
MICRODRAFT



DRAWN using MICRODRAFT on the PCW

USER MANUAL

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Manual additions for the PCW version of MICRODRAFT

This addition to the manual describes those features of MICRODRAFT V2.3 which are specific to the PCW8256 and PCW8512 versions.

The 8-bit version of MICRODRAFT is designed to be identical

to the 16-bit version which runs on IBM compatibles (including the Amstrad 1512), however there are differences between the individual machines which has resulted in slight changes being made to the program.

All the V2.3 MICRODRAFT's have the same features and you will find that the manual makes no mention of individual differences. All the menu items are the same and the procedure through the menus is identical. This section of the manual describes ALL the changes.

Making a backup of your master disc

It is very important that this is done before you use MICRODRAFT. There is far too little space left on the disc for any MICRODRAFT drawings to be stored and it is extremely bad practice to use a master disc for any purpose other than making a working disc.

Procedure to backup a disc on the PCW

There are instructions in the front of the Locoscript user manual supplied with your machine on using the Disckit program. When you have made a backup put the Master disc in a safe place . Fill out the registration card and send it to TIMATIC. If the card is not received by TIMATIC then no

support can be obtained. We will also be unable to send you details of upgrades or additional programs which you might require.

On side A: you will have the following files

MDRAFT .COM	_	The start up program
CADMAIN .OV8	_	The main overlay
ZOOM .OV8	_ _ _	The zoom overlay
BLOCK .OV8	_ _ _	The blocks overlay
MKBLOCK .OV8	_	The overlay to make blocks
FILES .OV8	_ _ _	File handling
SETUP .OV8	_ _ _	Setup Overlay
ARCS .OV8	_ _ _	Arcs Overlay
CIRCLES .OV8	_ _ _	Circles Overlay
STRINGS .OV8	_ _ _	String handling
MARKR .OV8	_ _ _	Marker Overlay
DIMENS .OV8	_ _ _	Dimensioning etc.
HATCHES .OV8	_	Hatching Overlay
FILLET .OV8	_ _ _	Fillet overlay.
MCHECK .COM	_	File integrity check

In addition you will have on side B,

MPLOT.COM This program outputs drawing files to a HPGL compatible plotter.

MPRINT.COM This is a printer driver produces output on a Epson compatible printer.

TEXT.FON The text font file for the hard copy programs.

MCHECK.COM Performs a confidence check on all the programs to ensure they have not been corrupted during copying.

MMD.SUB This SUBMIT file will copy the all of MICRODRAFT onto the M: drive.

MDRAFT.KYS A key setup file used by MMD.

CCP.KYS Standard PCW keys file.Used to reset the keyboard when leaving MICRODRAFT.

MLIB.COM Library Manager.

ELECSYM.LIB Sample library file.

LIBSHAPE.DRW Drawing of shapes from which ELECSYM.LIB was made.

RESTRICTIONS

The 8-bit version of MICRODRAFT is restricted to a file size of 20000 bytes. In practice this is not a disadvantage as we have found it very difficult to reach this limit due to the efficient way that MICRODRAFT stores data.

Users of 8-bit machines may have an RSX installed. This sits at the top of memory and takes up some space. The TIMATIC BIGDISC program is one such RSX, as are other programs and printer spoolers. The space at the top of MICRODRAFT is not too restricted, but if you have several RSX's installed and MICRODRAFT will not start, this is probably the cause.

MOUSE INTERFACE

Version 2.3 of MICRODRAFT includes a mouse driver as standard. The mouse driver will recognise the Kempston mouse and this will be integrated into the program automatically. If you do not have a mouse then MICRODRAFT will not expect mouse data entry.

The Kempston mouse will substitute for the cursor keys in MICRODRAFT and may be used anywhere that the cursor keys might be used. This includes moving the cursor around the screen. It can also be used to pick menu items rather than using the Function Keys (see later). Both buttons on the mouse perform identical actions so use whichever is most comfortable. The mouse interface is slightly different from that on the IBM version. The menu on the right hand side of the screen will display choices numbered 1,2,3...9,0. One of these will be highlighted at any time. To choose the highlighted item just press and release the mouse button. To change the selected item, depress the mouse button and then while NOT releasing the mouse button, move the mouse up or down. The highlight bar will move with the mouse. When the bar is over the required menu item, release the mouse button. This will select the required item. The cursor on the screen will not have moved during this operation. The use of the mouse, the cursor and the function keys can be freely intermixed. For example, you might like to move the cursor with the mouse but select functions using the function keys, according to your personal preference.

Using MICRODRAFT on the PCW series.

The PCW MICRODRAFT V2.3 consists of one main file (MDRAFT.COM) and several 'overlay' files (with the ending .OV8). For MICRODRAFT to run you must have these files on the default drive. With a twin disc system you can put the MICRODRAFT disc in drive A: and

store your drawings on drive B:. It is probably advisable to copy the MPRINT and MPLOT files to your data disc along with TEXT.FON.

With a single drive system you should still save and load from B: by explicitly putting a B: before all the filenames in MICRODRAFT and changing discs when prompted.

Using a PCW gives a distinct advantage over the CPC series in that you have drive M:. MICRODRAFT can be copied to this drive and run from there. Loading overlays is practically instantaneous and the use of the program is speeded up. The PCW screen has more pixels than the CPC range and the IBM PC. This means that drawings can be displayed to a higher resolution on the screen.

There is a file called MMD.SUB which copies all the MICRODRAFT files to the memory drive, sets up the keys and runs MICRODRAFT from the Memory drive. On exit from MICRODRAFT it resets the keys to standard using the file CCP.KYS.

To start MICRODRAFT insert the working MICRODRAFT disc and type **SUBMIT MMD** This copies all the files to M and then starts MICRODRAFT. When the initial message is displayed you can remove the MICRODRAFT disc and insert the drawing data disc. If you wish to load a file from this disc (e.g. MYDRAW.DRW) the name should be entered as B:MYDRAW rather than just MYDRAW. This entry is also required for saving and all other file operations. Until you are confident of which disc you are saving files on, use test files. It would be unfortunate if you spend 2 hours drawing the plans for your new house only to lose them through a misunderstanding of where to save the file. Remember to reinsert the MICRODRAFT working disc when prompted for A:

PCW8512 owners or PCW owners with a second drive need not remove the MICRODRAFT disc from drive A: insert the data disc in drive B:. All drawing file names must be preceded with B: in this case.

USER INTERFACE

The user interface is changed from that described in the manual. Since the numeric key pad is overlaid on the cursor keys it cannot be used for choosing menu items. With the standard key set, the menu items can be chosen using the numbers along the top of the keyboard or by pressing the space bar and picking with the period (full stop) key, 'esc' can be obtained with EXIT or ALT [.

We have supplied a file for SETKEYS which will set up a more useful interface. This file (MDRAFT.KYS) can be edited if you feel that another key set would be more natural.

ENTER	Picks the currently highlighted menu item
EXIT	This is set to exit from all menus
[+]	Increases the cursor increment
[-]	Decreases the cursor increment
STOP	Corresponds to the ESC key in the manual
f1	Menu item 3
f3	Menu item 4
f5	Menu item 5
f7	Menu item 6
EXCH	Menu item 7
DOC	Menu item 8
UNIT	Menu item 9

This has been chosen so that the most used keys are close to the cursor keys and with practice will enable the user to move quickly between the menus. The keys along the top of the keyboard can still be used if this feels more comfortable to the user.

NOTICE

The following commands are **NOT** available on the CPM versions of MICRODRAFT.

SHIFT f1

SHIFT f2

CHDIR

WRITE BLOCK

Those using MICRODRAFT on the AMSTRAD PCW and CPC should ignore all references to these commands.

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SECTION 1

INTRODUCTION

INTRODUCTION

MICRODRAFT is a program intended for use in the production of engineering and technical drawings of all kinds. The program was initially written as an aid to drawing schematics of electronic circuits and as such, an early requirement was an ability to define library drawings which could later be included in a larger drawing at any scale and orientation. This feature remains one of MICRODRAFT's most impressive capabilities and the ease of use and flexibility which are achieved, sets it aside from other drawing packages frequently costing many times the price of this program.

Since the initial intention was to use a plotter for a primary output device, it was clear that a simple 'bit-map' representation and screen dump output, as used by many simple screen design programs was totally inadequate. Consequently graphic entities, (lines, circles, etc.) are stored in parametric form. Lines for example are stored by the coordinates of their end points only. The advantages of this approach are many and include much smaller data files, (a drawing having one hundred lines will occupy less than one kilobyte of disc space whilst an equivalent accuracy bit map would occupy **512 MEGABYTES**) and the ability to perform advanced manipulations on drawings such as scaling, mirroring and rotation. Far greater accuracy is also possible with an ultimate resolution of **65,536** points along each axis being achieved.

The immediate result of the high precision drawing is that very deep zoom levels can be used without degradation or distortion of the drawing. MICRODRAFT features continuously variable zoom levels with magnification factors in the range 1 to greater than 150. This means, that

MICRODRAFT draws on an imaginary screen, more than one hundred times its width and more than three hundred times its height, but still having the same pixel size and density.

The high resolution data format and drawing manipulation capabilities, clearly provide an ideal vehicle for technical and mechanical drawing, if the inherent accuracy of the data can be properly harnessed. To this end the large variety of methods for determining the position of a point have been included in the program's library of functions. Auto dimensioning, auto filleting and programmable cross-hatching also provide essential tools for the professional draftsman.

It was recognized early in program development that all the facilities in the world do not produce an effective and efficient drawing tool if the user interface is either clumsy or complex. Much attention was devoted to this particular aspect of MICRODRAFT and it has been refined and re-programmed more than once as the capabilities of the rest of the program expanded. It is hoped that the command sequences will be found simple and natural and that the many hours of labour involved in the production of this program will result in very few hours of labour being required in its use.

SECTION 2

TUTORIAL

STARTING MICRODRAFT

Before starting MICRODRAFT you must first boot DOS on your computer. If you do not know how to do this, consult the users manual for your microcomputer.

Once DOS is running, insert your MICRODRAFT program disc in the disc drive and type either:-

DIR A: or DIR B:

Depending on whether you have used drive A: or B: on your computer, you should see the following file names appear:-

MDRAFT.EXE

MPLLOT.EXE

MLIB.EXE

MPRINT.EXE

MPLLOT.EXE and MPRINT.EXE are the plotter and printer driver program's whilst MLIB.EXE is a program for creating and managing shape libraries. All three of these are described later in this manual. MDRAFT.EXE is the drawing editor program and is the only one which needs to be present in order to run MICRODRAFT. Once MICRODRAFT is running, there is no need for the program diskette to remain in the drive. IF in addition, there is a file named READ.ME then print this out and read it, this file will contain details of any alterations to MICRODRAFT which have been made after this manual was printed or of any omissions from the manual.

At this point it is wise to make a back up copy of the MICRODRAFT program diskette before proceeding any further. The DISKCOPY program supplied with DOS will perform this function. Consult your DOS manual if you do not know how to use DISKCOPY.

If your computer has separate text and graphics screens, for example an IBM-PC with both mono and Colour Graphics adapters, it will be necessary to select the graphics screen first. In the case of the IBM, this is done by typing either:-

MODE CO or **MODE CO80** depending on the version of DOS being used

MOUSE

If you intend using a mouse with MICRODRAFT, the software driver supplied with the mouse should be installed at this point. If you do not know how to do this, consult your mouse owners guide.

MICRODRAFT is compatible with Amstrad, Microsoft, Mouse Systems and Summa mice. If you are not using a mouse then simply proceed as detailed below.

MICRODRAFT may be run by simply placing the program diskette in one of your disc drives and typing:-

MDRAFT or **B:MDRAFT** as appropriate.

After displaying a copyright message, the screen will clear and the main drawing window will be displayed. MICRODRAFT's main menu is then displayed down the right hand side of the window. This is the menu from which all the drawing functions are accessed and in general it is to this menu that the program returns after an option has been used and 'Exit'ed.

FIRST STEPS

Assuming that the program has now successfully loaded and is running correctly, the first thing to do is to become familiar with the screen layout and the way in which the cursor is moved around the screen.

The major part of the screen is occupied by the drawing window. This rectangular outlined area, covers around seven eighths of the display area and is used to display the drawing currently being edited. Along its top edge is written the name of the file currently being displayed. After program start up this will say 'No File', indicating that a drawing file has not yet been loaded from disc. Notice that the text font used to label the various boxes on the screen is not the usual graphics font. This is because MICRODRAFT uses its own font which is much smaller than the normal one, allowing more than 120 characters to be displayed on a single screen line. As will be seen later, MICRODRAFT can also produce text at any integer multiple of this basic size.

In the bottom right hand corner of the screen is a message saying 'Use 0.0%', this is an indication of the percentage of available data space occupied by the current drawing. A value of 0.0% means that there is no graphics data in memory at present. This display is updated each time the main menu is displayed and the user is warned that the figure displayed must not be allowed to exceed 100%. This is unlikely to be a restriction in normal use but it is quite easy to get carried away when experimenting with the macro load commands and produce very large quantities of data indeed.

Above this is an area containing the menu options currently available. Each option may be selected by typing the function key corresponding to the number displayed in front of the command name. Alternatively notice that one of the options is highlighted by a right hand angle bracket in front of it. Pressing the space bar moves the highlight to the next menu option and so

on. When the correct option is highlighted, pressing the RETURN key executes that command. If you are using a mouse, then moving the cursor over to the right hand edge of the screen allows the mouse to control the position of the angle bracket. With the mouse still at the edge of the screen, pressing any button on the mouse will activate the indicated command. With the cursor in the centre of the drawing window, the three buttons on a mouse, (Summa or Mouse Systems) duplicate the functions of f3, f4 and f5, since these are the most commonly used function keys in MICRODRAFT. The Amstrad mouse by default uses only the left hand button as f3.

The rest of this manual will assume that you use the first command selection method described above, although you may use the second if it seems more natural. All the commands function in the same way, whichever technique you use to invoke them. In general these command names are replaced whenever a function is selected with new ones appropriate to the command options now available. To see how this works press 'f3' (marked 'Element') after the new captions have appeared, press 'f10' (marked 'Exit') to return to the main menu display.

When you pressed 'f3', MICRODRAFT moved from its main menu to the element selection menu. This menu allows the user to select which type of graphics element (line, circle, arc, marker, hatch or text) he wishes to add, edit or delete. Pressing 'f10' caused MICRODRAFT to exit from the element menu and return to the main menu.

You may have noticed that during the preceding key sequence the legends beside 'f10' (Exit), 'f1'(Coarse) and 'f2'(Fine) did not alter. The functions of these three keys are constant across all commands in MICRODRAFT and they are never updated. As you have already seen, 'f10' is used to exit from one command menu to the one above. If 'f10' is pressed whilst the main menu is displayed then MICRODRAFT terminates and the operating system command prompt reappears. As a safety feature this function is disabled whenever there is any graphics data in memory. In other words MICRODRAFT will not allow you to throw away a drawing, you must

deliberately delete it (there is a delete everything command) before exiting the program.

If you have chosen to test the exit key then start MICRODRAFT again so that you may continue with this introduction.

The next thing to explore is the way in which the cursor is moved around the screen. The cursor is the small cross which is currently displayed in the centre of the drawing window. Naturally enough the cursor arrows located in the numeric keypad of the IBM-PC are used for this purpose. After making sure that the Num-Lock key is inactive, press the cursor keys and observe the cursor moving around the screen. If you have a mouse then it provides a fast method of moving around the screen whilst the cursor keys will be found to provide easier fine positioning. Notice also the cursor coordinate indication on the right hand side of the display. By default these indicators are in millimetres relative to the centre of the screen and the two horizontal lines located at roughly one eighth and seven eighths of the height of the screen indicate the height of an A3 page. The width of the page is automatically set to match the width of the drawing window. Both the page size and the coordinate display units may be altered if desired.

You will have noticed that when the cursor moves, it does not do so by single pixel amounts but jumps by a considerable distance. Press the 'f2' (Fine) key and observe that the step size is now smaller. Press 'f1' (Coarse) to restore the step size to its initial value. Repeated use of these keys allows access to 4 different cursor step sizes from 1 to 64 pixels at a time. If a cursor key is held down, then updating of the position indicator is disabled until the key is released. This enables very fast cursor positioning even when a small cursor increment is in force.

Finally observe that pressing 'esc', located at top left on the IBM-PC keyboard restores the cursor to its starting position at the centre of the screen. This key actually moves the cursor to the current coordinate origin (which may be redefined). Notice that since the coordinate origin need not

necessarily fall exactly on one of the screen pixels, the cursor position displays do not show 0.0 after pressing 'esc', they show the exact location of the screen pixel which is closest to the coordinate origin. This is the first outward indication of the high accuracy to which MICRODRAFT works.

DRAWING LINES

Having discovered the way in which the cursor can be moved around the screen, the first thing you are likely to want to do is draw some lines.

First make sure that the main menu is displayed and then press '3' (Element) to indicate that you wish to edit graphics elements. Next press the key marked Lines to indicate that it is a line that you wish to edit. The key now labelled 'New' is used to add a new line to the graphics data already defined, press it and observe the menu which is now displayed. This is the point definition menu which will be referred to repeatedly throughout the rest of this manual, it is used to locate a particular point and offers many ways in which this can be achieved. For now you will use the simplest of these which selects the current cursor position. Notice also the prompt line which has appeared above the cursor position indication. This is used to indicate which point it is that has to be input, MICRODRAFT is currently awaiting input of the start point of the line you wish to add.

Move the cursor to the position from which you would like your new line to start and select the 'Cursor' option from the menu. This tells MICRODRAFT that the new line has to begin wherever the cursor is currently positioned. The point definition menu will remain on the screen but the prompt line will have changed to indicate that MICRODRAFT is now awaiting input of the end point of the new line. To do this move the cursor to the position where you would like the line to end and press 'Cursor' again. Notice that as the cursor is moved, the new line is 'dragged' after it and that the 'Fine' and 'Coarse' keys may still be used to adjust the cursor sensitivity, allowing rapid movement to any part of the screen and pixel ac-

curate positioning. After the end of the line has been defined, the Lines menu from which you just selected 'New' is redisplayed enabling entry of further lines.

PRECISION POINT PLACEMENT

Although the cursor keys allow the ends of lines to be identified to single pixel precision, this is still not generally sufficient for drafting purposes. At the current magnification level a single pixel in the vertical direction represents a movement of greater than 2 millimetres on an A3 page and correspondingly larger movements on larger paper sizes. Few people would accept this accuracy on a technical drawing of any sort. One solution would be to zoom in, on that part of the drawing which is of interest, thus reducing the size corresponding to one pixel cursor movement, but this would only allow short lines to be drawn, since points could only be specified on that portion of the drawing currently being displayed.

In order to overcome these difficulties it is necessary to introduce more sophisticated forms of point location. These are provided by the other options on the point definition menu and are the features which make MICRODRAFT a true drafting package, rather than just a screen design program. Examples are given here of some, but not all, of the options provided. All are described in the reference section, and the user is again encouraged to compare what has been learnt so far with the contents of the reference section. The capabilities of the point definition routines are many and varied and may be combined in a number of ways to produce more complicated effects when required. It is essential that the operation of each option be understood in order to get the best out of MICRODRAFT.

To provide an example of how these functions work, let us now draw a square of side 100mm. This is an easy task with a ruler and pencil, so clearly any package which cannot readily cope with this task is of little or no use as a drafting aid. MICRODRAFT has no difficulty in this area.

First, select 'New' again to add the first new line. Instead of using the 'Cursor' option, this time press 'Cartesian'. This option is used when you wish to specify exact x,y (cartesian) coordinates for the point to be defined. A prompt line will appear at the bottom of the screen, asking for the coordinate pair to be entered. This should now be entered, using either the numeric keys along the top of the keyboard or those in the numeric keypad.

The x coordinate is entered first, followed by either a space or a return, then the y coordinate and finally another space or 'return'. For the first corner of the square enter the sequence :-

50.0 [return] 50.0

The decimal point and trailing zero are optional. This will fix one corner of the square and a line is rubber-banded to the cursor position. To enter the other end of the line, again select 'Cartesian' and this time enter -50.0 [return] 50.0

After you press return, the line will be drawn correctly and the 'Lines' menu redisplayed. The units in which coordinates are entered and their origin are both user programmable. By default, the units are millimetres and the origin is positioned at the centre of the A3 page whose boundary is displayed in the drawing window.

This procedure may at first seem slow and it may look as if you have achieved nothing more than you did by drawing your first line by cursor position. This is so, as far as the screen display at the moment is concerned. It has insufficient resolution to display the line you have just drawn correctly, so that which displayed is the closest approximation that can be managed. The difference between this line and the earlier one, is that when more resolution becomes available, for example when you use the zoom facility, or output to a plotter, the line you have just drawn will still be positioned to single pixel accuracy. Even though the computer cannot currently

display the line properly, it has recorded the exact positions you requested and will use the extra information when it becomes possible to do so.

Now draw in the left hand side of the square using coordinates '-50 50' and '-50 -50'. You could clearly repeat this procedure to complete the square, but MICRODRAFT has other methods which are usefully demonstrated here.

First, remove the line which you drew in at random. The 'Lines' menu should already be on the display, so move the cursor somewhere close to the middle of the line to be deleted and press the function key labelled 'Get'. The line on the display, closest to the cursor, will flash to indicate that that line has been selected for further operations. Now press the key labelled 'Delete' and the line will vanish, leaving just the top and left hand sides of the square you are drawing.

To add the bottom of the square, try the following procedure. Press 'New' to add a new line. For the first point use 'Cartesian' and enter coordinates '50 -50'. This should now give you a line, rubber banded from the bottom right hand corner of the square. Now position the cursor so that it is near the bottom end of the left edge of the square. Press the 'EOL' key and the line will be instantly joined to the correct point. The function you have just used, 'EOL' (End of Line) finds the closest line end to the current cursor position. This function is particularly useful when you require to define a point on the end of a line and you have either forgotten, or did not know the exact coordinates of the point you require.

It must be stressed, that while the results of this operation may not look particularly spectacular on the screen at the moment, the real advantage is that the bottom and left hand sides of the square will now meet regardless of the zoom level used to examine the join.

Clearly the EOL function offers an easy way of filling in the fourth side of the square, but you can use this opportunity to demonstrate another frequently used feature of MICRODRAFT.

Press 'Exit', to leave the lines menu. You are now back at the 'Element' menu (displayed after we selected 'Element' from the main menu). Press the key marked 'Points'. This enables you to define one of the ten coordinate stores that MICRODRAFT provides. These are broadly analogous to memories in a pocket calculator, except that each of them may be used to retain the coordinates of a single point on the drawing. You will now be prompted to enter the number of the point which you wish to define. Type 1, followed by a carriage return, to indicate that you wish to use coordinate store number 1. MICRODRAFT will now enter the point definition menu, which should by now be becoming familiar. Move the cursor to the right hand end of the top of the square and press 'EOL'. This sequence finds the coordinates of its right hand end, and stores them in memory number one for future use.

MICRODRAFT will now have returned to the 'Element' menu. Select lines again, to fill in the right hand edge of the square as follows, press 'New' to start a new line. When the point definition menu appears, again press the key marked 'Store' and reply 1 to the prompt which results. This recalls the value from store 1 and uses it as the start point of the line. To finish the square, simply position the cursor near to the right hand end of the base and press 'EOL'.

It cannot be over emphasised at this point, that the square which is on screen at the moment, is stored in the computer's memory to an accuracy of 0.01mm. When output to a high quality output device, such as a plotter, this will result in a drawing which is more accurate than could ever be produced by hand.

There are of course many ways in which to draw a particular shape and indeed the above procedure is certainly not the fastest way to draw a square.

You may already have noticed that one of the functions on the Lines menu is labelled Box. This function is provided specifically to enable quick drawing of squares and rectangles. Before you explore its use, first delete the square you have just drawn, by selecting 'Get' and then 'Delete' each of its four lines in turn.

Now press 'Box'. When the point definition menu appears, select 'Cartesian' and enter '-50 50' to define the top left hand corner of the square. Move the cursor around the screen and observe that a box is now rubber banded between the point defined earlier and the new cursor position. The menu on the screen at this point has two options labelled 'Accept' and 'Point def'. The Accept option has the effect of terminating the box operation and leaving the box as it appears on the screen, whilst 'Point def' produces the point definition menu to allow accurate placement of the second corner of the box. Select the 'Point def' option and use Cartesian coordinates again to enter the second corner at '50 - 50', then 'accept' the box without further cursor movement. This has drawn exactly the same square as before. Note in particular, that the four sides of the square are still individual lines, which may be selected and deleted as required.

It should suffice to say at this point, that equivalent operations to the 'get' line function exist for circles and arcs and that there is a currently selected circle and a currently selected arc which may be used in similar ways to the current line. The user is asked to read the appropriate section of the reference chapter for descriptions of the remaining options on the point definition menu. Note in particular the second menu of functions which is produced when the 'more' option is selected. Only the 'Offset' option requires further clarification. This function is probably the most advanced and necessarily complex feature of MICRODRAFT. You may feel it advisable to omit this section for the moment.

COMBINING POINT DEFINITION OPTIONS

The 'Offset' function is designed to cater for such occasions when you need to specify a point as being, for example, 3mm above and 2.5mm to the right of the end of an existing line and then 5 mm along a line at 13 degrees above horizontal. Finding such points would normally require a series of construction lines to be drawn when drafting manually but can be done automatically with some help from MICRODRAFT. Suppose

- a) That the line referred to above is the right hand edge of your square.
- b) That the point is relative to the top end of the line.
- c) That it is desired to join that point to the bottom end of the right hand edge. Proceed as follows
 - 1) Press 'New' to start the new line.
 - 2) Once the point definition menu appears press 'more' and then 'offset'.
 - 3) Press 'more' and then 'offset' again. This is necessary since we wish to specify two successive offsets from the one point.
 - 4) Move the cursor near to the top end of the right hand edge and press 'EOL' thus establishing the 'base point'.
 - 5) Press 'Exit' then 'Cartesian' and enter the coordinates '2.5 3'.
 - 6) Press 'Exit' then 'Polar' and enter the coordinates '5 13'.
 - 7) You should now be able to move the cursor around and watch the new line being rubber banded from the desired point.

8) To finish off the line as specified, move the cursor near to the bottom of the right hand edge of the square and press 'EOL'. The line is now complete.

This command sequence may, at first, appear extremely complex, but the user is urged to try it and check the command sequences against their descriptions in the reference chapter. The Offset command is rather complicated to use, but so is the function it performs. You may not often have occasion to use Offset, but when you do, you will find it indispensable.

LAYERS

MICRODRAFT offers the facility of drawing layers. These allow the user to achieve similar effects to transparent overlays on a conventional drawing board. Each drawing element which is added, is assigned to the current 'Insertion Layer'. After loading the program, this will be set to layer number 0, but may be set to any number in the range 0-255. When working on the drawing, any layer may be turned off if desired. If a layer is turned off, then its contents are not displayed, leading to an improvement in redraw and zoom times on a large drawing. After initial program load, all layers are turned on.

When the drawing is output to a plotter, you may assign a pen number and linestyle, (dotted, dashed, solid etc.) to be used for each layer. The linestyle does not affect text or hatches, but the pen number is used for all elements.

On the screen, to help you tell which elements are on which layer, MICRODRAFT uses fixed line styles. Since only eight different linestyles are really possible on a VDU, the sequence of linestyles repeats modulo 8 for the 256 layers. Layers 0, 8, 16... are displayed as solid lines, whilst 1, 9, 17... are displayed dotted and so on. If you choose layers carefully, it is possible to have the desired final output displayed correctly on the screen.

To alter the layer settings, first select 'Setup' from the main menu and then 'Layers' from the setup menu. The two options on the menu, 'Insert' and 'On/Off' allow the current insertion layer to be changed, and the status of a specified layer to be displayed and, optionally changed. If the On/Off status of a layer is changed, then its contents will not be drawn/deleted from the screen, until the next redraw or zoom operation is performed.

The various 'Get' and 'Delete' commands, together with 'EOL' and 'block', ignore elements on layers which are currently turned off.

Experiment with drawing lines on the various layers to see which linestyles are used. Try turning the layers on and off and then deleting some of the lines which are displayed.

CLEARING THE MEMORY

Before proceeding any further it would seem to be sensible to find out how to clear the screen and exit from MICRODRAFT.

First, verify that whilst there is a drawing on the screen, pressing 'Exit' at the main menu does not exit the program. Then press the key labelled 'Files,' to display the file handling menu. Press the key marked 'Zap'. This will clear the screen completely and remove all drawing data from memory. Note in particular, that if you have been editing an existing drawing file, altering the drawing on the screen does not in any way affect the disc file until the edited drawing is explicitly 'Saved'. Pressing 'Zap' before doing this will result in any modifications being lost, the original file will still be on the disc, as it was before you started.

Now press 'Exit' to redisplay the main menu. Notice that the 'Use' display will now show 0.0%, indicating that no data is currently in memory. Pressing 'Exit' now will exit from MICRODRAFT.

DRAWING CIRCLES

Several alternative techniques are provided for drawing circles and ellipses. To demonstrate them first redraw the 100 mm square you had earlier. This will provide more good practice at drawing accurate lines.

Now attempt to draw three circles and an ellipse. The first circle will pass through the four corners of the square, whilst the other two will sit side by side in the top half of the square, touching the sides of the square the top of the square and each other. The ellipse will fit in the bottom half of the square and will be the same height as the previous two circles but double their width, touching both sides of the square.

You need to reach the circle drawing menu. From the main menu, this is achieved by pressing 'Element' followed by 'Circles'. Select 'New', to indicate that you wish to draw a new circle. The menu will now offer four alternative methods of adding a circle. The use of each of these is described as follows.

CENTRE AND RADIUS CIRCLE

Circle passing through four corners of square. The easiest way to do this is by specifying the centre of the circle and one point on its circumference. Select the new circle option 'Cent Rad'. The point definition menu will appear, prompting for the position of the circle centre. Use cartesian coordinates to position the centre at 0,0, (assuming that you have drawn your square at the same place as before). Now move the cursor around and observe that a circle is 'rubber banded' through the cursor and centred at the centre of the square. The circle may be accepted as shown at any time by pressing the key now labelled 'Accept'. Alternatively the point definition menu may be used to fix the circle accurately by pressing 'Pointdef'. Press

this key, and use cartesian coordinates to enter the point '50 50', then press 'accept' without moving the cursor again. This enters the circle, and returns to the new circle menu.

TWO POINT CIRCLE

Circle in top left hand corner of square. Draw this using the '2 point' function. This draws a circle given two points at opposite ends of a diagonal. From the new circle menu, select '2 point' and enter the first point in cartesian coordinates as '0 25'. Now move the cursor around and observe the circle which is rubber banded. As before, select the point definition option by pressing 'pointdef' and enter the opposite end of the diagonal in cartesian coordinates at '-50 25'. Press accept to complete the circle addition.

THREE POINT CIRCLE

Circle in top right corner of square. This may be achieved using the 2 point function as above but we shall demonstrate the use of the three point circle routine. This function draws a circle, given three different points on its circumference. First press 'Exit' to leave the new circles menu and return to the circles menu. Move the cursor close to the centre of the top left circle you have just drawn and press 'Get'. This should flash the circle once and select it for further operations. Now press 'New' and then '3 Point'. For the first point on the new circle, you will use a different point definition option.

The point definition menu should currently be on the display. Select 'more' and then 'C Circum' to indicate that you wish to enter a point on the circumference of the currently selected circle. If you have not selected a circle as instructed above, nothing will happen and you will have to use one of the other options. You should now be prompted to enter an angle round the circle to the point you wish to define. Enter a value of 0. For the second point on the new circle, enter cartesian '25 50'. Again move the cursor

around and observe carefully the circle which is drawn. Finally select 'pointdef' and enter the third point as cartesian '50 25' and then 'Accept' the circle.

ELLIPSE

Ellipse in the bottom half of square. Select 'ellipse' from the new circles menu and enter the centre of the ellipse as cartesian '0 -25'. Now move the cursor to one side, above the position just entered and observe the ellipse being drawn. Note that horizontal and vertical lines drawn from the cursor are tangential to the ellipse. Select 'Point def' and enter the point '-50 -50' and 'Accept' the resulting ellipse. This should complete the drawing as specified at the top of this section.

SAVING AND RETRIEVING A DRAWING

Now you have a drawing on the screen which takes more than a few seconds to reproduce, it is a good idea to find out how drawings are saved to and loaded from disc.

First press 'Exit' to leave the new circles menu and 'Exit' again to leave the circles menu. Notice the 'Use' display being updated, to reflect the size of the current drawing. Press 'Files', to allow access to the filing functions. Press 'Save', and MICRODRAFT will prompt for the name of the file you wish to create.

The format of filenames, is specified by your operating system and consists of 8 letters or numbers, (punctuation marks and spaces not allowed). You may optionally prefix the filename with a single letter drive specifier, followed by a colon, suffix it with a period '.' and a 0 to 3 letter filetype. If the drive specifier is omitted, then MICRODRAFT will use the current default drive. If no filetype is given the type .DRW is provided. If you are not

familiar with the terms used above, use the name TRIAL for the moment and consult your operating system manual for details of filenames later.

When you have entered the filename, MICRODRAFT will write your drawing to disc. If a file already exists with the name you specified, its filetype will be changed to '.BAK'. If a .BAK file already exists, it will be deleted. In this way, MICRODRAFT automatically keeps the latest copy of your drawing, and the previous version.

Delete the data from the computer's memory by pressing 'Zap'. Your drawing can now be reloaded by pressing 'Load', and entering the file name you specified when the drawing was saved. Notice that when you use the Load command, the filename you use appears in the bar above the main drawing window as a reminder of where the drawing came from.

After a drawing has been loaded, it may be altered and added to as desired. Note however, that the results of the edit are not saved to disc unless a 'Save' command is used. The file name used when saving, need not be the same as the original file, allowing many different versions of the same drawing to be created if desired.

MAGNIFICATION CONTROL

You will already be starting to realize that the size of your VDU is rather limiting in the amount of precision which can be achieved when displaying a drawing. In particular, it is not possible to add detail of any sort to a drawing the size of an A3 page. In order to solve this problem and allow data entry of fine detail, MICRODRAFT provides a continuously variable zoom function. This allows small sections of the drawing to be expanded to fill the entire drawing window. We will now show how these functions are used.

First make sure that the square and circles drawn above are on the screen and that the main menu is being displayed.

Press 'Zoom' to provide access to the zoom functions, select 'In', to indicate that you wish to zoom in on a selected area of the drawing. Now move the cursor over the area you wish to zoom in on and press centre, (one of the intersections of the circles with the sides of the square should prove interesting).

When you move the cursor around, you should see a box being rubber banded. This marks the boundary of the area which will be expanded to fill the drawing window. This box has the same aspect ratio as the drawing window and is sized to pass through the current cursor position.

When you have the desired area enclosed in the rectangle press 'Accept' and the screen will be cleared and the drawing displayed in magnified form.

If you have drawn the square and circles according to the instructions above, you should be able to see that the sides of the square touch the circles at any magnification. This is the result of the high accuracy data storage format used internally by MICRODRAFT. You may now repeat the zoom in operation by again selecting 'In' from the zoom menu. This process may be repeated as often as desired except that MICRODRAFT will not allow you to magnify past the level where one pixel in the horizontal direction represents 1/100th of a millimeter. This should prove more than deep enough for all applications.

The 'Full' zoom function works in much the same way as 'In', except that MICRODRAFT selects the maximum possible zoom magnification, centred on the current cursor position.

'Pan' preserves the magnification level but moves the drawing so that the position underneath the cursor, when 'Pan' was selected, appears in the centre of the drawing window.

The final option, 'Default', on the zoom menu sets display magnification, so that the width of the paper currently selected fills the width of the drawing

window exactly. When you zoom in on an area near an edge of the paper, the paper border also appears correctly on the magnified drawing.

The relative zoom option prompts for a magnification factor and then the size of the drawing is multiplied by this number. Numbers greater than one increase the magnification and the new zoom level will be centred on the cursor position when 'relative' was selected. Unlike 'In' this option is not protected against excessively deep magnification levels. This may be occasionally useful but the user is **warned** that zooming more than 3 or 4 times deeper than the 'full' zoom level may produce errors in the displayed drawing. Similarly you should not use relative zooms less than one to go much further out than the 'default' level. In either case, no damage will be done to the drawing, the only cost is your time whilst the drawing is redisplayed.

AUTOMATIC FILLETING

In order to assist accurate drafting, MICRODRAFT provides this automatic function to fit a curve of specified radius between two previously defined lines, extending or truncating the lines as required to form a smooth fillet.

To use this function you must identify the two lines to be filleted by using the 'Get' option on the lines menu. The two lines to be filleted must be selected one after the other and no other operations should be performed in between selections and making the fillet. Move the cursor close to the ends of the lines which are to be moved when forming the fillet. Press the key marked 'Fillet' on the lines menu.

If the same line has been specified twice, or the two lines are parallel, or no lines have been selected, then MICRODRAFT will print an error message and after waiting for a key to be pressed will return to the lines menu.

If the lines have been selected correctly you will be prompted to enter the desired fillet radius. The two lines will have their lengths adjusted and an arc of the correct radius will be drawn between their ends. Neither the gradients of the lines or the positions of the ends furthest from the cursor will be altered.

There are in fact two arcs which satisfy the conditions outlined, depending on whether the arc is drawn clockwise or anticlockwise from the starting point. Pressing the space bar allows you to toggle between the two solutions, when the correct one is displayed, press 'ESC', the arc will be made permanent and the main menu will reappear.

Use the above procedure to fit 10 mm radius arcs to each corner of the square you have drawn, then save the drawing again.

AUTO DIMENSIONING

As a further aid to draughtsmen, MICRODRAFT provides an assortment of automatic dimensioning functions, which can be used to add indications of size to the edges of the square, and the circles inside it.

First, add a dimension arrow to show the radius of one of the circles drawn inside the square. Use the zoom command to magnify the circle of your choice so that it occupies around three quarters of the height of the screen.

SIMPLE LINE DIMENSIONING

From the main menu select 'Element' and 'Circles', then position the cursor near the centre of the circle and press 'Get' to select that circle. Press 'Exit' to leave the circle menu, then 'Element', 'More', 'Dimens', from the main menu when it reappears.

From the menu which appears next, select 'Line' to indicate that you wish to draw a single line with dimensions. This option inputs two points, draws a line between them with an arrow at each end and then adds a text label indicating the length of the line. In order to display the length of the circle radius, choose the two points to be the centre of the circle and some point on its circumference.

The point definition menu should now have appeared, press 'More' and then 'C cent' to select the circle's centre for the first point. When the prompt for the second point appears, press 'More' followed by 'C circum' and enter an angle of 45 degrees. The dimension line and arrows should now be drawn on the screen starting at the centre of the circle and ending on the circumference, at an angle of 45 degrees above horizontal.

The point definition menu is still on the screen and MICRODRAFT is prompting for the point where you want the size of the line to be written. The point definition routines are used to input this information in the interests of flexibility, but it is anticipated that simple cursor positioning will most often be used. If you have zoomed in sufficiently, the label will be displayed when you have indicated its position. MICRODRAFT automatically suppresses display of text which is too small to be legible on the screen, at the current magnification.

BOX DIMENSIONING

Now zoom back to the default level and then call up the dimensioning menu again. This time select the 'Box' option.

This option is similar to 'Line' dimensioning except that the dimension line may be displaced along a normal to the line being dimensioned. Small 'witness' lines are then added between the tips of the arrows and the points specified for the dimension operation.

Using the 'EOL' function to pick up the ends of the line accurately, enter the first two points as before. MICRODRAFT now prompts for a point to indicate how far the dimension line is to be displaced. Move the cursor about 10 mm to the right of the right hand edge of the square and press 'Cursor'. Note that the dimension box which is drawn passes through the cursor position. Finally, indicate as before, where you would like the dimension label to appear. This time the label will probably not be visible immediately since you are at the default zoom level. Zoom in on the point you have just specified to make sure that the label is there.

Zoom in further and observe that MICRODRAFT is capable of displaying text at a variety of onscreen sizes. In fact text can be drawn at any multiple of a pixel in height and will be spaced horizontally to single pixel accuracy.

ANGLE DIMENSIONING

The final dimensioning option 'Arc' is used to display the angle subtended by an arc on the drawing. To use it, you must first select the arc to be dimensioned by pressing 'Get' on the 'arcs' menu, (displayed by selecting 'Arcs' after 'Element'). Pressing 'Arc' from the dimensioning menu adds another arc to the drawing, according to the following specifications.

- a) The new arc has the same centre as the old arc.
- b) The new arc spans the same angle as the old arc.
- c) The radius of the new arc is selected so that it passes through the cursor position when 'Arc' was pressed.

Arrows are then drawn at each end of the new arc, pointing tangentially to it and you will be prompted, as in the above examples, to indicate where you would like the dimension label, this time a value in degrees, to appear.

As an exercise, use the auto dimensioning routines to display the angle and radius of one of the filleting arcs drawn earlier. Then display the full width of the square, (100mm as opposed to the 80 mm displayed for its right hand side). Arrange for the new dimension box to completely enclose the earlier smaller construction.

ABOUT DIMENSIONING

The above dimensioning was performed in millimetres, because that is the default unit size. If you choose to alter the units setting, then dimensioning will be performed in the new units. Angular dimensioning is always performed in degrees. When using the Macro Load facility described below however, dimension labels are not altered but remain as originally calculated.

As a final remark, notice that the constructions added by the dimensioning functions are simply collections of graphics entities. As such they may be deleted or moved individually as required.

MACRO LOADING

As stated in the introductory section of this manual, one of the most impressive functions of MICRODRAFT is its ability to merge one drawing file with another, rescaling and rotating the second file as required. We will now demonstrate how this is achieved.

First, save the drawing again using the same filename as previously. Zoom in so that the upper right hand circle roughly fills the drawing window.

Now return to the main menu and select files again. Press the key marked macro. This invokes the function which merges drawing data from a disc file with the data currently in memory.

Enter the name of the file you have just saved and type return. As with the Load command, if you mistype the filename then the prompt is repeated until a valid name is entered. Alternatively, if you press enter without giving a filename, the command will be aborted. This is provided to avoid loss of data when load is selected accidentally. Assuming that MICRODRAFT has been able to find your drawing file, the point definition menu will appear and you will be prompted to enter a point. Move the cursor to the centre of the circle (roughly) and press 'Cursor'. The file will then be loaded and the new data added to that already in memory.

At the same time as loading the file, MICRODRAFT performs a scaling and translation operation on the new data. The drawing is shifted so that the centre of the page on which it was drawn overlays the point specified above. In addition it is scaled so that its size ON THE SCREEN is the same as it would be if the original file were viewed as an A3 page at the default zoom level. That is to say, that whatever the current zoom level the merged data will all be visible on the screen after it has been loaded.

After this operation has been completed, MICRODRAFT automatically transfers control to the block manipulation menu. When the drawing file was macro loaded, it was collected as a block, made the current block, and therefore may be processed by these commands. The new menu contains options to allow manipulation of the new block. These include scaling and rotation, (both about the point defined before the data was loaded), mirror imaging, (about a vertical axis passing through the point) and deletion. See the reference section for a full description of the capabilities of the block commands. Note in particular, that the copies of your original drawing could have been produced by the duplicate move and scale commands, without reloading from disc each time.

Pressing 'Exit' allows return to the 'Files' menu. The status of the block is maintained as a block rather than individual entities until an unblock command is issued. Entities within a block are invisible to the normal deletion functions.

Note that text items in the merged data remain horizontal through rotation operations which may affect the appearance of the merged drawing. The 'origin' of a piece of text is the upper left hand corner of its first character. This point is handled correctly by the rotate and mirror options.

Return to the default zoom level and you should now find that you have another copy of your drawing inside the upper right hand circle of the first one. You may care to load another copy inside the top right hand circle of the copy you have just loaded and then zoom in until it fills the screen. You should find that the circles still meet the edges of the square and each other exactly. Move the cursor around at this zoom level and observe the cursor position indicators to get a feel for the accuracy to which the drawing entities are now positioned.

SECTION 3

REFERENCE

SCOPE

This section of the MICRODRAFT User's Manual provides a description of each function provided by MICRODRAFT. You should read this before starting to produce your first large drawing, so that you are at least aware of each of the functions available. Descriptions in this section have been kept deliberately brief, and it is left to your ingenuity to see how the functions may be combined to produce various different effects on your drawings. The functions are all simple in use and largely self explanatory once you have gained basic familiarity with the program. If you find it difficult to follow the descriptions given below, then repeat the tutorial session, and try to link each of the commands used with their descriptions in this chapter.

USER INTERFACE

The user interface is centred on the use of the ten function keys f1..f10 on the IBM keyboard, the names of the commands they invoke being displayed on the right hand side of the screen. In addition, there is a right hand angle bracket displayed opposite one of the menu options, which can be moved by pressing the space bar. Pressing the 'Enter' key activates the command opposite the angle bracket.

The graphics cursor is controlled by use of the cursor keys in the numeric pad, providing that 'Num Lock' is disengaged. If you have a mouse, then either it or the cursor keys may be used. When the mouse is used to move the cursor to the extreme right of the drawing window, the mouse will control the angle bracket mentioned above, instead of the graphics cursor. The graphics cursor is 'picked up' again when the mouse is moved to the left.

When the mouse is controlling the graphics cursor, the three mouse buttons duplicate the functions of f3, f4, and f5, since these are the most commonly used functions on each of the menus. When the mouse is controlling the angle bracket, pressing any of the mouse buttons, activates the command indicated by the angle bracket.

Considerable attention has been paid to achieving consistency in key allocation, when similar functions are performed from different points within the command hierarchy. F1 and F2, for example, always increase and decrease respectively, the increments by which the cursor moves, F10 always exits from a particular command level to the next level up, and so on. Prompts have also been chosen in a consistent manner, so that a new graphical element is added to a drawing by pressing the key labelled 'New', whether the element chosen is a line, circle, arc, etc. The key used for 'NEW' is always F3. This approach shortens learning time, and reduces the time spent searching around menus for some desired function, once the commands available have been learned.

Speed of use to the experienced user has been given priority at all times. Prompts are usually one word, or at most one line of text, and are designed as indicators of how to activate a particular function, rather than as explanations of what will happen when a particular key is pressed. For this reason it is advisable to study this section of the manual well, before attempting to use the program for large and complex drawings.

DRAWING ELEMENTS

The available set of drawing elements includes lines, circles, ellipses, arcs, markers, cross-hatched areas and text strings, text size being variable both on screen and on final print out. In addition, existing drawings may be scaled and read into the current drawing as library items. No distinction is made between normal drawing files and library files.

Any collection of elements may be grouped together to form a **BLOCK**, merged (macro load command) drawings being automatically loaded in this way. The entire block may then be scaled, moved, rotated, duplicated, deleted, split up into its constituents or included in larger blocks.

Auto dimensioning of distances and angles is provided. Note that when a library item is read into the current drawing, any dimension arrows will be scaled down from their normal three millimetres, and that the displayed line lengths will not be altered from the original values.

PAPER

MICRODRAFT may be used to create plots on any size of paper and may use any unit you require to specify line lengths.

It should be **emphasised** that the drawing files created by **MICRODRAFT** do not contain explicit physical size information, and that the plotter driving program supplied will happily produce hard copy at **any scale you require**.

To help you visualise what your finished drawing will look like, **MICRODRAFT** always displays the outline of a sheet of paper on the screen. The dimensions of the sheet are such that it has the same shape as an **ISO A** series sheet, and the coordinate scaling factor is set to 1 which gives dimensions correct as millimetres on A3. Altering the coordinate scale to 2 gives millimetres on A5, or you may regard the standard setting as being millimetres on A1 but with the drawing produced at twice actual size.

The coordinate scaling factor may be altered via the setup menu described later. When a drawing is saved, the scale factor is recorded in the data file, and is automatically used when the drawing is reloaded. The plotter output driver also extracts the scale information, and uses it to allow you to specify the area you wish to be plotted in the units you used to produce the drawing. The plotter driver cannot however tell where the coordinate origin was,

since you may well move this around regularly, and thus assumes it to be in the centre of the page (default condition when MICRODRAFT is loaded).

ACCURACY

With the standard coordinate scale settings, all points and dimensions are held accurate to 0.01 mm and points determined by the point finding functions described later will be to this accuracy also. This level of precision is probably sufficient for most purposes.

For a coordinate scale factor not equal to one, the point resolution is given by:-

0.01 / (coordinate scale) units

This is the closest separation at which two points are considered to be distinct from one another.

SCREEN LAYOUT

When the program loads, the screen is cleared and a large box is drawn. This covers roughly three quarters of the screen area, and is used to display the drawing. The remaining area, on the right hand side of the screen, is used to display the functions currently available on the function keys.

Below the function key menu the cursor position relative to the current origin is printed - initially millimetres relative to the centre of the page. The line above this is used to display a short prompt when a point input is requested. On the bottom line the current percentage memory use is displayed. Note that this is only updated when the outermost menu level is entered, and that you cannot exceed 100%.

ASSIGNED FUNCTION KEYS

Function keys f1, f2, f10

Function keys 1, 2 and 10 are assigned permanent functions which are not altered at any point during the operation of this program. For this reason their descriptions are given here.

f1 is labelled 'Coarse' and is used to increase the increment of cursor movement.

f2 is labelled 'Fine' and decreases the cursor increment. The cursor increment is allowed a wide range of settings which may be selected by pressing the above keys several times. Coarse settings allow rapid movement about the screen, whilst fine settings permit accurate location of the cursor more easily than with a mouse.

f10 is labelled 'Exit' and is used to exit from a particular command level to the next level up. Used at the outer level it permits exit from the program back to operating system command level. As a safety feature program exit is inhibited while a drawing is being displayed. The drawing must be 'Zapped' first using the Zap command on the Files menu before exit is permitted.

SHIFT & f1

This will take you directly to the Setup menu. To return to your current menu press Exit when finished with the Setup menu.

SHIFT & f2

This will take you directly to the Origin menu. To return to your current menu press Exit when finished with the Setup menu.

FILES

When you request a file to be loaded from disc, MICRODRAFT makes a copy of it in memory and editing commands are carried out on the memory copy. It is important to realise that the process of editing, or adding to a drawing on the screen, does not in any way alter the disc file from which the drawing was loaded, and that changes are not made permanent until the drawing is saved. It is therefore possible to load a drawing, alter it and save the result in a different file altogether, preserving the original, or indeed creating several copies of the drawing. Note that when a drawing is saved to a specified file, any previous file of that name is automatically deleted.

SPECIFYING POINTS

Screen resolution is limited, particularly in the vertical direction, so that when viewing an entire A3 drawing on the screen at once, the smallest achievable cursor movement corresponds to a distance greater than two millimetres. Furthermore, a line drawn at one zoom level by cursor positions, need not necessarily end exactly on one of the screen pixels when viewed at a different magnification. This means that lines which appear, when drawn on screen, to meet exactly, need not in fact do so. It is thus clear that the success of a program aimed at technical drawing must rely heavily on the flexibility with which points may be specified independent of screen resolution.

In this program a number of useful techniques have been devised and combined in two menu displays. These menus are called, each time a command is invoked which requires a point to be input, and hence these options are described here. Their use throughout the program is entirely consistent and the menus will always be presented in the same order.

Reference will be made in the following paragraphs to the 'currently selected' circle, line or arc. This refers to the last circle, line or arc indicated by the 'Get' option on the appropriate sub menu. These terms will be explained in detail later, for now it is sufficient to note that a particular line may be selected, and used for future line operations. Due to the nature of the internal database maintained by the program, deletion of any graphic entity or any file operation causes all selected items to be deselected.

The options presented on the first point select menu are described below. Note that whilst this menu is being displayed, the cursor keys still function normally to move the cursor around the screen. The Exit key is disabled, preventing return to the calling menu without specification of a point.

Cursor

Simply specifies the current cursor position.

Cartesian

Allows entry of point coordinates in cartesian (x,y) form. A line of text appears as a prompt beneath the drawing window. The x and y coordinates should now be entered as decimal numbers, separated by either a space, or a carriage return, and terminated by a carriage return. The coordinates are taken in millimetres by default, but may be altered to any desired unit, and are relative to the currently defined coordinate origin. See the 'Origin' option from the main menu for details of how to alter the origin position. Coordinate scaling is altered via the 'Coord' option on the 'Setup' menu.

Polar

Similarly, this option provides coordinate entry in polar coordinates relative to the current origin. The distance should be specified first followed by the angle (in degrees). The two numbers should again be separated by spaces.

Zero degrees is taken as being horizontal to the right, and positive angles proceed anti clockwise from this point.

Point

MICRODRAFT provides a facility to store a point's coordinates in any one of ten coordinate stores. This option allows one of the stored points to be recalled and used. The user is prompted for the number (1 to 10) of the point he wishes to use.

Intersect

Finds the intersection of the last two lines selected. No action is taken if the two lines are parallel, or if there are not two currently selected lines.

EOL

Searches the current drawing database and returns the coordinates of the line end closest to the cursor.

More

Transfers control to the menu dealing with point definition of circles and arcs. The circles menu presents the following options:-

C cent

Specifies the centre of the currently selected circle.

C circ

Used to select a point on the circumference of a circle. The user is prompted to enter an angle in degrees, (0 degrees being horizontal to the right), and the point selected is the point on the circumference of the circle,

at that angle measured from the centre of the circle. C cent and C circ function equally on circles and ellipses.

A cent

Selects the point which bisects the curve of the currently selected arc.

A circ

Like C circ, allows selection of a point on the circumference of an arc. The point defined in this way need not be on the drawn portion of the arc, but can be anywhere on the circle of which the arc is part.

Offset

This is the most complex of the point defining functions. It does not in itself define a point, but calls the point definition routines again, to allow specification of two points. From the second invocation of the point definition menus, you can again select Offset, causing the point definition menus to be called a third time and so on. Once you have selected offset a sufficient number of times, you then define a series of points in the normal way. When the last point has been defined, vectors from the current coordinate origin to each of the selected points are added to produce a vector to another point. The point indicated by this calculated vector is returned to the original calling function. Most commonly only Cartesian and Polar coordinates will be used as offsets from some base point. See the example in the tutorial section for an indication of the power of this option.

Ratio

This option allows you to find a point at some specified fraction of the distance between two other points. In a similar manner to 'Offset' above, ratio uses the point definition routines themselves to specify two points. The user is then prompted to enter a division ratio. A value of 0.0 results in the first

point being returned, whilst 1.0 returns the second point and 0.5 finds a point mid way between them. Note that values greater than 1.0 or less than 0.0 are perfectly acceptable and that when defining the two points to be 'ratioed' you may use the ratio option again.

Exit

From the 'Circles' point definition menu, this key causes a return to the initial point selection menu. If one of the options on this menu is correctly selected then the program will return directly to the command which invoked the point definition function. Successive selection of 'More' and 'Exit' allows you to alternate between the two point definition menus.

MENU DESCRIPTIONS

The following pages describe the functions offered on each of the menus. Descriptions are in general, brief but should be found adequate for reference purposes. Where pressing a key leads to a sub menu, the description of that key's function includes a list of the command names available on the sub menu. Whilst this is not of much help on first reading, it will be found to offer a quick way of finding the route to a particular function once the functions themselves are known.

The structure of the menus is unfortunately too large to be able to produce an overall diagram, but the manner in which options are positioned within the decision tree should enable them to be located easily with a little practice. Further description is included below for all those cases where some confusion may arise. Such cases are few, and arise purely from providing flexibility in operation of the various command functions. Occasional complexity is the inevitable price of functionality.

MAIN MENU

On program startup, the main menu is displayed. The options available from this point are described first. The Exit key from this menu forces the program to exit back to the operating system. As explained earlier, this command is disabled whenever there is a drawing in memory.

Element

Provides access to the drawing element sub menu from which drawing entities are added, deleted, or altered. Sub options are Lines, Circles, Arcs, Markers, Text, Point and Dimension.

Files

Used to provide access to file handling functions. The sub options are Load, Save, Macro, Zap, Sel Lib, Read Shape, Shapes.

Redraw

Causes the drawing window to be cleared and the drawing to be redisplayed. This option should be only occasionally required, since the use of invert mode drawing routines means that deleting a line does not leave a gap in any elements crossed by it.

Origin

Allows the user to alter, or save, the current coordinate origin. The coordinate origin is an absolute location on a page, and is not affected by zoom levels. The 'esc' key may be used to quickly position the cursor at the origin, or as close to it as possible, if it is not in the portion of the drawing on the screen at the time. Note that as a result of zooming, the origin may not coin-

side exactly with a screen pixel and that the cursor position display may not be exactly 0,0 after pressing esc.

If you select the save option from the resulting sub menu, you will be prompted to enter the number of a coordinate store in which to save the current cursor position. This can be useful if you wish to be able to restore the origin to a particular point later.

If you select the define option, the point definition routines will be used to indicate the position of the new origin. Selection of the 'Init' option will restore the origin to its initial state. (The centre of the startup screen)

Zoom

Displays the zoom control menu. The commands offered here allow control of the magnification to which a drawing is displayed, and which portion of the drawing is on the screen. Sub options are In, Default, Pan, Full, Relative and Blocks.

Setup

Displays the setup menu, from which you can select text height, line style and so on. Sub options are Marker, Text, A3, A4, Layers, Coord, and More, for Snap, Aspect, Chdir.

Blocks

Transfers control to the block manipulation functions.

The following paragraphs describe each of the sub menus available from the main menu. All are described before further nested menus are defined.

MAIN MENU \ Elements

This sub menu provides access to further sub menus, allowing adding, deleting, and editing of graphics elements. Pressing the Exit key at this stage returns to the main menu. Options provided are :-

Lines

Used when an operation is to be performed on a line. Sub options are New, Get, Delete, Perp, Tangent, Box and Fillet.

Circles

Accesses circle handling functions. Sub options are New, Get, Delete, Move.

Arcs

Access to arc handling functions. Sub options are New, Get, Delete.

Markers

Access marker handling functions. Sub options are New, Get, Delete.

Text

Allows entry and editing of alpha numeric labels. Sub options are New , Get, Delete, Move.

Point

This option is used to define the contents of one of the 10 coordinate memories. The user is first prompted to input the number of the coordinate

store which is to be defined, (1 to 10), and then the point selection menus are presented to allow input of the desired point.

More

Takes the user to a secondary element selection menu, the options on this being as follows:-

Dimens

Takes the user to the auto dimensing menu. Sub options are Line, Box, Arc, Horizontal, Vertical and Measure.

Hatch

Provides access to cross hatching functions. Sub options are New, Get, Delete, Border, Borders, Hatch, Hatches.

MAIN MENU \ Files

This menu allows the user to load and save drawing files. Also provided is a powerful facility to load and scale drawings, adding them to data already in memory.

Load

The user is prompted for a filename to load. If the filename specified cannot be found, then the prompt is repeated, until a valid entry is received. Filenames follow normal operating system conventions with the extension '.DRW' being supplied automatically if none is given. The named file is loaded, after deleting any graphics data currently in memory. The drawing

is then displayed on the screen. Since this command destroys data currently in memory, a safety net is provided in case it is invoked accidentally. If you press 'enter' without giving a filename, then the load command will be aborted without taking any action. The load 'filename' can be prefixed with a drive specifier ie:- B:TEST.DRW.

Save

The user is again prompted for a filename, and if no extension is specified, '.DRW' is supplied. MICRODRAFT then searches for a file with the same name, but extension '.BAK' and if found, deletes it. If a file already exists with the name you have given, it is renamed to have the extension '.BAK' and then the new file is written. In this way, MICRODRAFT automatically maintains a backup ('.BAK') copy of your drawing which contains the most recent but one version of the drawing. In addition to drawing data, the coordinate scale factor is written to the file and will be restored by the 'Load' command when the drawing is retrieved.

Macro

This command provides an extremely useful method of merging library drawings with the current drawing. After prompting for a filename, the point definition routines are used to define the centre of the merged data. The new data is loaded and automatically scaled and re-originated. The size is altered so that no matter what the current magnification, the loaded drawing appears on the screen at the same size as it would if 'Load'ed at the default zoom setting. This means that zooming in and macro loading has the effect of shrinking a drawing. Any file created by the save option may be loaded in this way, thus enabling entire drawings to be merged as small inserts on the current drawing. Macro loading at the default zoom level with the cursor in the centre of the drawing window has the same effect as 'Load' only slower and without deleting existing data first. This command is much easier to use than it is to describe. After the new data has been read and displayed, it is collected together as a block, and execution transfers to

the block manipulation menu. This allows rescaling, rotation and translation of the merged data. Unlike 'Load', this command ignores the coordinate scale information in the drawing being read.

Zap

Deletes all graphic data from memory. The data is not automatically saved to disc and the command is irreversible. This command must be executed before the program may be exited. The screen is then cleared ready for another drawing to be started.

Sel Lib

The user is prompted to enter the name of a library file, the extension '.LIB' being supplied by default. This specifies the library file to be used by future 'Read Shape' and 'Shapes' commands.

Read Shape

After prompting for the name of a shape, the point definition routines are used to specify the position where the shape has to be placed. The shape is then extracted from the current library, and merged as a block in the current drawing. Program execution continues with the block menu, as in the 'Macro' command. The scale factor applied to a newly loaded shape, is different to that used in the 'Macro' command. With the Read Shape command, if the shape was originally drawn *n* units in size, whatever coordinate scale factor was in use, then it will be merged and scaled to appear on the screen *n* units in size whatever the current coordinate scaling factor. This technique is particularly useful in architectural applications, since it means that a five foot window, once drawn and included in a library, will always be five feet across when retrieved, regardless of the scale being used for the current drawing, so long as both the original and the current drawing were intended to be viewed in feet.

Shapes

Lists the names of the shapes in the current library. The menu area on the right hand side of the screen is used for this purpose. Ten names are displayed at a time, and a keypress is requested, before going onto the next ten. After the last shape name has been displayed, the files menu is rewritten before continuing.

when

MAIN MENU \ Origin

This option allows the current coordinate origin to be saved or to be redefined.

Save

The user is prompted to enter the number of the coordinate store in which the current coordinate origin is to be saved.

Define

Control is transferred to the point definition menus, and the coordinate origin is set equal to the selected point on the drawing.

Init

Repositions the origin to its initial position (when MICRODRAFT was loaded) in the centre of the drawing.

MAIN MENU \ Zoom

This menu allows control of the position and magnification of the drawing relative to the drawing window.

In

Used to zoom in on part of the displayed drawing. The menu is rewritten with options 'Centre' and 'Accept'. The cursor should be positioned in the middle of the area to be magnified and 'Centre' pressed.

A square now appears around the position selected. The up and down arrows increase and decrease the size of the square, and the Coarse and Fine keys alter the sensitivity of the adjustment. Pressing Accept clears the screen, and redraws the selected area to fill the drawing window.

Default

Clears the screen and redraws the drawing, such that the paper outline fills the drawing window. This affords an overview of the entire drawing. This is also the zoom level at which MICRODRAFT starts when loaded.

Pan

Preserves current magnification, but moves the drawing, so that the point under the cursor is shifted to the centre of the screen.

Full

Selects maximum possible magnification with the current cursor position as the centre of the drawing window.

Relative

The user is prompted to enter a relative magnification factor, and the drawing is redrawn at the current magnification multiplied by the number entered. Values greater than one have the effect of zooming in, whilst values in the range 0.0 to 1.0 zoom out. The drawing is also panned so that the point under the cursor when relative was selected appears in the centre of the screen after redrawing. Relative with a value of 1.0 is equivalent to Pan above.

It is possible with this command to zoom further in than the 'Full' level or further out than the 'Default' level. This may occasionally prove useful but is not recommended since it can lead to errors in the displayed drawing. In such cases the drawing data is not damaged.

MAIN MENU \ Setup

This menu allows selection of MICRODRAFT parameters such as line style and coordinate scale.

Marker

You will be prompted to enter the number of the marker style to be used for future marker additions.

Text

The user is prompted to enter the size for all future text, including text added by the auto dimensioning functions. The text size you specify will be in whatever coordinate units are currently selected.

A3

Sets coordinate scale correct for millimetres on an A3 page. This is the default setting.

A4

As per 'A3' but for an A4 page.

Layers

MICRODRAFT allows drawing on 256 different layers (numbered 0- 255) which are analogous to transparent overlays on a conventional drawing. Different layers are distinguishable on screen by use of different line styles, these repeating modulo 8.

This command gives access to two sub options, which allow specification of which layer is to be used for future drawing entities, (the insertion layer), and also allows individual layers to be turned off or on. Note that when output to a plotter, each layer may be assigned a pen number, and line style number, independent of its appearance on the screen, but that printer drivers will follow the same pattern as the screen display.

Coord

This allows the user to specify a scaling factor, to be applied to all displayed and specified coordinates. A value of 1 gives coordinates in millimetres on an A3 page, 10 in centimetres, 25.4 in inches. Auto dimensioning correctly takes into account the current coordinate scale. Note that a value of 12.7 may be thought of as producing a drawing in inches, but at half size, or in inches, but on an A1 page. Coordinate scales are saved with a drawing, and automatically restored when the drawing is loaded.

More

This will pass you to the options Snap, Aspect, Chdir

MAIN MENU \ Setup \ More**Snap**

This command allows the snap grid feature of MICRODRAFT to be enabled or disabled, and the resolution of the grid to be specified. The snap grid is a square array of points, aligned with the coordinate origin and of spacing specified by this command. When the snap grid is enabled, any point calculated by the point definition menus is moved onto the nearest snap grid point before being returned to the function requesting input of a point. This is useful for making sure that lines on a drawing meet accurately even when placed by simple cursor positioning.

Aspect

This option allows you to change the aspect ratio of the drawing as displayed on the screen only. It has no effect on the hard copy output. Used to allow the display of circles to appear round on screen.

Chdir (16 BIT only)

This will let you select a new default directory for loading and saving drawing files. The chosen directory will be displayed along with the normal file name at the top of the screen. Note this will only let you select a directory that already exists.

This concludes the description of commands available immediately below the main menu. The remainder of this chapter describes the functions available further down below the Main Menu \ Element sub menu together with the macro manipulation sub menu

MAIN MENU \ Elements \ Hatch

This option provides access to cross hatching routines. MICRODRAFT allows you to specify polygons of up to 20 vertices for cross hatching. The hatching may be drawn at any angle between -75 and 75 degrees, and at any spacing. The spacing takes account of the current coordinate scale factor.

New

Enters a new hatched polygon. The point definition routines are used to define the first two points on the polygon, and thereafter new points are added by pressing the key labelled 'Point'. The finish key adds the last point, and after prompting for hatch spacing and angle, the cross hatch is drawn. Note that the polygon outlined displayed whilst defining the hatch area is not included on hard copy output.

Get

Selects the hatch area whose centre of gravity is closest to the cursor, and flashes its outline.

Delete

Deletes the last selected hatch area.

MAIN MENU \ Element \ Lines

All the functions for drawing lines are located here.

New

The point definition menus are used to define the two ends of a new line. After definition of the first point, the line is 'rubber banded' to the cursor which may be moved around, giving a preview of the line. When the second point is defined the line is drawn in correctly in the current line style. Note that there is no requirement for either end of the line to be on the screen when not using simple cursor position point definitions.

Get

Selects the line, whose mid point is closest to the cursor, for future line operations. In common with all the other 'Get' functions in MICRODRAFT, this command ignores any lines which are currently part of a block. To 'Get' lines inside a block, you must first use the 'Unblock' command to decompose the block.

Delete

Deletes the currently selected line from the drawing. All currently selected graphic elements are automatically deselected.

Perp

Uses the point definition menus, to input a point, and constructs a perpendicular from that point to the currently selected line.

Tangent

Uses the point definition menus, to input a point, and then constructs a tangent from the point, to the currently selected circle. Two such tangents clearly exist, and pressing the space bar will display first one and then the other. When the correct tangent is displayed, press the 'ESC' key to accept it, and carry on with the next command. Note that tangents to ellipses cannot be found correctly.

Box

The point definition routines are used to define one corner of a rectangle, then a rectangle is rubber banded from that point to the cursor position in the current line style. Pressing Accept completes drawing of the box. Alternatively 'Pointdef' will allow the full point definition routines to be used to define the second corner.

Once the point has been defined, the box is drawn correctly. Pressing accept at this point enters the box as displayed, whilst moving the cursor continued the rubber banding as before. The point definition routines may then be used again, to reposition the last corner if desired.

Fillet

Auto filleting function. To use this, two different lines must have been selected, using Get, one after the other. After prompting for the radius of the fillet to be formed, the ends of the lines closest to the cursor when Fillet was pressed are moved to form a perfect fillet with the arc. There are two arcs which can form a fillet in this way, pressing the space bar alternates between them, and pressing 'ESC' accepts the one currently on the display.

MAIN MENU \ Elements \ Circles

All operations concerning circles are carried out via this menu.

New

Used to add a new circle or ellipse. Three circle definitions, and one ellipse definition procedure is provided.

The sub options are :-

Centre and Radius.

The user first specifies the centre for the new circle, via the point definition routines, and a circle is 'rubber banded' to the current cursor position. 'Accept' terminates the input, whilst 'Pointdef' transfers control to the point definition menus, for accurate selection of the circle radius.

Two Point

Draws a circle by specifying the two ends of a diameter. The point definition functions are used to obtain the first point and the circle is rubber banded to the second point.

Three point

Draws a circle by specification of three points on its circumference. After the first two points have been entered, the circle is rubber banded to the cursor position. As in both the above cases, the point definition functions may be used to accurately fix the final point.

Ellipse

Broadly similar to the centre and radius circle described above, except that an ellipse is drawn with its semi axes parallel to the cartesian axes. The lengths of the semi radii are set equal to the x and y displacements of the cursor from the centre point.

Get

Selects the circle or ellipse whose centre is closest to the current cursor position.

Delete

Removes the currently selected circle or ellipse.

Move

Moves the currently selected circle or ellipse to centre on the current cursor position.

MAIN MENU \ Element \ Arcs

This menu provides access to all the functions concerning arcs. Arcs are defined as portions of circles and are characterised by a centre of curvature, a radius, a start angle and an angular range.

New

Adds a new arc to the drawing. Two methods of defining an arc are provided as described below.

Cent 2 Pt

The point definition menus are used to select first the centre, and then the start position of the arc. As the cursor is moved around, an arc will be rubber banded from the start point, anti clockwise to the point where the arc intercepts the line, from the centre of the arc, to the cursor position. Selecting 'Pointdef', allows the point definition menus to be used to accurately position the end of the arc, whilst 'draw' finishes the arc drawing process and enters it in the data base.

3 Point

Enters a new arc after specifying the end points. The point definition menus are used to enter the end points of the arc. Then an arc is rubber banded from the first point, through the cursor, to the second point. Pressing 'Draw' accepts the arc, whilst as before, Pointdef allows the full set of point definition functions to be used to locate the third point.

Get

Selects the arc whose centre is closest to the current cursor position for future arc operations.

Delete

Deletes the currently selected arc.

MAIN MENU \ Elements \ Markers

Markers are small symbols used to indicate the positions of important items on the drawing.

They have the interesting property of appearing on the screen at the same size independent of the zoom setting.

They can therefore be used to easily locate text which is not visible on the screen at the default zoom level and could thus be awkward to find. Markers must be removed from the drawing before attempting to obtain hard copy output.

New

Adds a new marker at the indicated position

Get

Selects the marker closest to the cursor for future marker operations.

Delete

Deletes the currently selected marker.

MAIN MENU \ Elements \ Dimens

This menu allows auto dimensioning of lines and arcs. Five distinct types of auto dimensioning are supported.

Line

The point definition routines are used to enter two points. A line is drawn between the two points with a three millimetre arrow at each end, pointing outward. A third point is then input to locate the position of the dimension label. The length of the line is added to the drawing, (in the currently active coordinate scale), at the specified point. All the lines drawn, and the text may be altered and removed, in the same way as any other lines or text on the drawing.

Box

Similar to the above except that three points are input before the dimension arrow is drawn. The arrow is drawn through the third point, parallel and of equal length to the line joining the first two points. 'Witness lines' are added from the ends of the dimension arrow and ending two millimetres from the first two defined points. The user is again prompted to locate the dimension label. This is the form of dimensioning normally used to indicate the length of lines.

Arc

This is used to display dimensions of arc angles. An arc is added, with centre equal to the centre of the currently selected arc, but radius selected to pass through the cursor position, when the Arc option is selected. Arrows are added at each end of the arc. The user is prompted to indicate the position of the label, in degrees, defining the size of the arc angle.

Horiz

Similar to 'Box', but the dimension line is placed horizontally with vertical witness lines. The dimension label reflects the horizontal displacement between the first two specified points.

Vertical

Complementary to 'Horiz' above.

Measure

Uses the point definition functions, to input two points. The bottom line of the display, is then used to display the vertical, and horizontal, displacement from point 1 to point 2, followed by the straight line distance, and angle of elevation from point 1 to point 2.

BLOCK MANIPULATIONS

After a file has been macro loaded, or after selecting blocks from the Zoom menu, the following options are presented, to allow manipulation of blocks of data. The options are :-

New

Used to select a group of elements on the screen , and form them into a block. Position the cursor at one corner of a rectangle, enclosing only those entities which you wish to include in your block, then press 'P1'. Move the cursor around and observe the rectangle being rubber banded. When the rectangle encloses the desired entities, press 'P2'. You will now be prompted to indicate the reference point by which the block will be known.

All other block functions, (rotate, scale etc), are carried out with respect to this point. After you have specified the point, MICRODRAFT will collect all the items **TOTALLY** enclosed in the rectangle, and then delete and redraw them.

In the case of already declared blocks, only the reference point must be inside the rectangle, for the whole block to be included. If the reference point is outside the new rectangle, then none of the entities inside the block will be included in the new block when it is formed.

The new block automatically becomes the current block.

The 'Macro' command on the files menu automatically creates a block from the data loaded. This block then becomes the current block.

Note that as a result of the New command, any currently selected circles, lines etc. are deselected.

Get

Finds the block whose reference point is closest to the cursor. This block is then flashed, and is used for the other block manipulation commands.

Blocks, which have been included inside other blocks, may not be found in this way. If the outer block is 'Unblocked', then all inner blocks become available again.

Rotate

The user is prompted to enter an angle, in degrees, through which the block is rotated about its reference point. The reference point does not move.

Flip

Causes the block to be reflected about the vertical axis passing through its reference point.

Scale

The user is prompted to enter a scaling factor, and the block size is multiplied by this amount. This command does not alter text added for auto dimensioning. The block reference point does not move under this transformation.

Move

The point definition menus are used to input a point. The block is then removed from the screen and redrawn shifted such that its reference point coincides with the specified point.

More

Produces a second menu allowing further manipulations.

Get As before, included for convenience.

Duplicate

Makes a copy of the current block, and shifts it so that its reference point coincides with the cursor position.

Delete

Deletes the current block, together with all other blocks and entities contained in it.

Unblock

Removes block status and restores all elements inside the block. Any blocks included in the 'Unblock'ed block become available again. Blocks may be nested in this manner to any required level but may be recovered at any later date.

Note that both Delete and Unblock cause all currently selected items to be deselected.

Write (16 Bit only)

This command will save the currently selected Block to disc. You will be prompted for the file name that you wish to use. Please note that the Origin of the block will be the INITIAL ORIGIN. This means that if the block was in the lower right hand corner of the drawing when saved, then the origin when you reload the block will cause the block to still be in the lower right hand corner of the drawing. To change this origin either move the block to 0,0 before saving, or after reloading simply unblock, and then reblock with a new origin.

Exit

Exit from this menu returns to the first menu.

SECTION 4

MICRODRAFT

Shape Library Extension

The MICRODRAFT Computer Aided Drafting package includes the powerful facility to merge any drawing already stored on disc into the current drawing. This means that you may create symbols which you use frequently as drawings on your work disc, thus saving time when they are needed next.

In many applications however, the number of standard symbols used quickly leads to an unacceptably high number of small drawing files on your disc. These files may occupy large amounts of disc space and clutter the disc directory making it difficult to tell at a glance what files are actually present.

In order to overcome these difficulties, the shape library extension to MICRODRAFT has been developed. This consists of the file, **MLIB.EXE** the library manager. Shape libraries are special files created by **MLIB.EXE** which can contain up to 256 drawing files. This form of storage is more compact and neater on disc than individual files, and allows related drawings to be collected together into logical groups.

In order to use the library manager, simply place the disc containing **MLIB** in your disc drive and type

MLIB

In response to the usual DOS prompt. The library manager will then load and display the menu of commands. The six functions, which are selected by pressing the appropriate numeric key are described as follows.

Select library

The user is prompted to enter the name of a library file which is to be used by future commands 3 to 6. The filename follows usual DOS conventions and if no extension is given then '.LIB' is supplied automatically. If you wish to select a library file which has no extension, then simply type in the name followed by a '.'. For reasons of clarity and to avoid later confusion, it is advised that you use the default file extension for all your libraries.

Create new library file.

This option prompts for a filename and creates an empty library file of that name. Again the extension '.LIB' will be supplied unless you specify another. Library files must be created in this manner before any of the options 3 to 6 may be used. The newly created library automatically becomes the currently selected library.

Display library contents.

This command opens the library specified by command 1) and displays the names and sizes (in bytes) of all the shapes contained in it. The size displayed is the number of bytes that shape will occupy when merged into a drawing file by MICRODRAFT. After every 24 lines of display, the prompt '-- MORE--' appears and you must press a key to continue with the listing. At the bottom of the list, MLIB displays the total amount of library space used and still remaining. Note that library space is allocated 256 bytes at a time and as a result, the total space used will generally be larger than the sum of the individual shapes within the library.

Delete shape from library

This command prompts for the name of a shape to delete from the current library and then removes it. The name will be removed from the contents display (3 above) and space occupied by the shape will be reclaimed. Note

that the space occupied by the library file on disc will not get smaller, but that it will not grow again until shapes have been added totalling a larger amount of space than that released by delete commands.

Add a drawing file to the library

The user is prompted to give the name of a drawing file on disc together with the name by which the drawing is to be known inside the library. In the case of the drawing file name, the extension '.DRW' is supplied automatically unless overridden. The specified file is then read and a copy of its contents are added to the library. Again it is recommended that you use these defaults. The 'Load', 'Save' and 'Macro' commands also provide the extension '.DRW' to help in this respect.

Write shape to drawing file

Complementary to (5), this function extracts one of the library shapes and creates a normal drawing file from it. As in the above case, a file extension of '.DRW' is supplied by default.

Options 4 to 6 mean that any predefined library shape may be written to a standard MICRODRAFT drawing file, edited by MICRODRAFT and then read back into the library either as well as, or instead of the original shape.

SECTION 5

OBTAINING HARD COPY OUTPUT

PLOTTING MICRODRAFT FILES

Plotter output

The plotter driver program supplied with MICRODRAFT is named **MPLLOT.EXE** (MSDOS versions), or **MPLLOT.COM** (8-bit CP/M versions), and is provided to enable output of drawings to high quality plotter devices. MPLLOT is compatible with plotters supporting the Hewlett-Packard Graphics Language (HPGL), including those made by Hewlett Packard, Gould, Roland DG, Hitachi and others.

These plotters typically use serial interfaces, although some are fitted with centronics parallel interfaces as well. When using the more common serial option, it is recommended that a data transmission rate of 9600 baud or higher be used. See your computer manual for instructions on how to configure your serial interface to work with the plotter. No configuration is required with parallel interfaces.

To run the plotter driver, simply type,

MPLLOT

at your computer's operating system prompt. After the program has loaded, you will see the MPLLOT main menu appear on your screen. Options on this menu are selected by pressing the appropriate key, then responding to the prompts which appear.

The command options available are described as follows.-

Data file.

This option is used to specify the name of the drawing file you wish to output. The filename format is the same as for MICRODRAFT file handling commands and again the extension '.DRW' is supplied by default.

Font file.

Specifies the name of the font file, containing character shape definitions, for this drawing. The MPLOT font file is named TEXT.FON. MPLOT automatically supplies the '.FON' extension.

Output file/device.

This is used to control the destination to which plotter output is sent. The default value is 'AUX:', which causes output to be directed to the operating system auxiliary output device, (usually the serial port). This value may be changed to 'LST:', which causes output to be sent to your computer's 'print device', (parallel port), or a disc file name may be specified. In the case of a disc file name, plotter control codes are sent to the named disc file instead of to the plotter. A default extension of '.PTR' is supplied.

Initialisation.

This option allows the user to specify a string of characters to be sent to the plotter before drawing output commences. Typical uses for this parameter are to set plotter drawing window sizes, take a new page on plotters with automatic page feed, or to rotate the plotter's x-y axes through 90 degrees, so producing output in portrait, rather than landscape mode. It should be emphasised that MPLOT does not perform any other plotter initialisation before commencing output, thus you may perform custom initialisation with your own program before running MPLOT.

P1/P2 coordinates.

When M PLOT is running, all output data is transformed to coordinates relative to the P1 and P2 plotter reference points. See your plotter manual for a description of these points. On power up, your plotter will typically position P1 at the bottom left and P2 at the top right corners of the paper. This command allows you to specify the coordinates from your drawing which have to be positioned at P1 and P2 on the output. Using this function will let you select any portion of your drawing and have it output to occupy any portion of the paper and at any aspect ratio. If you require precisely scaled output, then you will have to look up in your plotter manual the exact size of the rectangle, defined by the default positions of P1 and P2, and give appropriate values for the corresponding drawing coordinates. You will probably also have to look at your drawing using MICRODRAFT to determine the range of drawing coordinates which you wish to output.

Layers.

Each of the layers from your drawing may be assigned a different pen number, and linestyle, using this option. After selecting this option you will be prompted to enter a layer number. The current settings for this layer are then displayed, and if required, modified. A pen number of 0 will prevent this layer from being plotted. A line style of 0 gives solid lines, any other value being as selected by the 'LT' command for your plotter. See your plotter manual for further information. If the line type is non-zero, then the pattern size parameter specifies the size of the pattern produced, as a percentage of the diagonal distance from P1 to P2.

Pen speed.

The value entered here is used as a parameter to the 'SP' command before plotting commences. This controls the speed at which the pen will be moved whilst plotting is in progress.

Load Set up - Write set up.

Once all the parameters have been programmed, they may be written to a special plotter set up file on one of your discs. These two options allow such files to be created and recalled at a later date, avoiding the need for all the above information to be entered each time you wish to recreate a plot. After selecting one of these commands, you will be prompted to enter the name of the file to read or write. The file name again follows the same syntax as used elsewhere in MICRODRAFT, with the default extension **'PLT'** being supplied.

Start output.

This option commands M PLOT to start outputting to the plotter (or .PTR file) according to the currently programmed parameters. Output may be terminated at any time by pressing any key. After output has finished, the main menu is displayed again. As a fast alternative, when a set up file for your plot already exists, entering a command line of the form:-

M PLOT FNAM will cause M PLOT when loaded, to search the disc for a setup file named FNAM.PLT, and if found, load it. After loading in this way, M PLOT will immediately attempt to start plotter output, as specified by the .PLT file. After output has been completed, M PLOT will exit to the operating system if invoked by this form of command line. This feature, combined with 4), above means that if your plotter is fitted with automatic paper feed, then you can create a batch file (.BAT for MSDOS or .SUB for CP/M) containing a number of such commands, and then output a number of drawings one after the other, without operator intervention. Since plotters can take some time to produce output, this can be very useful.

Q) Quit.

Forces exit from M PLOT and returns to the operating system command prompt.

PRINTING MICRODRAFT FILES

PRINTER OUTPUT

MICRODRAFT is supplied with an output driver for use with EPSON compatible printers. This program is named **MPRINT.EXE**, or **MPRINT.COM**, and functions in a manner largely similar to the description of **MPLLOT** above. The main differences are that options 3, 4, 6 and 7 above are not applicable to printers and are thus omitted. For printer set up files, a default extension of **' .PRN'** is supplied.

To run the printer driver, simply type, **MPRINT**

MPRINT at your computer's operating system prompt. After the program has loaded, you will see the **MPRINT** main menu appear on your screen. Options on this menu are selected by pressing the appropriate key, then responding to the prompts which appear.

The command options are described as follows.

Data file.

This option is used to specify the name of the drawing file you wish to output. The filename format is the same as for **MICRODRAFT** file handling commands and again the extension **' .DRW'** is supplied by default.

Font file.

Specifies the name of the font file, containing character shape definitions, for this drawing. The standard MPRINT font file is named **TEXT.FON**. MPRINT automatically supplies the **'FON'** extension.

P1/P2 coordinates.

When MPRINT is running, all output data is transformed to coordinates relative to the P1 and P2 printer reference points. On power up, your printer will typically position P1 at the bottom left and P2 at the top right corners of the paper. This command allows you to specify the coordinates from your drawing which have to be positioned at P1 and P2 on the output. Using this function will let you select any portion of your drawing and have it output to occupy any portion of the paper and at any aspect ratio. If you require precisely scaled output, then you will have to work out the exact size of the rectangle, defined by the default positions of P1 and P2, and give appropriate values for the corresponding drawing coordinates. You will probably also have to look at your drawing using MICRODRAFT to determine the range of drawing coordinates which you wish to output.

Density.

One additional command is provided to enable the density of printed output to be selected. Two densities are supported. Single density gives 784 x 480 dots on an A4 sheet, whilst double density gives 1568 x 960 dots on the same size page.

As would be expected, the double density mode takes rather longer to process, since it involves more than 1.5 million dots, but gives a better quality of output. In either case it is generally not possible for a dot matrix printer to rival the performance of a plotter. Even laser printers do not currently offer anywhere near the 0.001 inch addressable resolution of most plotters.

Load Set up. - Write set up.

Once all the above parameters have been programmed, they may be written to a special printer set up file on one of your discs. These two options allow such files to be created and recalled at a later date, avoiding the need for all the above information to be entered each time you wish to recreate a print. After selecting one of these commands, you will be prompted to enter the name of the file to read or write. The file name again follows the same syntax as used elsewhere in MICRODRAFT, with the default extension '.PRN' being supplied.

Start output.

When you select this option MICRODRAFT will change its screen and display a message to tell you that it is printing. It may take some time before your printer appears to do anything. This is because MICRODRAFT works out the exact location of all the points on your drawing before sending any data to the printer.

Quit

This will return you to your operating system prompt.

NOTE:

With both of the output programs you **MUST** specify a **VALID** Font file even if you have no text in your drawing.

SECTION 6

MICRODRAFT DATA FILE FORMATS

Data File Formats

SCOPE

This section describes the format of drawing and library files used within the MICRODRAFT computer aided drafting program.

GENERAL

Values are stored in the data files as integers, there are no floating point values. Single byte fields are coded as unsigned integers in the range 0..255. Two byte fields are two's complement, signed integers in the range -32767 32768. The drawing file header contains two four byte fields, coded as four byte unsigned integers. All multibyte fields are stored least significant byte first.

Drawing coordinates are stored x coordinate first, the value stored represents a fixed point on the drawing relative to the page outline displayed at the default zoom level. The coordinates stored in the file do not in any way depend on the coordinate scaling factor, which is used only to determine the values for the cursor position display.

With a coordinate scale of 1 and the coordinate origin at its normal position in the centre of the drawing, the value recorded for a given point will be 100 times the value displayed on the screen with the cursor over that point. Thus the resolution of point specification on an A3 page is 0.01 millimetre. Angular parameters are stored as an integer number of tenth degrees.

DRAWING FILES

A MICRODRAFT drawing file consists of a drawing header, followed by a series of drawing entities. All records in the file are byte aligned and any extra data after the last entity to the physical end of file (CP/M files are always an integer number of 128 byte, logical sectors) are unused and may be set to any value.

NEWELEMENT

The first four bytes in a drawing file are a four byte integer value known as 'newelement'. The value of this field is 1 more than the total number of bytes in the drawing entities section of the file. If the drawing entities are loaded into a byte array with the first byte at array element 1, then array element newelement is the first unused byte in the array. Note that in the CP/M Plus version, this value is restricted to be less than 20,000.

SCALEFAC

This four byte integer field is used to record the value of the coordinate scaling factor when the drawing was saved. The value stored here is the coordinate scaling factor multiplied by 65536 and then rounded to an integer.

This is the end of the drawing header, the remainder of the file being filled with drawing entities. Each entity consists of an identifier byte which indicates which type of graphic entity is being described, followed by the appropriate number of parameter bytes. The identifier byte for the next entity follows immediately after the last parameter byte of the current entity.

The allowed values of the identifier byte are listed below. All other values are illegal and must not be used. MICRODRAFT, the printer and plotter drivers will all report error conditions and exit if any other identifier code is found.

The identifier byte is followed in each case by a single byte indicating the insertion layer on which this entity was defined.

IDENTIFIER BYTE

Identifier code	Entity	Type
1	-----	Line
2	-----	Circle
3	-----	Marker
4	-----	Text String
5	-----	Arc
6	-----	Hatched Polygon
7	-----	Start of block
8	-----	End of block

The meanings of the parameters following each identifier are described here, together with the total length of each entity (including identifier).

Entity Type	Parameter Name	Function
-------------	----------------	----------

Line

layer	_ (1 byte)	_ _ _ insertion layer
X1	_ _ (2 bytes)	_ _ X coord of start of line
Y1	_ _ (2 bytes)	_ _ Y coord of start of line
X2	_ _ (2 bytes)	_ _ X coord of end of line
Y2	_ _ (2 bytes)	_ _ Y coord of end of line

Total Length 9 bytes**Circle**

layer	_ (1 byte)	_ _ _ insertion layer
x	_ _ _ (2 bytes)	_ _ X coord of centre
y	_ _ _ (2 bytes)	_ _ Y coord of centre
xrad	_ (2 bytes)	_ _ Length of semi major axis
yrad	_ (2 bytes)	_ _ Length of semi minor axis
phi	_ _ (2 bytes)	_ _ Angle between semi major axis and horizontal

Total Length 11 bytes

Note that the circle is actually a generalised ellipse. The shape which this represents may be realised by taking the unit circle, scaling it by xrad along the x-axis and yrad along the y-axis, and then rotating it anti-clockwise through an angle of phi/10 degrees about its centre. This shape is then moved to centre on the point (x,y).

Entity Type	Parameter Name	__ __	Function
-------------	----------------	-------	----------

Arc

layer	_ (1 byte)	_ _ _	insertion layer
xcent	_ (2 bytes)	_ _	X coord of centre
ycent	_ (2 bytes)	_ _	Y coord of centre
xradi	_ (2 bytes)	_ _	length of semi major axis
yradi	_ (2 bytes)	_ _	length of semi minor axis
theta1	_ (2 bytes)	_ _	angle of start point
thetar	_ (2 bytes)	_ _	angle subtended by arc
aphi	_ (2 bytes)	_ _	Angle between semi major axis and horizontal

Total Length 16 bytes

Note that as for the circle entity, this actually defines a portion of a general ellipse. The parameters xradi, yradi and aphi are analogous to xrad, yrad and phi in the circle. Theta1 and thetar define the portion of the unit circle which is drawn, prior to being transformed by xradi, yradi and aphi. If the value of aphi is negative, then the arc is drawn clockwise from its starting point.

Hatch

layer	_ (1 byte)	_ _ _	insertion layer
cnt	_ _ (1 byte)	_ _ _	Number of vertices
space	_ (1 byte)	_ _ _	space between hatch lines
angl	_ _ (2 bytes)	_ _	slant of hatch lines
pts	_ _ (4*cnt bytes)		array of vertex coords

Total Length 6 + 4 * cnt bytes

Note that when performing the hatching operation, the point array is joined in the order given and that the resulting polygon may cross itself as many times as desired. For correct operation of the hatching algorithm, the value of cnt should be restricted to be less than 20, and angl should be in the range -750..750 (tenths of degrees). The space parameter determines the normal spacing between the hatch lines in tenths of millimetres on an A3 page.

Entity Type Parameter Name _ _ _ Function

Bkstrt

layer _ (1 byte) _ _ _ insertion layer
 bkx _ _ (2 bytes) _ _ x coord of reference
 bky _ _ (2 bytes) _ _ y coord of reference

Total Length 5 bytes

This defines the start of a set of drawing entities which form a 'block'. The point defined by (bkx, bky) is the point about which the rotate and scale commands operate and is the point which the cursor must be near in order to 'get' the block.

Bkend

layer _ (1 byte) _ _ _ insertion layer

Total Length 2 byte

Since every block has both a start marker and an end marker, the layer field in the end marker is redundant. For this reason this field is used differently from the other elements in the drawing database.

If the block was formed by either the new block command or by macro load then the field will be set to 0. If the block was formed from a library with the read shape command, then the value indicates the position in the library where the named shape was found. A value of three would mean that the directory entry for the shape was the third entry in the directory section of the library.

When the duplicate block command is used, the layer field in the block end element of the new block is copied from the parent block. It is thus possible to write a program which can search a drawing file and find out how many of a particular item (viz:- transistor) were used.

This marks the end of the set of drawing entities which make up a block. Note that blocks may be nested, that is a block may contain another block. The total number of Bkstrt and Bkend entities in a file must always be equal otherwise a fatal error will occur when attempting to edit the file.

SECTION 7

LIBRARY DATA FILE FORMAT

LIBRARY DATA FORMAT

Library files are split into three identifiable parts. The library directory gives the name and size of each shape within the library, together with a pointer to the start of the shape data within the data section of the library. The data block allocation table (DBLAT) records the use of data blocks within the data section and records data block chains for those shapes which are larger than a single block.

LIBRARY DIRECTORY

This is the first section of the library file, and performs a similar function within the library as the directory on your floppy disc does for the entire disc. The library directory contains space for 256 entries occupying 16 bytes each. The entire directory is always present whether the entries are used or not, and thus occupies the first 4 kbytes (4096 bytes) within the directory file. The contents of each entry are described.

Field Name

Field Name

Meaning

namlen (1 byte)

Number of characters in the name field (max of 10), a value of 0 indicate this directory entry is unused.

shpnam (10 bytes)

This field contains the name of the shape. Unused bytes are undefined.

srec (1 byte)

This indicates the number of the data block within the data section of the library where the drawing entities for this shape are stored.

fsize (4 bytes)

Simply the newelement field from the drawing file from which this shape was originally created.

DATA BLOCK ALLOCATION TABLE

DBLAT

The DBLAT is a table of 256 bytes (1 for each data block in the data section) numbered 0 to 255, which indicates the current status of each data block. The value of the *n*th byte in the table gives the status of data block *n*. A value of 0 indicates that this block is currently unused. When adding a shape to a library, the first data block which is used is the first block whose entry in the DBLAT is 0, subsequent 0 value blocks may be used if the shape is larger than 256 bytes. The blocks used by a shape should always be in ascending numeric order.

A value of 255 (FF hex) in a DBLAT entry indicates that the corresponding block is the last data block in the shape. Thus if the first shape added to a library has less than 256 bytes of data, then its name will appear in the first directory position, the *srec* field will be 0 indicating that the shape's data starts at data block 0, and DBLAT entry 0 will be 255, indicating that block 0 is the last block in the shape.

Values in the DBLAT other than 0 and 255 indicate the number of the data block where the shape's definition is continued. Thus if the first shape is between 256 and 512 bytes, then the *srec* entry will be 0 as before. DBLAT entry 0 will this time be 1 indicating that after block 0, the shape is continued in block 1. DBLAT entry 1 will be 255 because block 1 is the end of the chain.

Note that there is no need for the data blocks occupied by a shape to be contiguous and that if you delete shapes from and add shapes to a library, this will probably not be the case.

DATA BLOCKS

The directory section and DBLAT of a library are always present, even when the library is first created. The data block section however is not present at first and is added 1 block at a time as required by the shapes being added to the library. Thus the minimum size of an empty library is 4352 bytes (4096 directory + 256 DBLAT). The data blocks contain 256 bytes each from the drawing file used to create the shape. The newelement field from the drawing file header is removed and stored in the fsize field in the directory section of the library and data stored in the data blocks starts with the scalefac field. All the drawing entities are included in the data blocks. Empty space at the end of the last data block occupied by a shape will be filled with 0 bytes when writing a library file and ignored when reading.

Manual addition for the 6128 version of MICRODRAFT

This addition to the manual describes those features of MICRODRAFT V2.3 which are specific to the versions on the CPC 6128.

The 8-bit version of MICRODRAFT is designed to be identical

to the 16-bit version which runs on IBM compatibles (including the Amstrad 1512), however there are differences between the individual machines which has resulted in slight changes being made to the program.

All the V2.3 MICRODRAFT's have the same features and you will find that the manual makes no mention of individual differences. All the menu items are the same and the procedure through the menus is identical. This section of the manual describes ALL the changes.

Making a backup of your master disc

It is very important that this is done before you use MICRODRAFT. There is far too little space left on the disc for any MICRODRAFT drawings to be stored and it is extremely bad practice to use a master disc for any purpose other than making a working disc.

Procedure to backup a disc on the CPC6128

Using the program DISCKIT3 (detailed in the front of your user manual), copy the MICRODRAFT disc. Please note that MICRODRAFT runs under CP/M+. When you have made a backup put the Master disc in a safe place. Fill out the registration card and send it to TIMATIC. If the card is not received by TIMATIC then no support can be obtained. We will

also be unable to send you details of upgrades or additional programs which you might require.

On side A: of this copy you will have the following files

MDRAFT .COM	--	The start up program
CADMAIN .OV6	--	The main overlay
ZOOM .OV6	--	The zoom overlay
BLOCK .OV6	--	The blocks overlay
MKBLOCK .OV6	--	The overlay to make blocks
FILES .OV6	--	File handling
SETUP .OV6	--	Setup Overlay
ARCS .OV6	--	Arcs Overlay
CIRCLES .OV6	--	Circles Overlay
STRINGS .OV6	--	String handling
MARKR .OV6	--	Marker Overlay
DIMENS .OV6	--	Dimensioning etc.
HATCHES .OV6	--	Hatching Overlay
FILLET .OV6	--	Fillet overlay.
MCHECK .COM	--	File integrity check.

In addition you will have on side B,

MPLOT.COM This program outputs drawing files to a HPGL compatible plotter.

MPRINT.COM This printer driver produces output on an Epson compatible printer.

TEXT.FON The text font file for the hard copy programs.

MCHECK.COM Performs a confidence check on all the programs to ensure ensure they have not been corrupted during copying.

MLIB.COM _ _ _ Library Manager.

ELECSYM.LIB _ _ Sample Library File.

LIBSHAPE.DRW _ _ Drawing of library shapes from which ELECSYM.LIB was formed

RESTRICTIONS

The CPM+ version of MICRODRAFT is restricted to a file size of 20000 bytes. In practice this is not a disadvantage as we have found it very difficult to reach this limit due to the efficient way that MICRODRAFT stores data.

Users of 8-bit machines may have an RSX installed. This sits at the top of memory and takes up some space. The TIMATIC BIGDISC program is one such RSX, as are other programs and printer spoolers. The space at the top of MICRODRAFT is not too restricted, but if you have several RSXs installed and MICRODRAFT will not start, this is probably the cause.

MOUSE INTERFACE

Version 2.3 of MICRODRAFT is the first to include a mouse driver as standard. The mouse driver will recognise the Kempston mouse and this will be integrated into the program automatically. If you do not have a mouse then MICRODRAFT will not expect mouse data entry.

The Kempston mouse will substitute for the cursor keys in MICRODRAFT and may be used anywhere that the cursor keys might. This includes moving the cursor around the screen. It can also be used to pick menu items rather than using the Function Keys (see later). Both buttons on the mouse perform identical actions so use whichever is most comfortable. The mouse interface is slightly different from that on the IBM version. The menu on the right hand side of the screen will display choices numbered 1,2,3....9,0. One of these will be highlighted at any time. To choose the highlighted item just press and release the mouse button. To change the selected item, depress the mouse button and then while NOT releasing the mouse button, move the mouse up or down. The highlight bar will move with the mouse. When the bar is over the required menu item, release the mouse button. This will select the required item. The cursor on the screen will be stationary during this operation. The use of the mouse, the cursor and the function keys can be freely intermixed. For example, you might like to move the cursor with the mouse but select functions using the function keys, according to your personal preference.

MICRODRAFT on the CPC series

The CPC6128 MICRODRAFT V2.3 consists of one main file (MDRAFT.COM) and several 'overlay' files (with the ending .OV6). For MICRODRAFT to run you must have these files on the default drive. With a twin disc system you can put the microdraft disc in drive a: and store your drawings on drive b:. It is advisable to copy the MPRINT and MPLOT files to your data disc along with TEXT.FON.

With a single drive system you should still save and load from B: by explicitly putting a B: before all the filenames in MICRODRAFT and changing discs when prompted.

The Function Keys referred to in the rest of this manual are the keys f0 to f9 on the right hand side of the keyboard. Since these make a small group

with the cursor keys, this should be convenient to use. If you would rather use another arrangement then the keys can be redefined using setkeys and running your own key definition before starting MICRODRAFT.

Please note that you **MUST** run SETKEYS KEYS.CCP before starting MICRODRAFT. Failure to do so will mean that the arrow keys will not control the cursor.

