

MUL-T-SCREEN

by

VITOLD GORNICZ

CONTROL CODES

- 0 SET MODE 0
- 1 SET MODE 1
- 2 SET MODE 2
- 3 SET MODE 3
- 4 SET MODE 4
- 5 SET MODE 4 CONDENSED HORIZONTAL
- 6 SET MODE 4 CONDENSED VERTICAL
- 7-N DEFINE LIMITED SCREEN N
- 8 BACKSPACE
- 9-N GO TO DEFINED SCREEN N
- 10 SET COLORS ACCORDING TO COLORf,b
- 11 DELETE NEXT CLS
- 12 CLEAR TEXT SCREEN
- 13 CARRIAGE RETURN
- 14 END UNDERLINE
- 15 START UNDERLINE
- 16-F SET CHARACTER COLOR F
- 17-B SET BACKGROUND COLOR B
- 18-H SET CURSOR TO HORIZONTAL H
- 19-V SET CURSOR TO VERTICAL V
- 20-H1-V1-H2-V2 SET LIMITED SCREEN
- 21 SET CHARACTER SIZE 1
- 22 SET CHARACTER SIZE 2
- 23 SET CHARACTER SIZE 3
- 24 SET CHARACTER SIZE 4
- 25-0 NEGATIVE FULL SCREEN DUMP
- 25-1 POSITIVE FULL SCREEN DUMP
- 25-2 NEGATIVE MINI SCREEN DUMP
- 25-3 POSITIVE MINI SCREEN DUMP
- 26-L PRINTER HEAD LOCATION L\*4
- 27-0 SET REGULAR SCROLL TYPE
- 27-1 SET GRAPHIC SCROLL TYPE
- 28-D SET HORIZONTAL SCROLL DELAY
- 29-0 USE COLOR SET 0
- 29-1 USE COLOR SET 1
- 29-2 USE COLOR SET 1 SPECIAL CASE
- 30-0 TRACE DELAY OFF
- 30-1 TRACE DELAY ON
- 31-0 PRINTER OFF
- 31-1 PRINTER ON



ANY SIZE  
COLORFUL  
PRINT SCREEN  
FOR THE  
TRS-80®  
COLOR COMPUTER

## WELCOME TO MUL-T-SCREEN.

This pamphlet will explain the many uses of MUL-T-SCREEN. Once you become familiar with the control codes of MUL-T-SCREEN you can start writing programs that will look better and are much easier to read.

MUL-T-SCREEN will run all programs requiring the printing of characters CHR\$(32) to CHR\$(127). It will not however run programs that require printing of characters higher than CHR\$(127) or programs using SET(H,V) to set points on the regular text screen. (If you have EXTENDED BASIC, the PSET(H,V) command is not effected).

## LOADING MUL-T-SCREEN

The first thing on your TAPE or DISK is a basic program called "ENTER". For most applications you can use this program. Simply LOAD it and RUN it. It will figure out whether you have BASIC or EXTENDED BASIC, it will CLEAR the necessary memory for the program & the video memory, it will load MUL-T-SCREEN, adjust the video page if necessary & finally EXECute the program. You will end up in MUL=T=SCREEN.

If you do not have EXTENDED BASIC you might want to read the COLOR BASIC section on page 13 before continuing. MUL-T-SCREEN recognizes characters 0-31 as CONTROL characters. Each control character has a special purpose. To send a control character to MUL-T-SCREEN it must be in the CHR\$ FORMAT. Try,

```
PRINT CHR$(24);
```

This will change the character size to 4.

## MODES

MUL-T-SCREEN has 5 modes that correspond with the modes of your EXTENDED BASIC COLOR COMPUTER. Usually you will have EXTENDED COLOR BASIC and MUL-T-SCREEN in the same mode. You can however have MUL-T-SCREEN in one mode while EXTENDED BASIC is in another. This can create many special effects. One is

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INCENTIVE SOFTWARE  
P.O. BOX 323  
STATION B  
LONDON ONTARIO  
CANADA N6A 4W1

these effects is obtaining 4 colors in the high resolution MODE 4. The result of this is demonstrated in SAMPLE-1 program supplied with MUL-T-SCREEN.

MUL-T-SCREEN has two additional MODES 5&6 which are variations of MODE 4. These are the horizontal and vertical condensed screen modes. While in these modes only one character size is available. An attempt to change sizes while in these modes will be disregarded by MUL-T-SCREEN. You can however mix this size with any or all of the sizes of MODE 4. This will be explained later.

Every time you change modes the screen will be cleared automatically. To avoid this use CHR\$(11). This will be discussed later. Try,

```
PRINTCHR$(3);
```

This will go into MODE 3.

SCREEN CAPACITY TABLE

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
MODE 0	16*8	16*4	8*8	8*4
MODE 1	32*8	32*4	16*8	16*4
MODE 2	16*16	16*8	8*16	8*8
MODE 3	32*16	32*8	16*16	16*8
MODE 4	32*16	32*8	16*16	16*8
MODE 5	42*24	-	-	-
MODE 6	32*32	-	-	-

CHARACTER SIZES

MUL-T-SCREEN provides 4 sizes of characters in each of the 5 BASIC MODES. To change the size use codes 21 to 24. To use size 3,

```
PRINTCHR$(23);
```

These sizes do not correspond to each other from mode to mode. Therefore SIZE 1 in MODE 2 is larger than SIZE 1 in MODE 4. MODE 0 provides the largest characters while MODE 4 the smallest. This is all shown in the table. In all 10 different sizes of characters are available. Some sizes in some modes become stretched and might not find much use (MODE1 SIZE2). But there is always other more attractive sizes to chose from.

Each time you change sizes the screen is cleared automatically. Avoiding this is explained below.

DELETE CLS

Sometimes you will want to change modes or sizes without clearing what you already have on the screen.

MUL-T-SCREEN provides a code for this purpose.

```
PRINTCHR$(11)+CHR$(4);
```

This will go into MODE 4 without clearing the screen. If changing both mode and character size,

```
PRINTCHR$(11)+CHR$(11)+CHR$(3)+CHR$(23);
```

For every CHR\$(11), one clearing of the screen is deleted. This can be the automatic clear when changing modes or sizes or it can be the CLS, PRINTCHR\$(12) commands or the pressing of the [CLEAR] button. If you were to PRINT CHR\$(11) ten times then you would need 11 attempts to clear the screen before the screen would clear.

SETTING COLORS

MUL-T-SCREEN has two ways of choosing the colors you will be using.

```
PRINTCHR$(10);
```

This will set the MUL-T-SCREEN colors the same as the EXTENDED BASIC foreground and background colors

set by the COLORf,b command. If however you want to use other colors or if you don't have EXTENDED BASIC, you will want to use the second method. To set the character or foreground color,

```
PRINTCHR$(16)+CHR$(F);
```

Where F is 0-3 in MODES 1&3 or 0-1 in the other modes. To change the background color,

```
PRINTCHR$(17)+CHR$(B);
```

Where B is 0-3 in modes 1&3 or 0-1 in the other modes. In all two color modes (0/2/4) the foreground is reset automatically to the other color when a background color is chosen. In the color modes you have to be careful not to set the foreground and background to the same color. If this is done you will not be able to see any printing. The computer is still operating though and is still executing all commands so if you type very carefully you can correct this situation. The simplest way is to go into one of the 2 color modes.

```
PRINTCHR$(4);
```

Since this mode will adjust the foreground color opposite that of the background color.

### UNDERLINE

Underlining is available in all sizes and modes except the condensed MODES 5&6.

```
PRINTCHR$(15); - to start underlining
```

```
PRINTCHR$(14); - to end underlining
```

### CURSOR CONTROL

The PRINT@ and PRINTTAB commands are fully operational and all programs using them will run normally in MODES 3&4 using character SIZE 1. You can

also use PRINT@ for other modes and sizes but since all screens are different the method described below might be a lot easier to use. MUL-T-SCREEN recognizes PRINT@ up to 511. Since the condensed screens 5&6 require a higher control it is better to use this second method. To set cursor horizontal position,

```
PRINTCHR$(18)+CHR$(H);
```

This will set the horizontal position at H. The PRINTTAB command can be used to accomplish the same task but it will not always operate properly when used on the condensed MODE 5 since the line length is longer than 32. To set the vertical position,

```
PRINTCHR$(19)+CHR$(V);
```

Do not forget the semicolon in these cases. If you do a carriage return will follow your instruction and you will find yourself in the next line. It is a good idea to follow all codes sent to MUL-T-SCREEN by the semicolon since a carriage return is usually not required and sometimes hazardous.

Cursor control has priority over the limited screen described later. For example, if using the bottom half of the screen for text, MUL-T-SCREEN receives a PRINT@0, command. It will start printing @0 and continue from there until its back in the limited screen. This can be used to print a score or time at a specified location but one must remember to return to the text screen after doing so.

### LIMITED SCREENS

Your text screen can be limited anywhere from a single character to the entire screen. The limited text screen can be anywhere on the screen; top; bottom; side; corner; or in the middle. To set a limited screen,

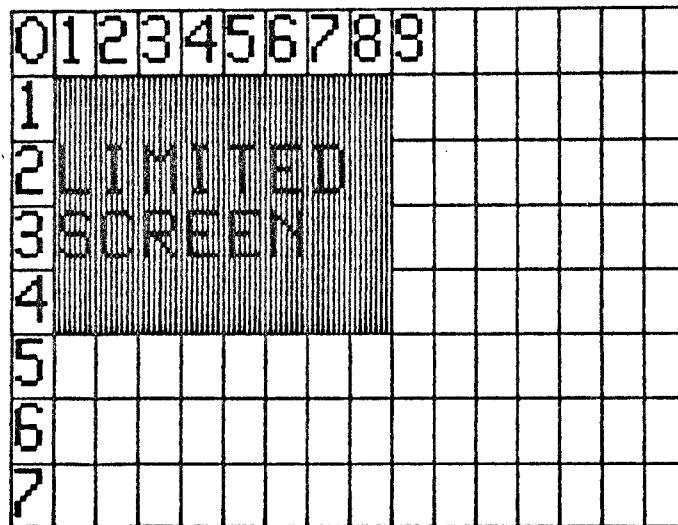
```
PRINTCHR$(20)+CHR$(H1)+CHR$(V1)+  
CHR$(H2)+CHR$(V2);
```

The top left character position is represented by

(H1,V1). the bottom right character position is represented by (H2,V2). While in MODE 4 SIZE 4,

```
PRINTCHR$(20)+CHR$(1)+CHR$(1)+CHR$(8)+CHR$(4);
```

This will result in a screen limited to the shaded area on the diagram below. This screen will be cancelled if you change modes or sizes.



### DEFINED SCREENS

If you want to use more than one limited screen you can have them defined. This will allow you to jump between these screens very easily. To define a screen,

```
PRINTCHR$(7)+CHR$(N); (Use 1 for N)
```

Where N is the screen number. MUL-T-SCREEN will save all the variables of that screen including the colors you are using. The cursor position will also be saved. This will be updated when you leave this screen

to go to another limited screen. The cursor position will not be updated if you cancel the limited screen by changing modes or sizes. Still you can come back to this limited screen anytime as long as you have not re-defined it and are in the same mode the screen was set in. Now you can define a 2nd screen.

```
PRINTCHR$(20)+CHR$(10)+CHR$(1)+CHR$(15)+CHR$(7);
PRINTCHR$(7)+CHR$(2);
```

Now we are in the second limited screen. To return to the first screen simply,

```
PRINTCHR$(9)+CHR$(1);
```

Now we will look at a special case. The 1 line screen.

```
PRINTCHR$(20)+CHR$(1)+CHR$(7)+CHR$(14)+CHR$(7);
PRINTCHR$(9)+CHR$(3);
```

While in this limited screen you will notice that the screen scrolls horizontally when you reach the end of the line. Also the lines are divided by a "|" every time a carriage return is needed. Try a few simple exercises to see this. Now practice jumping between all three limited screens.

You can define up to 4 limited screens in any size and mode. Use 0-3 to define screens. In order to jump from one limited screen to another they have to be in the same mode. Here MODE-4 and condensed MODES 5&6 are considered the same. The character size and colors do not have to match in all defined screens. This is shown in SAMPLE-1 basic program.

### HORIZONTAL SCROLL DELAY

When using a 1 line limited screen you might want to insert a horizontal scroll delay. On startup this delay is set to zero. The horizontal scroll delay operates whenever the width of a character is more than one byte. This is true for all character SIZES 3&4. To set a delay,

```
PRINTCHR$(28)+CHR$(0);
```

Where  $D*.0028\text{sec.}$  is the delay. This will cause a slight delay after scrolling the first byte and before scrolling the second byte. The result is a smoother and less jumpy scroll. The delay can also be used to control the speed of the scrolling. When used on a one line screen the delay delays the execution of the entire program.

### SCREEN DUMP

MUL-T-SCREEN provides a mini screen dump for MODES 0-4. To get a positive screen dump,

```
PRINTCHR$(25)+CHR$(3);
```

To get a negative screen dump,

```
PRINTCHR$(25)+CHR$(2);
```

If you wish to change the horizontal location of the screen dump,

```
PRINTCHR$(26)+CHR$(L);
```

Where L is the horizontal offset. The printer head will be adjusted to the  $(L*4)$  dot location. Be careful not to make L too large or you might end up with a broken-up screen dump. After you change the head position it will remain changed until you reset it. Depending on your printer the screen dump will be approximately  $3\frac{1}{2} * 2\frac{1}{2}$  inches.

If your printer provides condensed characters, printing at least 512 dots per row in the graphic mode, you can get a full size screen dump of modes 2 3 and 4. To get a positive screen dump,

```
PRINTCHR$(25)+CHR$(1);
```

To get a negative screen dump,

```
PRINTCHR$(25)+CHR$(0);
```

Once a screen dump has been started there is no way to interrupt it until it is finished.

### SCROLL & RETURN SELECTION

MUL-T-SCREEN has two ways of scroll and return. This has nothing to do with the horizontal scrolling of one line screens.

First we have the regular scroll. This is the scroll that scrolls and returns the same way that BASIC does. When running already written programs you will want to use this scroll. MUL-T-SCREEN goes to this scroll on startup. If you have changed the scroll and want to return to the regular scroll,

```
PRINTCHR$(27)+CHR$(0);
```

Then we have the graphics scroll. It is called graphic because it is more useful when doing graphic applications. It differs from the regular scroll in two ways, the scrolling and the return.

When a carriage return is encountered the graphic scroll will jump immediately to the next line. In the regular scroll a "space" is printed until you reach the next line. This erases everything that might have been in the remainder of that line. This is not always desirable.

Secondly the regular scroll scrolls the screen as soon as something is printed in the last print location. When doing graphics this means that the screen will run away on you. This is why we have the graphics scroll. It will not scroll when something is printed at the last print location until something else is to be printed afterward. Try doing this while in the regular scroll,

```
PRINT@511,"M";PRINT@64,"M"
```

You will notice that the screen scrolled. If you missed it try it again. Now go into the graphics scroll,

```
PRINTCHR$(27)+CHR$(1);
```

And after doing so try the same thing again. The screen did not scroll. Note that after printing @511 we jumped back on the screen. If we had not the screen would have scrolled in order to provide a space for the cursor.

Neither of the scroll types is superior to the other. Their use will depend entirely on the application.

### COLOR SET

You must chose between one of two color sets depending on the colors you want to use. On startup color set 0 is used. To set color set 1,

```
PRINTCHR$(29)+CHR$(1);
```

MUL-T-SCREEN will default to this set whenever you shange modes or sizes.

In EXTENDED BASIC you can temporarily change the color set with the SCREEN command. MUL-T-SCREEN will return to the original color set on the next SIZE or MODE change.

### TRACE DELAY

MUL-T-SCREEN has a special trace delay to help you debug your graphic programs. To operate this delay the TRACE must be on.

```
TRON:PRINTCHR$(30)+CHR$(1);
```

For best results you should also limit your text to one corner of the screen. There you will see each line number that is being executed. The rest of the screen shows you the graphic results of your program.

If the delay is on you will need to press a key before the execution of each line. If you have an INKEY\$ loop in the program you will have to press a key twice very fast in order to break out of this loop. If you are unable to do this, pressing the [BREAK] key will cancel the delay. Turn off the TRACE DELAY when you are not using it.

### PRINTER CONTROL

With MUL-T-SCREEN you can output all characters to the printer that were meant for the screen. This can be used for many applications. One of which is getting a printout of your disk or tape directory. For a disk,

```
PRINTCHR$(31)+CHR$(1);  
DIR:PRINTCHR$(31)+CHR$(0);
```

For a tape,

```
PRINTCHR$(31)+CHR$(1);FORX=1TO10:  
SKIPF:NEXTX:PRINTCHR$(31)+CHR$(0);
```

All characters output to the screen are output to the printer as well. Note that a CLS will not result in a paper feed but a carriage return instead. This has been included to to avoid wasting paper. You can still get a paper feed by PRINT#-2,CHR\$(12);. In fact all the characters sent to the printer are still operating as they were before. They will not appear on your screen.

Note that in the directories above we turned the printer on and off all in one line. This was to prevent other unwanted material from appearing on the printout. If you were to simply turn the printer on, everything would be output to the printer even each pressing of a key on the keyboard. This will act much like a typewriter but note that a backspace might erase a character on the screen, but it will not erase one on paper.

### COLOR BASIC

If you do not have EXTENDED BASIC don't worry. MUL-T-SCREEN was written with you in mind. The only thing that won't work for you is the TRACE CONTROL. Everything else has been prepared so that one way or another you can get full results from MUL-T-SCREEN. The MODES mentioned in this pamphlet are similar to the ones you are more familiar with. Here is a rundown of these modes.



MODE 0 = MODE G2R  
MODE 1 = MODE G3C  
MODE 2 = MODE G3R  
MODE 3 = MODE G6C  
MODE 4 = MODE G6R

Although we mention a mode 5&6 in this pamphlet they are really variations of MODE 4.

### SHORT ON MEMORY?

If you are running out of memory for your main program (especially 16K owners) there is a couple of ways to solve this problem. You will not however get something for nothing. If you give up the use of MODES 3&4 you can reclaim 3k of memory. You do this after entering MUL-T-SCREEN. First go into MODE 2. Then,

```
PRINTCHR$(29)+CHR$(22);
```

This will lock MUL-T-SCREEN to prevent you from going into MODES 3&4 accidentally. If you did you might have lost the program you were working on. The second step will depend on your computer. If you have EXTENDED BASIC simply,

```
PCLEAR2
```

If you have BASIC the method is a little more complicated. For 16K basic,

```
POKE&H7C95,34:PRINTCHR$(2);  
CLEAR200,8703
```

If you have 32K basic,

```
POKE&H7C95,98:PRINTCHR$(2);  
CLEAR200,25087
```

Another way to save some memory is to give up the condensed screens. Do this only if you have EXTENDED BASIC. This is done by clearing away the character table for these characters. For 16K computers,

```
CLEAR200,12260
```

For 32K computers,

```
CLEAR200,28644
```

If after doing this you try to use the condensed screens you might end up with garbage instead of characters. This procedure will save you 485 BYTES.

### ET CETERA

-MUL-T-SCREEN is relocatable but must be relocated by a multiple of 256 BYTES to satisfy direct page requirements. To relocate it use an offset when loading. The PEEK & POKE method will not work.

-For those of you who want to use MUL-T-SCREEN for word processing. The horizontal cursor location is at \$3C85 (16K) or \$7C85 (32K). The vertical cursor location is at \$3C86 (16K) or \$7C86 (32K).

-The VIDEO PAGE location is in BYTES \$3C95-3C96 (16K) or \$7C95-\$7C96 (32K).

-POKING \$3C96 (16K) or &7C96 (32K) with 1 will move SIZE 3&4 characters 1/2 character to the right. This can be used for centering. Be sure to POKE these locations with 0 before clearing the screen or reaching the last line.

-The GRAPHIC scroll is faster than the REGULAR scroll. Use it when writing programs. A listing of the program will run through a lot faster.

-The program uses a total of 4.5K (4.5\*1024) BYTES. The first 485 bytes are the character table for the condensed screens. The last 873 bytes are the character table for all the other screens. The shape of SIZE 1&2 characters is synthesized from the corresponding larger characters. That is why some of the shapes are irregular.

-If you change the shapes of the characters or replace them with graphic characters the changes must be stored as a separate machine language program and loaded after MUL-T-SCREEN has been loaded.

-The SCREEN DUMPS will dump the screen as MUL-T-SCREEN sees it. If you have used the PMODE & SCREEN commands to change the screens appearance you might not get what you have on the screen.

-IF YOU REQUIRE ANY ADDITIONAL INFORMATION, WRITE "INCENTIVE SOFTWARE" INCLUDING \$1 FOR POSTAGE AND HANDLING.

## INPUT/OUTPUT MENU

IF YOU WISH TO LOAD A FILE THAT YOU WANT TO MODIFY PRESS "L". IF THERE HAS BEEN NO INPUT OF A FILENAME, YOU WILL BE ASKED FOR ONE. AFTER YOU HAVE NAMED THE FILE YOU WILL HAVE TO PRESS "L" AGAIN. YOU WILL GET THE "SURE?" PROMPT. ENTER "Y" IF YOU ARE BUT REMEMBER THAT THE CHARACTER SET PREVIOUSLY IN MEMORY WILL BE DESTROYED. ALSO BE SURE THAT THE FILE YOU ARE LOADING WAS CREATED AT THE SAME MEMORY LOCATION THAT MUL-T-SCREEN NOW OCCUPIES. OTHERWISE YOU WILL NEED TO SPECIFY AN OFFSET. THIS WILL BE DISCUSSED LATER.

IF YOU WISH TO SAVE A CHARACTER SET PRESS "S". AGAIN IF THERE IS NO FILENAME YOU WILL BE ASKED TO ENTER ONE. THEN YOU CAN PRESS "S" AGAIN TO SAVE IT. AGAIN YOU WILL BE ASKED IF YOU ARE SURE?. KEEP IN MIND THAT IF A FILE WITH THE SAME NAME AS YOU ARE SAVING IS ON THE DISK, IT WILL BE ERASED AND REPLACED WITH THE NEW FILE.

PRESS "F" TO INPUT OR CHANGE A FILENAME.

PRESS "R" TO RETURN TO THE EDITOR.

YOU CAN SPECIFY THE CHARACTER SET THAT YOU WANT TO SAVE. UNLESS YOU CHANGE THIS ONLY THE GRAPHIC SET WILL BE SAVED. PRESS "1" TO SAVE JUST THE GRAPHIC CHARACTERS". PRESS "3" TO SAVE THE TEXT CHARACTERS. OR PRESS "2" TO SAVE ALL THE CHARACTERS.

IF THE FILE YOU WANT TO LOAD WAS NOT IN THE SAME MEMORY AS MUL-T-SCREEN NOW OCCUPIES YOU WILL REQUIRE AN OFFSET TO LOAD THE FILE.

- IF MUL-T-SCREEN IS NOW ON TOP OF 64K ROM, AND THE FILE WAS CREATED ON A 32K COMPUTER OR A 64K BUT MUL-T-SCREEN WAS NOT ON TOP OF ROM INPUT AN OFFSET OF 32512. IF YOU HAVE JUST UPGRADED TO 64K AND WISH TO RELOCATE ALL OF YOUR FILES USE THE SAME OFFSET. AFTER ENTERING THE OFFSET ENTER THE FILENAME. THEN LOAD IT AND SAVE IT. THE OLD FILE WILL BE DESTROYED AND REPLACED WITH A NEW 64K VERSION. IF YOU HAVE MORE FILES CHANGE THE FILENAME AND AGAIN LOAD IT AND SAVE IT FOR AS MANY FILES AS YOU WANT TO CHANGE.

- IF A FILE CREATED IN THE 64K MODE NEEDS TO BE BROUGHT DOWN TO THE 32K SIZE MEMORY USE AN OFFSET OF 33024. NORMALLY YOU WILL NOT NEED THIS UNLESS YOU HAVE A 64K COMPUTER AND YOU WANT TO COPY A FILE FOR A FRIEND WHO HAS ONLY 32K.

TO LOAD A CHARACTER SET YOU DO NOT HAVE TO USE THE CHARACTER GENERATING PROGRAM. SIMPLY LOAD THE MACHINE CODE FILE DIRECTLY.

eg. LOADM"FILENAME" or LOADM"FILENAME",OFFSET

IF AN OFFSET IS REQUIRED USE THE SAME ONES MENTIONED EARLIER.

## SAMPLE-4 PROGRAM

THE SAMPLE-4 PROGRAM IS A SIMPLE SPACE GAME THAT SHOWS HOW EASILY GRAPHICS CAN BE USED WITH MUL-T-SCREEN. TO RUN THE PROGRAM YOU REQUIRE A MINIMUM OF 32K AND ONE JOYSTICK. FIRST FIRE UP MUL-T-SCREEN. WITH 64K COMPUTERS PRESS "T" WHEN ASKED IN THE ENTER PROGRAM TO LOAD MUL-T-SCREEN ON TOP OF ROM. FOR 32K COMPUTERS PRESS "Y" WHEN ASKED TO LOAD MUL-T-SCREEN WITH THE FULL CHARACTER SET. AFTER YOUR COMPUTER IS IN MUL-T-SCREEN SIMPLY RUN "SAMPLE-4". THE GAME WILL START AS SOON AS THE PROGRAM IS LOADED. THE OBJECT OF THE GAME IS TO SHOOT DOWN AS MANY ENEMY SHIPS AS POSSIBLE. THE FASTER YOU SHOOT THEM DOWN THE MORE POINTS YOU GET. IF YOU SHOOT AND MISS ONE YOU ARE PENALIZED 10 POINTS. IF ONE MANAGES TO REACH THE BOTTOM OF THE SCREEN YOU ARE PENALIZED 100 POINTS. THE GAME IS OVER AS SOON AS THE TIME RUNS OUT. ALTHOUGH THIS IS A SIMPLE GAME IT SHOWS HOW MUL-T-SCREEN CAN BE USED TO IMPROVE THE SPEED OF GRAPHICS AND ALLOW YOU TO EASILY MIX GRAPHICS AND TEXT ON ONE SCREEN. IF YOU LIST THE PROGRAM YOU WILL NOTICE THAT IT CONTAINS EXTENSIVE REMARKS THAT WILL HELP YOU UNDERSTAND IT'S OPERATION. NOTE THAT THE VIDEO START PAGE HAS BEEN ALTERED AND THE AUTOMATIC MEMORY RESET DISABLED IN ORDER TO MOVE THE ENEMY SHIP 1/2 LINE AT A TIME. BECAUSE OF THIS IF YOU BREAK THE PROGRAM BEFORE IT IS FINISHED YOU MIGHT END UP WITH THE COMPUTER HANGING UP ON YOU. ALSO IF THE LEVEL OF PLAY IS TOO DIFFICULT FOR YOU YOU CAN SLOW DOWN THE PROGRAM BY PRESSING "SPACEBAR" AS MANY TIMES AS YOU WISH TO OBTAIN THE SPEED YOU WISH.

## NEW FEATURES

SOME NEW FEATURES HAVE BEEN ADDED TO THE DISK VERSION OF MUL-T-SCREEN. FIRST THE "ENTER" PROGRAM NOW RECOGNIZES 64K COMPUTERS AND IF YOU WISH WILL LOAD MUL-T-SCREEN ON TOP OF ROM. THIS WILL ALLOW FOR THE FULL 224 CHARACTER SET AND WILL SAVE MEMORY SPACE. ALSO IF YOU HAVE 32K YOU CAN IF YOU WISH USE THE FULL 224 CHARACTER SET. TO DO SO PRESS "Y" WHEN ASKED IN THE "ENTER" PROGRAM. NOTE THAT THE MEMORY LOCATIONS ON PAGES 14 AND 15 IN THE INSTRUCTION BOOKLET WILL CHANGE UNDER BOTH OF THESE CONDITIONS. IF YOU HAVE 32K AND ARE USING THE FULL CHARACTER SET DECREASE ALL MEMORY LOCATIONS BY &H520. IF YOU HAVE 64K AND HAVE LOADED ON TOP OF ROM INCREASE ALL 32K LOCATIONS BY &H7A00.

ANOTHER IMPORTANT ADDITION TO MUL-T-SCREEN IS A CHARACTER GENERATOR. IT'S OPERATION IS EXPLAINED BELOW. THERE IS ALSO A SHORT GRAPHICS PROGRAM "SAMPLE-4" THAT SHOWS HOW MUL-T-SCREEN CAN BE USED FOR GRAPHICS. THE LOWER CASE CHARACTER SET HAS ALSO BEEN MODIFIED TO PROVIDE BETTER SPACING.

### CHARACTER GENERATOR & EDITOR

BEFORE RUNNING THE CHARACTER GENERATOR, YOUR COMPUTER MUST BE IN THE MUL-T-SCREEN MODE. FIRST RUN "ENTER". TO USE THE GENERATOR YOU MUST HAVE AT LEAST 32K. FOR 32K PRESS "Y" TO LOAD THE ENTIRE CHARACTER SET. IF YOU HAVE 64K PRESS "T" TO LOAD MUL-T-SCREEN ON TOP OF ROM. NOTE THAT FILES SAVED IN THE 32 AND 64K MODES ARE NOT INTERCHANGEABLE. THE EDITOR DOES HOWEVER PROVIDE AN OFFSET SO YOU CAN TRANSFER THESE FILES. THIS WILL BE DISCUSSED LATER. AFTER YOU HAVE ENTERED MUL-T-SCREEN RUN "C". YOU WILL BE IN THE CHARACTER GENERATOR PROGRAM.

#### INPUT CHARACTER

YOU WILL FIRST BE ASKED FOR THE CHARACTER YOU WISH TO GENERATE OR EDIT. THERE IS A FEW WAYS IN WHICH YOU CAN DO THAT. IF YOU PRESS "A" YOU CAN ENTER THE ASCII CODE OF THE CHARACTER. IF YOU PRESS "K" YOU CAN ENTER A CHARACTER OFF THE KEYBOARD. IF YOU HAVE ALREADY GENERATED A CHARACTER YOU CAN GO TO THE NEXT HIGHER OR LOWER CHARACTER BY USING THE UP/DOWN ARROWS. AFTER A CHARACTER HAS BEEN SELECTED YOU WILL SEE THE CHARACTER YOU ARE WORKING ON, ON THE BOTTOM OF THE SCREEN ALONG WITH IT'S PRESENT APPEARANCE. THEN YOU WILL ENTER THE EDIT MODE.

#### EDIT MODE

ONCE IN THE EDIT MODE KEEP IN MIND THAT THIS PROGRAM HAS BEEN WRITTEN IN BASIC AND WILL TAKE A FEW SECONDS TO GENERATE EACH CHARACTER. DO NOT INPUT ANY COMMANDS UNTIL YOU SEE THE CURSOR FLASHING. IN A FEW SECONDS YOU WILL SEE ON THE RIGHT SIDE OF THE SCREEN A LARGE VERSION OF THE CHARACTER YOU ARE WORKING ON. BELOW THE CHARACTER A RECTANGULAR BOX SHOWS THE STATE OF THE PIXEL THAT IS FLASHING.

TO MOVE THE CURSOR USE THE ARROWS ON YOUR KEYBOARD.

TO SET A PIXEL PRESS "S".

PRESSING "D" WILL ALLOW YOU TO SET EVERY PIXEL YOU PASS OVER. IF YOU HAVE A LOT OF DRAWING THIS CAN SAVE YOU A LOT OF TIME SINCE YOU WILL NOT HAVE TO PRESS "S" TO SET EVERY PIXEL.

PRESSING THE "SPACEBAR" WILL RESET THE PIXEL AND TURN OFF THE DRAW COMMAND.

PRESSING "CLEAR" WILL ERASE THE CHANGES YOU HAVE MADE AND REDRAW THE ORIGINAL CHARACTER. THIS WILL REQUIRE A FEW SECONDS.

PRESSING "C" WILL CLEAR ALL PIXELS SO YOU CAN START WORKING FROM A CLEAN SURFACE.

PRESSING "ENTER" RECORDS THE NEWLY GENERATED CHARACTER.

IF YOU ARE FINISHED WITH A CHARACTER AND WISH TO GO TO ANOTHER PRESS "N".

IF YOU HAVE A CHARACTER THAT IS SIMILAR TO THE ONE YOU WANT TO GENERATE YOU CAN PRESS "K" TO COPY THAT CHARACTER. AFTER DOING SO YOU WILL BE ASKED FOR THE ASCII CODE OF THE CHARACTER YOU WISH TO COPY. AFTER ENTERING A NUMBER THE CHARACTER WILL BE REPLACED AND YOU CAN CONTINUE TO MAKE ADJUSTMENTS TO THE CHARACTER.

PRESSING "I" WILL PUT YOU IN THE INPUT/OUTPUT MENU.

## GEMINI SCREEN DUMP

YOUR VERSION OF MUL-T-SCREEN CONTAINS THE GEMINI SCREEN DUMP. IT'S OPERATION IS MUCH LIKE THE R/S DUMP EXPLAINED IN THE INSTRUCTION BOOKLET. THERE ARE HOWEVER A COUPLE OF DIFFERENCES YOU SHOULD BE AWARE OF.

1. THE FULL SIZE SCREEN DUMP REQUIRES THE GEMINI-15 or 15X PRINTER. THE GEMINI-10 and 10X WILL DO A FULL SIZE DUMP BUT THE RIGHT 1/16th OF THE DUMP WILL NOT BE PRINTED. ON THE REGULAR 32 COLUMN SCREEN THIS MEANS THAT THE LAST TWO COLUMNS WILL NOT APPEAR ON THE SCREEN DUMP.
2. TO SET THE LEFT MARGIN USE ESC"M"n BEFORE DOING THE SCREEN DUMP. CHR#(26) & THE CODE THAT FOLLOWS IT ARE OMITTED BY MUL-T-SCREEN.
3. THE SCREEN DUMP CAN NOW BE INTERRUPTED BY USING THE [BREAK] KEY. THE DUMP WILL STOP ON THE COMPLETION OF THE NEXT LINE.

THE SCREEN DUMP USES THE HIGH RESOLUTION GRAPHIC CAPABILITIES OF YOUR PRINTER. BECAUSE OF THIS AND THE LARGE AMOUNT OF DATA TO BE TRANSMITTED USING THE SLOW SERIAL INTERFACE, THE MINI SCREEN DUMP REQUIRES ABOUT 5 MINUTES. YOU CAN HOWEVER SPEED THINGS UP BY INCREASING THE BAUD RATE OF THE SERIAL TO PARALLEL CONVERTER.

TO TRANSMIT AT 1200 BAUD - POKE150,41  
TO TRANSMIT AT 2400 BAUD - POKE150,18  
TO TRANSMIT AT 9600 BAUD - POKE150,1