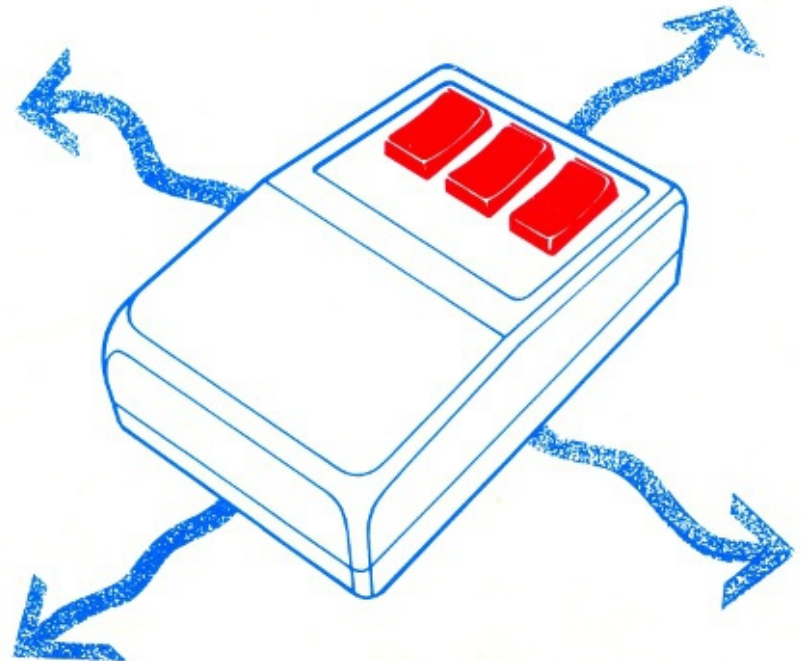
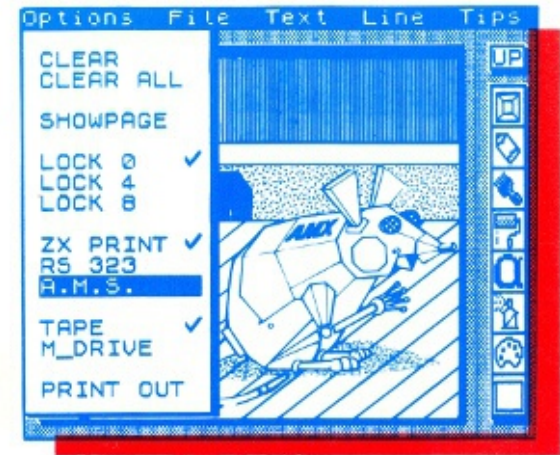


AMX mouse

**FOR THE
SPECTRUM**



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AMX MOUSE USER GUIDE FOR THE 48K SPECTRUM

by

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AMX Interface designed by R.POWELL
AMX ART and Colour Palette by R.POWELL
AMX Control and Icon Designer by K.R. HAMPSON

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WARNING!

REMEMBER DO NOT INSERT OR REMOVE THE AMX INTERFACE WHILE YOUR SPECTRUM IS POWERED UP - THIS CAN CAUSE DAMAGE TO YOUR MACHINE AS WELL AS YOUR HEALTH!

ALWAYS REMEMBER TO INSERT THE MOUSE CONNECTOR INTO THE INTERFACE WITH THE NOTCH FACING UPWARDS! IF YOUR MOUSE DOES NOT HAVE A NOTCH IT WILL HAVE A SMALL TRIANGULAR ARROW ON ONE SIDE OF THE CONNECTOR THIS SHOULD FACE UPWARDS ON INSERTION INTO THE INTERFACE ALSO!

THE AMX MOUSE IS COMPATIBLE WITH THE SPECTRUM 128 IN 48K MODE.

A NEW RANGE OF SOFTWARE WILL BE AVAILABLE SHORTLY.

1 SETTING UP

1.1 TO FIT THE INTERFACE CARD TO THE COMPUTER

1. Disconnect the power lead from the computer
2. If you are using a ZX type printer connect it to the computer according to the manufacturers instructions
3. Connect the interface card to the expansion port either on the back of the computer, OR to the INTERFACE 1, OR to the ZX Printer as shown in figure 1
WARNING Do not connect any other devices to the machine as damage to equipment may result

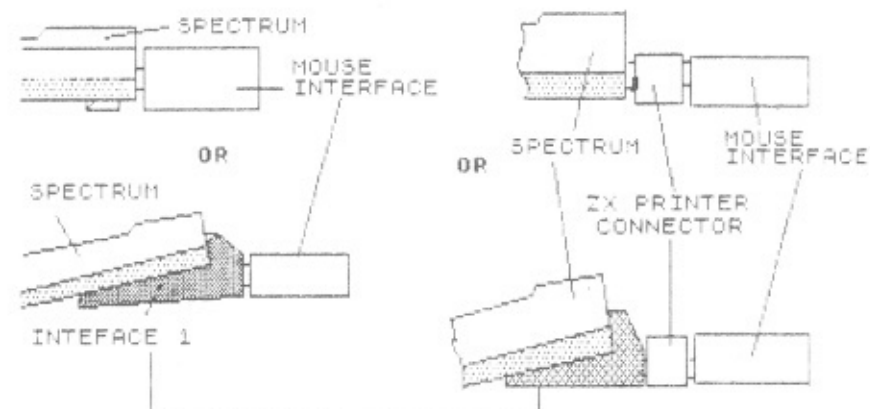


Figure 1

4. Plug the MOUSE into connector A on the interface board
5. If you are using a Centronics type printer you may connect this to connector B on the interface

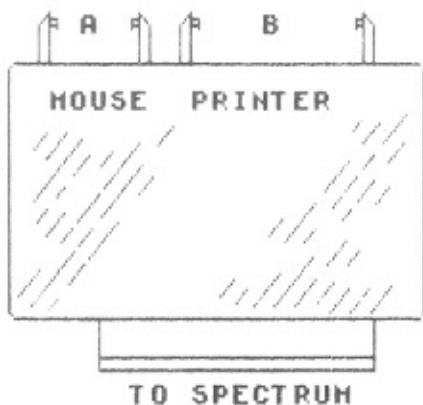


Figure 2

6. Or plug a serial printer into the RS 232 socket on the INTERFACE 1
7. Re-connect the power lead and switch on
8. If the computer fails to work, disconnect the power, and go through steps 2 to 7 again.

1.2 AMX ART AND COLOUR PALETTE Loading instructions

1. If you are using a tape only system read only this section. Ensure that the tape is rewound fully on side 1, type;
 - LOAD "AMX ART" <ENTER>.....for the art program
 - LOAD "Palette" <ENTER>.....for the colour palette
2. If you are using a MICRODRIVE system you may transfer the program to MICRODRIVE now. FORMAT a cartridge in drive 1, rewind the tape fully on side 1, type LOAD "" <ENTER>, and play the tape.
3. Watch the screen carefully and be ready to start and stop the tape when you are directed to do so, when transfer is complete you will be given a menu of 2 options;
 - 1 AMX ART
 - 2 COLOUR PALETTE

2 USING THE MOUSE

1. Keep the mouse on a clean, even surface.
2. Leave yourself plenty of room to move the mouse around on the table.
3. The three buttons on the mouse are to tell the computer what action to take, the illustration shows the names given to each button.

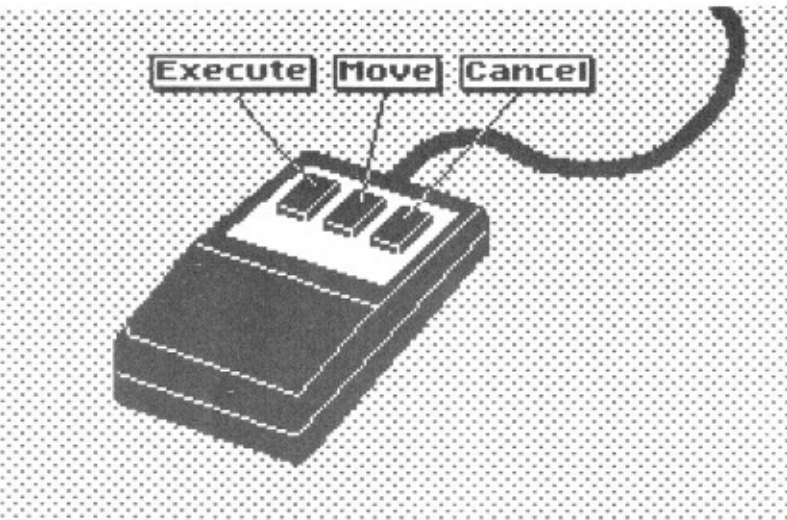


Figure 3

3 THE AMX ART GRAPHICS PROGRAM

3.1 HOW TO USE THE TOOLS

At the right hand side of the main screen is a window containing the ICONS, these represent the tools which are available to you for drawing and painting with. To use them you simply point to the item that you want and press EXECUTE, the icon will then change colour to tell you that it has been selected.

In all there are sixteen icons which can be used; however the SPECTRUM displays only eight at a time, this allows a larger area for drawing, to find the other eight icons point to the window marked "UP" and press EXECUTE, this scrolls the window and reveals the other icons.

In general the icons will respond to the EXECUTE and MOVE buttons, the full use of these will be given for each separate icon. Once an icon has been selected it will only work in the main drawing area, if you point outside this area it will be assumed that you wish to make a new selection and the button response will be adjusted accordingly.

3.1.1 ERASER

Move the eraser icon across the area to be cleaned while holding the EXECUTE button.

3.1.2 PENCIL

This icon allows you to draw a line on the main drawing area, when first selected the icon will expect the EXECUTE button to be pressed and released once, this will be the start of the line. You may now draw either freehand or point-to-point. To draw freehand move the pencil icon while keeping the EXECUTE button pressed. To draw point-to-point move the pencil icon without pressing a button to a position on the screen, you will see that the line to be drawn is displayed for you, when the line is in the correct position press the EXECUTE button to draw the line OR press the MOVE button to move the starting point of the line.

See also the section concerning the "LINE" pulldown menu, this allows you to draw with different effects.

3.1.3 PAINTBRUSH

The brush will allow you to paint a wide band of the current shade, the operation of the brush is similar to that of the eraser, move the brush across the area to be painted while keeping the EXECUTE button pressed. See also the section of the icon PALETTE, and the "TIPS" pulldown menu.

3.1.4 PAINTROLLER

This tool is for filling an area with a shade, to use it simply place the roller over the area to be shaded and press the EXECUTE button, for greater accuracy in the case of very small areas you can use the top left corner of the roller to point with. Use this function with great care as the smallest gap in a bounding shape will allow the whole screen to be flooded, possibly destroying the picture. See also the section concerning the icon PALETTE.

3.1.5 ALPHA

Alphabetic and numeric characters may be placed in any position on the screen using this icon, the mouse buttons have no effect on the alpha function, instead the keyboard is used to type the characters in. For further information see the section detailing the use of the TEXT pulldown menu.

3.1.6 SPRAY CAN

The operation of the spray can is the same as the brush, with the only difference being that the area is sprayed with a stippled colour, you will find it useful for shading areas. See also the section concerning the "TIPS" pulldown menu.

3.1.7 PALETTE

Instead of colours you are provided with a set or palette of forty shading patterns, to select one of these for use you must point to the palette icon and press EXECUTE. The screen will display a large window with the available shades, to select one of these, point to it with the finger icon and press EXECUTE again, the main screen will be returned and any further use of ROLLER, BRUSH, CAN, or any filled shape will use that shade.

3.1.8 BOX MODE

This will allow you to draw a rectangle of any size on the main screen, when selected the first use of EXECUTE will fix one corner of the box to a position on the screen, now move the pointer to the position where the diagonally opposite corner should be and press EXECUTE to draw the box, note that by pressing MOVE will re-position the present state of LINE.

3.1.9 SHADED BOX MODE

The operation of this function is the same as BOX, however the area bounded by the box will be filled with the currently selected shade, but the boundary takes no notice of the state of LINE and is always black.

3.1.10 CIRCLE MODE

A circle can be drawn by first selecting the point where the centre of the circle is to be and pressing EXECUTE, then move the pointer sideways across the screen to define the radius, the circle can then be drawn by pressing EXECUTE or re-centred once again by the MOVE button.

3.1.11 SHADED CIRCLE MODE

This function will behave in the same manner as CIRCLE but the area defined will be filled with the present shade.

3.1.12 THE SCROLL ICONS

The size of the main window is rather too small for a serious picture, for this reason you are provided with a screen area four times that size, for the technically minded four hundred and sixteen by three hundred and four pixels, it is impossible to work on all of this at once, but by using the scroll icons you may move your viewpoint around over the whole drawing area. Note that an overview may be obtained by using the SHOWPAGE selection in the OPTIONS menu.

3.1.13 ZOOM MODE

The zoom function is a very powerful one, it is selected by pointing to the magnifying glass icon. Zoom allows you to set or reset any one pixel. When first selected you must point to the area that you want to magnify, a brightly flashing rectangle will tell you where the pointer is, move this area over the section of screen to be examined and press EXECUTE, a screen with four windows will be displayed, the first window contains the area that you have chosen shown in 1:1 scale, the second,

larger window holds the same area but magnified by a ratio of 4:1. To alter each pixel simply point to it and press EXECUTE. When you have completed this stage to your satisfaction you may choose the ACCEPT window, if however you make a mistake or decide not to change anything, you can DISCARD the magnified version and continue without affecting the picture in any way.

3.2 HOW TO USE PULLDOWN MENUS

Just above the main window is a line displaying the words OPTIONS, FILES, TEXT, LINE and TIPS. Each of these are headings of menus which are only displayed when you ask for them. To select a menu, point to it with the mouse cursor and press EXECUTE, the menu will then drop down onto the main screen, keep the EXECUTE button pressed down and move the mouse cursor downwards, you will see a black bar appear over the first item on the list, move this bar over the selection that you want and release the EXECUTE button, the selection will be remembered by the computer.

3.2.1 THE OPTIONS MENU

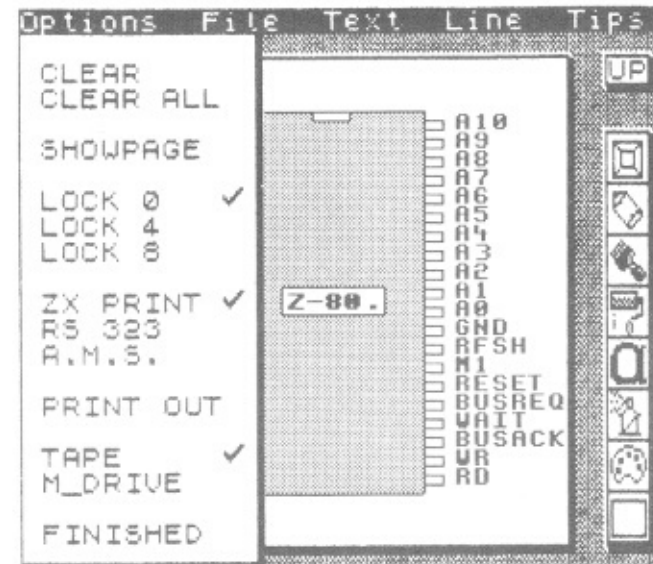


Figure 4 The OPTIONS MENU

3.2.2 THE FILE MENU

OPTIONS, will allow you to make changes to the way that the program uses its input/output.

CLEAR, Selection of this option will allow you to clear the main screen area, and the corresponding area on the background screen.

CLEAR ALL, will clear the whole of the background screen. Both of the CLEAR options will ask you if you are sure about your choice, if you are press EXECUTE, if not CANCEL will allow you to continue without clearing any of the screen.

LOCK 0, will cancel the LOCK 4 and LOCK 8 options.

LOCK 4, locks the movement of the mouse to an invisible grid, each square of which is four by four pixels, this is useful for drawing long straight line or doing accurate positioning of line ends.

LOCK 8, locks the mouse to an eight by eight grid, this function will enable you to keep to the colour attributes boundaries. For more help see the section on the colour palette program.

ZX PRINT, will allow you to use a standard SINCLAIR ZX PRINTER for your pictures, note however that the print out size will only be 255 by 192 pixels.

RS 232, directs all of the printer information to the RS 232 socket on the ZX INTERFACE 1, note do not use this selection if you do not have the correct printer.

A.M.S, uses the CENTRONICS type printer output supplied with the mouse interface, ince again have the right equipment connected.

PRINT OUT, as the name suggests, allows you to send the picture information to the output device chosen, see ZX PRINT, RS 232, and A.M.S. In the case of RS 232 or A.M.S, you will be asked to choose how much of the main screen to print, do this by surrrounding the area you wish to print with the box and pressing EXECUTE. NOTE: pressing CANCEL will return to the main program without printing.

TAPE, will make all selections from the FILES menu work with the tape cassette interface.

M_DRIVE, redirects all of the FILES options to the ZX MICRODRIVE.

FINISHED, selecting this option will allow you to exit the program. Be very careful to only select FINISHED after you have saved any important work. THIS OPTION COMPLETELY CLEARS THE COMPUTER'S MEMORY.

The FILE pulldown menu will enable you to save your pictures to cassette tape or onto a MICRODRIVE cartridge, depending on the selection of TAPE, or M_DRIVE in the OPTIONS menu.

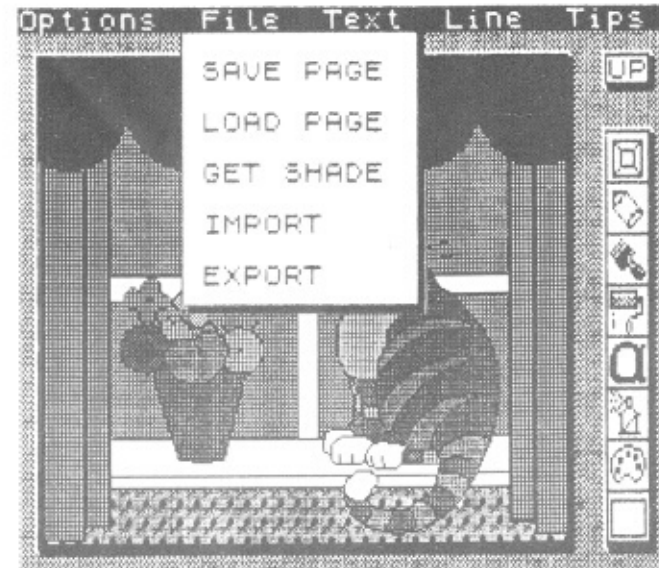


Figure 5 The FILE MENU

SAVE PAGE, use this option to SAVE the full screen, you will need about 16K of space left on a MICRODRIVE cartridge to do this.

LOAD PAGE, this will load a page saved by SAVE PAGE, note this will not load in a SCREEN\$, (see IMPORT).

GET SHADE, the shade given in the PALETTE menu may be changed using this option, to do this successfully you must have a file of CODE saved on tape or on MICRODRIVE of not more than 40 characters, or 360 bytes. When you construct these character codes, the first one must be a space. You may use any good font designer or use the SHADE files saved from the Mouse Aided Design program.

IMPORT, it is impossible to load a SCREEN\$ saved by the EXPORT option, or by another program using this function, once loaded you may treat it as any other page of information.

EXPORT, this allows you to save the top left hand corner of the main screen, this can be loaded from any basic program by using the LOAD"[FILENAME]" SCREEN\$, or LOAD *"[M";1;"[FILENAME]" SCREEN\$ commands, the file may also be loaded by the COLOUR PALETTE program.

3.2.3 THE TEXT MENU

The TEXT pulldown menu has five options, these are as follows:

SINCLAIR, selects the standard SINCLAIR character set, the selected set is then used for the ALPHA printing icon.

BOLD, selects the bold typeface.

2001, selects the stylised, futuristic typeface.

ITALIC, selects the italic typeface.

You may display any combination of these typefaces in your pictures and any mistakes can be ERASED.

DOUBLE, will print any of the typefaces in double height characters.

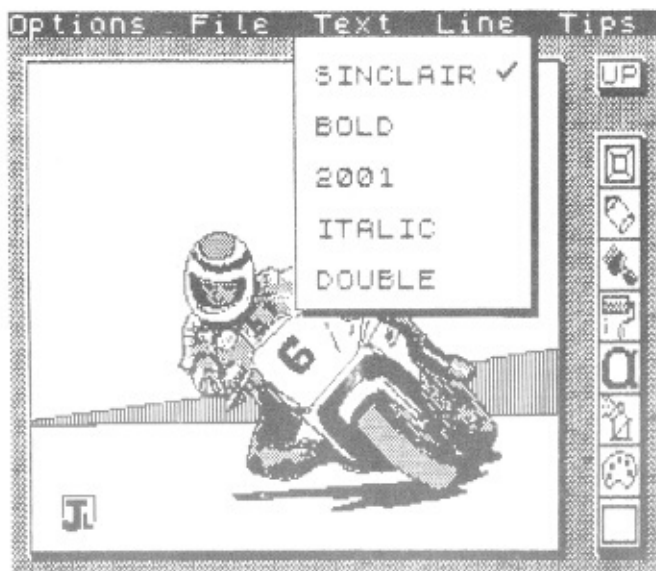


Figure 6 The TEXT pulldown menu

Standard font single height
Standard font double height

Bold font single height
Bold font double height

2001 FONT SINGLE HEIGHT

2001 FONT DOUBLE HEIGHT

Italic font single height
Italic font double height

Figure 7

3.2.4 THE LINE MENU



Figure 8 The LINE MENU

The LINE pulldown menu has three options which allow you to affect the way a line, box, or circle is drawn.

BLACK, will make all of the lines drawn by the PENCIL, UN-FILLED BOX, and UN-FILLED CIRCLE, use the INK colour, for those of you who are technically minded, the bit controlling the pixel will be SET.

WHITE, will draw with the PAPER colour, each bit in the line will be RESET, see also the BASIC manual for the INVERSE 1 command.

INVERT, this will cause any pixel which is SET to be RESET, and any RESET pixels to be SET, along the whole line, see the BASIC manual for the OVER 1 command.

3.2.5 THE TIPS MENU

The TIPS menu will enable you to select the brush size, and spray density for use with the BRUSH, and CAN icons. There are four sizes of brush tip, VERY FINE, SMALL, MEDIUM and LARGE. Similarly the choices of spray density are, FINE, MEDIUM, NORMAL and DENSE.

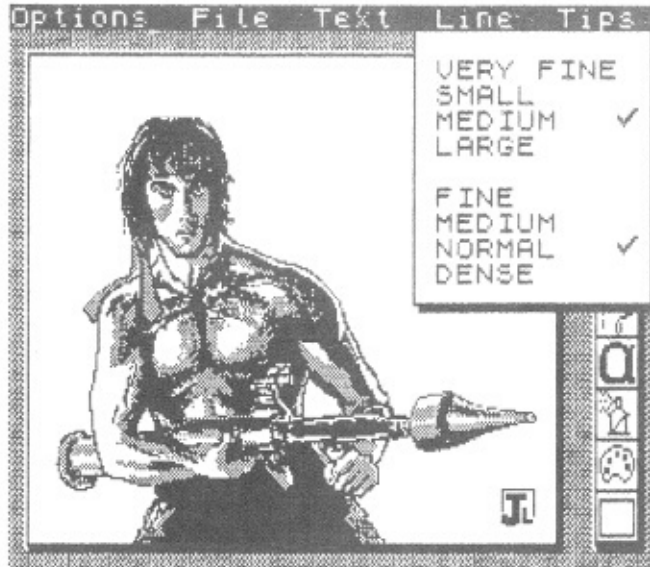


Figure 9 The "TIPS" menu

EXAMPLES OF BRUSH AND SPRAY TIPS



Figure 10

4 THE AMX COLOUR PALETTE PROGRAM

When you have finished editing your SCREEN\$ with AMX ART, save the data using the FILE (EXPORT) selection, select OPTIONS (FINISHED), and LOAD the COLOUR PALETTE program from tape or MICRODRIVE.

4.1 THE ICONS

BRUSH, will allow you to paint the picture in the main area with the current INK and PAPER colours, and the current FLASH and BRIGHT effects.

UP, DOWN, LEFT and RIGHT, will scroll the screen about in the main area, this is to allow you to colour all of the screen.

4.2 THE PULL-DOWN MENUS

The menus for the colour palette work in the same way as the ones in AMX ART, the different functions are summarised below;

OPTIONS

Bright, will toggle the brightness of the colour (see the ZX SPECTRUM manual for a full definition of BRIGHT)

FLASH, will turn the flashing of the colour on or off (see the ZX SPECTRUM manual for a full definition of FLASH).

TAPE, selects cassette tape filing system

M_DRIVE, selects MICRODRIVE filing system

FINISHED, returns to the BASIC operating system *note a full restart

FILE

SAVE PAGE, will save a finished SCREEN\$, to load it back type;

LOAD "filename" SCREEN\$ or LOAD *"M";1;"filename" SCREEN\$

LOAD PAGE, will fetch from tape or MICRODRIVE a file saved by the EXPORT function in AMX ART, or any SCREEN\$

INK

The selections in this menu will allow you to alter the foreground colour (see the ZX SPECTRUM manual for a full definition of INK).

PAPER

The selections in this menu will allow you to alter the background colour (see the ZX SPECTRUM manual for a full definition of PAPER).

In all cases where the FLASH, BRIGHT, FOREGROUND or BACKGROUND colours are changed, the current status of all these will be given in the window at the bottom right of the main screen.

5 HINTS AND TIPS

5.1 TROUBLE WITH THE MOUSE

If the action of the mouse becomes jerky or insensitive, carefully remove the plate which retains the rolling ball in the base of the mouse, clean the ball and ensure that there is no dirt or grit inside the mouse, do this by blowing into the mouse to remove any particles. **DO NOT PUT ANY CLOTH, SOLVENT CLEANER OR PROBES INTO THE MOUSE!** Replace the ball in the recess and re-position the retaining plate, take care not to overtighten the retaining screw.

To reduce the need for cleaning, keep the mouse unit on a clean dry surface.

5.2 PAINTING IN COLOUR

When you are editing a SCREEN\$ for use with the colour palette, remember that the foreground and background colours will apply to a block of 64 pixels or one character position, this means that you must keep the different coloured parts of the picture separate.

6 THE AMX CONTROL PROGRAM

6.1 INTRODUCTION

The AMX Control program is designed to allow users of the AMX Mouse to create a mouse environment in their own programs. This is done by extending the Spectrum BASIC interpreter to incorporate mouse associated commands.

The tape supplied in the package contains three programs associated with AMX Control, these are the machine code program to extend the BASIC interpreter, and Icon Designer and a demonstration program containing a calculator and puzzle.

To use either the Icon Designer or the demo just type LOAD"" and play the tape, follow on-screen prompts from then on. You may put AMX Control, Demo and Icon Designer on microdrive cartridge.

6.2 AMX CONTROL IN YOUR PROGRAMS

This section will explain how to use AMX Control in your own programs. A complete explanation of each command is given plus details of how to access the commands from assembly language.

When writing your own mouse driven program AMX Control must be loaded and initialised before any mouse commands are recognised.

It is ESSENTIAL the RAMTOP is lowered below 45000 before loading AMX Control. This is easily done with the command CLEAR 44999.

To load AMX Control use: CLEAR 44999:LOAD "AMX" CODE (This is assuming you have transferred Control to another tape).

Initialising AMX Control is done by a USR statement in the form RANDOMIZE USR 51912 or LET variable=USR 51912. After this has been executed all the mouse commands will be recognised. Please note that certain conditions may arise where the initialisation needs to be done again (mainly due to errors generated by INTERFACE 1 and direct CLEAR commands).

When you RUN your program, AMX Control must be initialised somewhere before the interpreter meets any extra commands, if not, the error 'Nonsense in BASIC' is generated, so it is best to have the initialisation somewhere near the start of your program.

7 AMX CONTROL COMMANDS

Initialising AMX Control causes the following actions to be taken:

1. The current pointer is set to icon 0 with icon 1 as the mask, the pointer is also considered to be hidden.
2. Any ON ERROR commands previously executed are cancelled.
3. The printer options are set to tokens on, line feed off.
4. The Pointer Position is set to 0,0 (bottom left hand corner of the screen).

Once you have loaded and initialised AMX Control you are ready to start coding your program. The first few lines of a typical program are shown in listing 1.

Listing 1.

```
10 BORDER 0; PAPER 0; INK 7
20 CLEAR 44999;LOAD "AMX"CODE
30 RANDOMIZE USR 51912:*DESK 56,170,85
```

AMX Control adds 28 commands to normal Sinclair Basic, all of these are preceded by an asterisk, the command being typed in letter by letter after that. Abbreviations may be used, but be careful when choosing how to abbreviate the command as it may appear to be a different command when it is interpreted.

To abbreviate a command simply type a full stop instead of the rest of the command, e.g. *WINDOW can be abbreviated as *WIND. or even *W. but remember to put the parameters if there are any. It doesn't matter whether you type the command in using upper or lower case, you may use what you wish.

AMX control commands may be freely mixed both together and with normal basic commands, you may treat them the same as normal basic commands in the way they operate, e.g. variables or expressions may be used as parameters etc.

If you intend using user defined graphics characters (CHR\$ 144-164), you should initialise AMX control before you POKE or LOAD the UDG data, since AMX control moves the UDG area to a different place in memory.

7.1 *DESK attr,b1,b2

e.g. *DESK 56,170,85

This command is used to create the 'desktop' effect commonly used in mouse software. It clears the screen using two bit patterns b1 and b2. A line of each of these is printed on every other vertical line, then the attribute file is filled with the value attr, thus giving you control over the entire attributes rather than just PAPER or INK. A description of how the value attr is made up is given in your Sinclair user manual. The values b1 and b2 are made up in binary, the same as each line of a user-defined graphic is made up.

7.2 *FIND menu, option

e.g. *FIND 0,5

This command allows you to find out the status of any option on any of the pull down menus. This is particularly useful when using ticked and unticked options. After the command has been executed, the status of the option in question is placed in memory and can be found using a PEEK command (see the table on page 30).

To find the status of option 1 on menu 0

```
*FIND 0,1 : LET status=PEEK 51919
```

7.3 *FONT n

e.g. *FONT 1

AMX control has two proportionally spaced fonts built in which may be accessed with the *PRINT command. The default font is 0, this is set after an initialisation. Font 0 is a fairly bold font, more commonly used than FONT 1, which is half the width of the normal Sinclair font. Font 0 is used by *HEADER and is also used to print the options on pull down menus.

Certain characters in the fonts have been re-defined as other things, more so in font 0 than font 1. The backslash '\ ' has been defined as a space, except that it moves the print position onto the next character position rather than by a character position. This is so you can line text up to character positions, which is essential when using *HEADER, otherwise your menus and titles will not line up correctly. *PRINT prints text at any graphic co-ordinates, not just normal character positions.

7.4 *HEADER options

e.g. *HEADER "File \ Options \ Edit"

*HEADER is used to print up the titles of the pull down menus on the top line of the screen. It also prints characters in the corners which give a rounded effect when using a black border and a mouse graphic. The titles are printed using font 0.

As mentioned in the *FONT section, the backslash character is used to move onto the next character position. This is essential since the titles will usually vary in length, without this facility it would be very difficult to line the titles up in character positions.

7.5 *HELP MOUSE

e.g. *H.

This command is generally only used in direct mode and its function is to give you a quick reference to all the extra commands, showing you each command in full, including any parameters. It also prints up how much free memory you have left in bytes and the current printer options. Pressing any key will pause the printing (so you can read it before it scrolls off).

7.6 *HELP ICONS

e.g. *HELP I.

Since AMX control allows access to 96 icons, it is difficult to remember the number for each one, especially the lesser used ones and your own icons. *HELP ICONS shows you all for the 96 icons with their respective number, icons 0-63 are predefined, icons 64-95 are user icons and may be defined using the icon designer. This command shows you the first 64 icons all at once and then waits for you to press a key before scrolling the other 32 onto the screen.

7.7 *HIDEPOINTER

e.g. *HIDE.

The general operation of mouse software involves moving a pointer around the screen. Programmers must be able to manipulate this pointer in various ways and AMX control provides commands for doing this. *HIDEPOINTER removes the pointer from the screen, replacing what was underneath it. If the pointer was not shown (i.e. if a *HIDE. command is issued before a *SHOW., *LOOP or *POSITION command) then the command does nothing.

```
10 RANDOMIZE USR 51912
20 *POSITION 127,87
30 *HIDEPOINTER
40 PAUSE 5
50 *SHOWPOINTER
60 PAUSE 5
70 GOTO 30
```

7.8 *ICON y,x,i

e.g. *IC. 17,29,20

This command is used to display icon i at the text position y,x. *ICON will print icons anywhere on the screen, including the bottom two lines. The value y may be anything from 0 (top line) to 23 (second to last line). The x co-ordinate stays the same as usual.

Icons are 2 x 2 character positions, 64 icons are already available from AMX control, the last 32 are blank and are for accommodating your own icons. Since the icons are stored in RAM, you may actually alter all 96, details of how to do this are in the instructions for using the Icon Designer.

When an icon is displayed on the screen it takes all of its attributes except PAPER, from the screen. The PAPER colour is taken from the permanent paper colour in ATTR P, address 23693.

7.9 THE PRINTER COMMANDS

*LF, *TOKENS, *MOUSE ON/OFF.

The AMX Mouse interface also has a centronics printer interface built in. AMX control allows you to use this interface if you have a centronics printer connected. To enable the printer interface you must first issue a *MOUSE OFF command. This stops the interface from generating interrupts when the mouse moves, and sets up the interface for the printer. After this, LPRINT and LLIST will send data to your printer.

If you want a listing you must have TOKENS enabled, otherwise the Basic commands will not come out in their expanded form. When AMX control is initialised, TOKENS are set as default, the *TOKENS commands toggles them on and off. If you want to send codes to the printer which are below 32 or greater than 127, TOKENS must be disabled. If your printer is set up to issue a line feed with a carriage return then you will not need to bother with the *LF command. If however, your printer does not issue a line feed then you may set up AMX control to issue the line feed instead of the printer. After initialising Control, this option is disabled, so you will have to enter a *LF command to turn the line feed on. Again, the *LF command toggles between line feed on and off.

The current status of the printer options may be found by entering *HELPMOUSE. The options selected will be printed at the end of the text.

If you want to use the ZX printer, the mouse must be ON.

7.10 *LOOP n

e.g. *LOOP 0

This command is used to allow the pointer to be moved around the screen by the mouse. If the pointer is not already shown before a *LOOP command, then *LOOP automatically shows the pointer on the screen. The parameter n in the command represents the code for the conditions which causes the *LOOP to end. These codes are to do with various combinations of buttons on the mouse, as follows:

Value of n	Condition
0	Execute must be pressed
1	Move must be pressed
2	Cancel must be pressed
3	Execute must be released
4	Move must be released
5	Cancel must be released
6	Any button must be pressed
7	All buttons have to be released
8	Any button has to change state

Execute, Move and Cancel being the three buttons on the mouse, from left to right. After the computer comes out of the *LOOP due to the appropriate condition being met, the graphics co-ordinates of the top left hand corner of the pointer are stored in memory and are obtained by two consecutive PEEK commands. A table of addresses of where the various information is stored is given later in the manual. The pointer is left SHOWN after a *LOOP.

```
10 RANDOMIZE USR 51912
20 *LOOP 0
30 LET x=PEEK 51915 : LET y=PEEK 51916
40 *HIDEPOINTER
50 PRINT AT 0,0; "Pointer at: ";x; " ";
   AT 0,15; ", "; AT 0,17;y; " "
60 GOTO 20
```

7.11 *MAKE menu,tab,attr;options

e.g. *MAKE 0,1,56;"Version/ /Quit"

One of the facilities provided by AMX Control is the ability to define and use pull down menus in your own programs. This command is one of four which allows you to do just that. *MAKE is used to actually define a pull down menu, Control has provision for 4 pull down menus. The things you need to supply to define a pull down menu are:

- 1) The number of the pull down menu, 0 to 3.
- 2) The position across the screen where the menu is to appear, this may be from 1 to 21. Menus are always printed 1 character down the screen and are 10 characters wide.
- 3) The attribute value to be used by the pull down menu, this is made up of PAPER, INK, FLASH and BRIGHT. Consult your Sinclair user manual for more details.
- 4) The options on the pull down menu. Each menu may have up to 16 options, of 10 characters each. You must supply a string containing the options, separated by a '/' character. You don't have to make each option 10 characters wide before inserting a '/', each option is padded out with spaces automatically if it is not 10 characters wide. A menu definition error is generated if you have defined the options illegally.

Please note that the slash character ("/") may not be used as part of an option, for obvious reasons.

7.12 *ON ERROR line number

e.g. *ON. 9990

A facility not provided by Sinclair Basic is error trapping. AMX Control adds this facility in the form *ON ERROR, which is actually an on-error-goto command. You supply the line number which you want the computer to jump to if an error occurs during the running of a program, or due to a direct command. The line number supplied must be in the range 0 to 9999, although it doesn't matter if that particular line number doesn't exist.

This command must be used very carefully as it is possible to lock up the computer using it. An example of this is if you set up a *ON ERROR so that a jump is made to a line containing an error. You may do this without realising, the outcome being that you have lost your program and will have to reset the computer, so be careful.

*ON ERROR does not trap the OK message or the Nonsense in Basic error, generated by the normal ROM. It does trap all other errors, including those generated by Interface 1 if you have one connected. If the error was generated by the normal ROM then you may find out the error code by PEEKing an address in memory, see later for a table of addresses. If the error generated was due to Interface 1 then the code in this memory address will probably be the code for 'Invalid Stream' or 'Invalid Filename' which are both normal ROM errors.

This command also traps all the errors generated by AMX control, including the extra errors which Control uses. If a special AMX Control error is trapped, the code of the error is the ASCII code for the error number, e.g. error 0 has code 48. This allows you to distinguish between AMX Control errors and Basic errors.

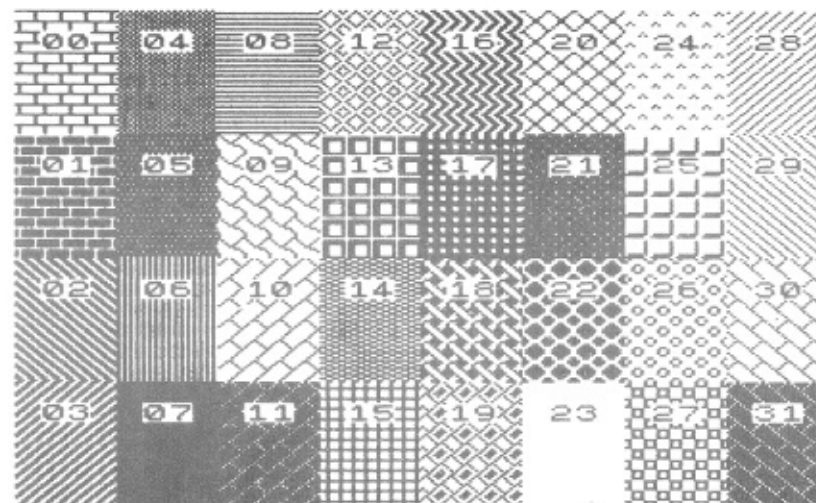
The ON ERROR may be cancelled with a *UNTRAP command. It is recommended that you either make a copy of your program, or check your coding very carefully before using *ON ERROR. Please note that if you type in a command directly which generates an error, and the ON ERROR is active, then a jump will be made to the appropriate line from direct mode. Enter a *UNTRAP command to cancel this effect whilst in direct mode.

7.13 *PATTERN y,x,h,w,attr,pattern

e.g. *PATT. 0,0,10,10,120,18

*PATTERN is used to print rectangles on the screen, in any colour using any of 32 built in patterns. You must supply the text co-ordinates of the top left hand corner of the rectangle, the width and height of the rectangle in character positions, the attribute value to be used in colouring the rectangle and the pattern number. A wrap around effect occurs if the rectangle goes off the top or bottom of the screen, but a rectangle may not be any bigger than the full screen.

The patterns which you may use are shown below, with their respective code number. Please note that this command allows the use of the full screen, and so 'y' may take the value 0 to 23 instead of 0 to 21 as usual. If OVER 1 is set, then the rectangle will be printed to give the effect.



Patterns Available

7.14 *POINTER i1,i2

e.g. *POI. 8,9

This command is used to specify which icons are to be used as the pointer. Each pointer consists of two parts. The first icon, i1, is used as the black part of the pointer. The second icon, i2, is used inverted to draw the white mask for the pointer. This method is used to ensure that the pointer is still visible if it appears over a black area.

If an icon has not got a mask then you can either use itself, or a full square as a mask. If the icon itself, or a blank icon are used as a mask the icon will disappear over a black area. It is therefore recommended that icon 39 is used as a mask when no special mask is available. Try modifying line 40 so the value of i2 is 39, and 64 to see the effect, assuming that you have not yet defined icon 64 as anything.

```

10 RANDOMIZE USR 51912
20 *DESK 56,170,85
30 LET i1=0
40 LET i2=1
50 *WINDOW 10,10,8,8,56
60 *PATTERN 10,10,8,8,56,7
70 *POINTER i1,i2
80 *LOOP 0

```

7.15 *POSITION x,y

e.g. *POS. 127,95

This command allows you to move the pointer to any position on the screen, instead of using the mouse. Generally this would only be used at the start of a program to position the pointer in the middle of the screen, or wherever you wish. After Control has been initialised the position is set to 0,0 which is the VERY bottom of the screen, i.e. at the bottom of the 24th line. Therefore the top of the screen is 191 instead of 175.

*POSITION will hide the pointer at the current position if it is shown on the screen, then print it at the position you supply.

7.16 *PRINT x,y;"text"

e.g. *PRINT 80,80;"Hello"

This command allows you to print text anywhere on the screen (i.e. using graphics co-ordinates), using one of the two built-in fonts. As usual the x and y co-ordinates are using the full screen. The text you supply must not contain any characters in the range 0 to 31 or 128 to 255, otherwise an error is generated. If the text supplied will not fit on one line, only the text which will fit on the screen is printed, this applies when using both fonts.

If you have set OVER 1, the text is printed using this effect, otherwise the area beneath the text is blanked out to the nearest character position before printing the text.

The text is printed using the INK 8, PAPER 8 effect where the attributes are taken from the screen, not from the current values. It is recommended that when writing mouse software you try and stick to the same INK colour throughout, but altering the PAPER colour is alright. Otherwise you will get colour clash when you move the pointer around the screen, since it takes its attributes from the screen.

You may print the values of numeric variables on the screen using the STR\$ function, since *PRINT requires a string expression unlike the normal PRINT command which allows you to print both string and numeric expressions.

7.17 *PULL menu number

e.g. *PULL 0

This is another command associated with pull-down-menus. Its function is to actually pull down one of the menus, provided that it has been defined. The process includes storing a copy of the screen so the area beneath the pull-down-menu can be replaced, printing the pull-down-menu, and then moving the pointer round inverting the option currently being pointed to. This continues until the execute button is released.

Successful use of the pull-down-menus means that your program must use a *LOOP command such that a return is made if execute is pressed. You then check if the current position of the pointer is on the title of one of the menus, if so you pull it down using a *PULL command with the appropriate menu number. The user will still have their finger on execute, so the menu will stay down once pulled down. They can then select the option they require on the menu, releasing execute when they are pointing to it. You will understand this effect better after using the pull down menus in icon designer, or the demo. Better still have a go at using them in a small program.

Once an option has been selected you will need to know what option was selected on the pull down menu, if any. This is found out by again using a PEEK command. The value peeked will be the option number, from 0 up to 15, or it will be 255 if the user selected a grey option or failed to select anything. Once you have this information you may take appropriate action, which may include calling certain routines and/or ticking/unticking the option just selected.

7.18 *RESTORE and *STORE

e.g. *RES. *STOR.

An area of memory is reserved by AMX Control to allow you to save a copy of the screen, so you may overlap windows and then restore the information beneath the window when you have finished with it. This is demonstrated by both icon designer and the demo programs. *RESTORE is used to restore the copy of the screen back onto the screen, which had been stored with *STORE. You do not have to use this feature if you don't want to, and can obtain another 6K of memory if you do not. However, the *PULL command uses this same area of memory, so if you are using pull-down-menus you cannot use the 6K for your programs.

Since the `*PULL` command uses the same area of memory as `*STORE` and `*RESTORE`, it will alter the copy of the screen you had stored if a `*PULL` command is executed between storing and restoring the screen. It is therefore recommended that you do not allow menus to be pulled down during situations like this, again icon designer and demo show how this is used when the OK/Cancel and filename windows appear.

If you do not wish to use pull-down-menus or save a copy of the screen then use `CLEAR 51911` instead of `CLEAR 44999` as mentioned earlier in the manual. Make sure you don't accidentally use `*STORE` or `*PULL` under these circumstances, it will probably result in a crash.

7.19 *SENSITIVITY n

e.g. `*SENS. 2`

This command allows you to alter how sensitive the mouse is, i.e. how far you have to move the mouse to obtain unit movement of the pointer on the screen. 1 is the most sensitive and should be used most of the time, this is the default sensitivity. The value of n may be from 1 to 6, a sensitivity of 6 being incredibly slow.

7.20 *SHOWPOINTER

e.g. `*SHOW.`

This command, as it implies, shows the pointer on the screen at the current pointer position. It may be used to continually show the pointer after a `*LOOP`, thus dropping copies of the pointer all the time. Try the following program to see this effect. Just press execute and move the mouse around.

```
10 RANDOMIZE USR 51912
20 *POINTER 10,11
30 *POSITION 30,150
40 *LOOP 0
50 *SHOWPOINTER
60 GOTO 50
```

7.21 *STATUS menu,option,status

e.g. `*STATUS 0,0,2`

This command is associated with pull-down-menus and is used to alter the status of any of the options on any of the menus. The parameters are thus the menu number (0-3), the option number on that menu (0 to a possible 15) and the status code. A list of these is given below:

Status Code	Effect
0	Option appears normally
1	Option appears ticked
2	Option is masked to grey

All the options you set up with a `*MAKE` command are given a default status code of 0. You may then set up your own default status values for each option, you may want an option ticked to start with for example. A status code of 2 causes the option to be masked out to grey when it appears on the menu, you will still be able to read the option but the bar will not appear when you point to the option after a `*PULL` command. This is used in icon designer, where you will not be able to select the Microdrive options if you haven't got Interface 1.

7.22 *UPDATE

e.g. `*UPDA.`

This command stores in memory the current position of the pointer in character positions, and the status of the 3 buttons. This information may be obtained with appropriate `PEEK` commands.

7.23 *WINDOW y,x,h,w,attr

e.g. `*WINDOW 7,9,8,14,120`

A common feature of all mouse software is the use of windows. The `*WINDOW` command does not define a proper window as on the BBC, Sinclair QL or other micros. Instead it simply draws a window and clears it to the attribute value you supply. You must give the text co-ordinates of the top left hand corner of the window, the height and width of the window in character positions, and the attribute value used to clear the window.

A border is drawn around the window to give its distinctive look, windows look particularly impressive when they overlap. Please note that the border is drawn in the character position around the area you specify in the command. For this reason the text co-ordinates of the window may not be on the very outside character position of the screen, and the window may not go over these positions if the width and height are set to do this.

8 INFORMATION STORED

As mentioned in the explanation of the commands, various information is stored in memory which may be read with PEEK commands. The following table shows the information:

Address in	Information Stored	When Stored
51915	X Co-ordinate of the pointer (0-255)	After a *LOOP
51916	Y Co-ordinate of the pointer (0-191)	
51917	Number of error generated (various)	
51918	Number of option selected on last menu pulled down (0 to 15)	After an error has occurred
51919	Status of the option selected on the last menu pulled down (0 to 2)	
51920	Status of Execute button (0 or 1)	After a *PULL or *FIND
51921	Status of Move Button (0 or 1)	
51922	Status of Cancel Button (0 or 1) (1 if pressed, otherwise 0)	
51923	X Character co-ord of pointer (0-31)	After a *UPDATE or *LOOP
51924	Y Character co-ord of pointer (0-23)	
51925	X co-ordinate of mouse (0-255)	All the time
51926	Y co-ordinate of mouse (0-191). (both updated by interrupts)	
51931	Machine code entry point for using certain AMX Control commands from assembly language.	

The X and Y co-ordinates of the MOUSE are continually updated unless something disables the interrupts, e.g. loading and saving, or the mouse is turned off with a *MOUSE OFF command. You may use these co-ordinates in your own programs if you want the mouse to move something else around the screen rather than the pointer.

The X and Y co-ordinates of the POINTER, refer to the position of the top left hand corner of the icon being used as a pointer. It is therefore recommended that you design your own pointers in so that the pointing part is in the top left hand corner of the icon. If you use a cross-hair then make sure you account for the distance between the top left hand corner of the icon and the centre of the cross hair, when using the co-ordinates.

8.1 ERRORS GENERATED

As mentioned earlier, AMX Control has its own errors built in. These are shown below:

Error	Error Code
0 Illegal Icon Number	48
1 Window too big	49
2 Illegal character	50
3 Illegal Font	51
4 Too many options	52
5 Illegal status	53
7 Option not defined	54
8 Menu not defined	55
9 Option definition error	56

Please note that some commands can also generate normal ROM errors, where appropriate.

8.2 USING AMX CONTROL FROM ASSEMBLY LANGUAGE

AMX Control has been written so that certain commands can be accessed from an assembly language program, if you want to gain speed by writing programs partly in assembly language. Icon designer has to do this so it can provide the more complicated facilities.

Only the commands thought to be best used from assembly language have been provided. Using some of the others would prove tedious with the amount of parameters required to pass over.

The routines are accessed by an entry code system, whereby each routine has a code, to call that routine you load the accumulator with the code and call an address which remains constant for all commands. The address you must call is 51931, a table of codes is shown below:

Value in accumulator	Action
0	Performs a *HIDEPOINTER.
1	Performs a *SHOWPOINTER.
2	Performs a *LOOP, with the parameter in the B register.
5	This pulls down the menu in the C register.
6	This prints the icon in D, at the text position in BC, where B=Y, C=X.

7	This performs a *STATUS command where the B,D and E registers hold the respective parameters.
8	This performs a *FIND command, the D and E registers hold the respective parameters.
9	This performs a *POINTER command where B=i1 and C=i2.
10	Performs a *STORE command.
11	Performs a *RESTORE command.
12	Performs a *UPDATE command.

The codes not shown are more complicated and are not much use without technical documentation on the AMX Control program.

The mouse interface generates interrupts so it can update counters and move the pointer around, so do not disable interrupts and then call the *LOOP or *PULL routine, otherwise the pointer will not move. Technical information on the interface plus more information on how to use Control from assembly language is available from Advanced Memory Systems Ltd. by sending £2.00 to the address on the cover.

To do a *LOOP 0 from assembly language:

```
LD A,2
LD B,0
CALL 51931
RET
```

8.3 TIPS ON WRITING MOUSE SOFTWARE USING AMX CONTROL

When you are writing mouse software there are a few things you must remember if you want your program to look and work well with the mouse.

If possible, keep to the same INK colour throughout. This is to avoid the pointer changing colour when it moves over any areas using different INK. This may sound limiting, but the end product will look much more professional. Using different background colours or BRIGHT colours can produce a nice effect, especially when used in separate windows.

Always use a mask on your pointers if you are defining your own. This stops the pointer from 'disappearing' when it moves over large solid areas of INK colour.

If you use overlapping windows for prompts as in Icon Designer and Demo, do not allow the menus to be pulled down during the time when the window is on the screen. This avoids the problem that the menus use the same area of memory that *STORE and *RESTORE use. Make sure overlapping windows are only temporary.

Keep the Border colour the same as the INK colour. If you do this then you will get rounded corners when you use the *HEADER command.

Try to be as economical as possible when writing your program. If you think that you may run out of memory, use the abbreviations in their shortest form.

8.4 MEMORY USAGE

AMX Control resides in memory from address 51912 to 65535. This includes all font and icon data, plus workspace. However, the memory from 45000 to 51911 is the 'spare screen' memory, and is used by pull-down-menus and *STORE and *RESTORE commands. This means that if you do not use these facilities then you may use 45000 to 51911 as program memory.

When you load Control from the tape RAMTOP is cleared to 44999, thus assuming you want to use all the facilities available. Under these conditions you have 20K of free memory. If however you do not wish to use menus or the spare screen then you must alter RAMTOP if you want the extra 6K of memory for your program. This is done by entering the command CLEAR 51911, you will then have 26K of program memory. Please note that this command must be included in your program, **BEFORE** it loads in Control, assuming you have copied Control onto your own media.

9 ICON DESIGNER

9.1 INTRODUCTION

The icon designer program enables you to define your own icons, these occupy icon numbers 64 to 95 in AMX Control. It is possible to use them as any of the icons, details on how to do this are given later. To load the program rewind the AMX Control tape and type LOAD "" then press <ENTER> and play the tape. Please note that there is no space between the quotes. Follow the on-screen prompts from then on.

After the program has loaded successfully you will be presented with the screen shown in Figure 11.

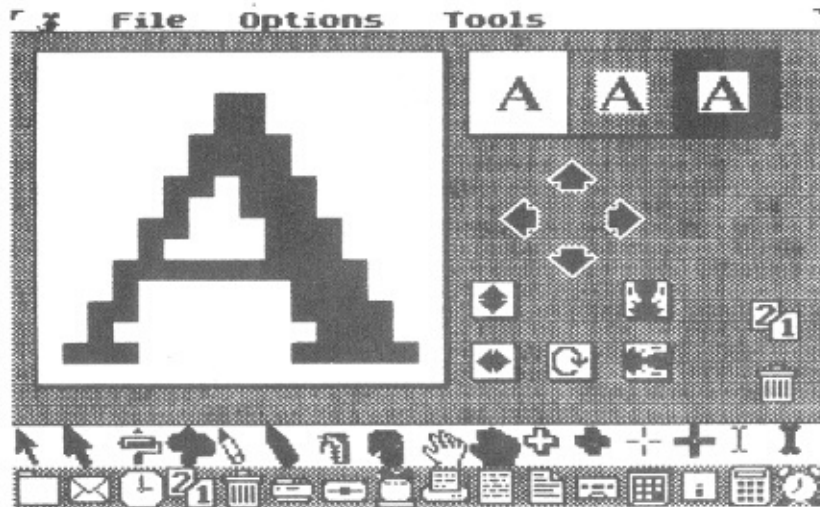


Figure 11: ICON DESIGNER

9.2 USING ICON DESIGNER

The Icon Designer screen contains five windows of various sizes, an options bar at the top of the screen, and various icons on the right hand side of the screen. The large window at the base of the screen will store any icons you design, it has space for 32 icons. The largest window is where you can actually create your icons. The three windows next to it show the current icon you are creating as it would appear on the screen, each one using a different border.

Below these is a set of various icons, they are used by moving the pointer over one of them and pressing the EXECUTE BUTTON. Each icon has a different function, some may seem obvious. The arrows are used to scroll the current icon in the desired direction, no part of the icon is lost as it wraps around when scrolled.

The two icons with faces in them are used to mirror the current icon either horizontally or vertically, the direction of the faces show this effect. The mirror effect is like a piece of blotting paper, if you draw something on each half of it then fold it in half and press the halves together you get the net result on both halves.

The icon with the circular arrow is used to rotate the current icon clockwise by 90 degrees.

The other two icons with the arrows pointing in opposite directions are used to reflect the icons horizontally or vertically. This has the effect of turning the icon upside down if used vertically or turning the icon over if used horizontally.

To actually draw your icon you must move the pointer over the large window and press EXECUTE. This has the effect of inverting the pixel you are pointing to. If you keep your finger on execute and move the pointer around the window you will continually keep changing pixels to the state you changed the first one to. For example, say you point to the window and a pixel is inverted so it becomes black. When you then move the pointer, any other pixels you point to will change to black. This means that you can design icons without pressing execute for every pixel you want to alter.

The options bar has four pull-down-menus on it. These are activated by pointing to the appropriate option (including the mouse in the corner) and pressing EXECUTE. Keep your finger on the execute button to keep the menu down. Move the pointer up and down to select the option you require. When you are pointing to the option you want, release the execute button. If you don't have a Microdrive then certain options on the File and Options menu will appear grey. This means that you cannot select them. If you successfully select something, the bar will flash on the menu. The tools menu serves the same purpose as the icons described earlier except that there are a few more options on it.

Once you have designed an icon you like, you may file it in the window at the base of the screen. This is done by pointing to the large window and pressing the MOVE button. Keeping your finger on the button you can then move the icon around the screen. To put the icon in the large window move it to the required position in the window and then release MOVE. The icon will then be fixed in the position nearest to where you dropped it. To make life easier when doing this, you can put a grid on the windows by selecting 'GRID' on the OPTIONS menu. This will show you where the positions are in each of the windows.

9.3 USING DEMO

When you drop an icon in the file window, the reference point used to define where you are pointing to is the top left hand corner of the icon you have picked up. Make sure that this part of the icon is in the required position in the file when you drop it, otherwise it will not be fixed in the place you wanted. Dropping icons in the file window destroys the icon beneath the one you last dropped.

You may move pick up an icon from the file, again using the MOVE button. The icon you picked up may be dropped in the bin (all this does is to return you to the normal pointer), on the large window (for editing), or back in the file window in another position perhaps.

The only icon left on to explain is the one above the bin with the numbers '2/1' on it. This is used to switch icon files. The icon designer has another store in memory for 32 icons which you cannot see normally. If you point to the 'switch file' icon then the current icons in the file are switched with the ones in memory. Pointing to it again brings back your other icons and returns the ones in the file back into memory. This means that you can actually define 64 icons although you can only see 32 at a time.

Another feature the icon designer has is an UNDO facility. This enables you to undo something if you accidentally mess up the icon you are editing. You may also undo what you have just undone. This undo facility works by pressing the CANCEL button at virtually any time. The undo facility will undo anything done by the TOOLS menu (or the icons below it except for the scroll which is undone by simply scrolling the icon back to the position it was in).

The Options on the pull-down-menus are generally self-explanatory, however some of them will now be explained. The FILE menu has two load options on it. You may load icons into the file window or into the ALTERNATE set. If you load icons into the alternate set you must use the switch file icon to see them, as described above.

The SAVE option saves the 32 icons currently in the file window. If you have more than one Microdrive, you may select which drive you want to save, catalogue or load from with the DRIVE NO. option. Default is drive 1.

Since the icons used by Control are stored in RAM, you may actually alter all of them, although only icons 64 to 95 were intended to be 'user icons'. To use the icons you have defined in positions 64 to 95 simply load them back into memory when you want to use them (after loading AMX Control) with:

```
LOAD "filename"CODE or LOAD *"m";1;"filename"CODE
    for tape users           if you have a microdrive
```

To load icons into positions 0 to 31 load the icons into address 62464, for positions 32 to 63 load them into address 63488. You do not need the address for positions 64 to 95 since the icon designer saves them so they load in at this position if no address is specified in the load command.

The demo program and icon designer show what sort of software can be written using AMX Control. DEMO contains a four function calculator and a sliding puzzle and is written entirely in Basic.

When the program loads, you may transfer it to Microdrive if you have one. There is only one pull-down-menu on the screen, this is selected by pointing to the mouse in the corner of the screen. From this menu you can select both the calculator and the puzzle, or you can quit, which puts you in Basic.

After you have selected something you can't select anything else without quitting. This is done by using the pull-down-menu if you are using the puzzle, or point to 'OFF' if using the calculator.

NOTES