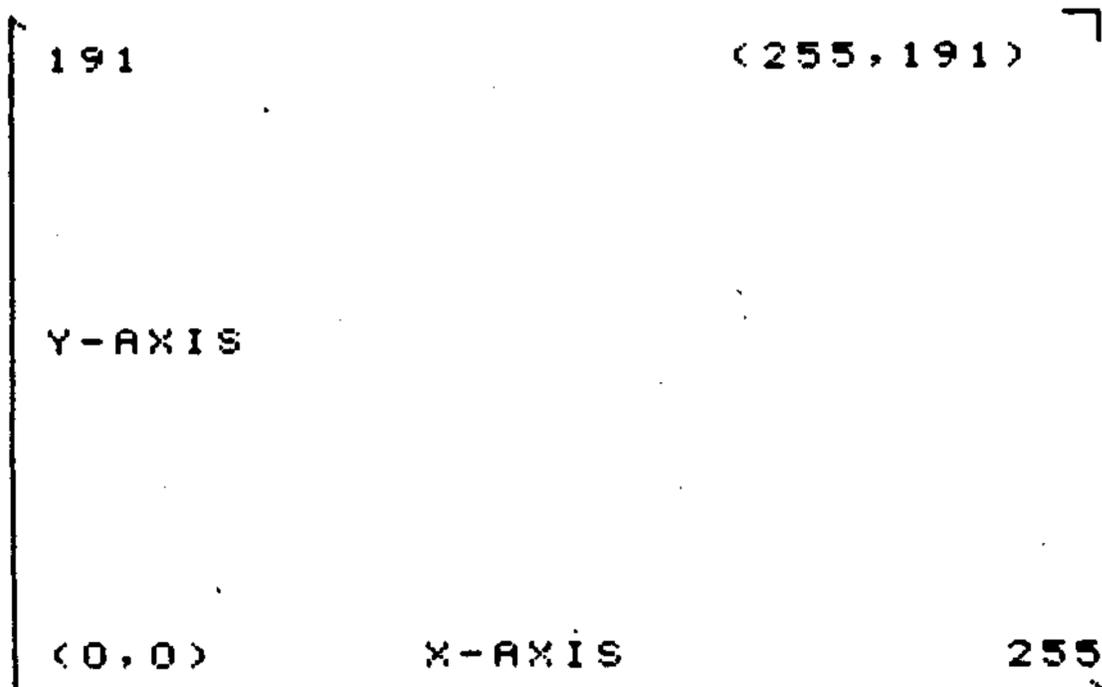
SYNTAX: CALL LINK("GSAVE", "DEVICE.FILENAME")

THE DEVICE MAY ALSO BE AN RS232 OR PIO PORT. THIS UTILITY MAY BE USED TO TRANSFER THE DIRECT PLOTTING DATA TO ANOTHER DEVICE VIA THE RS232 PORT.

GLOAD- UTILITY

THIS UTILITY ALLOWS THE USER TO LOAD PREVIOUSLY SAVED PLOTS (SAVED WITH THE GSAVE UTILITY).

SYNTAX: CALL LINK("GLOAD", "DEVICE. FILENAME")



To draw a circle from your program or command mode:

Give the coordinates of the center and the radius using the following syntax:

```
CALL LINK("CIRCLE",X,Y,R)
```

The center of the circle will be located at the point (X,Y), where X and Y are numeric expressions. The circle will have a radius of R. The radius must be a numeric expression not equal to zero and have an absolute value less than 128. If the radius is zero or more than 127, the pen will be moved to the center coordinates. Otherwise, a circle will be drawn and the pen will be moved to the center coordinates. NOTE: A circle that is centered off the screen may have unpredictable results.

To draw a circle in the Edit mode:

Move the cursor to the desired center of the circle. Press "M" (or the joystick fire button) to mark the spot. Move the cursor horizontally to the desired radius. Press "O" (the letter oh, not zero). The circle will be drawn very quickly and the cursor returned to the center of the circle. If the radius is larger than 127 pixels (dots), the circle will not be drawn, but the cursor will be returned to the center position.

To draw a square from your program or the command mode:

Use the following command:

```
CALL LINK("SQUARE",X,Y,S)
```

where the variables X and Y are the lower left hand corner of the square, and S is the length of a side. After the square is drawn, the pen will be returned to the position (X,Y). The maximum length side is 256 pixels (dots).

To draw a square in the Edit mode:

Move the cursor to the position desired for the lower left hand corner of the square. Press "M" or the fire button to mark that spot. Move the cursor to the right for the length of a side. Press "B" (for Box). A perfect square will be drawn instantly and the cursor will be returned to the lower left hand corner.

Error messages

If an I/O error occurs during GLOAD, GSAVE, or GDUMP, then the message "***I/O ERROR***" will appear at the bottom of the screen. This error message will be issued for the following types of file errors: BAD DEVICE NAME, DEVICE OR FILE WRITE PROTECTED, INCORRECT FILE ATTRIBUTES, INCORRECT OPEN MODE, DISK FULL, DEVICE ERROR, FILE ERROR.

If the error occurs during your program execution (i.e. not in command mode), the program will not be halted. Therefore, it is important to use a delay after these operations in order to visibly check the screen for an error message. When an error occurs, the image in memory is not altered. When the reason for the error is corrected, the operation can be repeated.

To load Draw 'N Plot (tm) into memory:

Plug in the Extended BASIC module. Turn on all power switches, console switch last. Insert Draw 'N Plot (tm) Program Disk in DSK1. From Master title screen, press any key. From Master Menu, press 2 for Extended BASIC. Draw 'N Plot (tm) will automatically load itself. Then follow the screen instructions.

FILL ROUTINE

This routine will fill a bounded area on the screen while in the edit mode of Draw 'N Plot. The fill routine will fill most convex objects (ie. square, circle, etc.) in one keystroke. In some instances the shape will not be completely filled. One example of this is the long slender triangle.

To invoke the FILL routine from the editor mode of Draw 'N Plot, simply position the cursor (flashing dot) inside of the object, then press the 'I' key. If the object is not completely filled, move the cursor to the unfilled portion of the object and press the 'I' key again. For concave objects (odd shaped) repeat the above process until the object is full.

To optimize the fill routine, always invoke it with the cursor in the center (center of area) of the object. This will insure the best coverage of the area.

The boundary of the object must be solid. The edges of the screen are considered to be boundaries. If the boundary is not closed, and the FILL routine is invoked, the result of the fill may be unpredictable.

NOTE: The larger the area is to be filled, the longer it will take for the fill routine to return control to the editor. As an example, to fill the entire blank screen (49,152 pixels) takes approximately 30 seconds.

\$225 IN PRIZES!

Contest for the best picture drawn with Draw 'N Plot (tm)!

First prize = \$100 worth of QUALITY 99 SOFTWARE software.

Second " = \$ 75 worth of QUALITY 99 SOFTWARE software.

Third " = \$ 50 worth of QUALITY 99 SOFTWARE software.

Entrants must be Registered Owners of Draw 'N Plot (tm). To enter, submit a printout of your picture, with your name, address, and home phone written on it. Entries must be postmarked by Jan. 31, 1985. Entries may be used in future promotions. Winning entries must submit a disk with the picture file on it. An independent computer expert will be the judge. Winners will be announced Feb. 28, 1985.

NOTES:

Do not use the SHOW, EDIT, GDUMP, GSAVE, or GLOAD routines in subroutines or subprograms.

The plot area takes 6,144 bytes of memory. Therefore, your program must not be larger than 17,000 bytes or the plot will overwrite your program.

To change the screen and line colors:

```
CALL LOAD(9483,SCREEN COLOR - 1)
CALL LOAD(10786,(PEN_COLOR - 1)*16)
```

For further examples, list and examine the DRAW and DEMO programs that are on the DATA disk.

(NOTE: The Program Disk cannot be cataloged, duplicated or written on.)
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