

THE IMAGE SYSTEM

CBM 64/128

USER'S GUIDE

GETTING STARTED

When the program has loaded you will be presented with the Master Control Screen. Almost every feature of The Image System is accessed from here so we will begin by learning the basics. To start with you will need to plug a joystick into control port 2. You will find that a tracker-ball such as is manufactured by Atari or Wico will work much better with The Image System than a joystick but if only the latter is available then it will suffice.

The Image System uses windows and pull-down menus to group it's functions together logically and facilitate easy selection of a large number of sophisticated operations by the user. Most of the facilities available can be invoked by using the joystick to guide the arrow-shaped cursor onto the appropriate icon and pressing the fire button. The keyboard however is used for a few basic functions.

THE KEYBOARD

In fact just three keys on the keyboard have special functions. They are: the Commodore logo key, the CTRL key and RUN/STOP.

We'll kick off our detailed examination of The Image System with a closer look at the purpose of these keys before moving on to the Master Control Screen.

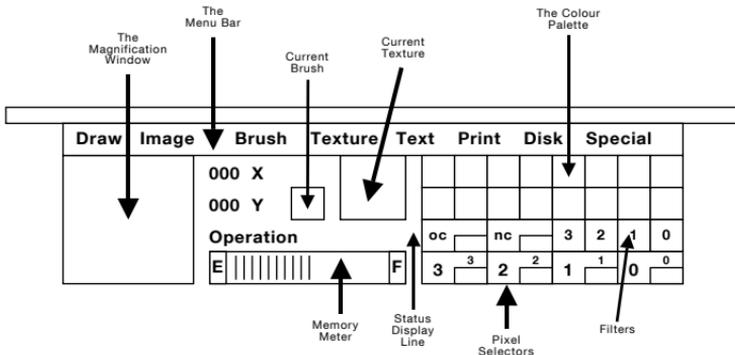
The Commodore logo key: Simply toggles the Master Control Screen on or off enabling you to view the graphics screen in it's entirety if desired.

The CTRL key: Toggles cursor control between the MCS and the graphics screen.

The RUN/STOP key: The effect of this key is generally to terminate certain graphics operations such as 'Flood fills'. The specific effects of this key will be described when and where relevant.

THE MASTER CONTROL SCREEN

With reference to the diagram let's now see what's available to us from the MCS.



Starting from the left of the screen and moving right . . .

THE MAGNIFICATION WINDOW

This yields an enlarged view of the pixels surrounding the drawing cursor. The actual pixel the cursor is pointing to appears inside the small flashing box at the centre of the window. You should note that the enlarged pixels will be displayed using the current colour assignments and NOT necessarily the colours they appear on the graphics screen. By referencing to the current colour selectors you can see at a glance exactly which type of pixel you are currently working on. The sometimes confusing design of the Commodore 64's colour system will be explained later. Rest assured that The Image System's facilities provide maximum flexibility in overcoming the hardware limitations.

CURSOR CO-ORDINATES

Located to the top right of the magnification window are the X, Y format co-ordinates of the drawing cursor. Location 0,0 corresponds to the bottom left of the screen.

MEMORY METER

To the bottom right of the magnification window is located the 'free memory' gauge. This provides constant indication of the quantity of memory available for image and text font storage. If you ever run out of storage then you will be forced to either save or erase some of your stored images. As a guide there are approximately 10K bytes of image storage space.

STATUS DISPLAY

Above the memory meter is a status line which simply reminds you which mode The Image System is operating in.

CURRENT TEXTURE AND BRUSH TYPE

Located towards top centre of the MCS is an image of the current Brush Texture with the actual brush type being located to the left.

COLOUR PALETTE

The right section of the MCS displays the colour-control icons. 16 coloured squares with the grey squares below them make up the so-called palette.

The row of rectangles along the bottom of the colour palette represent the range of pixel values currently available. You can assign any of the colours and any of the colour filters (the grey squares) to be associated with any of these pixel selectors. A full explanation of the Commodore 64's colour system and how The Image System interacts is now warranted

THE COLOUR ATTRIBUTES

The Commodore 64, like many other low-cost micros, endeavours to offer as sophisticated graphics as possible while also conserving precious memory space. To satisfy both these requirements inevitably requires some compromise and colour 'attributes' are the result. When you draw pixels onto the 64's screen using any of The Image System's functions you can only use a small number of different pixels - 4 if working in 'Multi-colour' mode and only 2 when in 'Standard' mode. The pixel values themselves tell the Graphics processor inside the 64 where to find the colour information. This colour information is held completely separately in it's own

area of memory known as a colour matrix. Each of the memory locations within the matrix holds the colour information for one character sized (8 bit * 8 bit) block of pixels on the graphics screen.

STANDARD-COLOUR MODE

In this mode we have only 2 different pixels to draw with. Therefore each Colour Matrix location can hold 2 colours - one for 0's pixels and the other for 1's pixels.

MULTI-COLOUR MODE

Multi-colour mode operates in a similar manner, except that now we have 4 pixels to draw with and as a result need 2 colour matrices in order to store the extra colour information. Having 4 pixels now implies that 4 attributes are required for each character square of pixels. In fact there are only 3 since pixel 0 in this mode uses a universal colour attribute common to the entire screen.

When you draw anything on the screen using The Image System you only affect the pixels. Their associated colours remain unchanged until you explicitly perform some colourizing function.

The Image System enables you to associate any one of 16 colours with any of the available pixels but remember that THE COLOUR WILL NOT BE USED ON THE SCREEN UNTIL YOU EXPLICITLY INVOKE ONE OF THE COLOURING OPERATIONS.

The Image System also provides the very useful concept of pixel filtering whereupon an image may be printed to the screen with certain pixels altered or removed completely. A filter may be associated with any or all of the available pixel types and will have effect on ALL subsequent drawing operations which use those pixels.

ASSIGNING COLOURS

Point the cursor at the desired colour icon and press fire. The icon will flash. Now move the cursor to the required pixel selector icon and press fire to assign the new colour. To remind you the colour will be displayed in the small inset at the bottom-right corner of the selector. The new colour has now been assigned and any subsequent colouring operation involving that pixel type will use that colour.

PIXEL FILTERING

The row of grey icons immediately below the colour palette represents the available 'pixel filters'. These filters work alongside the colour assignments to achieve special effects such as 'shadow relief' and 'negative imaging'. Basically they alter the way in which a particular pixel will appear when drawn on the screen.

To assign a filter to a pixel select the appropriate filter icon, as with the colours, causing it to flash. Then point and press fire on the desired pixel selector icon and the filter is assigned. A subscript will be added above the colour inset to remind you which filter is in effect.

SOME FILTERING EXAMPLES

To produce negative imaging on all subsequent drawing/painting and image manipulation we need to assign a complementary filter to each available pixel. So for example in Standard mode where we are working with just two pixels - 0 and 1 - we would want to convert both pixels to their binary complements . . . i.e. 0's would become 1's and 1's would become 0's. To do this simply assign filter 0 to pixel icon 1 and assign filter 1 to pixel icon 0.

To produce a silhouette of an image, say for shadow relief effect, we would want to make all the pixels in the image be printed as one and the same. To do this we simply select the appropriate filter and assign it to all the available pixel icons.

Experimentation is suggested as the best way to come to terms with the use of colour and pixel filters. Obviously if you do not wish any filtering to be operative you should assign filters to their similarly named pixel icons . . . i.e. filter 0 to pixel 0, filter 1 to pixel 1, etc.

Note that for a pixel or it's colour to be used on the screen the corresponding pixel selector icon must be active . . . i.e. flashing. As with the colour and filter icons, the pixel icons can be toggled on/off by pointing the cursor and pressing fire. If a pixel is not active it will not be used when printing images or drawing/painting, etc. This provides a useful technique for 'Transparency'.

For example, you may have created an image where 0's pixels represent 'see-through' bits and therefore are supposed to allow the original picture or background to 'show-through' after the image has been printed. To stop these 'see-through' 0's pixels from appearing in subsequent prints of the image we simply de-assign pixel selector 0.

USING THE MENUS

Finally we come to the most important part of the Master Control Screen - the menu. There are 8 main menus giving access to The Image System's powerful and unique draw functions.

Across the top of the MCS is the 'Menu bar'. Moving the cursor onto one of the menu headings and pressing the fire button causes a menu to 'drop down' yielding a list of options. Keeping the fire button down and moving the cursor over the list enables any option to be selected. When the fire button is released your selection is activated and the menu disappears. Some menu options invoke 'sub-menu' to enable you to specify more precisely how you wish a function to perform. For example opening the 'Print' menu and selecting the 'Printer type' option will cause another menu to appear giving you the choice of several different matrix printers.

A few menu options will cause 'communication windows' to appear. When this happens you cannot use any Image System functions until you have satisfied the requirements of the window. For example opening the 'Special' menu and selecting the 'Clear screen' option will immediately cause The Image System to ask for verification. You are given the choice between going ahead and clearing the screen or quitting. If you wish to continue then select the 'OK' icon otherwise you must choose the 'CANCEL' icon.

Generally the use of the menus and window to control The Image System is very straight forward and needs no special explanation.

There now follows a brief explanation of each of The Image System's menu-driven functions. Remember that any function that operates directly on the graphics screen requires you to toggle cursor control by using either the 'CTRL' key or the 'commodore logo' key . . .

THE DRAW MENU

“BRUSH PAINT”

Brush Paint enables you to paint freely using the current brush type and texture. Painting occurs as long as the fire button is held down.

“SPRAY PAINT”

Spray Paint is similar to Brush Paint except that you use a simulated air brush with adjustable spray pressure and nozzle spread. The ‘spray’ produces a random pattern of pixels which build up into the pattern of the current texture.

“FLOOD FILL”

Flood Fill is a standard area fill function. Pointing the cursor at a pixel and pressing fire causes all pixels adjacent to and of the same value as the pixel your cursor is referencing to be covered in the current texture. **BE WARNED!** Indiscriminate use of this powerful function is an excellent way to ruin your precious picture. You would be well advised to make a back up copy in memory of your work since there is no way to rectify the mess a ‘run away’ Flood fill operation can cause. Pressing the RUN/STOP key will terminate a Flood Fill.

“AREA COLOUR”

Area Colour enables you to change the colour attributes within any definable rectangular area of the screen. Only the attributes whose associated pixel icons are active (i.e. flashing) will be affected. The attributes will be set to the colours shown in the insets of the pixel icons on the MCS.

To initiate the operation you first define the rectangular region. Point the cursor at one corner of the region to be affected and press fire. Now move the cursor to the opposite corner so that the ‘elastic’ box thus created encloses your chosen region. Press fire to fix the size of the box. Subsequent pressing of the fire button will cause the area within the box to be coloured. The box may be re-used for colouring other similar areas of the screen. Pressing RUN/STOP enables you to start over and define a new box.

“COLOUR SCHEME”

Colour Scheme is a neat variation on the Area Colour operation. You use it in much the same way but it’s effect is subtly different. This command recognises that often there will be regions of different pixels which are coloured similarly. The artist will probably only be interested in changing one of the colours within the region and may not want the unnecessary complication of having to work out which attributes belong to which pixels. For example there may be an area of the screen containing pixels of values 0 and 1, some of which may be coloured say, red, some of which may be coloured blue. The artist may wish to change the colour of all the red pixels to green without affecting any of the blue ones. Since there may be some 0’s pixels which are blue and some other 0’s pixels which are red within the same region we need an operation which can differentiate.

Colour scheme is given two colours at the menu stage. An OLD colour and a NEW colour. When the operation is performed on the defined region, every occurrence of OLD colour within the region is changed to NEW colour.

“COLOUR COPY”

Colour Copy allows you to copy the colour attributes within any definable rectangular region of the graphics screen to any other part of the screen.

You define the area in a similar manner to Area Colour. Once the box has been fixed, it may be moved freely and pressing fire causes the original attribute block to be copied to the new area.

“SINGLE LINE”

Single Line enables you to define a line of any length and gradient between two points on the screen. Point the cursor to the first end point and press fire to fix. Now move the cursor to the second point. An elastic line will follow the cursor and pressing the fire button a second time fixes the line. The line can now be moved around the screen and printed over and over by pressing fire. The line will be drawn in the current texture using the current brush type.

Pressing RUN/STOP enables you to start over and define a new line.

“STITCH LINE”

Stitch Line is similar to Single Line except that it allows you to ‘stitch’ from one point to the next, sort of ‘dot to dot’ fashion.

“RAY LINE”

Ray Line is simply allows you to draw multiple ‘ray’ lines from a single origin.

“ELLIPSE”

Ellipse creates circles or ellipses of any radii up to the full width of the screen. Point the cursor and press fire to fix the origin. Now move the cursor in any direction to achieve the size of circle or ellipse desired. Vertical displacements from the origin govern the height while horizontal displacements govern the width. Press the fire button again to fix the shape. You can now move the circle/ellipse around the screen and print it over and over. The circle will be drawn in current texture using the current brush type.

Pressing RUN/STOP enables you to start over and define a new ellipse.

“ELLIPSE FILL”

Ellipse Fill operates exactly as with Ellipse, except that the interior of the defined ellipse will now be filled with the current texture.

“BOX”

Box enables boxes of any height or width to be defined and printed over and over. The box is defined as with the colour operations. The box will be drawn in the current texture using the current brush type.

“BOX FILL”

Box Fill works as above except that the interior is filled with the current texture.

THE IMAGE MENU

One of the most important features of The Image System is its ability to store and manipulate sub-images. Up to 64 separate images can be stored in memory for later retrieval. Each image is essentially two-dimensional but can be scaled and distorted almost without restriction to provide effects normally only associated with expensive systems. An image can be anything from a single pixel up to an entire screen - though practical limitations such as available memory space won't permit many very large images to be held in memory simultaneously.

“SELECT IMAGE”

Select allows you to specify any one of 64 memory allocations for image manipulation. An image can be any rectangular area of pixels. You are free to assign a filename to any image - doing so will aid you in remembering what you've stored. In any case every image is given a file location number between 0 and 63.

Note that image 0 is always the graphics screen itself.

“DEFINE IMAGE”

Define works as follows: Point the cursor to one corner of the image and press fire. Now move to the diagonally opposite corner and press fire to fix the box. The box may be moved around freely and subsequent presses of fire will cause the area within the box to be stored.

“DELETE IMAGE”

Delete simply erases the currently selected image from memory. Invoking this option causes a requester window to appear. This is to ensure that accidental erasure of images is avoided.

“SCALE IMAGE”

Images may be scaled independently in their lateral and vertical dimensions.

The cursor can be made to point to any of the 4 vertices of the image box by pressing the fire button. Each press of fire will cycle the cursor from one corner to the next. Having selected a corner you can shrink or expand the box by moving the joystick appropriately.

“DISTORT IMAGE”

Distortion of images is also provided. Successive presses of the fire button in this mode cause the cursor to skip from one vortex to the next in much the same fashion as with Scale. This time however, having selected a vortex you can move it anywhere on the screen in complete independence from the other corners of the box. You are free to 'twist' the box so that maybe two of the edges cross one another.

“PRINT IMAGE”

When you have manipulated the image box to your satisfaction you can print the resulting image to the graphics screen. The prepared box can be moved freely around the screen and printed over and over. Always make good use of the pixel filters when printing images on to an existing picture. Remember you can eliminate specific pixels from the image during printing to give the illusion that certain parts of your image are transparent.

THE BRUSH MENU

The Image System supports 32 user re-definable brush templates for drawing purposes. The templates are used as 'masks' for the associated texture patterns.

SAVING AND LOADING BRUSH SETS

The entire set of brush templates may be saved to tape or disk and a new set loaded in as required. A comprehensive set of tape and disk filing commands are provided from the menu. They operate in a standard fashion and do not warrant further discussion.

CHOOSING A BRUSH

You can select any one of the 32 available brushes using, logically enough, the 'Select' option from the menu.

ORIGIN

Origin allows you to define the 'centre' point of each of the 32 available brushes by assigning an X and Y bias each time the brush is applied to the graphics screen. The bias in each dimension can be set to any value between 0 and 15. The combined X and Y bias references a point within the brush cell itself and it is this point which will be located at the exact cursor coordinates each time the brush is applied.

PRINTING BRUSH TEMPLATES

A facility is provided to print the actual brush template onto the screen enabling you to edit its shape. As long as the fire button is held down the brush image is deposited on the screen. The Magnification window co-ordinates show the position of the top-left corner of the brush.

All brushes are 16 pixels wide (8 in Multi-colour mode) by 16 pixels high.

DEFINING NEW BRUSH TEMPLATES

New brush definitions can be grabbed directly from the screen. Pointing the cursor to the top left corner of the desired image and pressing fire causes the current brush image to be re-defined. Remember that each brush image is really just a type of stencil. When you draw/ paint on the screen using a brush, the texture only passes through those parts of the brush which are transparent. In this case 'transparent' means those parts of the brush constructed from 0's pixels. All other pixels will not pass texture.

THE TEXTURE MENU

As well as the brush templates The Image System also supports 64 user-re-definable texture patterns. Like the brushes the the patterns are 16 pixels wide (8 in Multi-colour mode) by 16 pixels high.

LOADING AND SAVING TEXTURE PATTERNS

The entire set of texture patterns may be saved to tape or disk and a new set loaded in as required.

SELECTING A TEXTURE

The 'Select' option allows you to select any of the 64 available textures to become active.

PRINTING TEXTURE PATTERNS

Any texture can be dumped to the screen for subsequent editing by using exactly the same process as for the brush templates.

DEFINING NEW TEXTURES

New texture definitions can be grabbed directly from the screen by pointing the cursor to the top-left corner of the new image and pressing fire. To facilitate the definition of textures which tessellate properly when used in subsequent flood fills and the like, four such texture 'tiles' are displayed on The Master Control Screen in a 2 x 2 matrix arrangement.

THE TEXT MENU

The Image System also provides a fairly flexible text printing facility. Up to 90 different characters can be produced directly from the keyboard.

SAVING AND LOADING TEXT FONTS

Entire fonts can be saved to disk or tape and new fonts loaded in as required. The facilities to do this are comprehensive and their operation self explanatory.

PRINTING TEXT ON THE SCREEN

To print text to the screen, first position the cursor at the point where you wish printing to begin. This will be the top-left corner of the position of the first character. Using the keyboard you can now type freely until the cursor reaches the edge of the screen.

Note that the cursor keys always cause single pixel movements of the cursor when drawing on the graphics screen. They operate simply to provide a means of accurately positioning the cursor for detailed graphics work.

DEFINING NEW FONTS

Individual characters or completely new fonts may be defined using the text grab function. Text characters can be any size from a single pixel to an image up to 32 pixels wide (16 in Multi-colour mode) by 48 pixels high.

To grab a character you must first define a box around it. Point the cursor to the top-left corner of the required image and press fire. Note that the top-left corner of every image you grab is the point from which it will be re-printed when you use it in subsequent lines of text. The text cursor only moves horizontally, NOT vertically unless you physically re-position it with the joystick.

Move the cursor to the bottom-right of the desired image - remembering that you are restricted to a maximum box 32x48 pixels. Press fire to fix the box size.

You are now free to move the box anywhere on the screen.

To grab the character position the box over the image and press any valid alpha-numeric key on the keyboard. This will assign the chosen image to that character position within the current text font. Remember that all text images are re-printed starting on the same vertical pixel row and directly side by side. This implies that you provide adequate spacing around each character definition within the box.

THE PRINT MENU

The Image System provides a comprehensive set of facilities for producing hard copy prints of the graphics screen. Commodore matrix printers connected to the 64's serial port and Epson compatible printers connected to the user port via a Centronics standard interface can be accommodated.

SELECTING THE PRINTER DEVICE

The 'Printer Type' option allows selection between the two aforementioned matrix printer types.

SWITCHING FOR AUTO LINE FEED

Some printers may be set up to automatically produce a line feed character at the end of each physical print line. In this case you should switch the line feed option to OFF. If you do not then double line feeding will occur.

ENLARGING THE PRINTED PICTURE

Using this option enables you to print your picture in two different sizes.

THE DISK MENU

For those users working with disk drives a set of useful utilities has been provided. Disks can be formatted, files scratched or renamed and the current disk directory can be examined. The use of these utilities is self explanatory and does not warrant special explanation.

THE SPECIAL MENU

A few fundamental utilities are provided under the 'Special' menu.

CHANGING GRAPHIC MODE

However The Image System supports both the available graphics modes on the 64. 'Mode' allows you to change between either Multi-colour mode or Standard-colour mode.

Multi-colour mode provides a low-resolution 160 horizontal by 200 vertical pixel bit map. The advantage with this mode is that you can have up to 4 different pixels within each character sized area of the screen - a character being 8 medium-resolution pixels square. Standard-colour mode provides a medium-resolution 320 horizontal by 200 vertical pixel bit map. The greater definition of this mode is paid for by the greater restriction on colour. Note that both modes allow full use of all the available 16 colours, the difference lies in the number of different colours that can be displayed within any single character square. In Standard-mode only two are possible.

Note that any stored images and text character definitions will be destroyed if a mode change is invoked. The Image System constantly maintains two sets of texture patterns and texture brushes - one each for both modes - so these will be preserved.

WIPING THE SCREEN

Clear Screen erases the graphics screen by filling it with 0's pixels and setting the colour attributes to the values of the current colours assigned to the pixel selectors.

CURSOR SPEED

Cursor Speed is adjustable from very slow - which may be suitable for detailed joystick control - to very fast which is intended for people working with tracker-balls.

USING PICTURES IN YOUR OWN PROGRAMS

For those of you wishing to use your pictures in your own programs there now follows a simple Basic program which loads and displays pictures created using The Image System. For the technically minded the memory addresses and format of the pictures is also given.

TECHNICAL

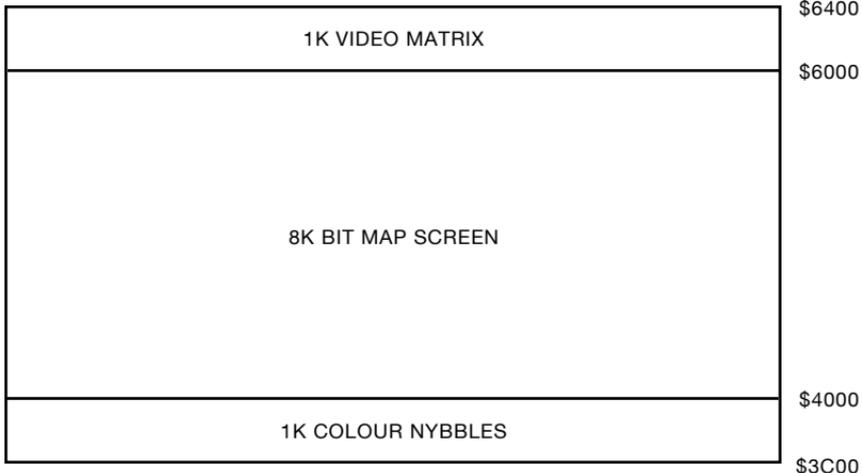
Image System pictures are stored as one continuous block of memory. Multi-colour mode pictures reside between memory addresses \$3C00 (15360 decimal) and \$6400 (25600 decimal). That's approximately 10K bytes of storage which breaks down as shown in the diagram below.

Standard-colour mode pictures require slightly less memory and run from address \$4000 (16384 decimal) to \$6400 (25600 decimal).

Note that after loading a Multi-colour picture from tape or disk you need to transfer the associated colour nybbles to the nybble matrix at address \$D800 (55296 decimal). The nybbles are the 1000 bytes which run from \$3C00 (15360 decimal). This of course, is in addition to setting the VIC II chip registers to display the picture.

For those of you who understand these things, here is the memory layout of the pictures after loading in using the format:-

LOAD "filename",device,1



EXAMPLE PROGRAM

For the less adventurous among you, here is a Basic listing for you to type in.

```
1000 C=C+1:IFC=2THEN1015
1005 INPUT"PICTURE FILENAME"; N$
1010 LOADN$,8,1
1015 PRINT"WAS PICTURE MULTI-COLOUR Y/N?"
1020 GET K$:IF K$=""THEN1020
1025 IFK$="Y"THEN1035
1030 POKE53270,8:GOTO1045
1035 POKE53270,24
1040 FORC=0TO999:POKEC+55296,PEEK(15360+C):NEXT
1045 POKE53272,128
1050 POKE53265,59
1055 POKE56576,(PEEK(56576)AND252)OR2
1060 POKE53280,0
1065 GETK$:!FK$=""THEN1065
1070 POKE53272,20
1075 POKE53265,27
1080 POKE53270,200
1085 POKE56576,PEEK(56576)OR3
READY.
```

The program asks for the picture filename and then loads in and displays the picture automatically. Press any key to get back to the edit screen.

