sinclair ®

ZX Spectrum ®

PRINT UTILITIES

```
1111 2222  3333  4444
5555 6666 7777 8888
1111 2222  3333  4444
5555 6666 7777 8888
1111 2222  3333  4444
5555 6666 7777 8888
FOUR Widths and TWO heights
```

SOFTWARE BY **ANDREW PENNELL** CASSETTE 48K RAM

USER MANUAL FOR PRINT UTILITIES

Introduction

This utility greatly increases the printing and display facilities of your ZX Spectrum by offering a range of character sizes on both the screen and ZX Printer. Eight character sizes are available, and they can easily be mixed within a program. Normally there are 32 characters per line; this software allows 42,32, 21 and 16 characters per line, in single or double height, anywhere on the screen. The additional facility can be used from the BASIC statements PRINT, LPRINT, LIST and LLIST.

Loading instructions

Set up your ZX Spectrum and tape recorder as shown in the diagram.
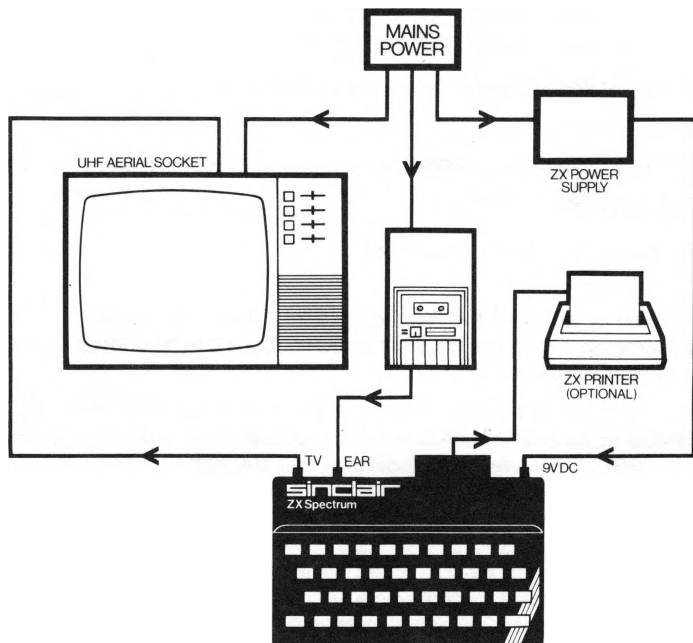
How to connect your ZX Spectrum

The software is in two parts on cassette. The first is a BASIC program which automatically loads the second machine-language section. To load it, type, as appropriate:

    LOAD "48k print" (side A)
    or LOAD "16k print" (side B)

and start the tape recorder.

Stop only after the second section has loaded. The demonstration program contains many examples of the extra facilities.

In use

Once loaded, the utility remains in memory even if NEW is used. However, it must be re-initialised after a NEW by executing

    RANDOMIZE USR 63570 (48K)
    or RANDOMIZE USR 30802 (16K).

NOTE - With the ZX Interface 1 connected, enter:

    CLOSE #15

before loading Print Utilities.

The screen

For this facility, use the statement

    PRINT#15;

followed by whatever it is required to print. Initially, the usual character size in single height is selected, but it can be changed by outputting certain control codes.

The character sets are identical to those listed in Appendix A of the Sinclair manual, with the following exceptions:

    CHR$ 8 moves the cursor one character left
    CHR$ 9 moves the cursor one character right
    CHR$ 12 clears the screen
    CHR$ 24 gives 32 characters per line
    CHR$ 25 gives 42 characters per line
    CHR$ 26 gives 16 characters per line
    CHR$ 27 gives 21 characters per line
    CHR$ 28 selects double height, and is cancelled by entering any
            other size-control characters.

In addition, the AT command is implemented differently. The statement

    PRINT#15; AT Y,X;

will move the cursor to the pixel position (X,Y), where X ranges from 0 to 255, and Y ranges from 0 to 175 with the (0,0) position at the bottom left (as for PLOT). This facility enables very accurate positioning of text and graphics, ideal for labelling and smooth games.

The statement CLS (clear screen) will not reset the additional cursor; to do this, use

    PRINT#15; CHR$ 12;

which clears the screen and resets both cursors.

The TAB function works in the normal way.

Programs can also be listed in the current character size by using

    LIST#15 or LIST #15; line number.

When the screen fills, the usual 'scroll?' prompt will appear, and pressing N, space or STOP will halt it. Pressing any other key will continue the listing.

The printer

All printer output is via normal LPRINT statements, and the control codes used are the same as those for the screen, with the following exceptions: CHR$ 12 is ignored; double-height mode is cancelled after a line is printed; and it is not possible to mix different heights on the same line.

The AT command works in a slightly different way from usual - the Y position is ignored (though it must be less than 176), but the X position can range from 0 to 255 and allows accurate horizontal positioning of text on the printer.

LLISTings in the current printer character width (but only single height) are possible by entering:

    LLIST or LLIST line number

in the usual way. For example:

    LPRINT CHR$ 25: LIST;

will produce a listing with 42 characters per line. Different character widths may be mixed on the same line, but TAB should not be used when doing so. Alternative printer statements, not mentioned in the manual, are LIST#3 and PRINT#3; equivalent to LLIST and LPRINT, respectively.

The character set

The patterns of the characters displayed in 42- or 21 -column modes are slightly different from the normal characters. In particular, graphics character codes 128-143 are slightly narrower, and the two least-significant bits of the User-Defined Graphics are ignored; the far right-hand side of them is not printed.

For advanced programmers

The machine code lies between locations:

        63570—65367 (48K)
    and 30802—32599 (16K).

You should not POKE any numbers into this area of RAM. The additional features can easily be used in machine code programs. To use the screen facility, the system should be set up with the instructions:

    LD A,0FH ;H denotes hex
    CALL 1601H

for the screen or

    LD A,3
    CALL 1601H

for the printer. After this, all characters (including control characters) can be output by loading the accumulator with the code, and executing RST 10H instructions. Registers BC, DE and HL are preserved. Note that this software will move any BASIC program eleven bytes up in the memory map. In particular, any REM statements containing machine code will have a different start address. Certain system variables are used by this software, and the following data should be considered an extension of Chapter 25 of the Sinclair manual:

Notes	Address	Name	Contents
1	23680	PPOSN	printer cursor position
X1	23681	FLAGSZ	various flags
1	23728	XPOSN	horizontal screen cursor position
1	23729	YPOSN	vertical screen cursor position