
AMSTRAD
CPC 6128

THE ADVANCED OCP ART STUDIO



U S E R

M A N U A L

The Advanced OCP Art Studio

BEFORE YOU DO ANYTHING make a backup copy of the Advanced Art Studio. Keep the original as a security copy, and always use the backup.

To copy the Advanced Art Studio, use your CP/M program DISCKIT as per usual.

WARRANTY (what to do if it doesn't work!)

If this program is faulty or fails to load, please return it (without the packaging, but ensure it won't get damaged in the post) to the address below and it will be replaced free of charge. This offer does not affect your statutory consumer rights.

WARNING

Copyright subsists in all Rainbird Software documentation and artwork. All rights reserved. No part of this software may be copied or transmitted in any form or by any means. This software is sold on the condition that it shall not be hired out without the express permission of the publisher.

E.E.C. Ltd licenses you to make copies of the ADVANCED ART STUDIO for your personal use only, subject to the following conditions: (1) that you destroy or erase copies before parting with the original, (2) that you neither supply or lend copies to another person. Legal action will be taken against anyone failing to observe these conditions.



THE ADVANCED TM ART STUDIO

AMSTRAD
CPC 6128

Advanced Art Studio features

- * Windows - icons - pull down menus - pointing devices
- * Operates in screen modes 0,1 and 2, with intelligent picture convert between modes
- * All information on screen - no need to repeatedly switch between the picture and a menu screen
- * Compatible with keyboard, joystick, AMX and Kempston mice
- * Continuous display of cursor coordinates
- * 25 sizes of grey-scale screen and window dumps to bit-image Epson and Amstrad compatible printers, and includes user-defined printer driver option
- * Save, load and merge pictures to and from disc
- * Extensive colour control, including colour cycling for animation, and colour priority enabling powerful manipulation of all colours, such as drawing 'behind' areas of the screen, and ignoring any colours during cut and paste operations and masking areas of the screen
- * Solid and multicoloured patterned fills with over-fill option. 12 user-definable patterns from 1x1 up to 16x16, can be saved to and loaded from disc. Comprehensive pattern edit facility
- * 16 drawing pens, 8 random spray cans with three spray speeds, 15 user-definable multicoloured brushes
- * 'Undo' facility for last operation
- * Text - 9 character sizes, 2 directions, bold and italic with variable spacing
- * Ninety-six user-definable font characters with comprehensive editor. Fonts may be saved to and loaded from disc
- * User-defined windows may be cleared, copied, moved, squashed, stretched, flipped or rotated
- * Windows may be saved to disc, enabling libraries of picture elements to be compiled, and called up onto the screen at any time for rapid picture creation
- * 3 levels of magnification with pan and zoom, pixel plot, cycle and view
- * Points, lines, triangles, rectangles, circles, filled circles, rays, ellipses and filled ellipses, all with elastic facility
- * The entire program may be re-saved to disc, so user preferences may be customized
- * Cursor may reflect current operational mode, or may be shown as a cross-hair to aid alignment

CONTENTS

How to load ADVANCED ART STUDIO	1
How to use this manual	1
Introduction	2
PRINT	5
FILE	7
PALETTE	10
INKS	13
PAINT	14
PATTERN EDITOR	17
MISCELLANEOUS	20
INPUT DEVICES	23
UNDO	25
WINDOWS	26
FILL	31
MAGNIFY	34
TEXT	37
FONT EDITOR	39
SHAPES	43
APPENDIX 1 - USER DEFINED PRINTERS	45
APPENDIX 2 - FILES ON THE MASTER DISC	48
APPENDIX 3 - WORKED EXAMPLE	50
GLOSSARY - GERMAN AND FRENCH	57
INDEX	62

How to load ADVANCED ART STUDIO

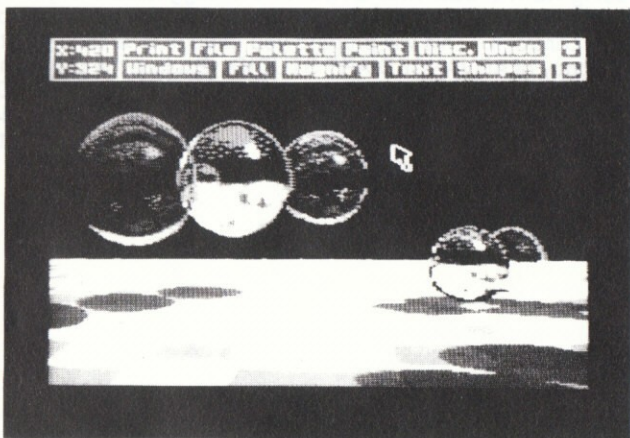
Reset your CPC6128 by pressing the CONTROL, SHIFT and ESC keys together. Insert the Advanced Art Studio disc into the drive (side A of the disc) and enter the command **RUN "STUDIO"**.

How to use this manual

Before using ADVANCED ART STUDIO, it is suggested that you read the Introduction immediately below, which explains the basics of the program and how to control it. This will prepare you enough to enable you to begin using your copy of ADVANCED ART STUDIO. Explore the program at your own pace, aiming to get a 'feel' for its structure and workings. Don't be afraid to experiment. Read the rest of this manual to clear up specific points and for reference. You are not expected to read the manual all the way through before using the program for the first time.

Introduction

ADVANCED ART STUDIO is built upon the 'windows - icons - mouse - pointing device' concepts as pioneered by Xerox at Palo Alto and popularised by Apple with the Lisa and Macintosh computers. The guiding philosophy behind these developments is that a program should be easy for the first-time user to operate, with all relevant information 'on screen', and no complicated keyboard sequences to learn. Instead, commands are given by simply 'pointing' at options in screen menus.



When you first run ADVANCED ART STUDIO, you will be presented with a clear screen with a blue and white 'menu bar' at the top and a small black arrow in the centre. The arrow (known as the 'pointer' or 'cursor') is the key to the program. It is controlled by the arrow (cursor) keys, pressing the left arrow key moves it to the left, pressing the up arrow moves it up, and so on. It is also possible to control the pointer using a joystick or mouse, but this will be covered later. The motion of the cursor is 'intelligent', in the sense that it speeds up the longer a key is held down.

The menu bar at the top of the screen contains a number of individual boxes with headings in them. Moving the cursor to within one of these boxes and pressing the space bar (from now on known as the 'select' button) causes a subsidiary menu to be drawn on the screen partly overlaying the main menu bar. This process is called 'pulling down' a menu. The subsidiary menu will contain a number of entries or 'options', which may lead to further sub-menus, or cause certain actions or commands to be performed. An option is chosen by moving the cursor over it (it will 'highlight' if it's available) and pressing the select button. This process is known as 'clicking' an option. If the option is a command, then what usually happens is that the pull-down

menu disappears and the arrow cursor changes into a small icon which bears some relation to the command selected. For example, a paint brush when painting on the screen. The icon here is acting as a reminder of the current 'mode'. This new cursor can then be moved about the screen using the same controls as the arrow cursor. The action of the select button depends on the particular icon. For example, with the brush icon, pressing select paints pixels on the screen.

If the icon cursor is moved into the menu bar at the top of the screen, it reverts to its arrow form. However if it is moved back out again, then it returns to its icon form (unless another command has been selected in the meantime). The program will continue to stay in the current mode (with the current icon) until another mode is selected.

As mentioned above, if an option in a pull-down menu is highlighted as the cursor is moved over it then that option is available. Options in some menus will only be highlighted if certain conditions have been met. For example, the option in the Print menu to print out part of the screen on a dot matrix printer. This will only be highlighted if a window has been defined before the Print menu is pulled down.

Some menus contain options which are neither commands nor lead to sub-menus. These are known as flags or 'switches' - devices which can be in one of two states, on or off. These switches generally modify the behaviour of other options in the same menu. For example, there is a switch in the Text menu which controls whether characters are printed sideways or not. The on state is represented by a tick, and the off state is represented by a cross. The state of a switch can be changed ('toggled') by moving the cursor to it and pressing select.

Often a menu presents two or three ways of performing an operation. For example, there are three sizes in which characters can be printed, either 'Normal height', 'Double height', or 'Treble height'. These are shown as three separate options in the Text menu, only one of which is marked with a tick, the others being unmarked. The tick indicates which height currently applies. The height can be changed by moving the cursor to one of the unmarked options and pressing select.

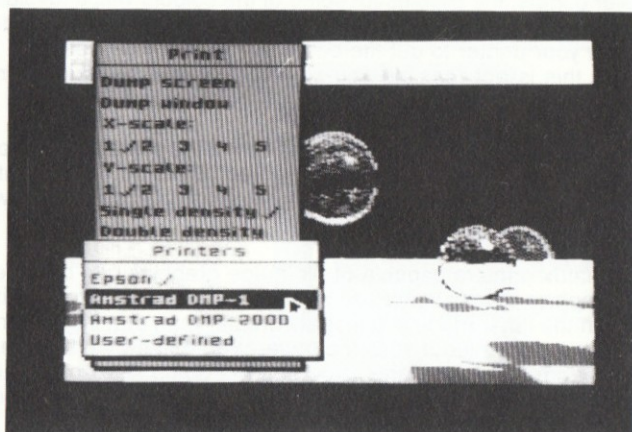
A full CPC6128 screen is 25 'lines', but the menu bar permanently occupies 3 of these lines. You may think then that you are limited to designing pictures that fit in the remaining 22 lines. However, this is not the case. The two boxes in the menu bar with arrows in them allow you to 'scroll' the visible part of the screen over the full 25 lines. Clicking one of the arrow boxes scrolls the screen by one line, clicking it three times scrolls it by the full amount. The small white bar immediately to the left of the arrow boxes shows which part of the whole screen is currently being displayed.

To remove or collapse a menu pulled down by mistake, just move the cursor away from it and press select.

ADVANCED ART STUDIO supports all three screen modes available on the CPC6128. The number of inks and the number of pixels are different in each of the three modes (a 'pixel' is a single dot on the screen, the smallest picture element). In mode 0, sixteen colours are available at a resolution of 160 horizontal by 200 vertical pixels. In mode 1, four colours are available at a resolution of 320 horizontal by 200 vertical pixels. In mode 2, two colours are available at a resolution of 640 horizontal by 200 vertical pixels. In mode 1 the pixels are square, in mode 0 they are double-width, and in mode 2 they are half-width. Note that the SHIFT key can be used in conjunction with the direction keys (cursor keys) to move the cursor a single pixel at a time.

The rest of this manual is divided into sections, each section covering one of the options in the main menu. The sections logically follow the same order as this menu, reading from left to right, then top to bottom.

PRINT



This menu allows you to take a hard copy, or 'dump' as it is called, of your finished picture (either the whole screen or just a part of it) on a dot matrix printer capable of bit image graphics. Various sizes of printout are available via independently adjustable horizontal and vertical scaling factors. The horizontal or X-scale corresponds to the number of dots across the printer paper to one pixel on the screen, and the vertical or Y-scale corresponds to the number of dots down the paper to one pixel on the screen. For example, if the X-scale was set to 2 and Y-scale to 4, then each pixel on the screen would be represented by a block of 2 by 4 dots on the paper. Note that the actual physical dimensions of the printed dots vary from printer to printer. Some experimenting will be necessary to get the best 'aspect ratio' for a particular printer, so that circles on the screen appear as circles on the printout and not as ellipses.

The whole screen is printed by selecting the 'Dump screen' option, or a part of the screen printed by selecting the 'Dump window' option. The latter requires that a window be defined before the Print menu is pulled down (see the section on Windows below).

Not all of the sizes of printout will necessarily be possible with the particular printer you are using - it depends on the total number of dots the printer is capable of resolving across a page. If a particular sized dump is available, the 'Dump screen' or 'Dump window' option in the Print menu will be highlighted as the cursor is moved over it. If it isn't highlighted, then you must try a smaller X-scale factor, or turn the 'Sideways' switch on (see below). Note that a mode 2 screen dump needs at least 640 dots across the page if not in sideways mode.

ADVANCED ART STUDIO uses 'stipples' - arrangements of dots of varying

density - to represent the different colours on the CPC6128's screen. With the smaller dumps, the stipples for some of the colours will, unavoidably, be duplicated. In general, therefore, you should aim for as large a dump as possible on your printer to get the best differentiation between the various colours. If this is not feasible you should choose your colours from the palette to be far apart from each other.

As each pixel is sent to the printer, it is echoed to the screen. A dump can be aborted at any time by pressing the ESC key. Note that your printer may need resetting (just turn it off and then back on again) if you stop it while it's in the middle of printing a line.

Most dot matrix printers capable of bit image graphics can operate in two different graphics modes known as single density and double density. The resolution in the latter mode is generally greater than that in the former, i.e. more dots can be printed across the page. You can switch between these two modes from the Print menu. Some of the dump sizes not available in single density mode may become available in double density mode as a consequence of the increased resolution.

It is possible to print a picture sideways, from left to right, rather than from top to bottom. Because the CPC6128 screen has a smaller height than width (in screen modes 1 and 2), it may be possible to make a larger dump in sideways mode than would otherwise be available.

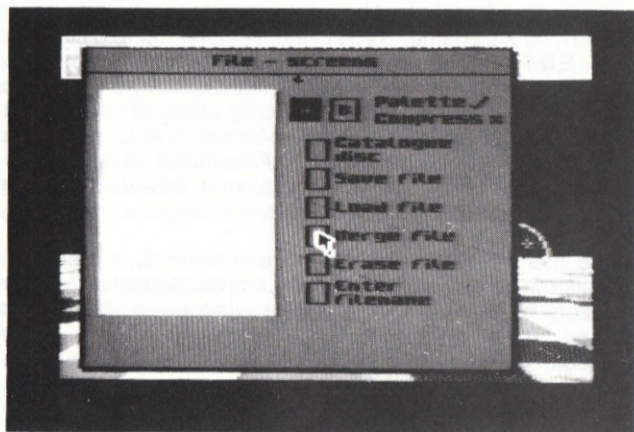
The three options 'Left justify', 'Centre', and 'Right justify' determine whereabouts across the page a dump is situated, either hard against the left-hand edge, in the centre with equally spaced margins, or hard against the right-hand edge. The tick indicates which option applies.

If your printer automatically generates a line feed after receiving a carriage return, then you must ensure that the 'Line feed' switch near the bottom of the menu is turned off (otherwise you will find your printout consists of alternate lines of dots and spaces). If it doesn't, then leave the switch turned on.

The final option in the Print menu pulls down a menu listing the printers supported directly by ADVANCED ART STUDIO. Click the entry for the printer you are using.

It is possible to extend the system to support a printer not included in this menu, the 'User-defined' printer. On loading, ADVANCED ART STUDIO looks for a printer definition file on the disc and loads it if one is found. This file contains the necessary codes to control the printer. Consult Appendix 1 to learn how to construct such a file.

FILE



ADVANCED ART STUDIO fully supports discs for the storage and retrieval of pictures (known as 'files'). It has the ability to maintain a RAM-based catalogue, that is a catalogue that is stored permanently in memory and can be displayed and accessed without the need to actually read the disc, each time. To generate the catalogue for a disc, move the cursor to the box alongside 'Catalogue disc' and press select. The drive motor will start, and after a few seconds the large white box on the left-hand side of the screen will fill with information. At the top of the box is the free space on the disc in kilobytes, and below that a list of filenames (assuming that you have a disc with some picture files on it).

You may notice that only certain files on a disc are displayed in the RAM catalogue - specifically only those files that have the file-type extension **.SCR** (for screen) to their filenames (although this extension is not actually displayed on screen in the File menu). These files can be highlighted by pointing the cursor at their filenames and pressing select. A highlighted file can then be saved, loaded, merged or erased by moving the cursor to the box alongside the desired operation, and pressing select again. This is a considerably more convenient and elegant means of file handling than the typing of commands and filenames in at the keyboard.

The total capacity of the RAM catalogue is 56 entries, although only 10 can be displayed at any one time. The up-arrow and down-arrow boxes, however, allow you to scroll through the whole catalogue to find a particular entry. The box with the linked squares symbol (the 'home' symbol) moves you back to the start of the catalogue, and the bar between the two arrow boxes shows which part of the whole catalogue is currently being displayed.

A filename can be entered at the keyboard when a file is being saved for the first time (and hence doesn't appear in the RAM catalogue) by moving the cursor to the box marked 'Enter filename' and pressing select. A prompt will appear requesting a filename. Type in the filename (up to 8 characters) and then press **ENTER** (pressing **ENTER** on a empty line aborts the operation). You do not need to actually type in the file-type extension when saving a file, it will be appended automatically (although the default can be overridden if required). If a drive is not specified (A or B), the current drive will be used (highlighted at the top of the File menu). It is possible to load files which do not appear in the RAM catalogue, because they don't have the right file-type, by entering the filenames manually.

A file can be 'merged' with the current screen contents, a process in which pairs of pixels are combined to produce a composite picture. The merging is on the same basis as the pasting of a window, i.e. taking account of excluded and protected inks and the current paste mode - refer to the Windows menu. Note that palettes are not merged (see below).

A file can be erased from a disc by highlighting it in the RAM catalogue or entering its filename manually, and then clicking the box by the 'Erase file' option. Confirmation is sought before proceeding. The disc is automatically re-catalogued afterwards so that the free space value will be accurate.

Note that files can be saved or loaded by first clicking the save or load boxes and then highlighting the filename. This is the recommended sequence as it removes the possibility of saving a file when loading was intended, and vice versa. A filename can be un-highlighted by selecting it for a second time.

To keep a complete record of a finished picture, it is necessary to save the current palette alongside the actual screen contents (see the section covering the Palette menu for a description of what the palette is). To do this, simply set the 'Palette' switch at the top right of the File menu to 'on' before saving a screen. The palette will then be saved as a separate file with the same first name part as the screen file, but with the file-type extension **.PAL**. For example, if you saved a screen with the palette switch on, using the name **MYPIC**, then your disc would contain the files **MYPIC.SCR** and **MYPIC.PAL**.

The current screen mode is also saved in the palette file, and when a screen and its palette are loaded back into **ADVANCED ART STUDIO**, the program will automatically put itself into the correct mode. Loading a file with the palette switch off will not change the screen mode, nor will it change the current palette. Erasing a screen file with the palette switch on also erases the associated palette file (if it exists).

Pictures can be compressed when they are saved, using a technique known as 'run-length' compression. A compressed file will typically be one third smaller (it depends on the amount of detail in the picture), giving 40% to 50% more pictures on a disc. To compress a picture, set the 'Compress'

switch at the top right of the File menu to on before saving it. Note that you don't have to set the switch when loading back a compressed picture, since the file will have been specially 'watermarked' to enable it to be recognised.

ADVANCED ART STUDIO supports the additional FD1 disc drive that can be connected to the CPC6128. To catalogue a disc in the second drive, click the 'B' box at the top of the File menu, then click the 'Catalogue disc' box. The free space on the disc in drive B will be displayed below that for the disc in drive A. The RAM catalogue will contain files from both discs, the drive number preceeding the actual filename. When a highlighted file is saved or loaded therefore, ADVANCED ART STUDIO knows which drive to use.

Note that ADVANCED ART STUDIO will only load files of the binary type, and will not load a screen file if its length is greater than 16384 (4000 hex) bytes. Some sample pictures are included on the supplied disc. If you load a screen into ADVANCED ART STUDIO that has been created under another art package or from BASIC, then it must have a zero offset, i.e. the screen must not have been hardware rolled.

Filetypes **.SRN** and **.PIC** are also recognised by ADVANCED ART STUDIO and will appear in the RAM catalogue. Only files in USER 0 are displayed, but files can be saved and loaded to other user areas by including a user number in a manually entered filename.

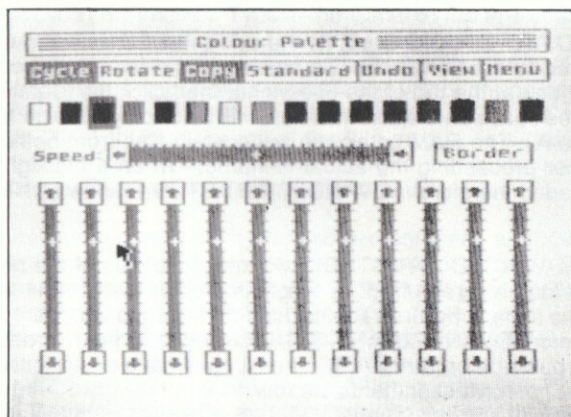
Because the CPC6128 disc operating system automatically maintains a one-level backup for files (with filetype extension **.BAK**), when overwriting a file to a nearly full disc, it may be necessary to erase the previous version before saving the new version. Beware that if you erase an old **.BAK** version of a screen file, ADVANCED ART STUDIO will also erase the associated palette file if the palette switch has been left on.

Similar File menus are used to load and save character fonts, patterns and windows (see below). In those menus, naturally, only font, pattern and window files respectively are displayed in the RAM catalogue. Note that you do not have to catalogue a disc separately in each File menu, catalogue in one and the others are updated automatically (since only one RAM catalogue is actually used internally). The current palette can be saved with pattern and window files, but not with font files. Window files can also be compressed, but pattern and font files cannot be.

Pictures you have created using ADVANCED ART STUDIO (they must not have been compressed) can be loaded back from BASIC with the commands:-

MODE 0: LOAD "picture.scr",&C000 for mode 0 screens or
MODE 1: LOAD "picture.scr",&C000 for mode 1 screens or
MODE 2: LOAD "picture.scr",&C000 for mode 2 screens.

PALETTE



The palette is one of the most interesting features of the Amstrad CPC6128. A total of 27 physical colours can be displayed by the video circuitry in the machine, but not all of these colours can be on the screen at the same time (in fact a maximum of sixteen colours in mode 0, four colours in mode 1, and two colours in mode 2). So, instead of referring directly to colours when working on the screen, we deal with 'inks'. These are 'logical' rather than physical colours. Each ink is linked to one of the available colours (at any one time), but the links are not permanent. Changing the links will actually change the colours that appear on the screen. The Colour Palette menu allows you to set up these links to the colours you want.

The menu contains a number of vertical 'scroll bars', each with graduations representing the 27 colours available on the CPC6128. The indicator in each scroll bar shows which is the chosen colour for that bar. The indicators can be moved up and down the scroll bars (and the colours changed) by clicking the arrow boxes at their ends.

Twelve colours (hence twelve scroll bars) are associated with each of the sixteen inks, and ADVANCED ART STUDIO sequences through the sets of twelve colours at a specified rate. Recall that BASIC allows two colours to be associated with an ink, and that the CPC6128 operating system flashes between the two colours. The ADVANCED ART STUDIO system is an extension of this, to enable more complicated palette animation effects to be realised.

The choice of twelve colours per ink is not an arbitrary one. It readily allows 2-part, 3-part, 4-part, 6-part, and 12-part animation sequences to be set up

(since all these numbers are factors of 12).

The scroll bar at the far left of the screen sets the first colour for an ink, the scroll bar to its right sets the second colour, and so on up to the bar at the far right of the screen which sets the twelfth colour. Note that all the bars to the right of a given bar will automatically track its indicator. Therefore, if you don't want palette animation, just use the leftmost scroll bar to set your colours. Otherwise set your colours one at a time working from left to right across the bars.

In addition to clicking the arrow boxes to change an ink, you can also click on the scroll bars themselves. If the cursor is moved up or down a scroll bar while the select button is held down, the indicator will move with it.

The twelve vertical scroll bars give the set of twelve colours for the current ink, which is the ink outlined at the top of the screen. The current ink is changed by clicking one of the sixteen ink boxes. As a convenience for keyboard users, the current ink can also be changed by pressing function key 0 or the second dot key (the keys immediately above the left and right arrow keys). The f0 key scrolls the current ink to the left, the dot key scrolls it to the right.

The horizontal scroll bar near the top of the screen sets the speed of the palette animation. The fastest speed is obtained by moving its indicator to the far left, and the slowest speed by moving it to the far right.

The border colour can also be changed from the Palette menu by clicking the box marked 'Border'. Again twelve colours can be set, sequenced at the same speed as the inks.

The 'Cycle' switch at the top left of the Palette menu allows the palette animation to be suspended, in which case only the first colour for each ink is significant. The 'Rotate' option is used in conjunction with this switch, and rotates the set of colours for each ink by one position to the left. As an alternative to a single animated palette, you can elect to have twelve stationary palettes, and use the 'Rotate' option to swap between them. Note that if the 'Cycle' switch is off, scroll bar indicators do not track one another.

The set of colours for one ink can be copied to another ink. To do this, first select the ink to be copied from, click the 'Copy' option, then select the ink to be copied to.

'Standard' sets the palette back to its default or initial state. Pressing the ESC key also restores the palette to its standard state. This key is useful to remember if you accidentally set two inks to the same physical colour and lose sight of the cursor!

The 'Undo' option cancels any changes made to the palette since the current ink was selected by clicking one of the sixteen ink boxes. If the

current ink was selected by using the f0 and dot keys, the 'Undo' will cancel all changes since the beginning of the palette change operation, or since the last ink was selected by clicking an ink box.

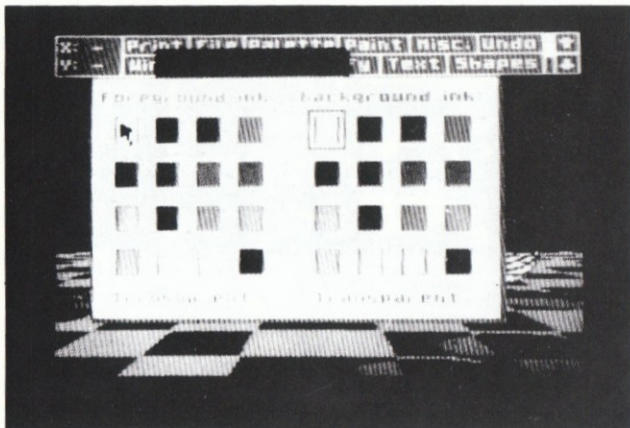
The effects of any palette changes to the picture being worked upon can be checked by moving the cursor to the 'View' box and holding down the select button.

The 'Menu' option is the exit from the Colour Palette menu, and confirms the new choice of palette.

When a palette is saved to disc (see File above), all the relevant information about it is recorded, i.e. the ink and border colours, the animation speed, excluded and protected inks, and the state of the cycle switch.

In screen modes 1 and 2, it is perhaps best to design your pictures using the standard colours, and then adjust the palette at the end just before saving the screen. This will ensure that all the pull-down menus are legible, since, with some arrangements of colours, they would not be.

INKS



For the sake of convenience, the Inks menu can be reached from most of the main pull-down menus via the 'Set inks' option. The menu allows two inks to be defined, a foreground ink and a background ink. Each ink can be set to one of sixteen colours or to transparent. The outlines around the boxes indicate which inks are current. Note that the same Inks menu is used in all three screen modes, where the number of inks actually available changes. In modes 1 and 2, therefore, some of the ink boxes are repeated, however the duplicates give the same results if used.

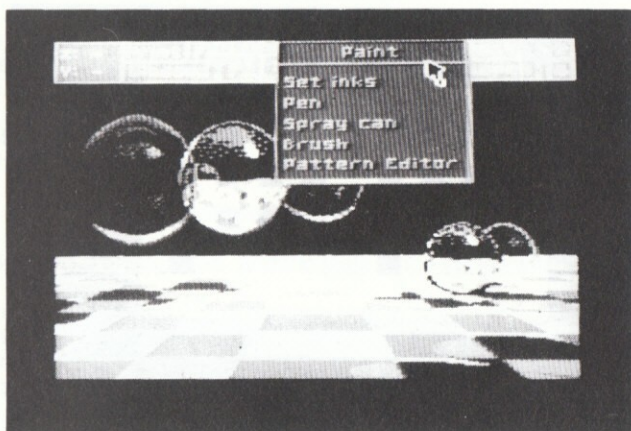
The foreground ink is used to specify an ink for most of the drawing that is done on the screen. For example, all shapes are drawn in the current foreground ink, and all pens paint in the current foreground ink. The background ink is used, for example, to specify an ink when clearing a window, or to specify the background of characters printed on the screen.

The Inks menu is also used to specify inks where the terms foreground and background don't have any literal meaning. For example, when swapping two inks within a window on the screen, the inks are defined via this menu.

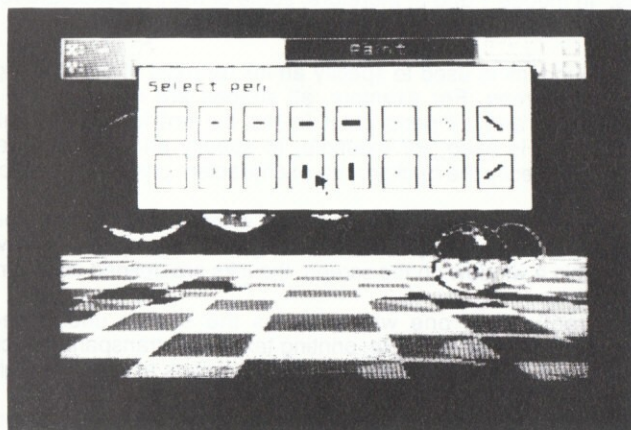
A 'transparent' ink is one which leaves the screen unchanged when anything is drawn. For example, printing text with a transparent background ink allows the existing pixels between the characters to show through.

Note that you can pull down the Inks menu to change the foreground and background inks without losing the 'mode' you are in, in other words the cursor icon doesn't change.

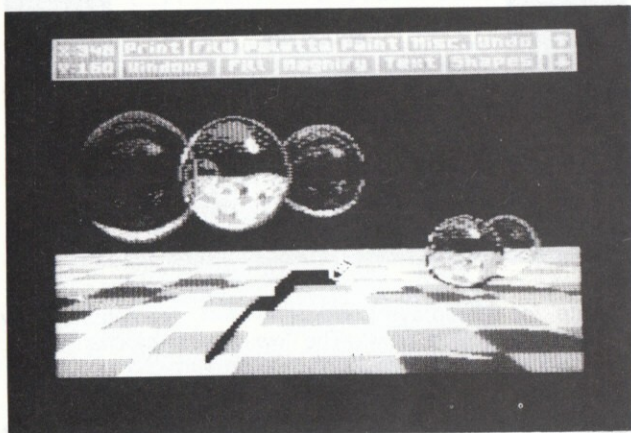
PAINT



This menu controls some of the main facilities for drawing on the screen. It provides access to three different 'tools' - a pen, a spray can and a brush. In addition, it allows brushes to be re-designed to suit individual requirements.



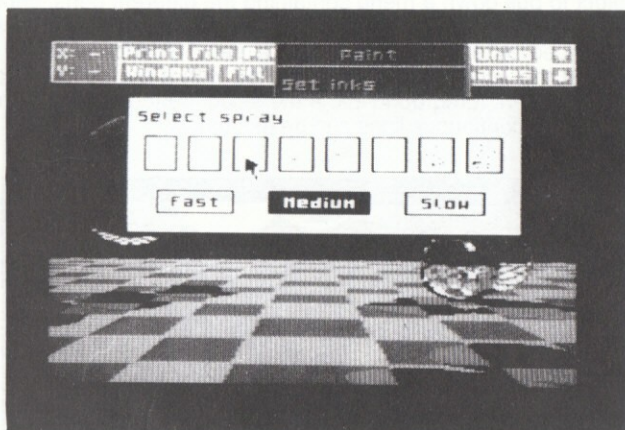
Sixteen pens of various shapes and sizes are available. To use a pen, move the cursor down the Paint menu until the 'Pen' option is highlighted, press select to pull down a menu containing the different pens, choose one by pointing at it with the cursor, then press select again. The arrow cursor will be replaced by a representation of a pen. This cursor can then be moved about the screen and pixels painted with it by pressing select. It paints in the current foreground ink. If the select button is held down as the cursor is moved, continuous lines can be painted.



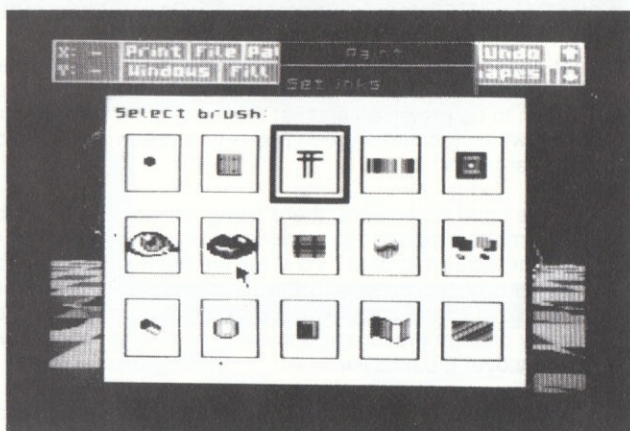
A pen will not change any pixel with a protected ink (see Miscellaneous). This enables you to set up special purpose pens. For example, set all the inks except green to be protected and set the foreground ink to yellow - you now have a pen which just turns green pixels into yellow pixels, and has no effect on any other pixels.

Pens can also be used as erasers, there being no real distinction between the two. For example, suppose you were constructing a diagram in red after having cleared the screen to blue. To draw the elements of your diagram, you would use one of the pens with the foreground ink set to red. Now suppose you made a mistake and wished to remove part of your drawing. You would simply change the foreground ink to blue, and continue using the same pen to draw over the mistake.

Eight spray cans with a range of diameters are available, each of which sprays a random pattern of dots on the screen in the current foreground ink. You can demonstrate this random nature by choosing one of the larger sprays, and holding down the select button while keeping the spray can in one place. Eventually a solid disc will be drawn. The spray may of course be moved as it is painting to produce graffiti-like effects. A spray will not affect pixels with protected inks.



The 'flow rate' for the sprays is adjustable. Three rates are available, namely 'Fast', 'Medium' and 'Slow'. The flow rate can be changed by clicking one of the boxes in the Spray menu.

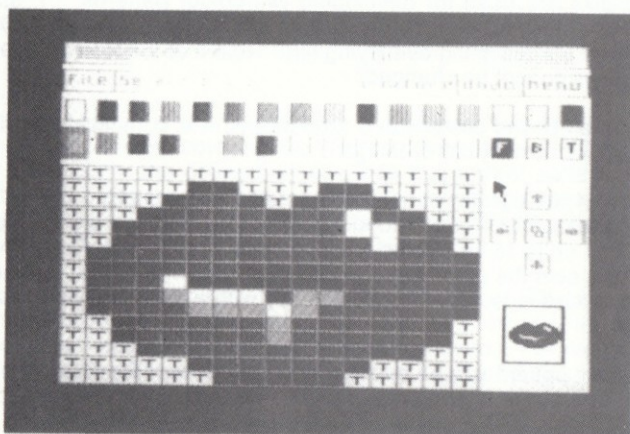


The 'Brush' option in the Paint menu pulls down a menu containing fifteen patterns which can be painted with as brushes. To use a brush, click one of the patterns from this menu. The arrow cursor will be replaced by a representation of a brush, which can then be moved about the screen and

pixels painted by pressing select. A brush will not affect pixels with protected inks. Brushes can be in one or two colours or they can be multi-coloured. A wide range of brushes is provided on the supplied disc.

The last option in the Paint menu invokes a Pattern Editor. This enables you to edit each of the fifteen brushes to fit your particular requirements, or to load some of the pre-defined brushes.

PATTERN EDITOR



This menu enables you to edit the fifteen patterns used for textured fills and as paint brushes. The same set of patterns is shared by the fill and brush options, and they both use the same Pattern Editor. The editor can be reached from the Fill menu or the Paint menu. If entered via the former, then the patterns are 'tessellated' in the menu boxes (so an idea of how they fit together can be obtained). If entered via the latter, single examples of the patterns are displayed in the centres of the menu boxes.

The Pattern Editor contains a large scale representation of the current pattern and an example of the pattern at normal size. The individual pixels in the enlarged pattern can be altered with the arrow cursor. Positioning the cursor over a pixel and pressing select will change the pixel to the current ink, which is shown outlined at the top of the display. The current ink is changed by clicking one of the bottom row of sixteen ink boxes. As a convenience for keyboard users, the current ink can also be changed by pressing function key 0 or the second dot key (the keys immediately above the left and right arrow keys). The f0 key scrolls the current ink to the left, the dot key scrolls it to the right.

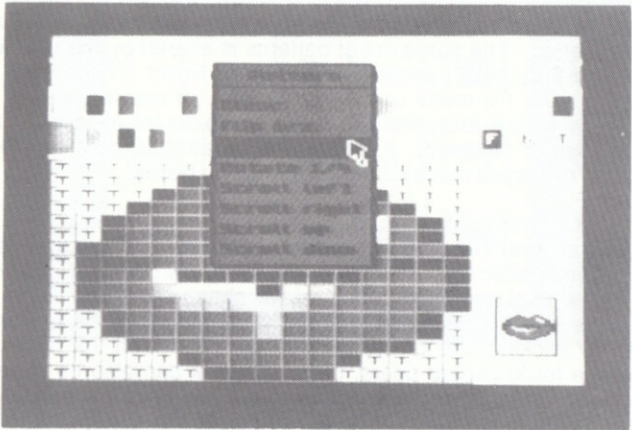
The patterns are really made up of pixels with 'pseudo-inks', where each pseudo-ink is linked to one of the real inks. Changing the links changes the colour of the pixels in the patterns. The top row of sixteen ink boxes represents the colours set from the Palette menu (the real inks). The bottom row represents the sixteen pseudo-inks. Clicking on one of the boxes from the top row changes the physical ink of the current pseudo-ink (the one marked with an outline) in the bottom row.

The last three pseudo-inks are different. 'F' and 'B' are the current foreground and background inks, set from the Inks menu. These pseudo-inks are used for developing two-colour patterns. 'T' stands for transparent, and this pseudo-ink is used for masking out irregularly shaped brushes, or for designing overlaying fills. Note that the links for these three pseudo-inks cannot be changed.

This may all sound complicated (and indeed it is complicated), but a little practice will hopefully clarify things.

The size of the current pattern can be altered by clicking one of the four arrow boxes at the right-hand side of the display. The size is adjustable from 1 by 1 up to 16 by 16 pixels, in steps of a single pixel. The box between the arrows sets the pattern to the maximum size. Note that a pattern used as a fill texture is tessellated to fit exactly within the example box whatever its size.

The current pattern can be changed by pulling down the 'Select' menu, and clicking one of the fifteen patterns. The current pattern is marked with an outline.



There are a number of operations that can be performed upon the current pattern by pulling down the menu from the 'Pattern' box. 'Clear' sets all the pixels in the current pattern to the current ink (which could be transparent for example). 'Flip hrz.' and 'Flip vrt.' flip the current pattern about its horizontal or vertical axis respectively. 'Rotate 1/4' rotates the current pattern by 90 degrees clockwise. 'Scroll left', 'Scroll right', 'Scroll up' and 'Scroll down' scroll the current pattern by one pixel left, right, up or down respectively. A pattern can be rotated by more than 90 degrees by selecting the rotate option two or three times, or scrolled by more than one pixel by repeatedly selecting the last four options.

One pattern can be copied to another. To do this, first select the pattern to be copied from, click the 'Copy' switch, then select the pattern to be copied to.

The 'Capture' option is only highlighted if a window has previously been defined (see the section covering the Windows menu below). Its function is to copy pixels from the defined window into the current pattern, in other words it grabs a pattern from the screen. The resulting pattern will be the same size as the window, unless it is larger than 16 by 16 pixels, in which case it will be clipped from its bottom right-hand corner.

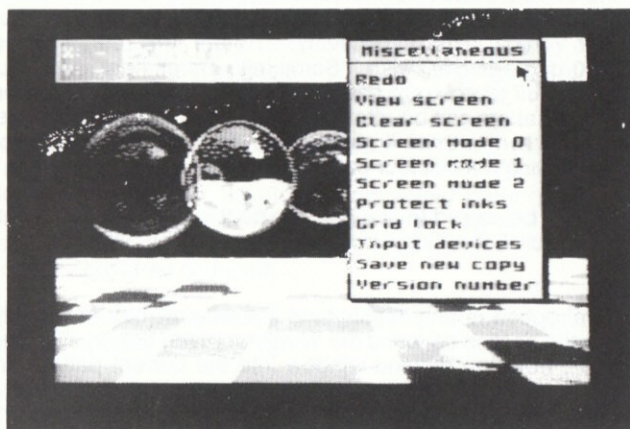
An 'Undo' facility is available within the Pattern Editor. This cancels any changes made to the current pattern, up until the point another pattern is selected, or an option in the 'Pattern' menu is used. For example, if a pattern was cleared by mistake, then clicking the 'Undo' box immediately afterwards would restore it.

Clicking the example box at the bottom right-hand corner of the display allows a newly edited pattern to be used as a fill texture or as a paint brush (depending on whether the Pattern Editor was entered via the Fill or Paint menus respectively). The 'Menu' option is an exit from the Pattern Editor without filling or painting.

Patterns can be saved to and loaded from disc by pulling down the menu from the 'File' box. This is very similar to the file options in the main menu (see above) except that merge is not available, and, of course, only the pattern files on a disc are displayed (those with the **.PAT** filetype). If the palette switch is set, the current palette will be saved or loaded alongside the patterns. Pattern files cannot be compressed.

A number of sample pattern files are provided on the supplied disc, some multi-colour as well as some two-colour fill and brush files. Study of the latter will show how the 'F', 'B' and 'T' inks can be effectively used.

MISCELLANEOUS



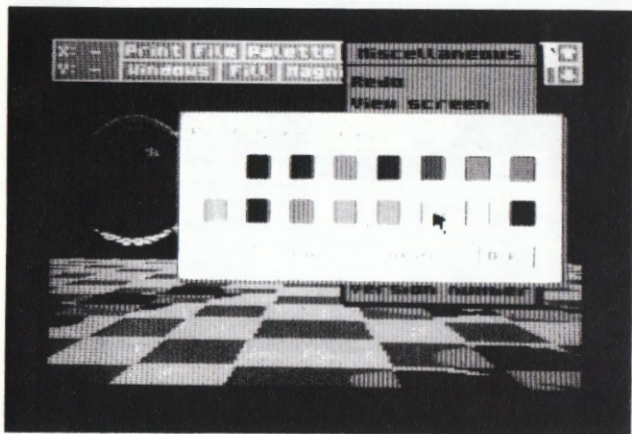
The first option in this menu, 'Redo', is the complement of the 'Undo' function (see below). It swaps the main screen with its back-up store (as opposed to replacing it with), and thus allows an 'Undo' to be previewed. Selecting 'Redo' a second time cancels the effects of a first 'Redo'.

The second option in this menu removes the menu bar from the top of the screen and allows you to view the entire 25 lines of your picture. Press the select button to return to the menu. Note that 'Undo' does not function after viewing the screen, but remember that you can always scroll a picture by clicking the up-arrow and down-arrow boxes to see the extra three lines and still retain the 'Undo' facility.

The third option clears the whole screen (including pixels with protected inks) to the current background ink. 'Undo' is available if you clear the screen by mistake. To clear the screen, but leave protected inks on the screen, select 'Whole screen' in the 'Windows' menu and then 'Clear window'.

The next three options allow you to switch between the different screen modes of the CPC6128. (To recap, mode 0 offers a resolution of 160 by 200 pixels in sixteen colours, mode 1 offers a resolution of 320 by 200 pixels in four colours, and mode 2 offers a resolution of 640 by 200 pixels in two colours). Your picture is not lost when changing mode, it is converted to the new format. Obviously some compromises have to be made in doing this. In going to a higher resolution mode, for example from mode 1 to mode 2, some of the colours in a picture are lost (with the standard palette, white and black are unchanged, red is changed to white, and blue is changed to

black). In going to a lower resolution mode, for example from mode 1 to mode 0, no colours are lost, but some of the fine detail in a picture may be. Note that you can always undo a mode change by clicking the 'Undo' box in the main menu bar. If a fresh start is required in the new mode, the screen can be cleared after the mode has been changed.



Ink protection is a powerful facility which specifies which inks have a higher priority over others. Pixels with protected inks are not obscured when anything is drawn over them. Ink protection applies to just about any drawing done on the screen - it applies to shapes, text, windows, pens, sprays, brushes, and to fills.

The protection of an ink can be set or reset by clicking its associated box in the Protected Inks menu - an outline around the box signifying that it is protected. The option to protect 'All' the inks would, at first sight, seem to be of limited value, but is useful when protecting all but one of the inks. The box marked 'None' sets no ink to be protected. The 'Undo' option cancels any changes made since the ink protection menu was last pulled down, and the 'O.K.' option exits from the menu confirming the ink protection settings. Protected ink settings are saved with the palette file.

A grid lock is available in ADVANCED ART STUDIO, which locks the cursor to an imaginary grid on the screen. The grid is useful in aligning the components of a drawing. The lock can be set independently in the two axes, and at a number of graduations. For example, if the X-lock was set to 4 and the Y-lock to 8, then the cursor would be restricted to every 4th pixel horizontally and 8th pixel vertically. If a shape was being drawn at the time, then the vertices of the shape would be locked to those particular pixels. Note that the grid lock also applies to painting, windowing, and text.

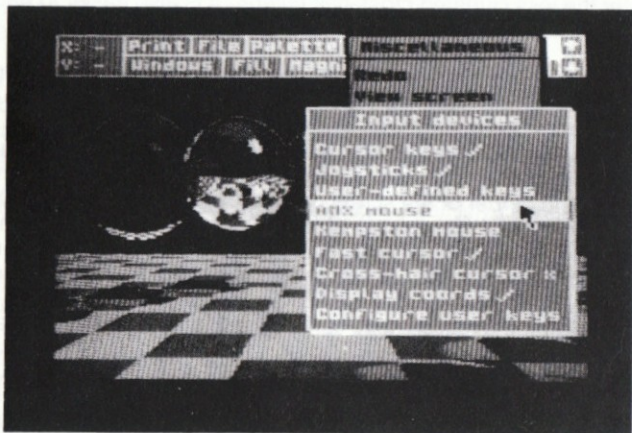


The next option pulls down a menu which controls the Input devices. This menu is dealt with in the section below.

The option 'Save new copy' saves a personalised copy of ADVANCED ART STUDIO to the disc in drive A. The copy will be personalised in the sense of being saved with the state of the menu switches, the screen mode, the current palette, the current set of patterns, the RAM catalogue, and the current font all intact. Consequently, when the copy is loaded back, the system will be already set up for individual requirements. Make sure you have a formatted disc in drive A when selecting this option (Do not use the master disc supplied with ADVANCED ART STUDIO). Copies of ADVANCED ART STUDIO are loaded in the same way as the original, i.e. reset your CPC6128, then enter the command **RUN "STUDIO"**.

The final option in the Miscellaneous menu displays a copyright message and the release number of the particular version of ADVANCED ART STUDIO you are using.

INPUT DEVICES



This menu enables you to specify the input device for your copy of ADVANCED ART STUDIO, i.e. what actually moves the pointer around the screen. In fact, ADVANCED ART STUDIO allows more than one input device to be 'active' at the same time, two devices can act in 'tandem'. For example, a joystick might be used for most of the movement around the screen, and then the keyboard brought in for very fine pixel work. The program is initially set up to use the cursor (arrow) keys to move the pointer and the space bar to select options, in tandem with a joystick (joystick #0 or #1, either 'fire' button).

You can configure the program to use your own choice of five keys on the keyboard (four direction keys and select). The final option in this menu (see below) allows this. Once defined, the new arrangement of keys can be brought into play by clicking the 'User-defined keys' option. Note that the user keys are initially set to cursor keys and ENTER.

ADVANCED ART STUDIO also supports AMX and Kempston mice. A mouse is a far more sophisticated input device than a joystick or the keyboard, and allows much greater control over the movement of the cursor. Note that any of the select buttons on a mouse can be used to control the program.

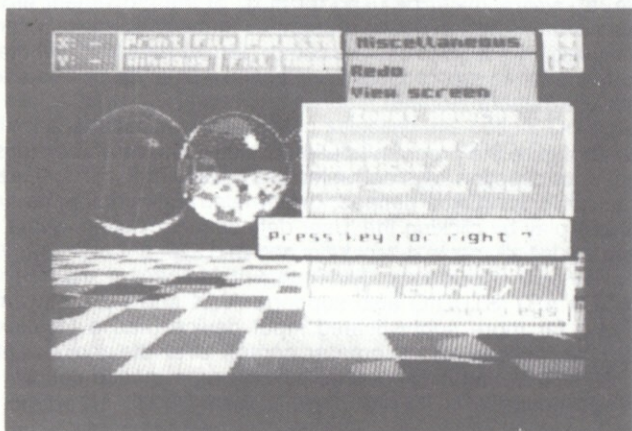
Two cursor speeds are available, whether the pointer is being moved by the keyboard/joystick or by a mouse. The initial setting is the slower speed. To engage the faster speed, simply set the 'Fast cursor' switch to on.

To can elect to use a cross-hair cursor instead of the icon cursors (except

the window and text cursors) by setting the 'Cross-hair cursor' switch to on. Icons are useful reminders of the 'mode' you are in, but experienced users may prefer the less cluttered cross-hair cursor. It is also easier to gauge the actual point of application of the latter.

The coordinates of the cursor can be continuously displayed in the top left-hand corner of the screen by turning the 'Display coords' switch on (the coords are only actually displayed when the cursor is not in a menu). These coordinates uniquely identify every pixel on the screen, and so are useful in positioning the cursor accurately. The origin of the coordinate system is the bottom left-hand corner of the screen (when fully scrolled up). The X-coord runs from 0 to 639 (in increments of four in screen mode 0, increments of two in mode 1, and increments of one in mode 2), and the Y-coord runs from 0 to 398 (in increments of two in all three modes). This is the same coordinate system as is used by BASIC. Recall that the SHIFT key in conjunction with the direction keys can be used to move the cursor a single pixel at a time.

The final option in the Input devices menu allows the user-defined keys to be reconfigured. Click this option and you will be asked to specify the five keys, in the order corresponding to 'left', 'right', 'up', 'down', and 'select'. For each, press your choice of key. You should only use letter, number and punctuation keys, not CAPS LOCK, SHIFT etc. as these have other meanings.



UNDO

This is one of the most useful facilities in ADVANCED ART STUDIO as it undoes the effects of the last command or operation.

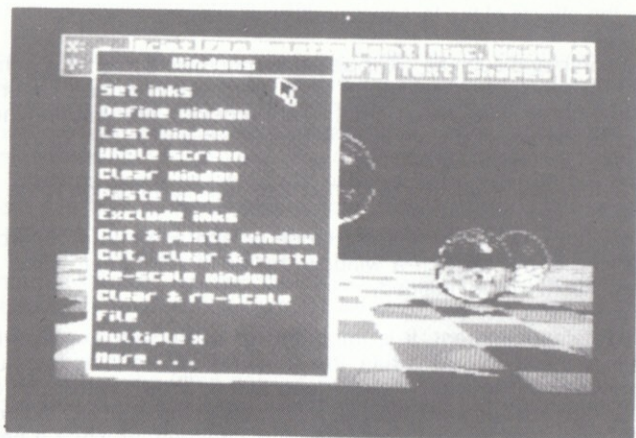
When a command such as 'fill' is selected, the main screen is automatically copied to a special back-up store. The fill operation is then performed on the main screen. If the result is not what's required, then clicking the 'Undo' box causes the back-up store to be restored to the main screen.

Note that this facility only works immediately after any change to the screen.

Undo will not change the current mode of operation, in other words the current icon is not lost. If a window outline is on screen when undo is selected, then it will be retained.

To avoid disappointment, it is important to appreciate exactly when the screen is 'backed up'. As a rule, the screen is copied to its back-up store when a command in a pull-down menu that flashes is selected (defining windows is an exception to this), or, for example, the Font Editor is entered. It is not backed-up when a menu switch is changed, or when a new ink is selected. If in doubt, remember that you can always force a back-up by re-selecting the command.

WINDOWS



A window is a rectangular section of the screen, marked by a dotted outline, which can be acted upon as a whole. Windows can be cleared, moved, copied, smeared, re-scaled, flipped, rotated, and saved to or loaded from disc. 'Undo' can be used after a window has been processed to reverse any effects.

A window can be defined by pulling down the menu from the 'Windows' box, moving the cursor to the 'Define window' option, and pressing select. The arrow cursor will be replaced by a small box cursor. This cursor can then be moved about the screen and the select button pressed twice to define two opposite corners of a window. The outline of the window will be marked on the screen with a dotted line, and the cursor will turn back into an arrow. The Windows menu can then be pulled down for a second time and one of the window processing commands selected. Note that at any time while the window is being defined, you may abort the definition by pressing the ESC.

A window that is larger than the 22 visible lines of the screen can be defined by clicking the first corner, clicking one of the arrow boxes to scroll the screen, then clicking the second corner. The option 'Whole screen' defines the whole screen as a window. The option 'Last window' re-defines the last used window.

Clicking the option 'Clear window' clears the pixels in a window to the current background ink, set from the Inks menu. Pixels with protected inks (see Misc. above) are not cleared.

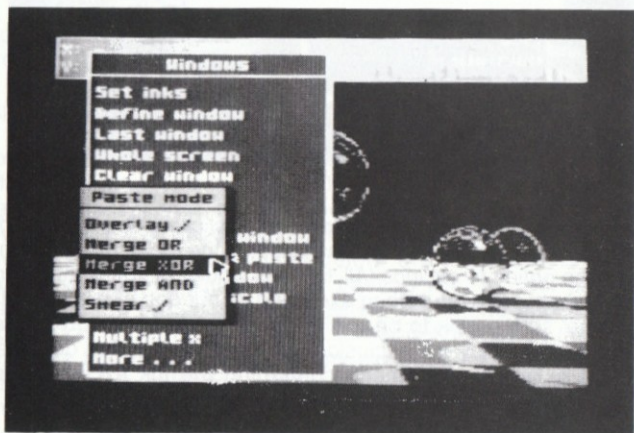
As explained above, a window can be cleared by first defining it using the

'Define window' option, then pulling down the Windows menu a second time and selecting the 'Clear window' option. But an easier and faster method is to select the 'Clear window' option directly, which allows a window to be defined and then immediately clears it. The rest of the window processing commands in this menu work in the same way, they can be selected directly, or selected after a window has been defined. You should use the separate 'Define window' option however in the following situations:- for capturing pixels from a window into a pattern or font, for printing a window, or for saving a window to disc.

The 'Multiple' switch allows multiple windows to be cleared, or multiple windows to be pasted, re-scaled, flipped, rotated etc. Set the switch to on before selecting a window processing command to use this facility.

A window can be copied to another point on the screen by clicking the 'Cut & paste window' option. Once the window has been defined, a second window outline appears which moves as a whole with the cursor, and when the select button is pressed, the original window is copied to the new window. Note that the second window is moved via the first corner defined in the original window. If the 'Multiple' switch is on, as many copies of the window can be made as required.

The option 'Cut, clear and paste' is similar to the above with the addition of clearing the original window (to the current background ink) when copying it, i.e. it effectively moves a window.



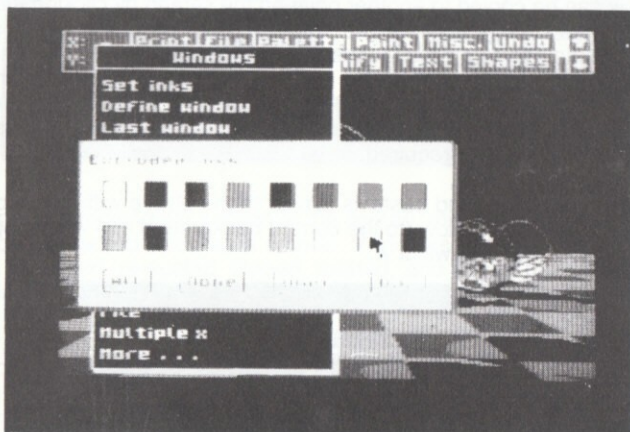
The sub-menu 'Paste mode' contains a number of switches which affect the pasting of windows.

Normally a window overwrites the screen when it is pasted. It can, however, be combined or merged with the existing screen by selecting one of the

'Merge' options. If 'Merge OR' is set, pixels are combined on an OR basis. If 'Merge XOR' is set pixels are combined on an XOR basis. Finally, if 'Merge AND' is set, pixels are combined on an AND basis. To turn off merging, re-select the 'Overlay' option.

'Smear' is essentially an auto-repeat on the select button when pasting, and allows a window to be used like a paint brush. It is best in conjunction with small windows.

Ink exclusion is a powerful feature that allows particular inks to be excluded when a window is pasted, in other words the inks are left behind. It is useful to exclude the background of an object being pasted, so as not to obscure the object's new surroundings.

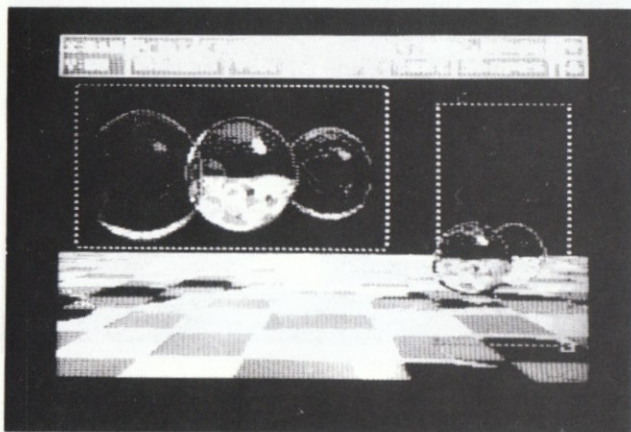


The exclusion of an ink can be set or reset by clicking its associated box in the Excluded Inks menu - an outline around the box signifying that it is excluded. The option to exclude 'All' the inks would, at first sight, seem to be of limited value, but is useful when excluding all but one of the inks. The box marked 'None' sets no ink to be excluded. The 'Undo' option cancels any changes made since the ink exclusion menu was last pulled down, and the 'O.K.' option exits from the menu confirming the ink exclusion settings. Excluded ink settings are saved along with the colour palette.

Ink protection also applies to the pasting of windows, any pixel with a protected ink will show through when pasted over. This enables windows to be pasted behind other objects, typically to preserve the foreground of a picture.

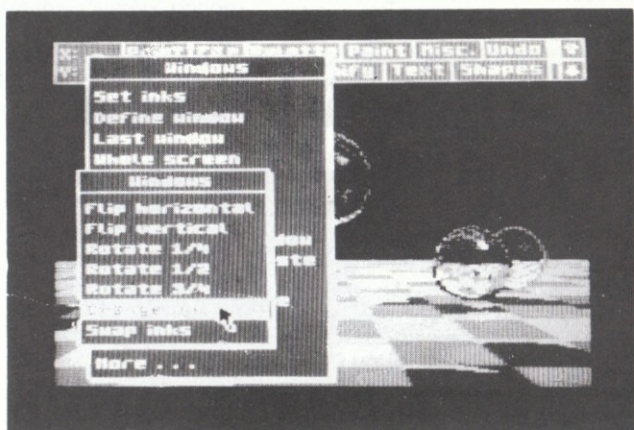
A window can be enlarged, reduced, squashed, or stretched - actions

collectively known as 're-scaling' - by clicking the 'Re-scale window' option. This allows two windows to be defined, the first window is then 'mapped' onto the second window, being re-scaled as necessary to fit into the new outline. Note that there may be some loss of fine detail when a window is reduced in size.



The option 'Clear & re-scale' clears the original window when re-scaling it. Ink protection, ink exclusion and the switches in the Paste mode menu (apart from 'Smear') apply to the re-scaling of windows in the same way that they apply to the cutting and pasting of windows.

Windows can be saved to and loaded from disc by pulling down the menu from the 'File' entry. This is very similar to the file options in the main menu (see above) except that merge is not available and, of course, only the window files on a disc are displayed (those with **.WIN** filetype). A window to be saved to disc must be defined before the File menu is pulled down. Loading a window is equivalent to pasting with it. Ink protection, ink exclusion and the switches in the Paste mode menu apply as before. A loaded window is moved via the first corner defined when the window was saved. Note that the paste mode, any excluded inks etc. must be set up before the window is loaded, if a menu is subsequently pulled down the window will be lost (because the internal buffer used to store the window is also used to store the section of the screen under a pull-down menu). If the palette switch is set, the current palette will be saved or loaded alongside a window. Window files can be compressed in the same way that whole screens are, by setting the 'Compress' switch at the top right of the File menu. Some sample windows are provided on the supplied disc, and are detailed in Appendix 2.



Clicking the 'More . . .' option at the bottom of the Windows menu pulls down an extension to the menu containing some more window processing commands.

Windows can be 'flipped' or mirrored about their horizontal and vertical axes by selecting the 'Flip' options in this menu.

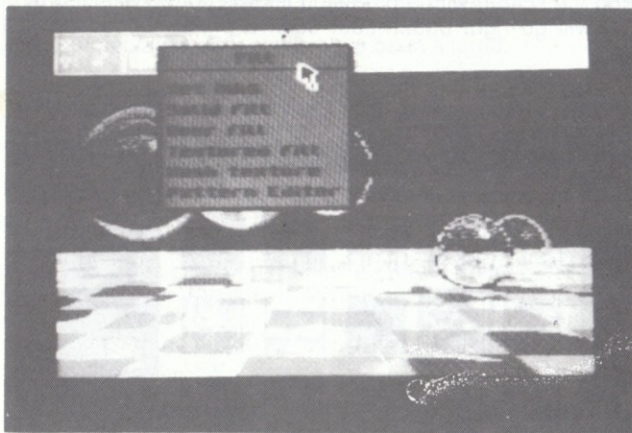
Windows can be rotated clockwise by one-quarter, one-half, and three quarters of a complete turn (equivalent to 90, 180 and 270 degrees respectively) by selecting the 'Rotate' options.

The function of the 'Change ink' option is to change one ink into another over the whole, or part of, the screen. Two inks are defined via the Inks menu, a source ink is specified as the background ink, and a destination ink is specified as the foreground ink. The option then converts all occurrences of the source ink to the destination ink within a window.

The 'Swap inks' option takes two inks within a window and exchanges them. Again, the inks are defined via the Inks menu as foreground and background.

It should be realised that these last two options physically change the inks of pixels on the screen, and have nothing to do with the palette.

FILL



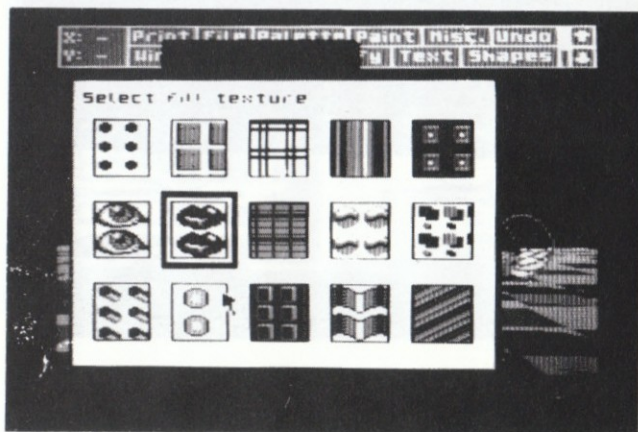
Filling is a technique for rapidly setting all the pixels within an object or shape on the screen. The object to be filled must have a continuous outline, but the outline can be quite complex. An object can be filled with solid colour or it can be filled with a pattern (or texture, as it is known). Textures can be in two colours or they can be multi-coloured. A wide range of textures is provided on the supplied disc - these include various stipples and hatches, and specialised patterns such as bricks and roof tiles. In addition, new textures can be designed to suit individual requirements.

To fill an object solidly, move the cursor down the Fill menu until the 'Solid fill' or 'Over fill' option is highlighted and press select. The arrow cursor will be replaced by a representation of a paint roller. Move this cursor about the screen to some point within the object you wish to fill, then press select again. The fill will proceed outwards in every direction, in the current foreground ink, from the chosen point until the outline of the object or the border of the screen is encountered.

The distinction between 'Solid fill' and 'Over fill' is a subtle but important one, and rests upon their different 'boundary conditions'. A solid fill fills outwards until a pixel of a different ink to the starting point is encountered. An over fill fills outwards until a pixel of a different ink to the starting point is encountered. Both fills set pixels in the current foreground ink. For example, imagine a triangle on a white background with one side of the triangle black, another red, and the third blue. Selecting 'Solid fill' and clicking some point within the triangle, with black foreground ink set, will result in the triangle being neatly filled in black. Or, selecting 'Over fill' and clicking some point within the triangle, again with black foreground ink, will

result in the fill going right over the red and blue sides and probably ending up covering the whole screen.

Any pixel on the screen with a protected ink will not be affected by a fill, in fact any fill will go right underneath such a pixel (it does not act as a boundary).



To fill an object with a pattern, move the cursor down the Fill menu until the 'Textured fill' option is highlighted, then press select to pull down a menu containing the fifteen available textures. Click the desired texture, then click some point within the object to be filled. A textured fill is a two stage process. First an ordinary solid fill is done, then the chosen texture is 'mapped' onto all the pixels on the screen that have been set by the solid fill.

Note that fills take place over the whole screen including the three lines not visible at any one time. The results of a fill can be checked by clicking the up-arrow and down-arrow boxes in the main menu bar to see these extra lines. A fill can be aborted by pressing the ESC key. If a fill 'leaks' out of an object, or is in any way unsatisfactory, it can be removed by clicking the 'Undo' box.

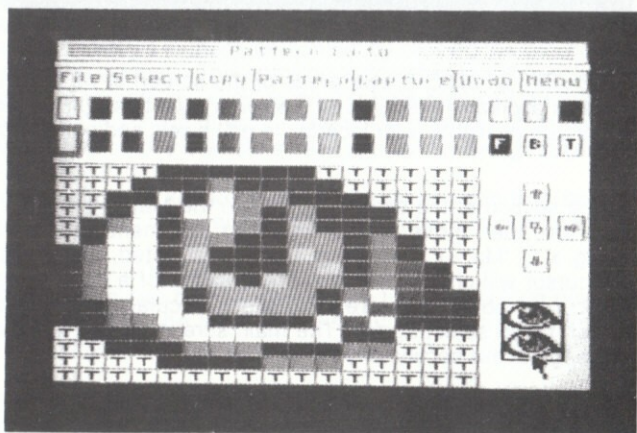
You may like to know that the fill algorithm is structured around an internal stack which stores line segments for the object being filled. Approximately 8 kilobytes of memory are available to this stack, but it is possible that very convoluted shapes may cause the stack to overflow. If this happens, ADVANCED ART STUDIO will not crash, but it may leave some small holes in the object being filled. However, this is hardly ever likely to happen in practice.

'Wash texture' is a versatile feature that effectively allows you to paint directly with a pattern. It uses the same menu of fifteen textures as the above, and works by 'mapping' a chosen texture onto any pixels on the screen that have been changed by a previous operation. This process is essentially an extension of the second stage of a textured fill. Note that it only works immediately after pixels have been altered.

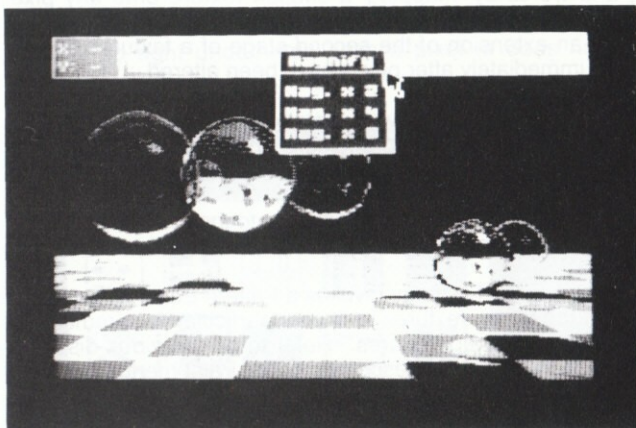
For example, you could draw a rectangle using the Shapes menu (see below), and then wash a stipple texture onto it to get a dotted outline. Or you could wash a striped texture onto a line of text for distinctive lettering.

Note that it is possible to wash a texture onto the results of an over fill. This is a powerful facility, allowing textures to be overlayed on to one another.

The last option in the Fill menu invokes a Pattern Editor. This enables you to edit each of the fifteen textures to fit your particular requirements, or to load some of the pre-defined textures. Refer to the previous discussion of the Pattern Editor following the description of the Paint menu.



MAGNIFY

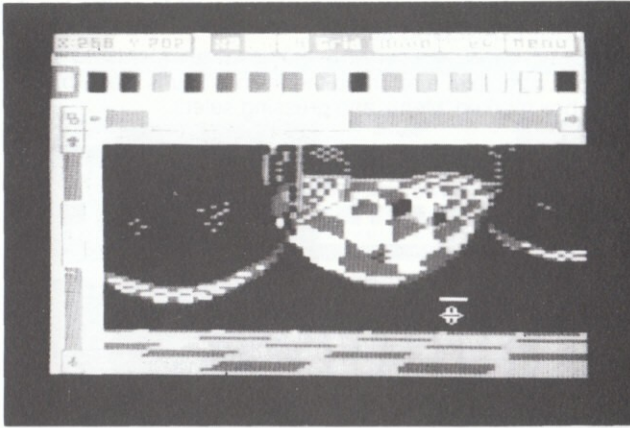


ADVANCED ART STUDIO allows areas of the screen to be magnified for detailed examination and alteration on a pixel by pixel basis. Three levels of magnification are available, with facilities to edit pixels and pan and zoom in each.

To magnify a section of the screen, pull down the Magnify menu from the main menu bar, then move the cursor down this menu until one of the options 'Mag. x 2', 'Mag. x 4', or 'Mag. x 8' is highlighted, and press select. The arrow cursor will change into a representation of a magnifying glass. Move this cursor about the screen to the particular area you wish to magnify, then press select again. The main screen will be replaced by a magnified image of this section of your picture.

An individual pixel within the magnified section can be altered by positioning the cross-hair cursor over it and pressing select. The pixel will be changed to the current ink, which is shown outlined at the top of the display. The current ink is changed by clicking one of the sixteen ink boxes. Note that the cursor can be moved while the select button is held down to alter pixels more rapidly.

As a convenience for keyboard users, the current ink can also be changed by pressing function key 0 or the second dot key (the keys immediately above the left and right arrow keys) when the cursor is in the magnified section. The f0 key scrolls the current ink to the left, the dot key scrolls it to the right.



The area to be magnified can be scrolled over the whole screen by clicking the boxes with arrows in them, or 'homed' by clicking the box containing the linked squares symbol. The scrolling auto-repeats if the select button is held down. Alternatively, clicking on the bars between the pairs of arrow boxes scrolls the screen directly. The white markers on these scroll bars show which fraction of the whole screen is currently being magnified.

As a convenience for keyboard users, the screen can also be scrolled by pressing CONTROL and a direction key when the cursor is in the magnified section.

The magnification can be changed at any time by clicking one of the 'x2', 'x4', or 'x8' boxes at the top of the display. The current magnification is shown highlighted.

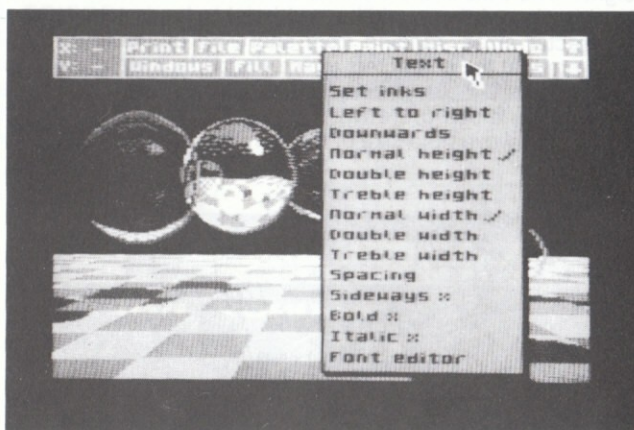
A grid is available in the x8 magnification mode - one square in the grid representing one pixel on the screen. This grid can be switched on or off from the 'Grid' option in the menu bar. Note that the pixels in screen mode 1 are square, whilst those in mode 2 are half as wide as they are tall, and those in mode 0 twice as wide as they are tall.

A local 'Undo' facility is available to cancel any changes made to the magnified section, up until the point the screen is scrolled or the magnification is changed.

The 'View' option allows the whole screen to be seen un-magnified, for as long as the select button is held down. A box is drawn around the area currently being magnified.

The coordinates of the pixel under the cross-hair cursor - using the same

TEXT



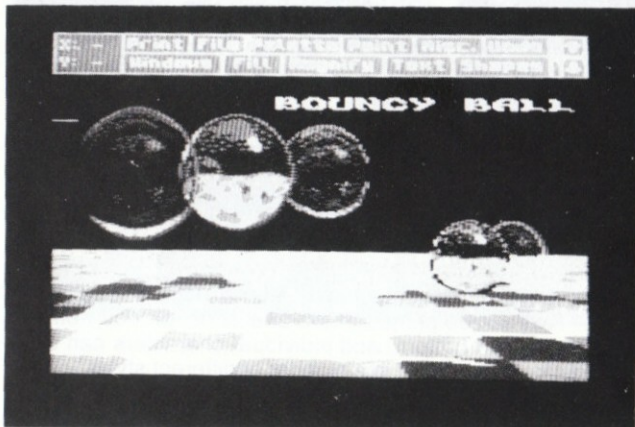
This menu controls the addition of text - letters, numbers, punctuation etc. - to a picture. Text can be printed in two directions, to read from left to right, or to read from top to bottom, and individual characters can be printed in one of nine different sizes and in a number of different styles.

To add text to the screen, move the cursor down the Text menu until the 'Left to right' or the 'Downwards' option is highlighted, and press select. The arrow cursor will change into a cursor which looks like a capital I. Move this cursor about the screen to the point at which you wish to add your text, then press select again. The I cursor will be replaced by an underscore character, which is the text entry cursor. Type in your text using the keyboard. All the symbols marked as the key legends are available. If you make a mistake, the last character can be deleted by pressing DEL. All keys auto-repeat, and full cursor control (with wrap-around) is available using the cursor keys. The CAPS LOCK key functions as normal, as does the CLR key which clears the character under the cursor.

All characters are printed in the current foreground and background inks, set from the Inks menu. Either ink may be transparent, but note that, with a transparent background, DEL and CLR will be ineffective. Any pixels on the screen with protected inks (see MISCELLANEOUS) are left unchanged when a character is printed.

As each character is printed, the text cursor is advanced to the next character position either immediately to the right or immediately below, depending on the direction chosen originally from the Text menu. Pressing ENTER or RETURN terminates the input of text and recovers the I cursor.

Three character widths are available, labelled 'Normal width' to 'Treble width', and three character heights are available, labelled 'Normal height' to 'Treble height'. The ticks in the Text menu indicate which options currently apply. Combination of these widths and heights leads to a total of nine possible character sizes, ranging from short, fat characters to tall, thin characters. Note that the characters in screen mode 2 are half the width of the corresponding characters in mode 1 (because the pixels are half the width), and those in mode 0 are twice the width (because the pixels are twice the width). However, the size of each character is reflected in the size of the capital I cursor.



The spacing of text is variable, and can be altered by pulling down the menu from the 'Spacing' option. This specifies the separation of characters in pixels, in the range 4 to 15 (normally 8). There is a half-width character font on the supplied disc (see below), which will give, with the spacing set to 4, double the number of characters per line.

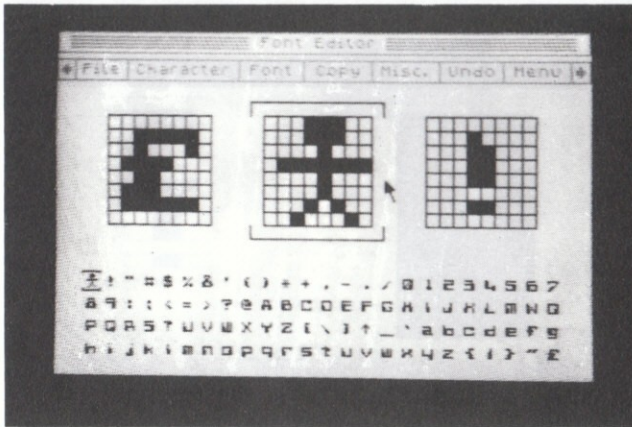
Individual characters can be printed at normal orientation or sideways. The latter helps with the annotation of diagrams, etc. To print characters in this way, simply set the 'Sideways' switch in the Text menu to on before selecting 'Left to right' or 'Downwards' (or indeed, after selecting).

Text can be bold, where each character is printed twice, the second time one pixel to the right, and so appears to stand out. To print bold characters, set the 'Bold' switch to on.

Text can also be printed in italic, a forward slanting style, by setting the 'Italic' switch to on. However, this does not always give satisfactory results for every character, so a separate italic font is included on the disc (see below).

Finally, the last option in the Text menu invokes a Font Editor.

FONT EDITOR

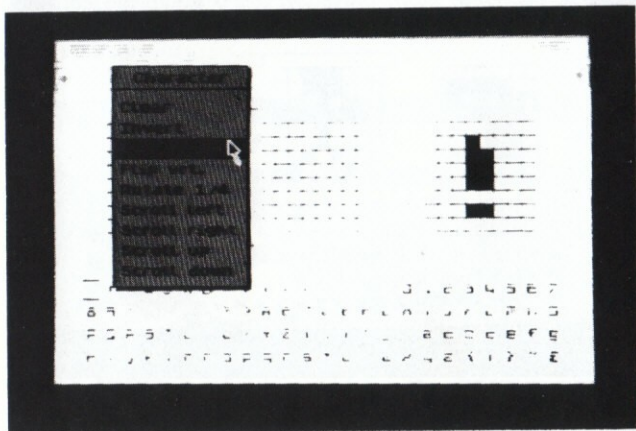


This menu allows you to edit the character set, or font as it is called, that the Text options use. There are 96 characters in a font, ranging from the space character to the pound symbol (ASCII 32 to 127). (Technically this last character is out of ASCII sequence but is included in this position so that there are equivalents in the font for all the symbols marked on the keyboard.) Whole new fonts can be created using this menu, or existing fonts can be altered. Fonts can be stored on disc, and loaded into memory as required.

The 96 characters in a font are displayed at the bottom of the screen, each consisting of 8 by 8 pixels. One of these characters is the current character, this is marked by a top and tail cursor. The current character and the characters immediately to its left and right are shown in enlarged form above the font.

The individual pixels in these enlarged characters can be altered with the arrow cursor. Positioning the cursor over a pixel and pressing select will toggle the pixel. Then, as long as select is held down, and the cursor is moved about, other pixels under the cursor will be changed in the same way as the first. For example, clicking on a set pixel will reset that pixel and reset any others until select is released, and clicking on a reset pixel will set the pixel and subsequent pixels until select is released.

A particular character can be made the current character by pointing at it in the font at the bottom of the screen and pressing select. Alternatively the current character can be scrolled through the entire font by clicking the boxes with arrows in them. The scrolling auto-repeats if the select button is held down. As a convenience for keyboard users, the current character can also be scrolled by pressing CONTROL and a direction key.



There are a number of operations that can be performed upon the current character by pulling down the menu from the 'Character' box. These operations are:- clear (reset all pixels), invert (toggle all pixels), flip horizontal, flip vertical, rotate 1/4 (90 degrees clockwise), scroll left, scroll right, scroll up and scroll down (by 1 pixel). A character can be rotated by more than 90 degrees by selecting the rotate option two or three times, or scrolled by more than one pixel by repeatedly selecting the last four options.

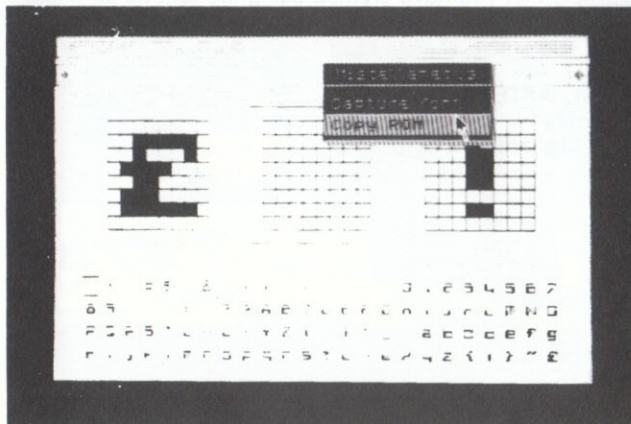
The same set of operations can be performed upon the font as a whole by pulling down the menu from the 'Font' box.

An 'Undo' facility is available within the Font Editor. This cancels any changes made to the character set, up until the point the current character is scrolled or an option in one of the pull-down menus is selected. For example, if the whole font was cleared by mistake, then clicking the 'Undo' box immediately afterwards would restore it.

One character in the font can be copied to another. To do this, first select the character to be copied from, click the 'Copy' box in the menu bar, then select the character to be copied to.

The character set contained in the CPC6128's ROM (the characters

available in BASIC) can be loaded into ADVANCED ART STUDIO's font by selecting the 'Copy ROM' option in the Misc. menu (this is the font that is in memory when ADVANCED ART STUDIO is loaded for the first time).



The 'Capture font' option in the Misc. menu is only highlighted if a window has previously been defined (see the section covering the Windows menu above). Its function is to copy blocks of pixels from the defined window on the screen into the font. Copying starts at the current character and proceeds left to right across the window, from top to bottom, until all the pixels have been used. In screen modes 0 and 1 the least significant ink bit determines whether a pixel is set or reset.

Fonts can be saved to and loaded from disc by pulling down the menu from the 'File' box. This is very similar to the file options in the main menu (see above) except that merge is not available and, of course, only the font files on a disc are displayed (those with .FNT filetype). Note that there are 768 bytes (96 x 8) in a font, and ADVANCED ART STUDIO will refuse to load a file if it's larger than this value (it can be smaller though). Fonts cannot be compressed - they are already the minimum file size.

A number of sample fonts are provided on the supplied disc (including a special italic font and a half-width font). These fonts can be used in the design of your own pictures.

When editing is complete, a return to the main menu can be made by moving the cursor to the box marked 'Menu' and pressing select. The font created or loaded is then available via the Text menu.

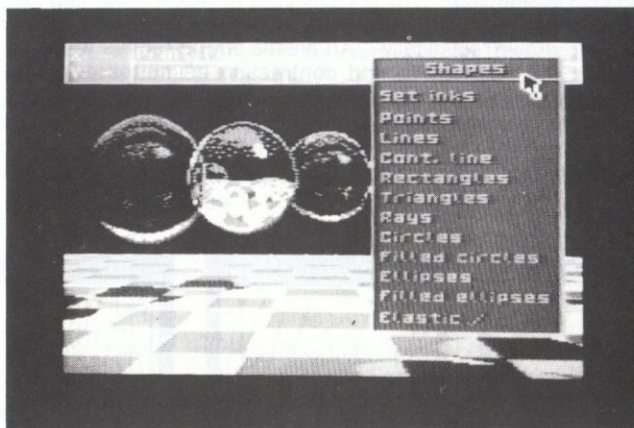
Note that this font editor doesn't have to be used exclusively for ordinary

letters and numbers. It could just as well be used for the creation and editing of user defined characters, or any other symbols that fit into an 8 by 8 grid.

Character sets that you have created using the font editor in ADVANCED ART STUDIO can be used in your own programs with the following BASIC routine:-

```
10 SYMBOL AFTER 32
20 x=HIMEM+1
30 LOAD "filename.fnt",x
```

SHAPES



This menu is used to draw various shapes on the screen. Ten different shapes are available, namely single points, lines, a continuous line, rectangles, triangles, rays, circles, filled circles, ellipses, and filled ellipses. Shapes are drawn by moving the cursor about the screen and pressing select to define the vertices. All shapes are drawn in the current foreground ink, and pixels on the screen with protected inks are not obscured by any shapes drawn over them. Rectangles, triangles etc. are composed of line segments of single pixel width.

For example, to draw a triangle, pull down the Shapes menu, then click the 'Triangles' option. Move the cursor about the screen, and press the select button three times to define the three corners of the triangle.

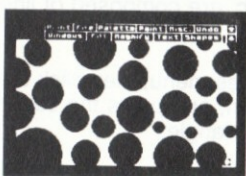
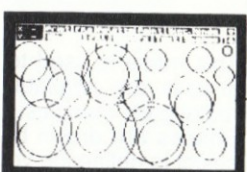
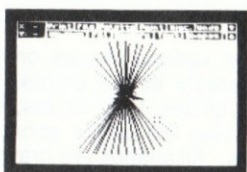
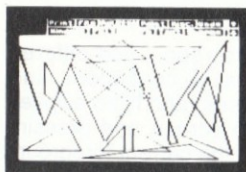
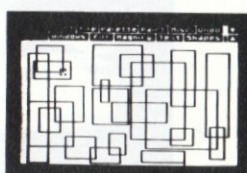
Rays are line segments radiating out from a common centre point, the first point defined.

A circle is drawn by pressing select once to define the centre, then pressing select a second time to define a point on the circumference. An ellipse is similarly drawn - pressing select the first time to define the centre, then pressing it a second time to define the dimensions (think of it as defining the centre and corner of a box into which the ellipse is fitted).

Filled circles and ellipses are drawn in the same way as outline circles and ellipses. They are filled in the current foreground ink. Note that circles and ellipses are drawn over the whole screen, including the three lines not visible at any one time.

Multiple shapes can be drawn without needing to pull down the Shapes menu each time. ADVANCED ART STUDIO stays in 'shapes mode' until something else is selected.

Shapes can be drawn 'elastically'. An elastic shape moves with the cursor across the screen, expanding and contracting as necessary. Pressing select fixes the vertex of an elastic shape as before. This is helpful in getting a shape into the correct position before being committed to that position. To draw an elastic shape, set the 'Elastic' switch in the menu to on before selecting one of the shape options. Note that an elastic shape can be aborted by pressing the ESC key.



APPENDIX 1 - USER-DEFINED PRINTERS

Provision has been made in ADVANCED ART STUDIO to support printers not explicitly listed in the Print menu. The system is expanded via a printer parameter file, which is stored on the same disc as the working copy of the program (don't use the master copy). When ADVANCED ART STUDIO is booted, it looks for the parameter file on the disc, and loads it if present. This must be a 29 byte binary file with the filename **"PRINTER.DEF"**. It can then be selected by setting the 'User-defined' option in the Print menu. The information needed to construct a parameter file for your printer should be contained in its user manual.

Note that subsequent copies of ADVANCED ART STUDIO saved have the printer parameters built into them, and no longer need the parameter file on the disc.

The parameter file can be created with an assembler or with a short BASIC program. An example of the former, for Epson compatible printers, and an example of the latter, for the Amstrad DMP-1, are given below.

The first byte in the parameter file is a flags byte. Bit 0 of this byte is reset if the top wire in the print head is controlled via the most significant bit (m.s.b.) of data bytes sent to it, or set if it is controlled by the least significant bit (l.s.b.). For most printers, it is the m.s.b. Bit 1 of the flags byte is reset for Epson-type printers, or set for printers specifically designed for 7-bit Centronics ports (such as the Amstrad DMP-1).

The next eight bytes in the file are a set of control codes sent to the printer at the start of a screen dump. These control codes will typically be used to set the correct line spacing (7 dot spacing).

The next two bytes are the total number of dots across a printer page in single density mode, low byte first. These are followed by eight control codes to select single density mode. The control codes should be padded out to the left with nulls (zeroes), rather than to the right.

The next two bytes are the total number of dots across a page in double density mode, low byte first. If your printer has only one graphics mode, these two bytes should be zeroes. The final eight bytes are control codes to select double density mode. Again the control codes should be padded out to the left with nulls.

The distinction between Epson-type printers and 7-bit printers needs some elaboration. Epson-type printers are switched into graphics mode by sending a control sequence such as ESC K followed by the number of bytes of graphics data (number of dots) per line. This number is invariably greater than 255, so it must be transmitted as two bytes, the low byte first, then the high byte. At a single density resolution of 480 dots per line, this comes out as the numbers 224 and 1. The byte 224 cannot be sent through the 7-bit

parallel port on the CPC6128. To overcome this problem, ADVANCED ART STUDIO splits pixel lines into groups of up to 127 bytes at a time (127 being the largest number in 7 bits) and precedes each group with the appropriate control codes. Consequently, the set of control codes in the parameter file for Epson-type printers do not need the two bytes for the number of dots as part of them. The DMP-1, on the other hand, is designed by some clever juggling not to need an eighth bit. It can transmit a complete line with only one set of control codes at the beginning. For these types of printers, the number of data bytes per line should be built into the set of (7-bit) control codes in the parameter file.

Assembler example:-

```

; Parameters for Epson printers
;
    DEFB 0      ; top wire = m.s.b.
;
    DEFB 27     ; control codes to set line
    DEFB 65     ; spacing at 7/72"
    DEFB 7
    DEFB 0
    DEFB 0
    DEFB 0
    DEFB 0
    DEFB 0
;
    DEFW 480    ; dots in single density mode
;
    DEFB 0      ; control codes to select
    DEFB 0      ; single density mode
    DEFB 0
    DEFB 0
    DEFB 0
    DEFB 0
    DEFB 27
    DEFB 75
;
    DEFW 960    ; dots in double density mode
;
    DEFB 0      ; control codes to select
    DEFB 0      ; double density mode
    DEFB 0
    DEFB 0
    DEFB 0
    DEFB 0
    DEFB 27
    DEFB 76

```

BASIC example :-

```
10 REM Parameters for Amstrad DMP-1
20 FOR a = 32768 to 32768+28
30 READ b
40 POKE a,b
50 NEXT
60 SAVE "printer.def",b,32768,29
100 DATA 3,0,0,0,0,0,0,0
110 DATA 224,1,0,0,0,0,27,75,3,96
120 DATA 0,0,0,0,0,0,0,0,0
```

APPENDIX 2 - FILES ON THE MASTER DISC

The master copy of ADVANCED ART STUDIO contains a number of sample pictures, fonts, patterns, brushes and a window library.

Pictures (Set the PALETTE switch before loading). All in MODE 0

RAYTRACE	A demonstration of shadowing and reflection techniques.
FANTASY	A background landscape for the window library demonstration.
CYCLEDDEM	A demonstration of colour cycling. Load this picture and select the CYCLE option from the Palette menu).

Character Fonts

ALPBET	FATCAT	FLY
HITECH	ITALIC	SCRIPT
SPYDER	SQUARE	SQUASHED
HALFSIZE		

Fill Patterns

There are six pattern files supplied:

PATTERNS0	This set of patterns is designed for use in MODE 0, and uses the default palette.
PATTERNS1- 5	These sets of patterns have been specially designed in monochrome, and don't make use of any physical colours. Instead, they use the currently selected foreground and background inks at all times.

Brush Patterns

BRUSHES0	These brushes are based upon the PATTERNS0 file.
BRUSHES1	These are simple brushes which use the currently selected foreground and background inks.

Window library

The window library contains a number of pre-drawn picture elements which can be used to produce a picture very quickly and easily. The picture sections supplied can be use to create a fantasy scene, using the picture FANTASY as a backdrop.

CLOUD
FLAG
WALL

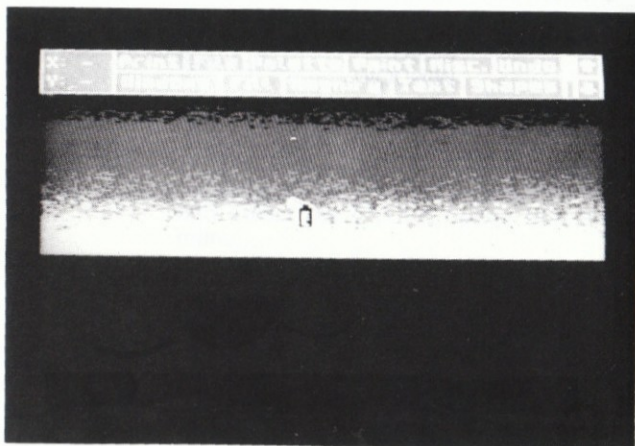
DOOR
MOAT
WINDOW

DRAWBRID
MOON

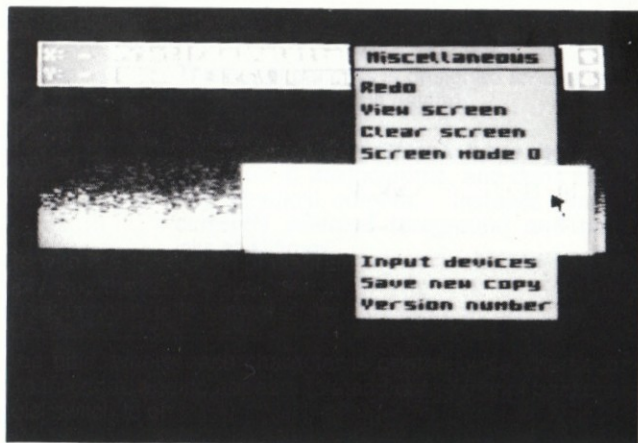
Also included is a section of the Raytrace picture which can then be called up and used as a 'brush'. The window file for this is called GLOBE.

APPENDIX 3 - WORKED EXAMPLE

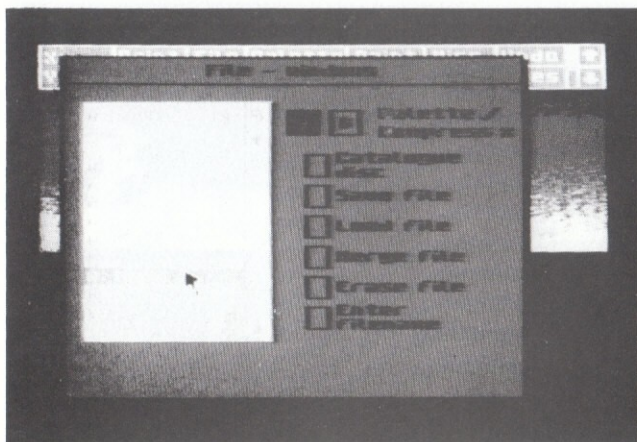
This section has been included to show what can be easily achieved with the ADVANCED ART STUDIO by using its powerful features. This example mainly takes advantage of window libraries and colour protection/exclusion.



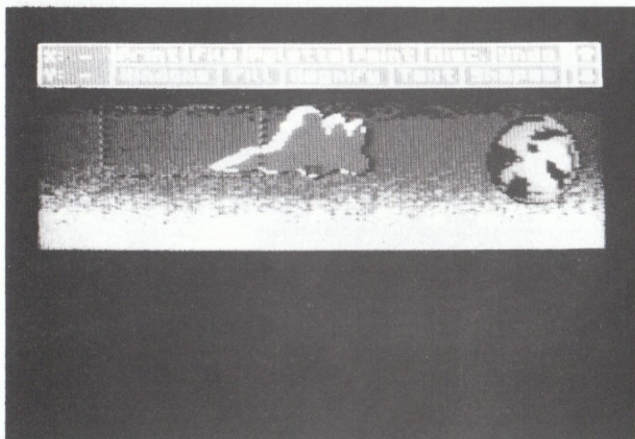
Firstly, the backdrop is drawn using the spray-can.



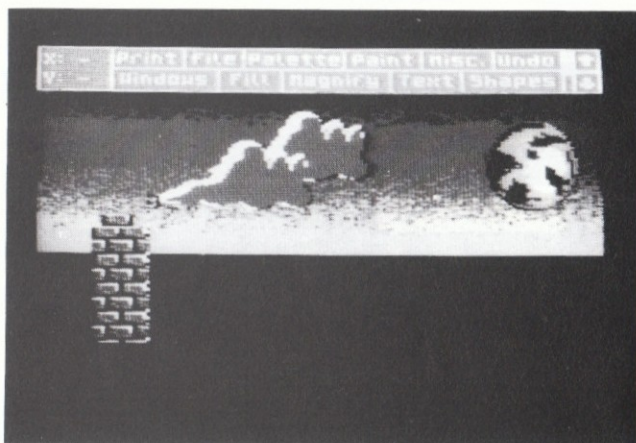
The grid-lock is set to 16 on both axes, for the positioning of pre-defined windows.



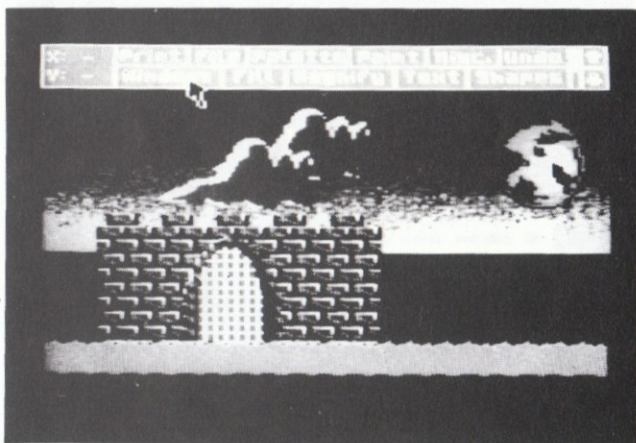
The file option is selected from the windows menu, with the palette switch set. This also ensures that the protected and excluded inks are set correctly.



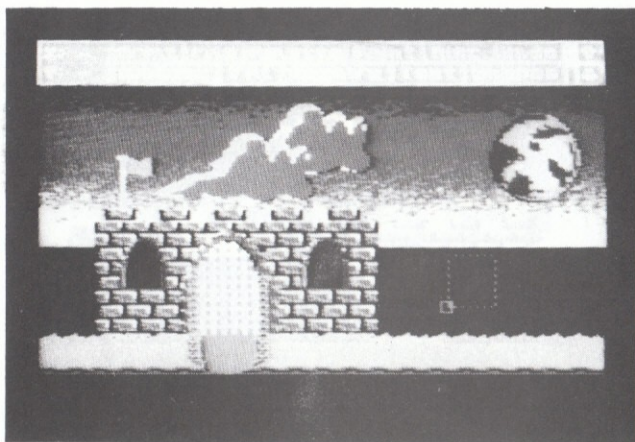
A 'moon' and a cloud are positioned on the screen, and the window box is moved in order to position another window.



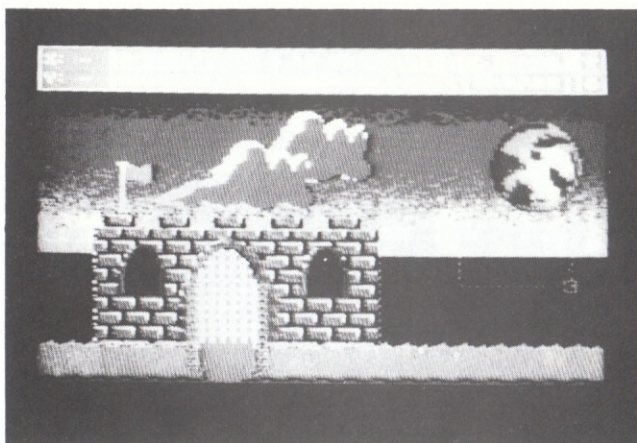
A brick wall is positioned on the screen. Because the Grid-lock is on, it makes positioning of multiple walls very straightforward.



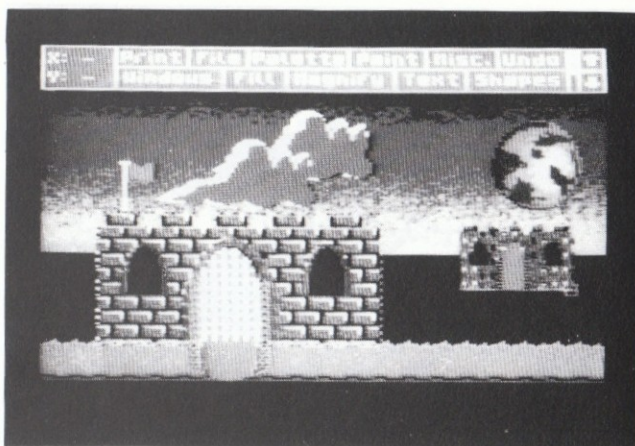
More sections of the wall are added, followed by a number of moat sections, and a portal with a door and lowered portcullis.



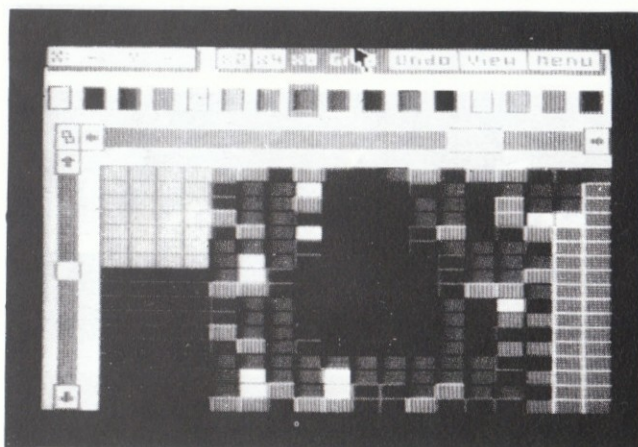
Two windows are positioned on the 'castle', along with a flag and a drawbridge.



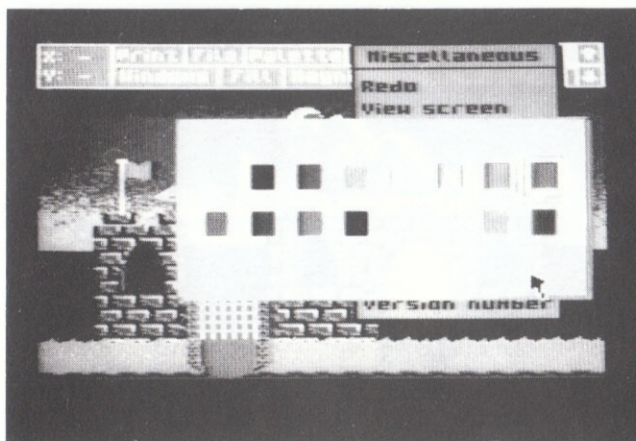
A window is defined around the castle, and then the re-scale option is selected.



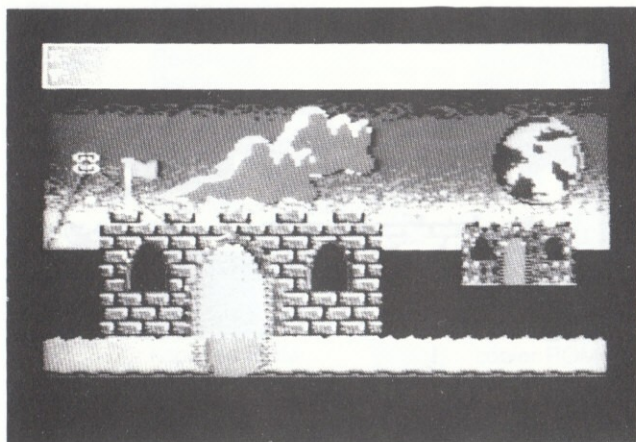
A second castle is now visible in the distance, although some of the moat has been rescaled along with the castle itself.



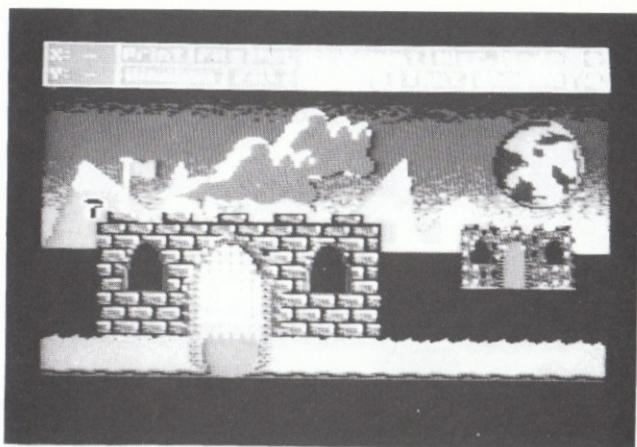
Magnify mode is now selected, with x8 magnification and a grid. The castle is 'touched up', and the offending pixels are removed.



The colours used in the castle are now protected, in order for some background scenery to be positioned behind the castle.



The 'triangle' option is selected from the Shapes menu, in order to draw some mountains.



Once the mountains have been drawn, they are filled, and snow-capped peaks are added.



Finally, a title is added, using the Text option.

GLOSSARY

English

Deutsch

Français

A

arrow boxes

Pfeilkästchen

cases fléchées

B

background

Hintergrund

fond

back-up store

Zusatzspeicher

copie de sauvegarde

binary

binär

binaire

bold

fett

gras

bold print

Fettdruck

impression en gras

border

Rand, Grenze; angrenzen

bord, bordure, avoisiner

boundary

Grenzlinie

limite

brushes

Pinsel

pinceaux

C

caps.lock

Großdruck einstellen

mettre en capitales

capture font

Font einnehmen

saisir un caractère

catalogue

Verzeichnis

catalogue

centre

Mittelpunkt/Zentrum

centrer, centre

change colour

Farbe wechseln

changer la couleur

circles

Kreise

cercles

circumference

Peripherie

circonférence

clear

löschen

effacer, supprimer

clear character(s)

Zeichen löschen

effacer un caractère(s)

clear screen

Bildschirm löschen

effacer un écran

clear window

Fenster löschen

effacer une fenêtre

clicking

Einklicken; durch

cliquer, valider

Knopfdrücken aktivieren

colour palette

Farbpalette

palette de couleurs

colours

Farben

couleurs

compressed

komprimiert

condensé, compacté

control codes

Kontroll-Codes

codes de contrôle

co-ordinates

koordinieren

coordonnées

copy ROM

kopieren ROM

copier ROM

cross-hair

Fadenkreuz

en forme de croix

cursor

Cursor, Positionszeichen

curseur

cut and paste

ausschneiden und einkleben
bzw. inserieren, einfügen

couper et coller

D

define window

Fenster festlegen, definieren

définir une fenêtre

diameter

Durchmesser

diamètre

discs

Disketten

disquettes

dot matrix printer

Punktmatrixdrucker

imprimante matricielle

double density

doppelte Dichte

intensité double

dump screen	drucke Bildschirm	vidage de mémoire de l'écran
dump window	drucke Fenster	vidage de mémoire de la fenêtre

E

edit	editieren	éditer
edit brush	Pinsel editieren	éditer un pinceau
edit texture	Textur, Struktur editieren	éditer une texture, une structure
elastic	elastisch	élastique
ellipse	Ellipse	ellipse
erase	löschen, streichen	effacer, gommer
erasers	Löcher	gommes
exclude inks	Farben ausschließen	exclure des encres

F

files	Dateien	fichiers
fill	füllen, an-, auf-, ausfüllen	remplir
filled circles	ausgefüllte Kreise	sphères
filled ellipses	ausgefüllte Ellipsen	ellipses pleines
fill, solid	einfarbige füllen	remplir d'une couleur unie
fill, textured	texturiertes füllen	remplir d'une texture
flag	Fahne	indicateur
flip character(s)	Zeichen wenden, umdrehen	basculer un caractère
flip window	Fenster wenden, umdrehen	basculer une fenêtre
flow rate	Flussrate	taux de diffusion
font	Font, Schrift (-art, -form)	caractère(s). jeu de caractères
foreground	Vordergrund	au premier- plan

G

grey-scale	Graufarbtton-Skala	échelle de dégradés gris
grid	Raster	grille
grid-lock	Raster-Verschluss	verrouillage de grille

H

hard copy	ausgedruckte Kopie	copie en clair ; support
hexadecimal	hexadezimal	hexadécimale
highlight	hervorheben	mettre en valeur

I

icons	Steuer-, Vorrichtungssymbole bzw. -zeichen	icônes
ink	Druck, Tinte	encre
input devices	Eingabeeinheit	dispositifs d'entrée
inverse	invertieren, invertiert	inverse

invert character(s)	Zeichen invertieren	inverser les caractères
invert window	Fenster invertieren	inverser un fenêtre
J		
justify	Rand ausgleichen	justifier, aligner (des lignes, par ex.)
K		
keyboard	Tastatur	clavier
L		
last window	letztes Fenster	dernière fenêtre
linefeed	Zeilenvorschub	interligne
lines	Linien, Zeilen	lignes
load file	Datei laden	charger un fichier
logical colour	logische Farbe	couleur "logique"
M		
magnifying glass	Lupe	loupe
mask	Hülle	masque
menu bar	Menü-Balken bzw. -streifen	barre de menu
merge	miteinander verbinden, mischen	fusionner
merge file	Dateien miteinander verbinden bzw. mischen	fusionner des fichiers
merge window	Fenster miteinander verbinden	fusionner des fenêtres
miscellaneous	vielseitig	divers
mode	Modus	mode
mouse	Maus-Steuervorrichtung	souris
multiple	mehrfach	multiple
multiply	vervielfältigen, multiplizieren	multiplier
N		
null brush	Null-Pinsel	pinceau nul
null texture	Nulltextur	texture nulle
O		
overfill	übermalen	couvrir d'un remplissage
over, overwrite	überstempeln, überschreiben	recouvrir, écrire par recouvrement
P		
paint roller	Farbroller	rouleau à peinture
pan	richten (auf), zielen	panoramique
Paper	Papier	papier
parameter file	Parameter-File	fichier de paramètres

paste mode	Klebe-Modus	mode "colle"
patterns	Muster	modèles
pens	Stifte	stylos
physical colours	physikalische Farben	couleurs "physiques"
points	Punkte	points
printers	Drucker	imprimantes
protect inks	Farben sichern	protéger des encres
pseudo-inks	Pseudofarben	pseudo-encres, fausses encres
pull-down menus	'raus ('runter-) ziehbare Menüs	menus déroulants
punctuation	Punktion	ponctuation
R		
rays	Strahlen	rayons
rectangles	Rechtecke	rectangles
redo	noch einmal machen	refaire
re-scale window	Fenstergröße neu festsetzen	rééchelonner une fenêtre
rotate character(s)	Zeichen rotieren	faire pivoter un caractère(s)
rotate window	Fenster rotieren	faire pivoter une fenêtre
S		
save file	Datei (ab)speichern	sauvegarder un fichier
screen mode	Bildschirm-Modus	mode écran
scroll	durchlaufen (lassen), nach oben (unten, rechts, links) verschieben, durchrollen	faire défiler, vers le haut, le bas, vers la gauche, la droite
scroll catalogue	Verzeichnis durchlaufen lassen	défiler un faire catalogue
scroll character(s)	Zeichen rollen, durchlaufen lassen	faire défiler caractère(s)
scroll font	Font durchlaufen lassen	faire défiler l'écran
scroll screen	Bildschirm durchlaufen lassen	sélectionner une touche
set inks	Farben setzen	mettre des encres
sideways	seitlich	oblique, de côté
single density	einfache Dichte	densité simple
smear	schmieren	tâcher
snap	schnelles Einfügen, Aufsetzen	claquement, claquer, casser net
solid fill	festes Füllmuster	remplissage uni
spray cans	Sprühdose	aérosols
stipple	punktieren	pointillés
swap inks	Farben tauschen	échanger des encres
switches	Schalter	interrupteurs

T		
tesselated texture triangles	Mosaikboden Textur, Struktur; texturieren Dreiecke	en mozaïque texture, structure triangles
U		
undo	ungültig bzw. rückgängig machen durch den Benutzer festgelegte Graphiken	défaire
user-defined graphics		graphismes redéfinis oblique, de côté
V		
version number view screen	Ausgabe-Nummer Bildschirm einsehen	numéro de version visualiser la page écran
W		
wash	mit einer Farbe "tünchen" bzw. kolorieren	badigeonner avec une couleur
wash texture	"Tünch"-Textur	badigeonner une texture
worked example windows	bearbeitetes Beispiel Fenster	exemple de travail fenêtres
Z		
zoom	zoomen, annähern	faire un zoom rapprocher

INDEX

A

- arrow boxes 3,7,10,11,18,20,26,32,35
- aspect ratio 5

B

- back-up store 20,25
- BASIC 9,10,24,41,42,45,47
- bit-image graphics 5
- bold 38
- border 11,12,31
- brushes 2,14,16,17,18,19,21,28,48

C

- capture font 41
- catalogue 7,8,9,22
- Centronics 45
- change ink 10,11,13,18,30
- change mode 20,21,22
- circles 5,43
- clear, character(s) 37,40
- clear, font 40
- clear, pattern 19
- clear, screen 15,20,21
- clear, window 13,26,27,29
- clicking 1,3
- colour, rotate 11
- colours 3,5,10,11,12,13,17,20,21,28,31
- colours, cycle 11,12,48
- colours, logical 10
- colours, physical 10,11,18
- compress, picture 8,9,19,29,41
- cont. line 13,43
- copy ROM 41
- cross-hair cursor 23,24,34,35
- cursor 2,3,4,23
- cut and paste 27

D

- define, window 26,27
- disks 6,7,8,9,12,15,17,19,22,26,27,29,31,38,39,41,45
- dot matrix printers 3,5,6,45
- double density 6,45,46
- dump, screen 5,6,45
- dump, window 5,6,45

E

- edit, font 25

edit, pattern	17,18,19,33
elastic	44
ellipses	5,43
erase, file	7,8,9
erasers	15
exclude ink	8,12,28,29,51
F	
fast cursor	23
file extensions	7,8,9,10
files	7,8,9,19,29,41,48
fill, solid	31,32
fill, patterned	17,18,19,31,33
flags	3,45
flash	10,25
flip, character(s)	40
flip, font	40
flip, pattern	19
flip, window	26,27,30
font	9,22,25,27,38,39,40,41,42,48
G	
grid	21,35,42,54
grid-lock	51,52
H	
hard copy	5,6
highlight	2,3,5,7,8,9,14,19,31,32,34,35,37,41
home box	7,35
I	
icons	1,3,13,23,25
ink	3,4,10-20,25,26,27,30,31,34,37,41
inks, excluded	8,28,29
inks, protected	8,15,16,21,29,32,37,43
input devices	22,23,24,36
invert, character(s)	40
invert, font	40
italics	38,41,48
J	
joystick	2,23
justify	6
K	
keyboard	2,7,8,11,17,23,34,35,37,39,40
L	
last window	26

line feed	6
lines	3,6,15,20,26,32,43,46
load, file	7,8,9,48
load, font	39,42
load, pattern	19,33
load, window	26,29

M

magnifying glass	34
mask	18
menu bar	2,3,20,32,34,35,40
merge, file	7,8
merge, window	27,28
mode	3,4,6,9,10,12,13,20,21,22,24,35,38,41
mouse	2,23
multiple	27

O

over fill	31,33
overlay	28

P

paint roller	31
palette	6,8,9,10,11,12,18,19,20,21,22,28,29,30,48
paste mode	8,27,28,29
patterns	9,16,17,18,19,22,27,31,32,33
pens	13,14,15,21
pixel	2,13,15,17,18,19,23,24,26,27,28,30,31,32,33,34
points	43
printers	3,5,6,45,46,47
pull-down menus	2,3

R

rays	43
rectangles	33,43
re-scale window	26,27,29,53,54
rotate, character(s)	40
rotate, font	40
rotate, palette	11
rotate, pattern	19
rotate, window	26,27,30

S

save, file	7,8,9,12,21,28
save, font	41
save, pattern	19
save, printer parameters	45
save, window	26,29
save new copy	22

scroll, catalogue	7
scroll, character(s)	40
scroll, font	40
scroll, magnify	35
scroll, palette	11
scroll, pattern	18,19
scroll, screen	3,24,26
select, button	2,3
select, pattern	18,19
sideways	3,5,6,38
single density	6,45,46
smear	26,28,29
spray cans	14,15,16,21,50
stipples	5,31,33
swap ink	30
switches	3

T

textures	17,18,19,31,32,33
transparent	13,18,19,37
triangles	31,42,43

U

undo	11,12,19,20,21,25,26,28,32,35,40
user-defined graphics	42
user--defined keys	23,24
user-defined printer	6,43

V

version number	22
view screen	20,35

W

wash texture	33
windows	2,5,8,9,19,20,21,25,26,27,28,29,30,41

Z

zoom	34
------	----

