

LoopDraw 8280

User Guide

TCS

LoopDraw

8280

User Guide

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Chapter 1

OVERVIEW OF LoopDraw

What is LoopDraw?

LoopDraw is *the* software package for the design, documentation, and downloading of process control and monitoring strategies for the 6370/80 series of Intelligent Loop Processors. LoopDraw provides you with all the tools you need to create the ideal control strategy for a broad range of industrial applications — efficiently.

LoopDraw's icon-based user interface is intuitive to learn, quickly becoming second nature because there is nothing to memorise and *no programming is needed*. This cuts down the time it takes to design control strategies, letting you work with a speed and efficiency not previously possible.

CAD Approach. Developed for the IBM PC/XT, AT/ATX, or equivalent computers, LoopDraw's powerful computer-aided-design approach fully exploits personal computer technology to give great functionality *plus* user-friendliness. Using a 'mouse' or keyboard you 'sketch' a control strategy on the colour display by placing and inter-connecting function blocks. LoopDraw thoroughly checks your layout and reports any errors and inconsistencies with clear, helpful messages. Finally, when you are happy with the scheme, you can file it away to the hard disk and download the complete strategy to the instrument.

LoopDraw & TACTICIAN. If you have the TCS TACTICIAN T2000 system, you can use it to test the downloaded control strategy *before* connecting it to the plant. You do this by constructing a simulation of the process (with T2000 SIM blocks), linking the Intelligent Loop Processor to the simulation via TCS 6432 Signal Processors, and running the entire strategy as if it were connected to the actual plant! This facility gives you the chance to experiment and to refine your control strategies in safety.

What You Need To Run LoopDraw

Hardware & Software. The hardware and software needed to run LoopDraw, and how to connect up and install it, is fully detailed in Chapter 2, *Installing LoopDraw*.

Documentation. To take full advantage of LoopDraw you should have access to the following documentation:

- The LoopDraw *User Guide* (which you are reading now)
- The LoopDraw *Facts Card*, a memory-jogger and quick reference to the system commands and icons
- The *6370/80 Series Intelligent Loop Processors Reference Manual*, for comprehensive details of all function blocks and their parameters
- The *6370/80 Series Intelligent Loop Processors User Guide & Tutorial*
- The *6370/80 Series Intelligent Loop Processors Facts Book*, a quick reference to all function blocks, parameters, and block I/O.

NOTE. The LoopDraw software includes a file called DOC, which you can read on-screen for convenient user guidance.

Using LoopDraw

This section outlines the main stages in designing and implementing a control strategy with LoopDraw, using the 'toolkit' and the function block library.

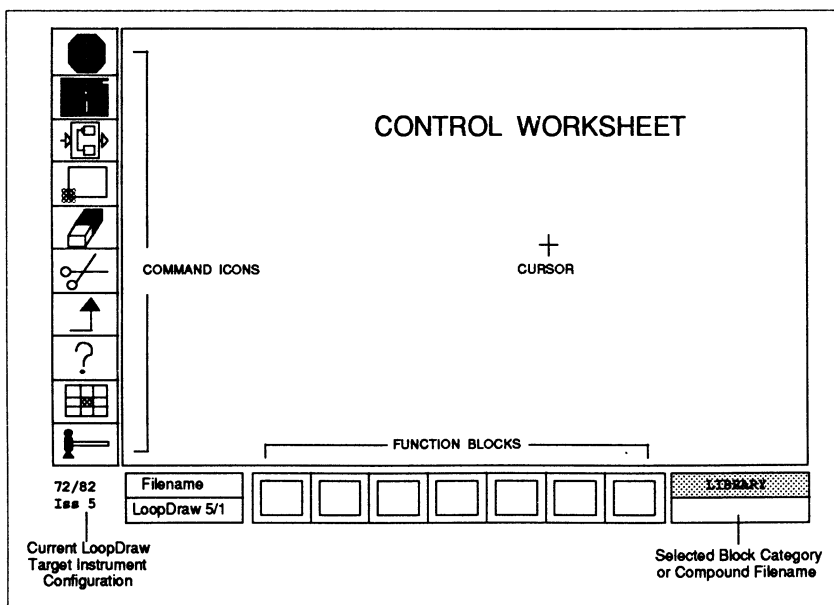












Figure 1.1 *Control Configuration Screen*

The LoopDraw Toolkit. On LoopDraw's Control Worksheet (shown in Figure 1.1) is a powerful and comprehensive 'toolkit' represented by the ten command icons arranged vertically down the left-hand side of the screen. You use these icons, together with function blocks from the resident library, to build and edit your control strategy. Facilities include cut-and-paste, replication, pan and zoom, compounding, interconnection, and many more. Saving and retrieving strategy files to and from the hard disk, obtaining printouts of your strategy, and downloading, are also carried out via the toolkit.

Full details of all the command icons are given in Chapter 4, *Configuration Icons*, and are summarised briefly here:

STOP SIGN		Quit LoopDraw
DISK		Hard disk file handling
COMPOUNDS		Combine & file blocks
PAN & ZOOM		Resize/shift screen view
ERASER		Delete objects or areas
SCISSORS		Move/copy objects
CONNECTION		Interconnect blocks
QUERY		Enter/read parameters
ZONES		Select worksheet area
TOOLS		Grid, print, configure for target instrument, HHT simulation, download

The Function Block Library. LoopDraw provides you with the same library of function blocks that is resident in the 6372/82 Intelligent Loop Processor. The blocks are grouped into categories, which when selected appear along the bottom edge of the control worksheet (see Figure 1.1). How to select blocks, position and parameterise them is explained in Chapter 3, *Function Blocks*. (For details of block parameters and functions, please refer to the 6370/80 Reference Manual.) The block categories are shown in the following table:

Category	Blocks							
CONTROL	XCON	RCON	XPID	RPID				
FIXED	GENP	ALRM	TOTL	DISP	MANS			
FIXED PROC	CHAR	LLAG	DTIM					
REAL I/O	ANIN	ANOP	DGIN	DGOP				
COMMS I/O	AICB	AOCB	DICB	DOCB				
ARITH.(1 I/P)	RANG	INT	ABS	NEGT				
ARITH.(2 I/P)	ADD2	SUBT	MPLY	DIVD	AVG2			
MATHS	EXPN	ROOT	EXP	NLOG	SIN	COS	TAN	
LOGIC	AND2	XOR2	OR2	AND4	OR4	NOT	LTCH	
SELECTOR	HSL2	LSL2	MSL3	SAMP	SLCT	CONS	PEAK	
COMPARE	GT	LT	EU					
TIME & PULSE	TIME	RATE	RAMP	PCNT	PGNT			

Configuring a Control Strategy. To configure and implement a control strategy with LoopDraw you:

- Select the function blocks you need from the library and position them on the screen in the control worksheet area.
- Parameterise each function block by entering values into its Specification Menu, accessed via the QUERY icon.
- Draw the connections between the blocks to define the control strategy, using the CONNECTION icon.
- Download the control strategy to the Intelligent Loop Processor, via the TOOLS icon.

Checking the Strategy. During download, LoopDraw automatically prioritises the block execution order, and also checks the strategy for errors. If any are found, LoopDraw's error messages help you to locate and rectify them using the configuration toolkit.

Editing the Strategy. At any time you can add to or alter what you have drawn on the screen with the appropriate toolkit icons, particularly the ERASER (to delete objects) and the SCISSORS (to move or replicate objects). Saving strategies to hard disk, or retrieving them from the disk, is carried out via the DISK icon.

Hand-Held Terminal Simulation. One of the options in the TOOLS icon allows you to communicate directly with an attached Intelligent Loop Processor, via an on-screen representation of the 8263 Hand-Held Terminal. There are two representations available: a *full* graphical representation of the 8263 front panel showing the screen and keyboard, and a *partial* display showing only the screen.

With the *full* representation you can 'press' the 'keys' on the simulation using the mouse, and also type in characters from the real computer keyboard. This representation does not allow you to do anything else within LoopDraw while it is active.

The *partial* representation allows entries using the real computer keyboard only, so you must be familiar with the 8263 terminal to use it. But it does have the advantage that while it is active you can also use other LoopDraw functions such as querying blocks, and so on.

All the usual mode prompts, error messages, and data characters appear on the terminal display.

Further details are given in Chapter 4, in the section on the TOOLS icon.

LoopDraw File Structure

For each strategy you save in LoopDraw, *four* DOS files are created with the same name as your strategy but with the following file extensions:

- .CI (control information, links etc.)
- .DB (database, block parameters etc.)
- .OCI (previous version of .CI file)
- .ODB (previous version of .DB file)

Each LoopDraw *compounds* file is stored as two DOS files of the same name, but with the file extensions .CMP (latest version), and .OCM (previously saved version). The 'previous' versions of all these files are for backup purposes only, and may not be needed.

File Transfer. When you save a control strategy using the DISK icon, LoopDraw normally writes the strategy files to the drive from which the program was originally loaded at the start of the session. This will be the hard disk (C drive) if you followed the installation instructions recommended in Chapter 2. The same applies to the *loading* of strategy files: only the original drive is normally read by LoopDraw.

You can get LoopDraw to use another drive by prefixing the filename with a DOS drive label. For example, if you call the file **A:name**, it will be saved to, or read from, the A drive under the filename **name**. But if you do this you have only a maximum of six characters, instead of eight, for the filename, because the first two characters are taken by the drive label.

If you want to transfer strategy files between disks, a better way is to quit LoopDraw and copy over the appropriate files in the DOS mode. (Your DOS manual tells you how to do this.)

Chapter 2

INSTALLING LoopDraw

EQUIPMENT REQUIREMENTS

Minimum Hardware

The LoopDraw system has the following minimum hardware requirements:

- IBM PC/XT or /AT or /ATX (or equivalent)
- 512K RAM
- One or more floppy disk drives
- Hard Disk (20 megabyte) (optional)
- Enhanced Graphics Adapter with at least 256 Kbytes of memory (IBM EGA or compatible)
- Enhanced Graphics Colour Monitor (IBM or compatible)
- Mouse Systems Bus Plus Mouse (optional)
- RS232 cable, for downloading strategies to the instrument via the front panel Hand-Held Terminal socket. TCS supplies one cable (P No. 8265/AT/HHT) for a 9-way computer rear panel connector, together with one 9- to 25-way adaptor (P No. CI 081041) for 25-way connectors. Figure 2.1 details the pin designations, functions, and wiring for both arrangements.

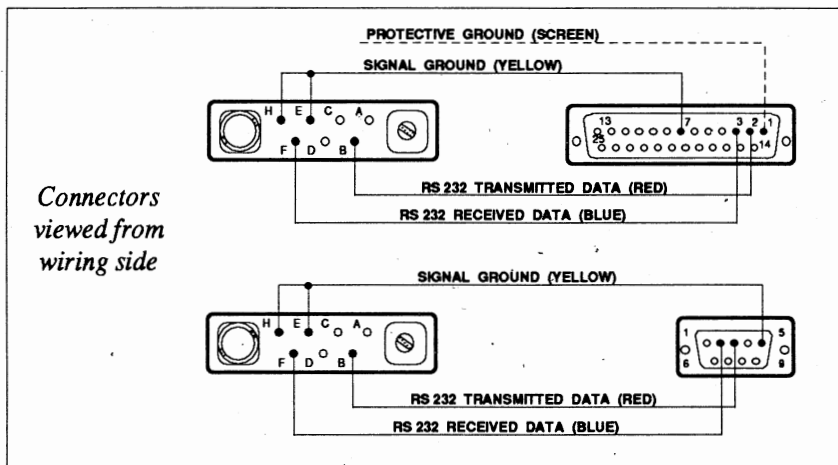


Figure 2.1 RS232 Cable Wiring & Pin Designs

Optional Hardware

The LoopDraw system supports a variety of optional peripherals. If you want to obtain high-resolution hardcopy of control strategies or the process data, your computer must be configured with one of the following parallel dot-matrix printers:

- Epson LQ800, LQ850, LQ1000, LQ1050 (standard), Data Products 9034

NOTE. Epson-compatible printers can be substituted but usually produce lower-resolution results.

Software

LoopDraw requires the following software:

- MS DOS 3.0 or higher
- LoopDraw Program (5.25" or 3.5" diskette)
- LoopDraw Utilities (5.25" or 3.5" diskette)

2 brown
3 red
5 yellow

CONFIGURING LoopDraw HARDWARE

Instruments & Printer Interface Card

A standard serial and parallel interface is used (which may be on a single card). The serial RS232 port, configured as COM1, communicates with TCS Intelligent Loop Processors. TCS supplies two cables for this purpose, to cater for both 9-way and 25-way serial port connectors.

The 25-way parallel port, configured as LPT1, serves the printer. Please refer to the manual supplied with the card for further details.

Mouse Set-Up

The mouse communicates with LoopDraw via a serial link. The card providing this link can be configured as **serial port 1 or 2** (usually COM2, if the instrument is on COM1). The configuration is determined by the positioning of jumpers located throughout the card. Please refer to the manual supplied with the card for further details.

The mouse works on an optical principle sensing left/right and up/down motion by means of ultra-violet and infra-red sensors. It is normal for only one of the LEDs on the underside to appear lit.

(It may be possible to use a MicroSoft-compatible mouse — see page 2.9.)

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CABLING THE SYSTEM FOR LoopDraw

The following description refers to the cabling of a typical IBM PC/AT or /ATX computer setup. *Some systems may need a slightly modified cabling procedure; if in doubt consult your computer dealer or contact TCS.*

CAUTION: Carry out the following procedure with the computer and peripherals **SWITCHED OFF**, and all cables **DISCONNECTED**.

1. Connect the colour monitor to the computer's 9-pin EGA output port and tighten the retaining screws.

Figure 2.2 shows a general view of the computer's rear panel. Figure 2.3 shows the connector details.

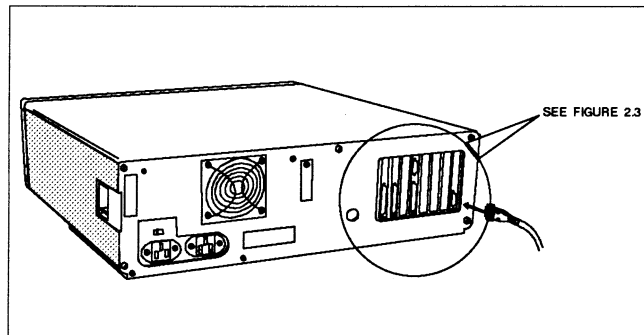


Figure 2.2 Connecting the Colour Monitor

2. Connect the printer to the 25-pin parallel port (LPT1 in Figure 2.3) and tighten the retaining screws.
3. Connect the IBM 'qwerty' keyboard to the 5-way DIN connector. This is shown on the extreme left in Figure 2.3.
4. Connect the mouse to communications port 2 (COM2 in Figure 2.3) and tighten the retaining screws.

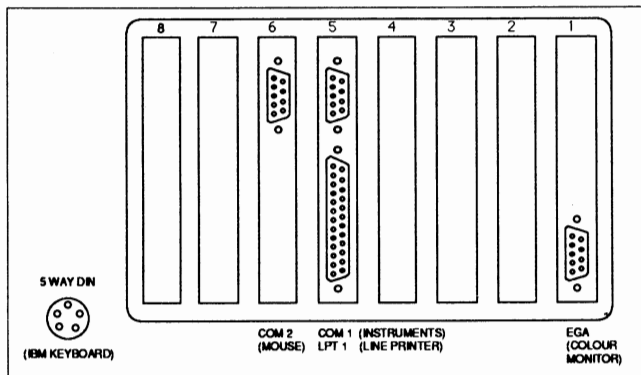


Figure 2.3 Rear Panel Connectors (Typical)

5. Connect *properly grounded* mains supply cables to the computer (Figure 2.4), printer, and colour monitor.
6. Switch on the mains supply. Then switch on the peripherals, followed lastly by the computer chassis.

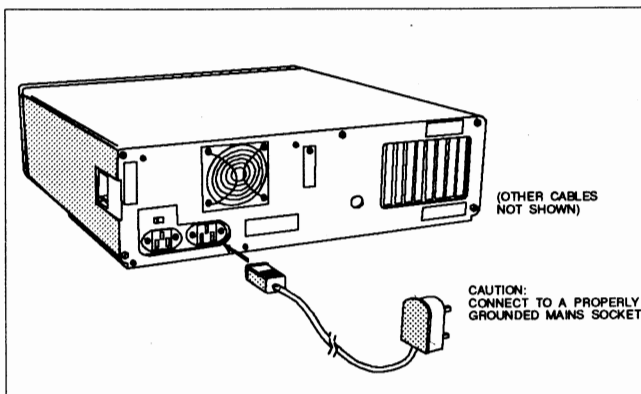


Figure 2.4 Connecting the Mains Supply Cable

CAUTION: Do not connect a mains-powered computer to an instrument that is installed in an operating plant system. COM1 is not an isolated port and so mains earth noise could be injected into the plant's 0V reference, possibly disrupting the control system.

7. Connect the 9-way serial communications port1 (COM1 in Figure 2.3) to the front panel socket of the *powered-up* 6370/80 Series Intelligent Loop Processor, using the appropriate cable (supplied).

CAUTION: Switching the computer and instrument on or off should only be done with the RS232 cable disconnected.

8. Adjust the colour monitor to your requirements.

INSTALLING THE SOFTWARE

To run your LoopDraw software successfully you must have the approved hardware and software correctly installed and configured. To install the software, follow the instructions given in this section.

First, install the DOS (3.0 or higher) software. Then install the LoopDraw software, delivered on two double-density 360K diskettes. This must be transferred to the hard disk and allocated a directory. Note that the *original* LoopDraw program disk is also a copy-protect 'key' which has to be present in drive A whenever you download strategies, print out hard copy, or use the utilities.

Installing the DOS

To install the disk operating system you should refer to the DOS Reference Manual. You are recommended to place all DOS files into a single directory on the hard disk, named (for example) DOS3. To boot the system you may use the DOS diskette or DOS3 on the hard disk.

Installing LoopDraw*

1. Boot the system
2. LoopDraw must have a path to the DOS files (particularly the MORE.COM file which runs the in-built documentation file, DOC). To ensure this, use the DOS EDLIN editor, or equivalent program, to edit the AUTOEXEC.BAT file to include a 'path' command line having (at least) the following arguments:

path_Δ \;DOS3;\loopdraw;

(This assumes that your DOS files are all in the directory named 'DOS3'. If not, substitute the correct directory name in the command line.)

*In this Manual the subscripted delta symbol (_Δ) indicates a mandatory *space* character in a command line.

NOTE. If your DOS files are in the *root directory* instead (not recommended), the minimal command line should read:

path_\;loopdraw;

3. Make sure you are logged on to drive C, the fixed disk.
If you are logged on to drive A you need to type:

c: <ENTER>

to change to drive C.

4. Make a directory on drive C called *loopdraw* by typing:

md loopdraw <ENTER>

5. Call the *loopdraw* directory by typing:

cd loopdraw <ENTER>

6. Place the LoopDraw Program disk in drive A and close the drive door.

7. Copy all the files on the LoopDraw disk to the *loopdraw* directory by typing:

copy a:*. *c:\loopdraw <ENTER>

8. Repeat steps 6 and 7 for the LoopDraw Utilities disk.

You have now installed LoopDraw in your computer.

Running LoopDraw

- If you want to enter LoopDraw from DOS3 or another offline package you must first log on to the *loopdraw* directory before running loopDraw. Do this by typing:

cd loopdraw <ENTER>

- If you have a Mouse Systems PC optical mouse installed on COMx, type:

g_x

or

pc_x

To run LoopDraw where **x** is 1 for COM1
and 2 for COM2

- If you have a MicroSoft-compatible mouse which is capable of interfacing with the MicroSoft mouse driver, type:

ms_x

where **x** is again 1 for COM1
or 2 for COM2

- To run LoopDraw solely from the *keyboard*, without a mouse, you must type:

k <ENTER>

This disables the normal keyboard functions and assigns keys <X>, <C>, and <V> as the left, middle, and right mouse buttons, respectively. To move the LoopDraw cursor vertically and horizontally you use the keyboard 'arrow' keys. The <Home>, <Pg Up>, <Pg Dn>, and <End> keys give you diagonal control of the cursor.

When you want to enter alphanumeric characters (e.g. file names) press the <Esc> key to return the keyboard to normal function. Press <Esc> again to restore mouse/cursor control.

- To run the resident LoopDraw on-screen documentation, from the loopdraw directory, type:

doc <ENTER>

You then press any key when you are ready to advance to the next screen page of information.

LoopDraw Utilities

Two utility programs are provided with the LoopDraw package. They let you convert LoopDraw graphics files to AutoCAD .DXF format, and LoopDraw control strategy database files to TCS 8275 VDU format.

Please refer to Chapter 5 of this manual for full details of the utility programs.

Chapter 3

FUNCTION BLOCKS

This chapter describes how you select and position *function blocks* on the control worksheet, and then enter parameter values for each block. You should already have looked at Chapter 1, *Overview of LoopDraw*, for an outline of the process and the blocks available. Full details of function blocks and their parameters are given in the *6370/80 Series Intelligent Loop Processors Reference Manual*.

The instructions assume you are using a *mouse* to move the cursor, but you can also use the corresponding keyboard cursor control keys, as detailed in Chapter 2, *Installing LoopDraw*.

Selecting & Placing Function Blocks

When you start up LoopDraw an Issue notice appears on the Control Worksheet. This becomes the regular small white cross-cursor as soon as you move the mouse.

- Move the cursor with the mouse until it is in the box in the lower right of the screen, positioned in the top section labelled **LIBRARY**.
- Click any mouse button. A pop-up menu appears listing all the block categories in the resident library. One of them will already be selected (its small check-box painted red) with the category name showing below 'LIBRARY', and the corresponding set of block icons displayed along the bottom of the worksheet. Figure 3.1 shows an example.

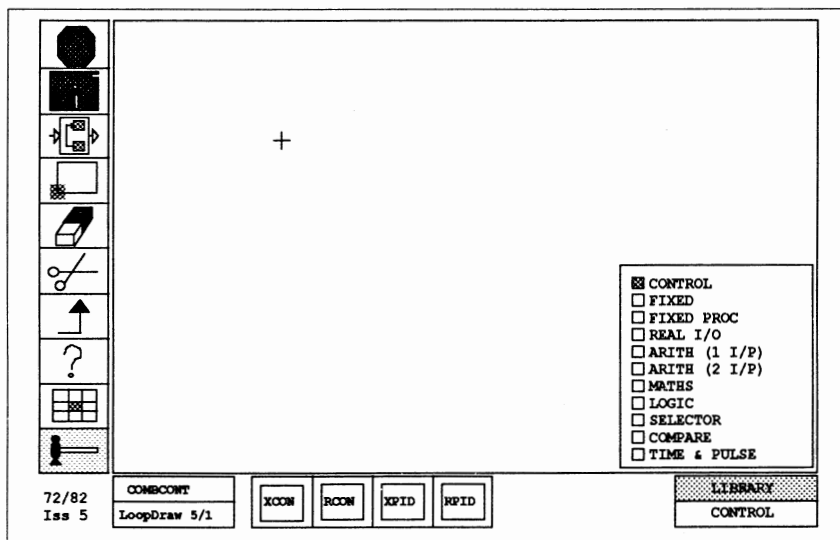


Figure 3.1 *Function Block Library Pop-up Menu*

■ Move to the check-box of the category you want and click a mouse button to select it. Now you see a new set of block icons appear along the bottom of the screen, and the new category name is displayed under 'LIBRARY'.

■ To start building the strategy, move the cursor into the required function block at the bottom of the screen and click the left mouse button. When you do this, the border around that block's icon highlights in red, indicating that it is the currently 'active' icon.

■ Move the cursor into the control worksheet and notice that it now appears as a purple 'box'. Position the box on the worksheet and, if you are happy with its size and shape, click the mouse to make the box 'stick'. The block name (e.g. ANOP) now appears in the placed box.

NOTE. If you find a block cannot be 'pasted' to the worksheet, this means it is not available for use in the strategy because you have already placed all the blocks of that type. (E.g. you cannot place more than two TOTL blocks.)

■ If you decide that you want a differently shaped box, hold down the middle mouse button and move diagonally to alter the aspect ratio of the active icon. When you are satisfied, click the left button to paste the function block on the worksheet.

■ Repeat this procedure until you have placed all the function blocks you require in your control strategy.

You are now ready to enter the values of the block parameters.

Aligning the Function Blocks. As you move the cursor (or a function block) around the screen you find that it jumps from one position to another, aligning with an invisible grid. This 'snap grid' action is to help you line up the blocks on the screen, giving your designs greater symmetry. If you do not need the grid, click on the TOOLS icon with the left mouse button. The grid-marks over the hammer disappear and the mouse can now be moved smoothly anywhere on the screen.

Parameterising the Function Blocks

After choosing the *types* of block you want, you need to provide information that characterises each block uniquely. With LoopDraw, you do this by filling in *Specification Menus* for every block on the worksheet. Data input to a Specification Menu is stored in the process database for eventual downloading to the instrument. At any time, you can 'query' a function block to recall its Specification Menu for review or modification.

Specification Menus. Every function block has its own Specification Menu. You access it by clicking anywhere inside the block with the QUERY icon '?' activated. This is described in Chapter 4 in the section on QUERY (page 4.19). An example of the Specification Menu for an XPID Control block is shown in Figure 3.2.

XPID				
Tag	=		Block No	= C2
Dec. Places	=	(0 to 4)	Loop No	= (1, 2 or 3)
PH	=	+99.99 Eng	PL	= +00.00 Eng
RS	=	+99.99 Eng	LS	= +00.00 Eng
SL	=	+00.00 Eng	SR	= +00.00 Eng or E
SB	=	E Eng or E	RL	= 00.00 Eng/s or E
HA	=	+99.99 Eng	LA	= +00.00 Eng
HD	=	+99.99 Eng	LD	= +99.99 Eng
XP	=	% or E	FF	= +50.00 % or E
TI	=	+01.00 s/m or E	TD	= +00.00 s/m or E
Int Bal Dis	=	N (Y/N)	SP trk PV	= N (Y/N)
Time Units	=	S (s/m)	Inverse 3T	= N (Y/N)
SL chng Dis	=	0 (0/1/E)	OP chng Dis	= 0 (0/1/E)
Man Btn Dis	=	N (")	Aut Btn Dis	= N (Y/N)
Rem Btn Dis	=	N (")	OP low (FM)	= N (Y/N)
MAN powerup	=	N (Y/N)	OP low pwpr	= N (Y/N)
NOT Hold En	=	1 (0/1/E)	Track Enabl	= 0 (0/1/E)
Remote En	=	0 (0/1/E)	Forced Man	= 0 (0/1/E)

Click the mouse or Press Escape key to exit menu.

72/82
Iss 5

COMBOWT
LoopDraw 5/1

XCON RCON XPID RPID

LIBRARY
CONTROL

Figure 3.2 Example Specification Menu

Entering Information. Once you are in the Specification Menu the keyboard is activated, so you can begin entering information in the fields. The cursor appears as a reverse video white rectangle which you move around the menu using the arrow keys. To enter a value into a field, move the cursor onto the field and then type in the data. The maximum field size is indicated by the size of the cursor rectangle. Use the <Backspace> key to delete incorrect characters; alternatively you can re-enter the field and start again. LoopDraw ignores illegal or invalid characters, and flags out-of-range entries with a message.

When you have finished typing in a field, simply move on to the next one via the arrow keys, or by pressing <Enter>. The new data is automatically written to the parameter database whenever you move to another field (or quit the Specification Menu).

Types of Data Field. Initially, most of the data fields have default values in them which you can change as you need. LoopDraw automatically allocates the next appropriate block address (e.g. C2, DO4, O5 etc.) to the *Block No* field. Generally, valid input types include numbers, text (for units, tagnames), or the letters Y (for 'Yes'), N (for 'No'), or E (for 'External'). Placing an E in a variable field signifies that the variable value is to come via a connection from another function block. If you omit the E, LoopDraw will not let you make a connection to the parameter later on.

Many of the fields correspond exactly to the block parameters detailed in the Intelligent Loop Processors *Reference Manual* (Chapters 4 and 5). Others, particularly those associated with hexadecimal status words in the instruments, are spelled out in a much more 'user-friendly' way in the LoopDraw Specification Menus. You simply fill in Y(es) or N(o), 0 or 1, etc., instead of converting information to bit-patterns and hexadecimal digits.

When you finish entering this information, pressing <Esc> returns you to the Control Worksheet.

Colour Coding. You will notice that different colours have been used in the Specification Menus to highlight the various data types. Tags and Block Numbers are in *blue*, internal analogue parameters are *green*, and external analogues (i.e. those that can be set to E) in *light purple*. Internal and external digital parameters are in *red* and *turquoise*, respectively.

Function Block Annotation

When you first paste a block to the worksheet it appears as a *purple* box, annotated with only its block type (e.g. ANOP). In this state the block cannot be connected to; first you must QUERY it and enter a unique *tag* and a valid Loop Number of 1, 2, or 3 if this field appears in the Specification Menu. Whilst doing this the block changes to green, if it can be seen from behind the window. After you have parameterised the block it becomes a *brown* box, annotated with its type, address, and tagname.

Block addresses (usually two-character) also show the block's *loop number*, separated from the address by a period mark. Examples are: **C2 . 2** (Control block in loop 2); **B2 . 2** (Analogue Output block in loop 2); **18 . 2** (assigned block at address 18, in loop 2). Blocks that are not tied to a loop (i.e. the blocks with no input connections and no FC parameter) just show the block address. Examples: **A2** (Analogue Input block); **34** (CONS block at address 34).

Block Addresses: Digital I/O Blocks. Exceptions to the two-character block address rule are the Digital I/O block addresses, i.e. the DGIN, DGOP, DICB, and DOCB function blocks. In the 6370/80 Series Reference Manual these blocks are treated as *single* blocks with a single address but having eight channels.

LoopDraw, however, treats each *channel* as an individual 'block' with its own three-character address, e.g. DO3, the channel 3 Digital Output 'block'. This makes it easier to graphically place and interconnect these multi-channel blocks in your strategy.

NOTE. Because the set of eight channels in any digital I/O block actually belongs to a single block in the instrument, you must assign *all* channels in the set to the *same loop*. If you do not, then when you try to download the strategy the checking algorithms detect the error, abort the downloading operation and display an error message.

Chapter 4

CONFIGURATION ICONS

Control strategy configuration is performed from the *Control Worksheet* (shown in Figure 4.1), which appears when you boot up LoopDraw as described in Chapter 2, *Installing LoopDraw*.

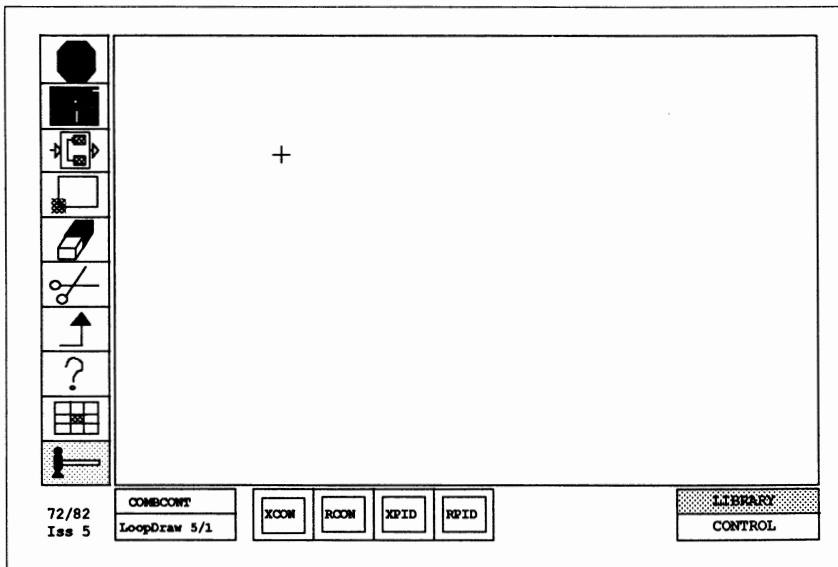


Figure 4.1 *The LoopDraw Control Worksheet*

The Control Worksheet Icons. The Control Worksheet has ten icons oriented vertically to the left of the screen. They represent executable commands used to edit and manipulate the function blocks in a control strategy design.

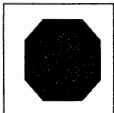
To select an icon, use the mouse to move the white cross cursor onto the icon and then click the left mouse button.

Some of the icons have *options*. These are displayed in pop-up menus in the upper part of the screen when you activate the primary icon, usually with the middle mouse button. To select an option, simply click on the option you want (with the appropriate mouse button). If you don't make a selection, the leftmost option is automatically selected by default (where appropriate).

Current File Name. The file name of the currently displayed configuration is shown in the box at the bottom left of the work area. If it has not yet been named, this box is blank. When you start up LoopDraw (except for the very first time) the last control configuration to be on-screen is automatically reloaded from disk and displayed.

This chapter describes each of the ten command icons in the order that they appear on the screen, in descending order from the top to bottom.

STOP SIGN



The icon marked with a picture of a STOP SIGN is used to exit to the LoopDraw directory in DOS.

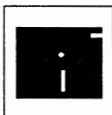
If the current control strategy database has already been stored to disk (see the DISK icon below), click on this icon (with any mouse button) to exit directly to the LoopDraw directory prompt in DOS.

If you have not yet stored the database, selecting the STOP SIGN produces a 'beep' and a pop-up window containing the message:

```
Warning! Current DBASE
has not been stored.
Return to DOS ?
Left = Yes, Right = No.
```

Pressing the left mouse button returns you to the DOS prompt *and the database is lost*. Pressing the right button keeps the current control worksheet active, allowing you to store it if required.

DISK



The disk icon is used to save, retrieve, or delete control strategies from the hard disk. Selecting this icon (with any mouse button) produces a pop-up menu with three option icons like the one in Figure 4.2

The pop-up window shows a list of the available files on the disk. You can page up and down the list (which may be too long to fit completely in the box) or go directly to the top and bottom, by selecting the UP, DWN, TOP and BOT fields. Choose a file by clicking on it, or enter a file name using the keyboard (which you must do anyway to create a new filename). The entered or chosen file name appears next to the green arrow-head prompt (see Fig 4.2).

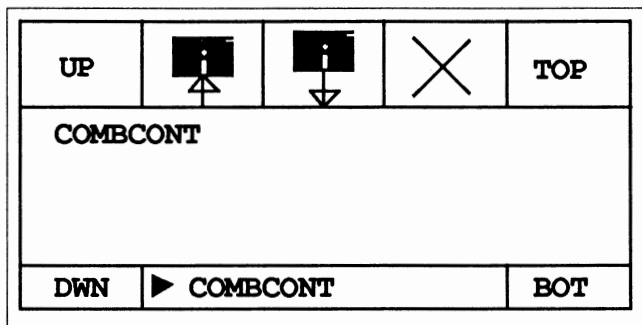


Figure 4.2 DISK Option Menu

A more selective way to display filenames is to type the first letter (or first few letters) of the file you want, and LoopDraw lists only those filenames starting with your chosen letter(s).

Once a file has been chosen you can save it to disk, read it into LoopDraw, or delete it.

Naming Files. File names can be from one to eight characters long. If you wish to save to a disk that is other than the current drive, use the drive assignment e.g. 'A:' and six characters e.g. 'A: CMBCNT'

NOTE. If you wish to retrieve a file from another drive with an eight character identifier, you should return to DOS and copy the file onto the drive from which you run LoopDraw.

You can use upper and/or lower case letters, but there are certain *characters* you should not use in a file name (e.g. colon or period), and certain *names* are forbidden (e.g. COM1, LPT1). This is because the names or characters would have inappropriate significance for the DOS system. Please refer to your DOS manual for fuller details.




Saving To Disk. The icon showing a disk with an arrow pointing *into* it writes the control strategy on the current monitor screen to disk under the chosen name. If the file already exists LoopDraw sends the message:

```
File exists. Update?  
Left = Yes, Right = No
```

Press the left or right mouse button as appropriate.

If you try to save a control strategy that has incomplete connections, LoopDraw performs the 'save' but sends you a warning message in the upper left of the screen:

```
Warning!  
Unmade Connections Exist.  
Use  Icon for Details.  
Click Mouse to continue.
```




Retrieving From Disk. The disk with an arrow pointing *outwards* loads the chosen file from the disk and places it on the monitor screen. If you already have a control strategy on the screen which you have not yet saved to disk, LoopDraw warns you of this with the message:

Warning! Current DBASE has not been stored. Do you want to overwrite?
Left = YES, Right = NO.

Clicking the left mouse button loads the new file and overwrites the current one, which is lost. The right button aborts the operation, giving you the chance to save the current file first.

If you have entered a non-existent or misspelled file name, LoopDraw tells you so, with:

File does not exist.
Click mouse to continue.

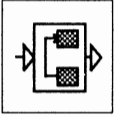


Deleting a File. The X icon is used to delete the chosen filename from the disk. When you select this option, LoopDraw asks you to confirm the delete with the message:

File Delete?
Left = YES, Right = NO.

The left mouse button performs the delete; the right button aborts it. Both return you to the option menu afterwards.

COMPOUNDS



This icon, marked with a small picture of connected function blocks, is used to combine two or more blocks into a single compound 'block'. Compounds may also be 'nested' within other compounds. When activated with the middle mouse button, the icon produces a pop-up option menu like Figure 4.3.

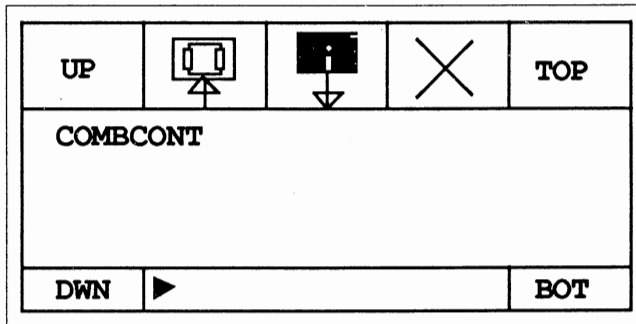


Figure 4.3 *COMPOUNDS Option Menu*

The COMPOUNDS icon is used to create/save, load, and delete user-defined compounds. Compounds are stored on disk in *files*, each holding up to 30 compounds. If a new file of compounds is to be created the file name should be entered at the arrow prompt. If an existing compound file is to be used it should be selected from the list.



Making a Compound. To make a Compound, select the first icon on the left. If you haven't typed or selected a file name LoopDraw requests you to do so with the message:

Please type a file name or select one with the mouse.

In this case, move the mouse to clear the message, type in a file name and click on the leftmost icon again.

NOTE. For details on file naming, please refer to the paragraph *Naming Files* in the *DISK* icon section.

Moving into the design area produces a box-cursor that you size using the middle mouse button. To define the area to be contained in the compound, position the lower left of the box-cursor, press the middle mouse button and drag the mouse until the area is enclosed within the rectangle. When this is done, click the left mouse button and watch the COMPOUNDS menu pop up as in Figure 4.4.

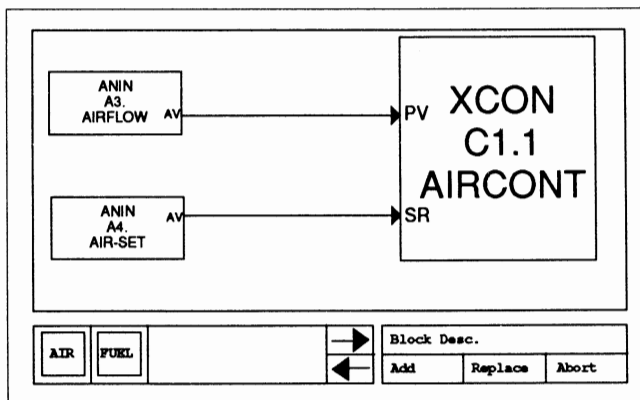


Figure 4.4 *COMPOUNDS Menu*

The menu shows a magnified view of the area selected for compounding. Also shown in boxes are the names of any compounds already stored under the current file name. If more than six names are stored you can click the scroll bar arrows to see the rest.

Key in the 'Block Desc(riptor)', which is the 4-character type name that you must give the compound (analogous to ANIN for example). Then select either Add, Replace or Abort, to either *add* the compound to the selected file, *re-place* an existing compound with the new one, or *abort* the whole operation, respectively.

If you click 'Add', the new compound is stored to disk (under its block descriptor) and LoopDraw asks if you want to replace the selected area with the new compound in the displayed strategy. Click the required button as directed.

If you click 'Replace', LoopDraw asks you to select the compound that you want to replace. Clicking the name box that is to be replaced overwrites it with the new compound, and you are again asked if you want to see the compound in the displayed strategy.

NOTE. The block descriptor is only a 'type name' given to the compound, like ANIN or GENP. Later you will have to give the compound block an individual *tagname* before connecting it into your strategy.

Unfiled Compounds. There is another use of the compounds facility that does not involve special storage of a group of compounds under a file name. If you click on the COMPOUNDS icon with the *left* mouse button, the option menu does not appear. Now you can move directly into the work area, define a group of blocks with the variable box-cursor, and click the group (as before). This time you are asked to enter only the block descriptor that you want the compound to have. When you click the mouse, the selected group of blocks is replaced on the screen by the new compound.

Unfiled compounds are convenient ways of simplifying the strategy, but they cannot be used as described in the next section, *Using a Compound*.



Using a Compound. The Compound block can now be used as if it were a built-in LoopDraw function block. To read in saved compounds you have created, select the file-name from the COMPOUNDS option menu and recover it from disk with the second option icon (the floppy disk with the arrow coming out of it). Icons now appear at the bottom of the screen representing all the compounds stored in the selected file. Click the left/right arrows to scroll to any icons not shown. Each icon box contains the 4-character descriptor you originally gave it, and the Library box at the bottom right of the screen shows the compound file name.



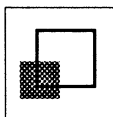
Deleting a File of Compounds. The last option is a large X, used to delete the file whose name has been selected from the directory or typed in at the prompt. Remember that deleting a filename removes *all* compounds stored in that file. Selecting this option produces the message:

File Delete?
Left = Yes, Right = No.

which allows you to escape from the delete operation.

NOTE. If you delete the file containing the compound icons currently displayed along the bottom of the screen, they remain on the display as 'ghosts'. If you place the deleted compounds in your strategy and query them they will be found to be empty.

PAN & ZOOM



Beneath COMPOUNDS is the PAN & ZOOM icon, a small shaded rectangle and a larger unshaded rectangle. This icon brings up an option menu of three icons as shown in Figure 4.5.

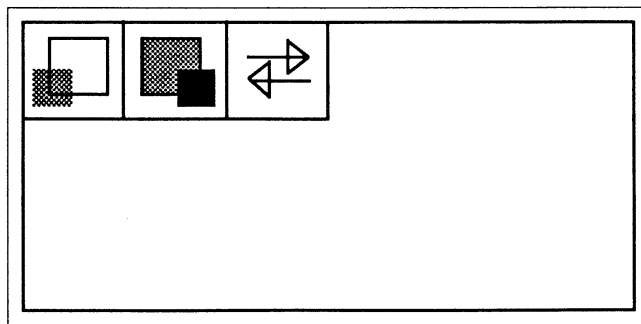


Figure 4.5 PAN & ZOOM Option Menu

The first icon on the left is for *selective zooming*. This icon lets you enlarge portions of a strategy to fill the entire screen. While you are in this mode, all the editing capabilities are still available. The selective zoom feature can be nested up to four levels by continually zooming selective portions of an already zoomed diagram. The second icon is used to un-do (*de-zoom*) one level of selective zoom, and the last one (the parallel arrows) is used to manually scroll or *pan* around the entire worksheet.



Selective Zooming. The first option icon is actually selected by default; click a mouse button to clear the option menu if needed. Moving into the design area produces a variable-sized box-cursor. To define the area to be zoomed, position the lower left of the box-cursor, press the middle mouse button and drag the mouse until the area is enclosed within the rectangle. When this is done, click the left mouse button and watch the selected area zoom out to fill the screen.



De-Zoom. From the PAN & ZOOM option menu, click on the second option icon to 'de-zoom' the field of view by one level. You can repeat this process until you are back to the normal unzoomed view.

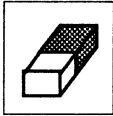


Pan. From the PAN & ZOOM option menu, click on the third option icon (the parallel arrows) then position the cursor at the point you want to move. Press the left mouse button whilst dragging the cursor to the required new position; when you release the button, you are at a new location in the Control Worksheet.

NOTE. Using the Pan option has no effect on the ZONES icon grid, even though you may have changed the zone being viewed.

The PAN option remains active and can be used repeatedly until you select something else.

ERASER



The ERASER icon, shown as an ink/pencil eraser, is used to 'rub out' part or all of the control strategy from the screen (and the database). ERASER works in three ways: it can erase *objects* (blocks and connections), or *areas* (selected groups of blocks), or the *entire screen*. You can also 'undo' all your erasures, except deletion of the whole screen, stepwise in reverse order. Selecting the ERASER icon with the middle button produces the option menu shown in Figure 4.6.

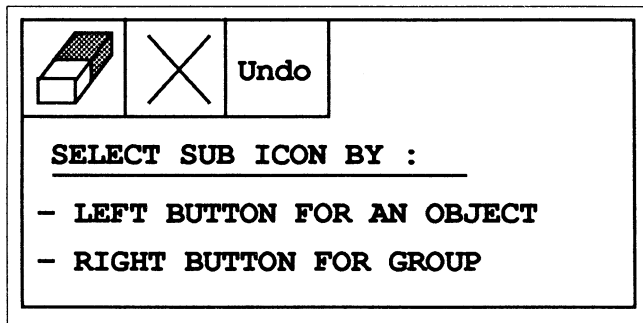


Figure 4.6 ERASER Option Menu



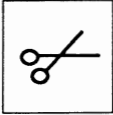
Erasing Objects. To erase an *object*, click on the first option icon (another 'eraser') using the *left* mouse button. This closes the menu, leaving you with the cross cursor ready to be moved to the object to be erased.

NOTE. Object erasure is the default option of the ERASER icon, so you don't have to open up the option menu to select this. Just click on the ERASER icon with the left mouse button.

To erase a block, move the cursor inside the block and click the mouse (any button). The block and any connections coming out of it disappear.

To erase a connection, move the cursor onto either end of the connection to be removed. When you are on the connection point, a small yellow box encloses it. Click the mouse and the entire connecting line disappears.

SCISSORS



The icon marked with a pair of Scissors is used to edit control strategies. When you activate this icon with the middle mouse button the pop-up option menu looks like Figure 4.7.

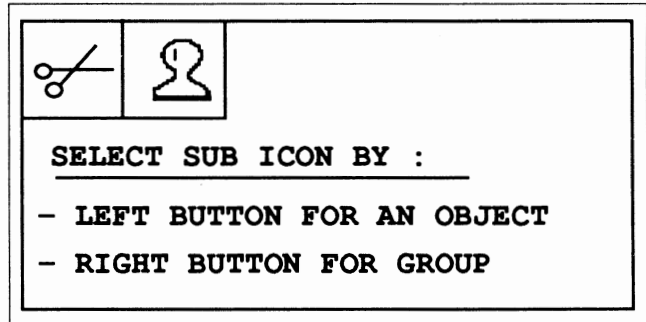


Figure 4.7 SCISSORS Option Menu

The first icon on the left (the small SCISSORS) is for *cutting-and-pasting*, i.e. moving a block or group of blocks from one position to another. The second option icon, the STAMP, is used to *replicate* a block or group of blocks. Both options can work on a single *object* (a block or an interconnection) or on a selected *group* of objects. You choose object or group mode by clicking the required option with the left or the right mouse button, respectively.

NOTE. Object cutting-and-pasting is the default option of this icon, so you don't have to open up the option menu to select this. Just click on the SCISSORS icon with the left mouse button.



Cutting-and-Pasting Blocks. To move a *single* function block, select the small SCISSORS with the left mouse button and position the cross-cursor in the block. Click the left button to 'cut' the block, then move it to its new position with the mouse. Finally, click the left button again to 'paste' the block in position. Any connections coming from the block are stretched as needed. If you hold down the *middle* button whilst moving the mouse, you can change the

size and shape of the block as well. Click the *right* button at any time to abort the operation and return the block to its original position, size, and shape.

To move a *group* of blocks, select the small SCISSORS option with the right mouse button. Moving into the design area produces a variable-sized box-cursor. To define the area to be moved, position the lower left of the box-cursor, press the middle mouse button and drag the mouse to enclose the area within the rectangle. When this is done, click the left mouse button to 'cut' the group of boxes and drag the mouse to move the box to the new position. You can enlarge or reduce the pasted area by adjusting the box size with the middle button. Finally, click the left button to 'paste' the area when you are satisfied with its size/position.

Again, clicking the *right* button at any time cancels the operation.



Cutting-and-Pasting Connections. Select the small SCISSORS option icon with the left button (or simply use the default selection without opening the option menu). Move the cursor onto the end of the connection, or angle in the connection, you want to reposition. When you are on the end or angle, a small yellow box encloses it. Click the left mouse button to 'cut' it, and drag the mouse to move it to the new position. Finally, click the left button to 'paste' the connection in place. As usual, clicking the *right* button at any time cancels the operation.

You can add new joints to the connection by clicking the small yellow box with the *middle* mouse button instead of the left one. Now when you drag the mouse an extra angle and length of connection appear, which are pasted into position as before.

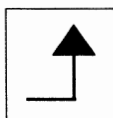
NOTE. The new angle always appears 'down-stream' of the selected point.



Replicate. To *replicate* a block or group of blocks, choose the STAMP option icon (second from the left). Use the same procedure outlined above and duplicate the designated block or area as many times as you click the mouse.

NOTE. Replicated blocks are reproduced initially without tagnames, and connections external to the replicated area are severed. (Connections *between* blocks within a replicated area remain intact.) A replicated block is automatically allocated the next available consecutive address.

CONNECTION



The CONNECTION icon is represented by the right-angled arrow. It is used to connect the function blocks that make up the control strategy, and has no options.

Starting a Connection. To start a connection, click on the CONNECTION icon with the left mouse button, move to the block you want to connect and click again (anywhere inside the block). LoopDraw responds with a grid-menu that lists all the points you can connect from (i.e. all points that emanate from the block). Figure 4.8 is an example of a connect menu for an ANIN block (Analogue Input). The connection mnemonics are colour-coded: analogues are *magenta*, and digitals are *cyan*. Click on the point you want and drag the mouse to the block to be connected to.

AI	AV	OC	O3
NO	N3	SC	

Figure 4.8 ANIN Connection Points Menu

Drawing the Connection. After you select the source connection point, moving the mouse draws a line segment. Analogue connections appear as *solid* lines, digital connections as *dashed* lines. If the block you are connecting to is not in line with the source block, you need to generate angles in the connection. To do this, draw a line segment to the length of your choice and at the angle vertex, click the left mouse button. This fastens the line segment and allows you to change direction 90° and continue with the next line segment. From block *corners*, however, lines can be drawn at any angle. Figure 4.9 shows examples of 90° and oblique (corner) connections.

NOTE. If you change your mind about the position of an angle you have just fixed, click the middle mouse button to take you back a step. You can then reposition the angle without having to start the connection all over again.

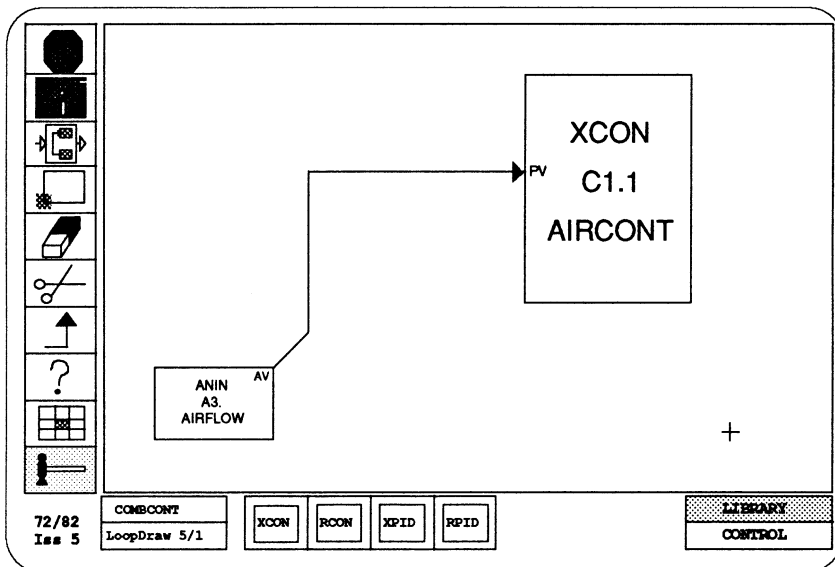


Figure 4.9 Angled Connection

Finishing the Connection. When you reach the destination block, position the cursor anywhere inside it and click again. This time, the grid-menu that appears lists all the points that are available for connection *to*. Click on the one you want to complete the connection. When you do so, the connection source and end-point are labelled with their connection mnemonics.

NOTE. If the destination block has no valid connection points available, or has not yet been given a tagname or assigned to a valid Loop Number (via the QUERY icon), clicking inside it has no effect and you must abandon the connection. Do this by simply clicking the right-hand mouse button. This clears an incomplete connection from the screen.

Closed Loops. If you make a connection that results in the formation of a loop, LoopDraw highlights the loop in red and sends this message at the bottom of the worksheet:

```
Loop Detected!  
Click on the first block in the loop.
```

The reason for this is that in the Intelligent Loop Processor each block is executed in the order of signal flow. If a loop is formed, the instrument has no way of knowing which block to process first so you indicate your choice by clicking the mouse anywhere inside the master block. This causes the connection point that closed the loop to be flagged with a white circle.

Starting a Connection in a Compound. To *start* a connection from within a compound, click on the compound box (with the CONNECTION icon selected). The contents of the compound now appear magnified inside a green box. Click again on the particular box inside the compound that you want the connection to start at. (If this is another, nested, compound *its* contents are displayed magnified as before and the process is repeated.)

The usual grid-menu of connectable points pops up (as described above under *Starting a Connection*) and you select a point and draw the connection as before. If the connection is to go outside the compound, draw it beyond the edge of the green box enclosing the magnified compound and click the left button. The compound box now reverts to its normal view, and the connection line can be drawn to the destination block.

If you are working with nested compounds you may have to repeat the process of clicking outside the green magnified compound boxes as you take the connection to its final destination function block.

Finishing a Connection in a Compound. Draw the connecting line up to the compound box and click on it as usual (see above, *Finishing the Connection*). The compound 'opens up' inside a green box and you can click on the required destination block. As before, nested compounds can be opened up for connection by repeating these steps.

QUERY

The QUERY icon is represented by a large question mark. Its pop-up option menu (see Figure 4.10) has two icons that allow you to see (and enter) information about a block or compound, identify a connection, and also to verify that all expected connections are complete.

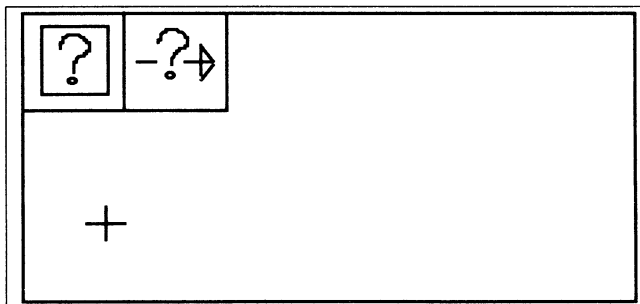


Figure 4.10 *QUERY Option Menu*



Querying a Block. If you select the query-block icon (first on the left) and click again on a block in your process, a pull-down Specification Menu appears listing all the main block parameters. (This first option is the default one, so there is no need to open the option menu to select it. Just click QUERY with the left button).

NOTE. Parameters not in the menu can be accessed via an 8263 Hand-Held Terminal (either a real one, or the simulated screen version provided in the TOOLS menu of LoopDraw).

Parameterising a Block. To parameterise each of the function blocks in your strategy, move from block to block pulling down the Specification Menu for each one. Menus vary slightly depending on the block type selected.

Once you are in the Specification Menu the keyboard is activated, so you can begin entering numerical or text values in the parameter fields. The cursor appears as a reverse video rectangle and is moved in any direction using the four arrow keys on the numeric keypad.

Alternatively, pressing the ENTER key inputs data and steps to the next field as well.

Initially, most of the option fields have default values in them which you can change as needed. Generally, valid input types include numbers, text (for units, tagname), or the letters 'Y', 'N', or 'E'. Placing an E in a variable field signifies that the variable value comes from an external element and must be graphically connected to that function block.

Some Specification Menus are two-page. Use the <PgUp> and <PgDn> keys to change page (or the left/right mouse buttons). When you have finished entering data, press ESC or click the mouse to return to the Control Worksheet.

Full parameter definitions are given in the 6370/80 Series Reference Manual.)



Querying a Compound. You can also query a *compound* with the first (default) query option. Clicking on the compound with the left-hand button produces a simple pull-down Compound Template containing only the compound's tagname field. Click again when you want to close the template. (Click with the *middle* button to skip the template.) A magnified view of the contents of the compound then appears, enclosed in a green box. Figure 4.11 shows an example of a blown up Compound. Note that external connections are included in the box, and that the small rectangle at the bottom left of the work area contains the compound's tagname (or a dash if not yet assigned).

You can now query the components within the compound in the usual way, including any compounds nested inside the blown up compound. When you do this, a compound template appears as before, and the contents of the nested compound are shown magnified, ready for further querying. Its tagname is added to those already shown in the work area, in hierarchical order. Clicking in any tagname box returns you to the 'closed' view of that compound, and its name and those of any nested compounds disappear.

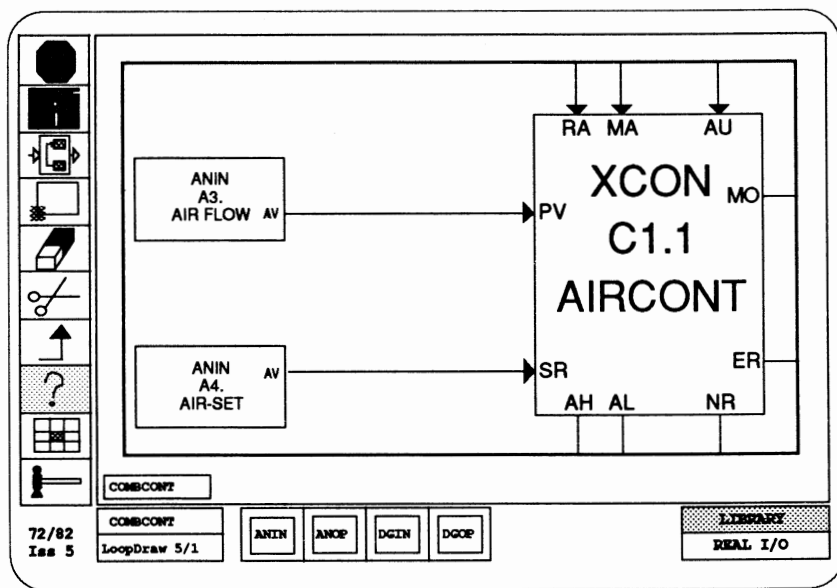


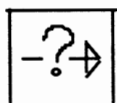
Figure 4.11 Example of Queried Compound



Querying a Connection. You can also use the first (default) query option to query a *connection*. If you move the cursor onto either end of a connection, or onto a vertex, a small yellow box encloses it. Clicking the mouse produces a description of the connection at the bottom of the screen. An example of such a description might be:

Analog connection from (FIC100)A1-AI to (TIC100)Ø1-1A
Click the mouse to continue.

Block tagnames are enclosed in the brackets, with block addresses and connection mnemonics following.



Checking the Strategy. The second option icon, an arrow with a query sign on it, is for checking that all the connections in the strategy have been made, and that there

are no unconfigured blocks. Simply click on this option with any mouse button. If any connections are missing, LoopDraw sends a message like:

```
MISSING CONNECTION:
TIC100             MA   RA   AU
HI ALARM           DO
TIC100OP           AO
```

Click the mouse to return.

The tagnames of any blocks with missing inputs are in green, followed by their available unconnected input(s), and any other input you have designated as external. The 2-letter input mnemonics are colour-coded: *cyan* for digital inputs, and *magenta* for analogue inputs. Blocks inside compounds are listed as the compound tagname followed by the block tagname, separated by a backslash, e.g. COMBCONT\AIRCONT.

NOTE. If the list of unconnected blocks is too long to fit the screen, clicking any mouse button displays the next 'page'. No more than nine unconnected inputs to a given block are listed at one time.

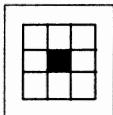
If the strategy contains any unconfigured blocks (ones that have not yet been assigned tagnames or Loop Numbers, and show as purple), LoopDraw sends the message:

Warning! Unconfigured block was found.

If all connections are complete and all function blocks have been assigned a tagname, the LoopDraw message reads:

```
Configuration complete.
Click mouse to continue.
```

ZONES



This icon consists of a 3×3 grid, with (usually) one of the nine boxes highlighted in red. The Control Worksheet is divided into nine zones, each approximately filling the VDU screen at normal magnification. The ZONES icon is used to select which one of the nine zones you want to view. Activating ZONES with the middle mouse button produces an option menu like the one shown in Figure 4.12.

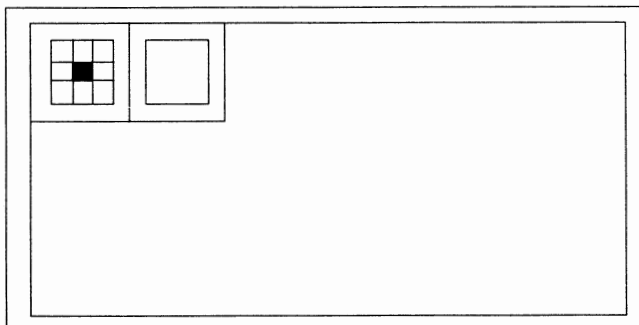


Figure 4.12 ZONES Option Menu



Selecting a Zone. Selecting the first option icon causes a larger grid of zones to appear. Click on the zone you wish to see and it will fill the screen. The corresponding ZONES icon square is highlighted in red.

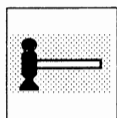
A quicker way to select a zone, without having to open up the option menu, is to click directly on the required square in the ZONES icon using the *left* mouse button.

NOTE. Zone selection cancels any zooming you may have set up.



Viewing the Entire Worksheet. If you click on the second option icon (the plain square) a bird's-eye view of all nine zones appears on the screen at a reduced scale. Zone borders are shown as pale dashed lines. The ZONES icon grid is now appropriately highlighted all over. To return to viewing a single zone, click on the corresponding square in the main ZONES icon.

TOOLS



The icon with the hammer is used to implement special support facilities or *tools*. Clicking with the middle mouse button produces a pop-up option menu like Figure 4.13.

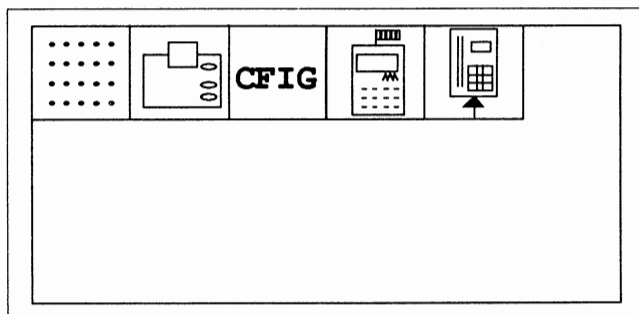
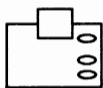


Figure 4.13 *TOOLS Option Menu*

- **Drawing Snap-Grid.** The leftmost option icon (the default option) imposes an invisible 2mm background grid on the control worksheet. Although you cannot see the grid, you can 'feel' it through its snap-action. This restricts you to positioning the cursor (or object corner) only on grid-points, helping you line up the blocks and connections in your strategy.

You need not open up the TOOLS option menu to switch on the grid; simply click the main icon with the left mouse button. A dotted grid pattern shows whenever the grid is active. Click it again to toggle the grid 'off'.



Printer Options. The second icon, marked with a 'printer' symbol, is used to copy the current control strategy to a printer. Alternatively, you can use this option to list the entire strategy, in terms of compounds, block templates, and all interconnections. Note that to use the printer options you *must* have the original LoopDraw program 'key' disk inserted in drive A. If it is not, you will see the message 'Insert LoopDraw Key Disk in drive A. Press Enter to retry, any other key to abandon.'

When you click the printer option, LoopDraw presents you with a menu of six print options:

- ☐ DRAFT 8 inch HI-RES ☐
- ☐ DRAFT 13 inch HI-RES ☐
- ☐ HI-RES 24 pin
- ☐ LIST STRATEGY

Epson Type or Compatible	Paper 8 inch	Carriage 13 inch	Size	Draft or High Res	24-Pin High Res
FX 800	✓			✓	
FX 1000	✓	✓		✓	
LQ 800/50	✓			✓	✓
LQ 1000/50	✓	✓		✓	✓

Printing the Control Strategy. The top four selections are for Epson FX compatible printers with either 8- or 13- inch paper carriages and with the option of Draft or High Resolution printout. The fifth option is for use with Epson LQ or compatible 24-pin printing heads.

Printing Compounds. If an expanded magnified view of a *compound* is on-screen (in its green box) when you start the printing, you get a hard copy of the compound, rather than the central zone.

Listing the Strategy. Clicking on the last menu item prints out a textual listing of all compounds (tagname and blocks inside), blocks (type and full parameter template), and interconnections (to and from each listed block). With this option, you need not specify the printer details.

Errors During Printing. If an error occurs while LoopDraw is printing, an error message appears on the screen with options either to clear the error condition and resume printing, or to abort printing and return to using the other LoopDraw functions.

CFIG **Configuring LoopDraw for the Target Instrument.** The third TOOLS option, **CFIG**, configures LoopDraw for different issues of the target instrument, and for different target instruments in the 6370/80 series. Clicking on the **CFIG** item displays the options menu in Figure 4.14.

7/82 ISS 3	7/82 ISS 4	7/82 ISS 5	7/80 ISS 3	7/80 ISS 5

Figure 4.14 *CFIG Options Menu*

Effects of Changing Issue. Selecting an instrument issue number different from that of the current strategy retrospectively updates all blocks in the strategy so that they have only the features (I/O, parameters, etc.) contained in the selected issue. However, any invalidated blocks or connecting wires are not automatically deleted. For automatic block updating to occur, *you must actively select a different issue number*, not merely load a strategy of one issue into a LoopDraw program of another issue. To ensure this happens, first reset LoopDraw's issue and instrument type to match that of the newly loaded strategy, then select the final required issue number and target instrument.

Effects of Changing Instrument Type. Selecting a target instrument type different from that of the current strategy alters the library of available function blocks to correspond to that of the selected instrument. The maximum numbers of different block types able to be placed are also made to correspond to the new target instrument.

Selecting a different target instrument cannot automatically delete any invalidated blocks or wiring from the current LoopDraw strategy or from a subsequently imported strategy. You must yourself ensure that a 're-issued' strategy is correct in this respect before trying to download it.



Hand-Held Terminal Simulation. The fourth option icon represents an 8263 *Hand-Held Terminal*. Clicking this icon displays the options menu in Figure 4.15.

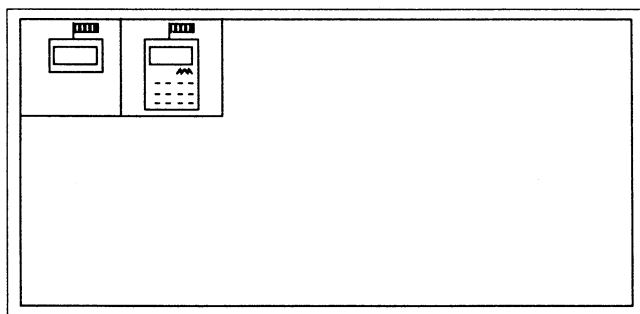


Figure 4.15 *Hand-Held Terminal Simulation Options*

The first option accesses a *partial* HHT simulation, and the second a *full* graphical representation.

Partial Hand-Held Terminal Simulation. The partial option simulation represents just the 8263 HHT readout window. When selected, the window appears at the bottom of the screen overlaying the set of currently available function blocks. It enables you, using the PC keyboard, to monitor and modify data in an instrument connected to the computer via the serial RS232 link (9600 baud only).

Whilst the partial simulation is on-screen you can simultaneously use most of the other LoopDraw functions, e.g. **QUERY**, but you cannot select and place new blocks. When an option requires data entry, characters typed at the keyboard are automatically directed to the relevant field, not

sent to the connected instrument. Otherwise, all keyboard input is transmitted to the instrument and its effects seen in the simulated window.

To deactivate the HHT window and clear it from the screen, type <Control E>. The HHT window is also cleared automatically whenever you:

- Return to DOS
- Select a new library set
- Select the download option
- Select the full HHT simulation

Full Hand-Held Terminal Representation. This is a full graphical simulation of the 8263 Hand-Held Terminal displayed in the centre of the screen, overlaying the LoopDraw strategy. You cannot perform any other function while the full simulation is active.

To 'press' a simulated key, position the cross-cursor on it and click with the left mouse button. The simulated terminal behaves exactly like a real one, displaying all the usual mode prompts etc. (Please refer to the *Intelligent Loop Processor Reference Manual* for details of HHT use). You can also at the same time use the real computer keyboard to input characters via the simulated HHT.

There are some differences in the control key usage in both HHT modes given by LoopDraw. To *execute* the program in the instrument, key in the \$ character from the real keyboard. This is equivalent to the Shift-0 on the HHT. To *clear all connections* key in £ (Shift-5 on the HHT), and to *autoprioritise* key in & (Shift-6 on the HHT). Note that to get a shifted character with the real keyboard you must hold down both shift and character keys *simultaneously*, but with the HHT you press shift and *then* the character key (not both together).

When you use the simulated HHT in either mode, you are communicating directly with the instrument, not with your LoopDraw control strategy. Any parameter changes you make in the *instrument* do not alter the corresponding ones in the strategy. It is not possible, using LoopDraw, to upload the instrument database into a LoopDraw strategy.

NOTE. There is no need to *autoprioritise* a downloaded strategy (by sending &) because LoopDraw does this automatically during the download operation. In fact, if you have specified the first block in any signal loops during the LoopDraw configuration, sending & could alter your specifications.



Downloading a Control Strategy. You use the fifth and last TOOLS option icon to copy your LoopDraw control strategy to the RAM of the Intelligent Loop Processor, via the RS232 serial data link. Note that to use the download tool you *must* have the original LoopDraw program 'key' disk inserted in drive A. If it is not, you will see the message 'Insert LoopDraw Key Disk in drive A. Press Enter to retry, any other key to abandon.'

When you click on this option LoopDraw sends the message:

Prepare COM1 to download to instrument.
Press any key to continue.

WARNING: Do not download a strategy to an instrument whilst the instrument is on-line and controlling plant!

COM1 is an RS232 serial port on the computer, and you may have to disconnect the mouse from it to connect it to the instrument's HHT fascia socket. (This is not necessary if you have the mouse running on the COM2 port.) Press any key when the instrument has been connected and you are ready to proceed.

LoopDraw then displays a series of messages telling you that it is initiating communications, clearing out unused links and blocks, installing blocks, and sending links and parameters. Assuming all goes well, the final message is:

```
Download successful.  
Press any key to continue.
```

Note that a large strategy may take up to a minute to download completely, and you cannot use LoopDraw for any other purpose during this time.

Error Messages. LoopDraw checks every stage of the download process as it runs, and reports any errors together with details to help you rectify them. Right at the start, LoopDraw checks for duplicated or invalid block addresses; if any exist you are told the details and the download is aborted. Failure to send a link or a parameter, or to install a block, results in an appropriate error message with diagnostic details. Digital I/O bit numbers and loop numbers are also checked for duplication and inconsistency.

Block Execution Order. LoopDraw automatically determines the optimum block execution order during the download process, taking into account any first blocks in a loop you may have specified. Because of this you should not also use the Hand-Held terminal autoprioritise facility, which will not necessarily specify the same 'first blocks'.

NOTE. You can always alter the block execution order manually, by writing new values to the FC parameters of the blocks. Refer to the Reference Manual for details.

Chapter 5

LoopDraw UTILITY PROGRAMS

The LoopDraw program disk is supplied with a second disk containing two utility programs: LD2DXF.EXE and LD2VDU.EXE. To run either of these utilities you must have the original LoopDraw program 'key' disk inserted in drive A. If it is not, you will see the message **'Insert LoopDraw Key Disk in drive A. Press Enter to retry, any other key to abandon.'**

The LD2DXF.EXE Utility

This utility converts a LoopDraw strategy file into AutoCAD™ DXF file interchange format. This means you can import LoopDraw strategies into the AutoCAD drafting package where they can be further annotated, and plotted on a high-quality hard copy device, such as a laser printer or a pen plotter.

To use this utility, at the DOS prompt type:

LD2DXF *filename* [-s] <ENTER>

where *filename* is the root filename of the strategy you wish to convert (excluding the extension), and [-s] is an optional switch for when you are using the AutoCAD Small system. The utility then converts the strategy and outputs a file called *filename*.DXF, ready to be imported into AutoCAD via its DXFIN menu option. Refer to the AutoCAD manual for details.

Drawing Border. Supplied with the utility is a file called A3BLOCKS.DXF containing a TCS 'drawing border'. The utility automatically imports this file into any output file it creates, giving the printout a standard border and drawing control system. Whilst running, the utility prompts you for certain items of information needed to fill in the boxes of the border. The prompts are as follows:

Please Enter Drawing Number:—

Please Enter Drawing Issue:—

Please Enter Date:—

Please Enter Modification Notes:—

Please Enter Drawn By:—

Please Enter Drawing Title Line 1:—

Please Enter Drawing Title Line 2:—

Please Enter Drawing Title Line 3:—

Please Enter Customer Info Line 1:—

Please Enter Customer Info Line 2:—

Responding to any of these prompts with just the <Return> key produces a blank border box.

NOTE. You should confine the strategy to the *central* zone of the nine LoopDraw zones (see page 4.23) if you want the standard border to enclose it completely.

Customising the Border. To customise the supplied border, save an 'empty' strategy in LoopDraw, convert it using this utility, and then import this into AutoCAD where you can edit Block A3 as required. Using the DXFOUT option, export the edited border from AutoCAD, then edit the file (via a text editor, such as EC) to remove all except the BLOCKS section — which includes the BLOCKS section header and section end. Finally, store this as A3BLOCKS.DXF. The Block to be imported into this file must be named A3.

The LD2VDU.EXE Utility

This utility converts a LoopDraw strategy file into VDU .DAT format.

To use the utility, at the DOS prompt type

LD2VDU *filename* <ENTER>

where *filename* is the root filename of the strategy you wish to convert (excluding the extension). The utility then converts the strategy and outputs a file called *filename.DAT*, which may be used by the TCS 8275 VDU package.

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