GRAPHIC GENERATOR™

GRAPHIC GENERATOR™
By Mark Riley

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INTRODUCTION

This manual assumes the reader is somewhat familiar with the Atari® computer graphic system. Excellent information describing character graphics may be found in any one of the following sources: De Re Atari, the Atari BASIC Manual or the Atari Operating System and Hardware Manual. Popular computer magazines (Creative Computing, Compute and Antic) are also good sources of information.

GRAPHIC GENERATOR was designed to help the Atari programmer generate and use character sets in his own BASIC or machine language programs. The Atari computer comes with one character set already defined in its internal ROM. GRAPHIC GENERATOR allows you to modify this set or start off with an entirely new set of your own. GRAPHIC GENERATOR will give you access to the full power of Atari's character graphics. You can create specialized character sets for such applications as scientific notation, mathematical representation, exotic computer languages (such as APL), foreign language interpreters, and best of all, visual arcade games. Up to five character sets may be edited at the same time in a 48K machine. Groups of characters may be edited as one unit (called a "matrix"), for larger pictures. Individual character sets may be saved to or loaded from disk and used later in your own programs.

GRAPHIC GENERATOR gives you easy access to character graphic modes 4 & 5 from BASIC. These modes allow the use of three colors and one background color. Graphic modes 0, 1 & 2 only allow one color per character.

GRAPHIC GENERATOR lets you edit pictures as a matrix of characters. These "matrices" are useful when you wish to create objects larger than a single character. Each matrix uses its own color registers so you can see what the matrix will actually look like in your BASIC or machine language program.

USING THE GRAPHIC GENERATOR

To operate GRAPHIC GENERATOR, you will need the following hardware:

- Atari 400 or 800 Computer
- Atari 810 disk drive (optional second drive)
- 32K RAM (48K recommended)
- Atari BASIC Cartridge
- Color or B/W television monitor

To start the GRAPHIC GENERATOR, turn on your disk drive. After the red "drive-busy" light goes out, insert the GRAPHIC GENERATOR program diskette in drive 1 and turn on the computer. When the program boots, the Master Menu will appear on the screen:

```
GRAPHIC GENERATOR
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SAVE          EDIT
LOAD          CREATE
DELETE        VIEW
RENAME        MERGE
PROTECT       EXTENDER
FILES         GR=0

EDITING:  A
D1:STANDARD
```

MAIN MENU

Information about the current GRAPHIC GENERATOR operation is printed at the bottom of the Master Menu. The prompt: "EDITING: A" indicates which of the five character sets (A-E) is currently being edited. The prompt: "D1:STANDARD" tells you that drive 1 is active, and that the name of the character set currently in memory is titled "STANDARD" (in this case, the regular Atari character set). You may choose a new character set to edit by pressing the **SELECT** key until the desired letter appears next to the prompt: "EDITING:". As you move through the sets, the name of each set (or the word "BLANK") will appear next to the drive/file prompt. Press the **OPTION** key to switch between drive 1 and drive 2 on a two disk system.

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When GRAPHIC GENERATOR first starts, character set "A" is loaded in. It contains the standard Atari characters. The remaining sets (B-E) are blank.

NOTE: If you are using GRAPHIC GENERATOR on a 32K system, you may only edit character set "A" (STANDARD) due to memory restrictions. You will not be able to select other sets.

MENU OPTIONS

SAVE

The first menu option lets you SAVE one or more of the edited character sets in memory to a disk file. First, choose a character set using the **SELECT** key. When the correct character set letter appears next to the prompt "EDITING:", use the **OPTION** key to switch the correct disk drive and press the **S** key. When the "SAVE:" message appears, type in a filename to use for this set or press **RETURN** to use the current name.

Next, you are asked if you wish to save "matrix" information with the character set. If you have created character groupings, answer YES to save the matrix data. If no such matrices were used, reply NO.

NOTE: you do not have to press **RETURN** after answering the prompt.

To correct typing errors or incorrect answers, press **DELETE** You may abort the SAVE operation any time prior to actually saving a file by pressing **ESC** Do NOT try to save your own character sets to the GRAPHIC GENERATOR program diskette. Instead, create a seperate storage diskette using instructions found in your Atari DOS Manual.

LOAD

This·option lets you LOAD a file created with GRAPHIC GENERATOR. Follow the procedures outlined above (under "SAVE") to select a character set, drive number and filename. If the file was created with matrix information, be sure to answer YES to the "LOAD MATRIX?" prompt. If you create a character set with matrix information but LOAD the file in without it, you will not be able to view the groupings as created.

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DELETE

To eliminate a character set file from a diskette, select the drive number and enter the filename to erase. A protected file (as described below) cannot be deleted from a diskette with this option. Any character sets in memory will not be affected by this operation. Also, make sure you have removed any write-protect tabs from the diskette before attempting to DELETE a file. Once a file has been deleted, it is next to impossible to retrieve it. So be advised to make back-up copies of your important files.

RENAME

This menu option lets you RENAME character sets stored on a diskette. You are asked for the name of the target file, and then the new name to assign to it. The target file will be renamed to the new filename (if the target file has not been previously protected). Again, this operation does not affect any character sets in memory.

PROTECT

This option permits you to LOCK or UNLOCK a file on a diskette. If a file has been locked, it cannot be erased with the DELETE option or renamed with the RENAME option. If you wish to DELETE or RENAME a locked file, use the UNLOCK feature first.

FILES

This option lists all files on a diskette. If a file has been locked, an asterisk (*) will appear next to its name. The 3 numbers to the right of the filename indicate the number of sectors each file uses. One sector is equal to 124 bytes of disk space.

Filenames created by GRAPHIC GENERATOR during the I/O mode automatically have the extension "FNT" (for font) attached to them. This extension must be present on a filename in order for GRAPHIC GENERATOR to recognize the file as a character set.

```
*DOS      SYS
*DUP      SYS
*AUTORUN  SYS
*CG43
*CG       CDE
*GREEK    FNT
*ROMAN    FNT
*STOP     FNT
*OUTLINE  FNT
*SPACE    FNT
*BUNNIES  FNT
*DEMO1
*DEMO2
*CHARLOADASC
*GRMODE   ASC
409 FREE SECTORS
HIT [ESC] FOR MENU
```

FILE DIRECTORY

CREATE

The CREATE option lets you define which characters will make up a matrix. Select a character set by letter and type **C**. A row of letters from A to P will appear. Each letter is used to label a particular matrix. Type in the letter of the matrix you wish to define (there are 26 in all). You will then be asked for the WIDTH of the matrix or the number of characters wide you wish to make the object. Next, you will be asked for the HEIGHT (in characters) of the matrix. After entering these dimensions, a matrix of dots will appear on the screen.

```
ENTER CHARACTERS       ENTER CHARACTERS
  ■ . . . .               12345
  . . . . .               QWERT
  . . . . .               ASDFG
  . . . . .               ZXCVB
  . . . . .               KL;+*
CREATE A MATRIX        HIT [ESC] FOR MENU
```

Use the keyboard and type in the letters which will make up the matrix. If a certain character cannot be typed from the keyboard, press **RETURN** and the computer will prompt you for the Atascii number of the character. If you press **RETURN** once more you will be asked for the internal value of the character you wish to place in the matrix. Tables for the Atascii value and the internal value of characters appear on pages C-1 and 55 of the Atari BASIC Reference Manual, respectively.

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BUNNY MATRIX A
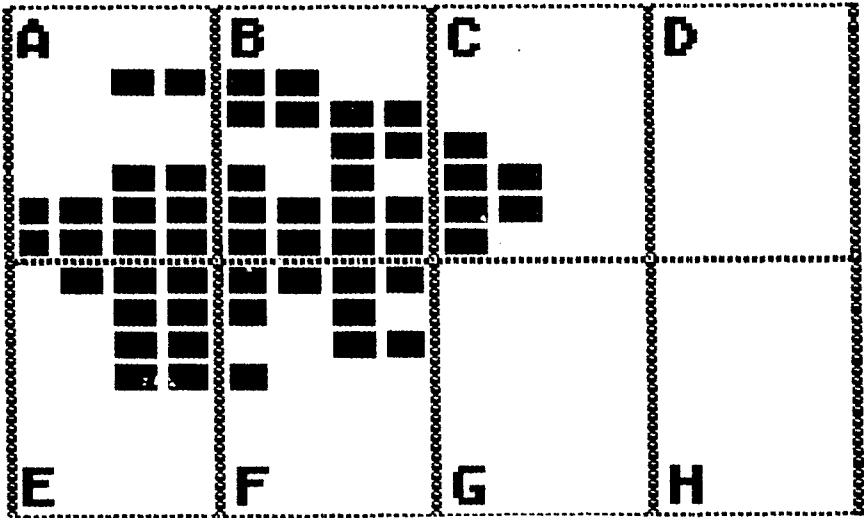
REDEFINED CHARACTERS

If, while in the keyboard entry mode, you press the **DELETE** key, the previous character will be erased. After you fill up a matrix, press the **ESC** key to return to the Main Menu.

NOTE: a maximum of 32 characters may be used in any one matrix.
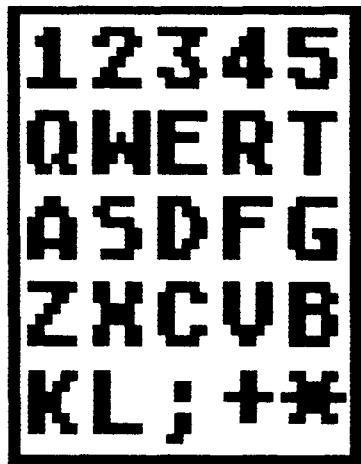
EDIT

When you select the EDIT option, you are asked if you wish to edit a character or a matrix. As mentioned earlier, a matrix is composed of a group of interrelated characters which are treated as a single character for editing and display purposes. The matrices are generated with the CREATE option, above. If you select the CHARACTER option, you are asked which character you wish to edit. Type the letter of the character you desire and you will enter the EDIT mode. Like the CREATE option, you may enter Atascii or internal values by pressing **RETURN** instead of a character. When you choose to edit a matrix, the letters A-P will appear on screen. Those letters which have been assigned to a matrix will appear in red. Type in the letter of your choice (one of those in red), and the matrix will appear for editing.

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EDITING THE CHARACTERS

The editing screen is an enlarged representation of the character or matrix you are editing. In the upper left corner of the screen is a box colored with the current draw color. It also indicates whether the cursor will erase the blocks it passes over (if the box is solid), or will not erase them (if the box is hollow). These two conditions, destructive and non-destructive cursor, are switched by pressing the ▲ key on the keyboard (next to the right SHIFT key).
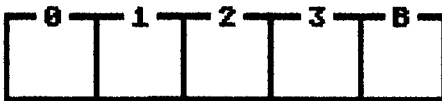
EDIT A CHARACTER

EDIT A MATRIX

Beneath the box is the number of the current graphic mode, 0 thru 5. To change colors in modes 4 & 5, press the SELECT key. To edit a character (or matrix), move the flashing cursor to the desired position using the arrow keys or the joystick. Hold down the firing button or the SHIFT key to draw the selected color using the cursor.

SELECTING COLOR VALUES

Press the ▮OPTION▮ key twice while in the EDIT mode to display the Color Palette.

```
BRIGHTNESS      0  1  2  3  4  5  6  7
┌──────────────────────────────────────────┐
│ GRAY          0  │  │  │  │  │  │  │  │  │ │
│ GOLD          1  │  │  │  │  │  │  │  │  │ │
│ ORANGE        2  │  │  │  │  │  │  │  │  │ │
│ RED-ORNG      3  │  │  │  │  │  │  │  │  │ │
│ PINK          4  │  │  │  │  │  │  │  │  │ │
│ VIOLET        5  │  │  1  │  │  │  │  │  │ │
│ BLUE          6  │  │  │  │  │  │  │  │  │ │
│ CYAN          7  │  │  │  │  │  │  │  │  │ │
│ LT BLUE       8  │  │  │  │  │  │  │  │  │ │
│ TURQUOISE     9  │  │  │  │  │  │  │  │  │ │
│ GRN-BLUE     10  │  │  │  │  │  │  │  │  │ │
│ GREEN        11  │  │  │  │  │  │  │  │  │ │
│ YLLW-GRN     12  │  │  │  │  │  │  │  │  │ │
│ ORNG-GRN     13  │  │  │  │  │  │  │  │  │ │
│ LT ORANGE    14  │  │  │  │  │  │  │  │  │ │
│ RED          15  │  │  │  │  │  │  │  │  │ │
└──────────────────────────────────────────┘

  ┌─0─┬─1─┬─2─┬─3─┬─B─┐      GRAPHICS
  │   │   │   │   │   │      MODE: 0
  └───┴───┴───┴───┴───┘
         COLOR PALETTE
```

The Color Palette display consists of a color cross-reference chart, a graphic mode indicator and a "Color Jar". The Color Jar holds a sample of the color/brightness combination currently in use by the editing cursor. To change a particular color, press the number of the jar (or "B" for background color) you wish to change. A flashing number (or the letter "B") will appear on the chart. The color and brightness values for the selected jar will change accordingly as you move the character with the keys or joystick. You can change the graphic mode by pressing the space bar.

When you finish with color selection, press ▮ESC▮ to return to the editing screen. Press the ▮OPTION▮ key once while in the EDIT mode to change the colors of an image while it is still on the screen. This mode achieves the same results except that you see the image you are editing instead of the Color Palette. To exit this mode press ▮ESC▮.

There are a number of keyboard commands to help you EDIT an image while in the editing mode. They are:

ESC — exits the EDIT mode and places the edited image back into the character set.

SPACE — changes the graphic mode while editing.

SELECT — lets you change the draw color if you are in graphic modes 4 or 5.

U D L R — allows you to move the image up, down, left, or right, respectively.

M — makes a mirror image (left for right) of the image on the screen.

S — changes the size of the image you are editing.

X — lets you exit the EDIT mode without altering the character set. This is useful when you make a mistake and wish to recover the previous character definitions.

SHIFT CLEAR — clears the image to the backround color

VIEW

The VIEW option lets you view an entire character set or any matrix as it would actually appear. Press **V** and respond with the letter (A-P) when you are asked which matrix you wish to view. Press [SELECT] to view the letters used to make up a matrix. If you press **RETURN** instead of a letter, the entire character set will be displayed. Like the EDIT mode, you may change the color of the image you are viewing by pressing the **OPTION** key. Press **ESC** to exit to the Main Menu.

MERGE

The MERGE option is useful when you want to move characters or matrices within a character set. You may even move character data from one character set to another. When you enter the MERGE mode you will be asked if you want to merge a character or a matrix. If you are merging a character you will be asked for the character you are copying from and the character you are copying to. The character will then be displayed briefly and then copied to the destination character.

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If you are merging a matrix, you will be asked for the letter of the matrix you wish to copy from and the letter of the matrix you want to copy to. If the matrix you are copying to is already defined it must have the same dimensions as the source matrix. The image data will be transferred from the characters that make up the source matrix to the characters that compose the destination matrix. If the dimensions are not the same or the destination matrix is not defined the destination matrix will be defined with the same characters as the source matrix.

EXTENSION

This command lets you change the default extension (automatically added) from "FNT" to anything you wish. This is useful when you want to transfer character sets to GRAPHIC GENERATOR from other sources. The EXTENSION option displays the old extension and then prompts you for the new extension. Type in the new extension and press **RETURN**. An extension may be no longer than three letters.

PROGRAM EXAMPLES

GRAPHIC GENERATOR is supplied with two demonstration programs written in BASIC. These programs use the two BASIC subroutines outlined above. Press the **Q** key from the GRAPHIC GENERATOR Main Menu. This will let you exit the program to BASIC. Now type either:

RUN"DEMO1" **RETURN**
   or
RUN"DEMO2" **RETURN**

Both programs use character graphics generated with GRAPHIC GENERATOR and are easily understood. To exit to BASIC, press **Q** from either one of these programs. You may then list the programs and see how they use the subroutines supplied with GRAPHIC GENERATOR.

PROGRAM SUBROUTINES

GRAPHIC GENERATOR is supplied with two BASIC subroutines to help you use character sets in your own programs. The file "CHARLOAD.ASC" is used to load character sets from diskette. The file "GRMDE.ASC" is used to create graphic modes 4 & 5.

CHARLOAD.ASC

To merge this subroutine to your BASIC program you must first load your program from diskette. Place the GRAPHIC GENERATOR disk in the drive and type:

ENTER"D:CHARLOAD.ASC" `RETURN`

This command merges the character set loading subroutine into your program. The subroutine uses line #'s 32000 & 32010. Here is an example of how to use this subroutine:

10 DIM FILE$(20):FILE$="D:ROMAN.SET":GOSUB 32000 20 ... your program follows ...

Line 10 is all you need to setup and load the ROMAN character set.

GRMODE.ASC

This routine generates modes 4 & 5 which are normally inaccessible in BASIC. As in the example above, first load in your BASIC program then merge this subroutine with the following command:

ENTER"D:GRMODE.ASC" `RETURN`

10 GM=4:GOSUB 31000
20 ... your program follows ...

Line 10 sets up the screen with graphic mode 4. Change GM=4 to GM=5 to set up mode 5.

For the more advanced programmer, the following example of assembly language code may be used to load a character set:

```
CHRSET  .BYTE 'GREEK.SET'  ;LOAD THE GREEK CHARACTER SET
CHRADR = $A000             ;CHARACTER SET LOACATION

LOADC   LDX #$10     ;IOCB #1
        LDA #3       ;OPEN COMMAND BYTE
        STA $342,X
        LDA #<CHRSET ;LOW BYTE OF FILESPEC ADDR
        STA $344,X
        LDA #>CHRSET ;HIGH BYTE
        STA $345,X
        LDA #4       ;READ STATUS
        STA $34A,X
        LDA #0       ;SHOULD BE ZERO
        STA $34B,X
        JSR $E456    ;CIO CALL ADDR
        TYA
        BMI ERROR    ;USER SUPPLIED ERROR ROUTINE

        LDA #7       ;GET CHARACTER COMMAND BYTE
        STA $342,X
        LDA #<CHRADR ;LOW BYTE OF CHARACTER SET BASE ADDR
        STA $344,X
        LDA #>CHRADR ;HIGH BYTE
        STA $345,X
        LDA #0       ;LOW BYTE OF BUFFER LENGTH (1024 BYTES)
        STA $348,X
        LDA #4       ;HIGH BYTE
        STA $349,X
        JSR $E456    ;CIO CALL ADDR
        TYA
        BMI ERROR

        LDA #12      ;CLOSE COMMAND BYTE
        STA $342,X
        JSR $E456    ;CIO CALL ADDR
        TYA
        BMI ERROR

        LDA #>CHRADR ;HIGH BYTE OF CHARACTER SET BASE ADDR
        STA 756      ;O.S. CHARACTER SET POINTER

        RTS          ;RETURN TO USER
```

ERROR HANDLING

If you make a typographical error or ask GRAPHIC GEN-ERATOR to do something it either does not know how to do or cannot do at the time you ask, it will generate an error message. This message appears on the screen briefly as a number code and then disappears, leaving you to try again.

The following error codes may be generated by GRAPHIC GENERATOR:

ERROR #	DESCRIPTION
130	Nonexistant Device
138	Device Timeout
144	Device Done (Write Protected)
162	Disk Full
167	File Locked
169	Directory Full
170	File Not Found

ABCDEFGHIJKLMNOPQRST
UVWXYZabcdefghijklmn
opqrstuvwxyz12345678
90!"#$%&'@()⌐▞▞<>*+-
=^_|?/][,.▞▞

STANDARD SET

ABCDEFGHIJKLMNOPQRST
UVWXYZabcdefghijklmn
opqrstuvwxyz12345678
90!"#$%&'@()⌐▞▞<>*+-
=^_|?/][,.▞▞

ROMAN SET

ABΓΔEZHΘIKΛMNΞOΠPΣTΥ
ΦXΨΩαβγδεζηθικλμνξοπ
ρστυφχψω1234567890<>
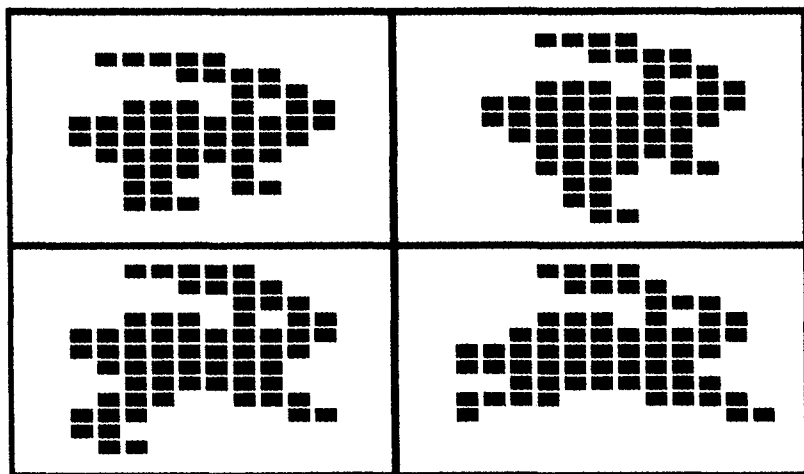!"#$%&'@()⌐▞▞*+-=^_
|?/][,.▞▞

GREEK SET

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ABCDEFGHIJKLMNOPQRST
UVWXYZabcdefghijklmn
opqrstuvwxyz12345678
90!"#$%£'&()↙↓↑«»*+-
=^_|?/][,.→↔

STOP SET

ABCDEFGHIJKLMNOPQRST
UVWXYZabcdefghijklmn
opqrstuvwxyz12345678
90!"#$%&'&()↙↓↑«»*+-
=^_|?/][,.→↔

OUTLINE SET

BUNNIES SET

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