ACORNSOFT
The choice of experience in software.

View Printer Driver Generator

The View Printer Driver Generator is a configuration aid which permits VIEW text *to be printed in italics*, or highlighted **with bold characters** or underlining. Superscripts or subscripts are also possible as are other fonts where supported on the printer. The View Printer Driver Generator is a configuration aid which permits VIEW text *to be printed in italics*,

Printer Driver Generator

for the BBC Microcomputer

ACORNSOFT

Copyright © Acornsoft Limited 1984

All rights reserved

First published in 1984 by Acornsoft Limited

No part of this book may be reproduced by any means without the prior consent of the copyright holder. The only exceptions are as provided for by the Copyright (photocopying) Act or for the purpose of review or in order for the software herein to be entered into a computer for the sole use of the owner of this book.

FIRST EDITION

ISBN 0 907876 91 9

Note: British Broadcasting Corporation has been abbreviated to BBC in this publication.

Acornsoft Limited, Betjeman House, 104 Hills Road,
Cambridge CB2 1LQ, England. Telephone (0223) 316039

Contents

Introduction 1

MPRINT 2
The Screen Driver 2

1 What are printer drivers? 3

Driving printers 3
Highlights 4
Resetting highlights 4

2 Printer facilities 5

Types of printer 5
Spacing and microspacing 5
Special printer facilities 6

3 Answering the Generator's questions 7

Answer files 7
Codes 7
Printer facilities available through VIEW printer drivers 10

4 Using the VIEW Printer Driver Generator 11

Loading the program 11
Screen instructions 12
Entering codes 12
QUESTION – Do you wish to load an answer file? 13
QUESTION – Include printer initialisation? 13
QUESTION – Does printer have auto line feed? 14
QUESTION – Include italics? 14
QUESTION – Include alternative font? 15
QUESTION – Include bold type? 16
QUESTION – Include underlining? 16
QUESTION – Include super/subscripts? 16
QUESTION – Include microspacing? 17
QUESTION – Give the codes for obtaining $, # and £. If the character is not available on your printer just give it in quotes. 17

QUESTION – Include extended character set? 18
QUESTION – Is there a prefix sequence? 21
QUESTION – Is there a postfix sequence? 21
QUESTION – Repeat the dialogue? 21
QUESTION – Save file of answers? 22
QUESTION – Assembly listing? 22
QUESTION – Save this printer driver? 23
QUESTION – Repeat the dialogue? 24

5 Using the printer drivers 25

Loading 25
Microspacing 25
Setting up the printer 26
Highlight codes 128 and 129 26
Extended highlights 26
Copying a printer driver 28
Booting the printer driver (disc only) 28
Interrupting printing 30
Printing from memory 30
Loading MPRINT 31
Using MPRINT 31
Simulating a print-out on the screen 31
Loading the Screen Driver 33
Using the Screen Driver 33

Notes 35

Form of entry for codes 35
Sequences of codes 35
Codes for toggled functions 35
Longer sequences of codes 36
Code error messages 36
The horizontal motion increment (HMI) 37

Index 38

Introduction

The Printer Driver Generator is a series of linked programs, available on both disc and cassette, which enables you to create programs to control your printer and to use its facilities through VIEW.

In this book, instructions which apply only to the cassette version of the program are shown by the symbol [cassette] ; instructions which apply only to the disc version are shown by the symbol [disc]. Instructions without a symbol apply to both versions.

The following files are provided.

The Generator	Answer files	Printer drivers	
PDRGEN	A.FAC2	FAC2	for the Facit 8105
B.PDG24a1	A.FLO16	FLO16	for the Ricoh Flowriter 1600
B.PDG24b	A.FX4	FX4	for the Epson FX80
B.PDG24c1	A.JUKI4	JUKI4	for the JUKI 6100
B.PDG24c2	A.JP101	JP101	for the JP101
B.PDG24d			
B.PDG24e			

Note that the figures in the names of the printer drivers refer to the size of the extended character set.

The printer drivers have been created by means of the Printer Driver Generator, and you can use them immediately through the `PRINTER` command as described in chapter 5. The answer files provide default answers to help you create printer drivers of your own. If you need a different selection of facilities from those in the ready-made drivers, you should use the Printer Driver Generator, load the appropriate answer file and create your own printer driver.

In the cassette version the answer file A.FX4 (for the Epson FX80) is placed immediately after B.PDG24b, so that it can conveniently be loaded to provide default answers. The rest of the answer files and printer drivers follow the Generator programs.

Two additional facilities have been provided on both disc and cassette.

MPRINT

MPRINT allows you to print out a series of files from disc or cassette, and include a print-out of the contents of memory among them. It also enables you to print out the contents of text memory if you are using VIEW version 1.4.

The use of MPRINT is described in chapter 5.

The Screen Driver

This simulates a print-out on the screen, displaying bold, underlined and italic type, superscripts and subscripts. See chapter 5 for details.

1 What are printer drivers?

A printer driver is a program which links a computer with a printer. It accepts printing instructions from VIEW or ViewSheet and passes on corresponding instructions to the printer.

This use of printer drivers distinguishes VIEW from many other word processors. Most are sold as complete packages, including the computer, monitor, disc drives, printer and software. As such they are usually limited to one printer.

VIEW and ViewSheet are designed to allow much greater flexibility. In fact, given the right printer driver, the choice of printers is virtually unlimited. If you wish to use VIEW with another printer, VIEW itself remains unchanged; only a new printer driver is needed.

The VIEW Printer Driver Generator has been developed to take advantage of this very flexible approach. Instead of having a fixed range of printer drivers to choose from, the Generator offers the possibility of making your own drivers to suit the printers you wish to use.

The Generator is loaded in BASIC and when run it questions you about the characteristics of your printer and makes up a printer driver accordingly.

Driving printers

Simply causing a printer to place characters on paper is no great problem. VIEW itself contains a default printer driver suitable for straightforward production on most serial or parallel printers.

Many printers, however, are capable of such variations as bold or underlined type, special fonts, additional character sets, microspacing, superscripts and subscripts. Printer drivers allow you to take advantage of these special effects.

Highlights

In order to signal to the printer driver that some special effect is required VIEW makes use of highlights. These are markers in the text, like this:

```
word _underlined_ for emphasis

keywords in *bold* type
```

In this case the underbars are used to signal the words which are to be in underlined type and the asterisks the words which are to be in bold type. The underbars and asterisks are not in fact normal characters at all, but highlight codes.

Their function is to signal to the printer driver that a highlight is required. In the default mode, ie if you leave VIEW's setting as it is at switch-on, these codes are:

Highlight 1 (underbar) – code 128
Highlight 2 (asterisk) – code 129

When the printer driver receives one of these codes it sends a corresponding signal to the printer. In the default mode, if the driver receives code 128 it signals the printer to print the characters following underlined; and if it receives code 129 it tells the printer to use bold type.

Resetting highlights

VIEW has only two highlight codes, but printers often have more than two facilities. The Epson FX80 for example can not only print bold and underlined; it can also use an alternative font and print superscripts and subscripts.

VIEW's `HT` command copes with this by allowing the user to change the meaning of the highlight codes temporarily. For example by using a stored command `HT 2 130`, highlight 2 is changed from 129 to 130. After this, provided the printer driver has been correctly designed, you will be able to use a highlight 2 signal to print a special character, for example.

So a high degree of flexibility is built into both VIEW and the printer drivers themselves. By using the Generator, drivers can be tailored to the characteristics of the printer and to your choice among the facilities it provides. At the same time the highlight instructions from VIEW can be modified to take advantage of the full range of facilities available.

2 Printer facilities

Types of printer

Two kinds of printer are commonly used with microcomputers: matrix and daisy wheel.

Matrix printers print characters made up of a pattern of dots. Such printers may work by impact, ie by using a row of 'needles' to press an ink ribbon on to the paper, or by heat or spark discharge producing an image on specially sensitised paper. Matrix printers are fast and relatively cheap, but their print quality is limited by the resolution of the dot pattern.

Daisy wheel printers work like typewriters, pressing fully formed character shapes on to the ink ribbon. The character shapes are carried on a print wheel which is rotated to bring each character opposite the ribbon when it is required. They are more versatile than matrix printers in that the type font can be changed by changing the print wheel, but they are slower and more expensive. Their print quality can be excellent.

Spacing and microspacing

When text is word processed in VIEW it may be either justified or ranged left. For a full discussion of this you should read *Into VIEW* and the *VIEW Guide*. For the moment we need only note that justified text is lined up at both the left and the right margins, so that all lines are the same length.

In order to achieve this even length of lines, VIEW has to adjust the spaces between the words. When you type a line in VIEW with justification switched on the system detects when your last word oversteps the margin and transfers this word whole to the next line.

VIEW's formatting function then distributes the spare spaces throughout the line by adding them one by one to the spaces already there. This produces a tidy appearance to the line, but the spaces between the words are necessarily uneven.

If your printer has a microspacing facility you can improve on this. With microspacing VIEW divides up the spare spaces needed to justify the line into units of one hundred-and-twentieth of an inch. It then distributes these units

evenly by adding an equal amount to each of the spaces in the line. On the screen the text looks the same as before, but when printed out all the spaces in the line are equal and the general appearance is improved.

Special printer facilities

Bold type is achieved by printing a character, moving the carriage of the printer forward a very small distance, and typing the character again. If the printer has an 'auto bold' mode in which it prints any character sent to it in bold, you can include this facility in the printer driver.

Underlined type is achieved by printing a character, moving the carriage back a full space, and printing the underline character. If the printer has an 'auto underline' mode in which it prints any character sent to it underlined, you can include this facility in the printer driver. Some printers which do not auto underline can be made to underline through the printer driver.

Italic type is available on some printers as a special character set, and this can be specified in the printer driver.

Superscripts and subscripts can be achieved in two ways, depending on the printer. The Epson FX80, for example, has superscript, subscript and normal modes, and these modes can be selected through the printer driver. Some other printers which lack these facilities can be made to superscript and subscript by means of half line feeds. With a superscript for example the platen moves down half the distance for a normal line space, the superscript is typed, and the platen moves back again. This can be controlled through the printer driver.

Characters **$ # £** as shown on the screen sometimes appear as quite different characters in the printed text. The printer driver can be made to print them correctly, provided they are in the printer's character set.

An *extended character set* may be available in the form of additional characters which the printer is able to reproduce but which are not present on the computer keyboard – for example the degree sign or 'e' with an acute accent. You can make a selection from those available by specifying them in the printer driver.

Microspacing (see above) can be controlled through the printer driver, provided the printer is capable of it, and provided you can specify the code to operate the 'horizontal motion increment' of the printer so as to achieve the fine spacing needed.

An *alternative font* may be available on your printer in the form perhaps of elite type instead of pica. Moving into and out of the alternative font can be controlled by the printer driver.

3 Answering the Generator's questions

Before you can use the VIEW Printer Driver Generator you should make sure you have the information you will need to answer the questions it puts to you.

The Generator asks you about the characteristics of your printer – whether it needs any initialisation codes, whether it has auto line feed, etc – and it also asks you which facilities on your printer you wish to activate through the particular printer driver you are making.

Answer files

In practice the process of answering the questions can be made a good deal easier if you use one of the answer files on the disc or cassette. These contain standard answers which would be needed to make drivers for certain specific printers. The program asks you if you want to load one of the answer files. If you do so a standard answer from that file will be provided beside every question, for you to accept or modify as you wish.

Answer files are provided for a selection of matrix and daisy wheel printers. Even if your printer is not among these, it will probably still be useful to load one that relates to a similar printer and modify the answers accordingly.

Codes

Many of the questions ask for a 'code'. By this is meant the ASCII code for the characters to be sent to the printer to perform a particular function.

For example the code which causes a Facit 8105 electronic typewriter to print underlined characters is given in the Facit documentation as '29' or '&1D'.

Both numbers mean the same. The first is decimal and the second hexadecimal, and either form may be used in your replies to the Generator's questions. For information on ASCII code and hex, see the *BBC Microcomputer System User Guide.*

Other information which you may need to find out from your printer's documentation includes the following.

Printer initialisation

Some printers require an initialisation code to reset them before printing. For example the Epson FX80 requires the code `ESC "I" 1`.

Auto line feed

Some printers need only to be told to 'return' and they both move back to the beginning of the line and execute a line feed, ie move the paper up one line: this is 'auto line feed'. Others have to be told to 'return' and 'line feed' with two separate commands.

Italics

Codes for starting and stopping italics.

Alternative font

Codes for starting the alternative font and returning to normal printing.

Bold type

Codes for starting and stopping bold type. The driver will only work if the printer is capable of 'auto bold', ie if it can be switched to print any character sent to it in bold.

Underlined type

If your printer 'auto underlines', ie if it can be switched to print any character sent to it in underlined type, you need the codes for entering and leaving underlining.

If it needs to be told to back space and print the underline as two separate commands, you need to know whether the code for back spacing is '8'. Only if it is '8' (alone) can you include underlining in the printer driver.

Superscripts and subscripts

If your printer has superscript, subscript and normal modes, you need the codes to activate these. If not, you need the codes for half line feed and reverse half line feed.

Microspacing

The ability to perform microspacing depends on the HMI (horizontal motion increment) of the printer achieving the correct spacing in units of one hundred-and-twentieth of an inch. Oddly enough most printers have to be told one unit more than the number actually required. If your printer is different, the Generator allows you to make an adjustment.

You also need to know the codes to prefix the setting of the HMI.

Characters $ # £

You need the codes for obtaining these, if any. If you know from experience that placing a certain character in the text results in the printing of one of these characters, you may use that character in double quotes in your reply to the program instead of a code. For example when used without a printer driver the Facit 8105 prints a pound sign when a hash (#) is entered in the text, so the reply to the Generator's question could be `"#"` or `&23` (in hex) or `35` (in decimal). Check the codes in your printer manual.

Extended character set

You need the codes for the extended characters you wish to use. Extended characters are those which are in the same typeface as the printer's normal characters (ie not the alternative font characters) but cannot normally be printed.

Sources of information

Ideally you should be able to find all this information in the documentation provided with your printer. In practice this may not always be adequate. However it is often a good idea to run the Generator even if your information is still incomplete, loading an answer file for a printer similar to your own, and trying out the resulting driver. With a little trial and error you may get a great deal of useful information about your printer.

Printer facilities available through VIEW printer drivers

The following table provides data on a selection of printers.

Printer	Facit 8105	Ricoh Flowriter 1600	Epson FX80	JUKI 6100	JP101
Answer file	A.FAC2	A.FL016	A.FX4	A.JUKI4	A.JP101
Printer driver program	FAC2	FL016	FX4	JUKI4	JP101
Type	Daisy wheel	Daisy wheel	Dot matrix	Daisy wheel	Dot matrix
Initialisation code	–	–	ESC "I" 1	–	–
Auto line feed?	Yes	Yes	Yes	Yes	Yes
Italics – enter	–	–	ESC "4"	–	–
– leave	–	–	ESC "5"	–	–
Alternative font – enter	–	–	ESC "M"	–	–
– re-enter normal	–	–	ESC "P"	–	–
Bold type – enter	28	ESC "O"	ESC "G"	ESC "W"	–
– leave	28	ESC "&"	ESC "H"	ESC "&"	–
Underlined type – enter	29	ESC "V"	ESC "-" 1	ESC "E"	ESC "*" "0"
– leave	29	ESC "R"	ESC "-" 0	ESC "R"	ESC "+"
Underlines spaces?	Yes	Yes	Yes	Yes	No
Code 8 back space?	–	–	–	–	–
Super/subscripts?	Yes	Yes	Yes	Yes	No
Half line feed	ESC 3	ESC "U"	–	ESC "U"	–
Reverse half line feed	ESC 7	ESC "D"	–	ESC "D"	–
Superscript	–	–	ESC "S" 0	–	–
Subscript	–	–	ESC "S" 1	–	–
Normal	–	–	ESC "T"	–	–
Microspacing?	Yes	Yes	No	Yes	No
HMI adjustment?	Yes	No	–	No	–
HMI setting code	ESC 13	ESC 31	–	ESC 31	–
Code for $	"$"	"$"	"$"	"$"	"$"
Code for #	ESC 17	"#"	"#"	"#"	"#"
Code for £	"#"	163	6	ESC "I"	ESC "[" "1" "0" "0" "#" ESC "[" "1" "1" "0"
Extended character set?	Yes	Yes	Yes	No	Yes
Prefix	ESC	–	–	ESC	–
Postfix	–	–	–	–	–

4 Using the VIEW Printer Driver Generator

Loading the program

The Generator is a series of linked programs and is used as follows.

If the computer is not already in BASIC type:

*BASIC **RETURN**

You are advised to make a copy of your Printer Driver Generator disc before using it. This is partly for safety, and partly to provide a disc for recording any additional answer files and printer drivers that you make for your own use. Use *COPY (not *BACKUP) as follows:

COPY 01$. **RETURN** *COPY 01A.* **RETURN** *COPY 01B.* **RETURN**

(to copy all files from drive 0 to drive 1) or

COPY 00$. **RETURN** *COPY 00A.* **RETURN** *COPY 00B.* **RETURN**

(if you have one drive only)

Place the disc in the drive. Hold down **SHIFT** while you press and release **BREAK**. Then close the hatch.

You are recommended to use a cassette recorder with remote control (REM), and the following instructions assume this.

Wind back the cassette fully and place it in the cassette recorder. Type:

CHAIN "" **RETURN**

When you see the message Searching press the PLAY button on the cassette recorder.

After the third program (PDG24b) has been loaded the first question appears. Leave the PLAY button on the cassette recorder down (ie assuming your recorder has a REM connection) and continue with the questions, which are explained on the following pages.

When answering the first question (`Do you wish to load an answer file?`) note that the next file on the cassette after PDG24b is the answer file A.FX4 (for the Epson FX80). (See the Introduction for a list of the files on the tape.) If you want a different answer file, type in its name and wait for it to be loaded. You will then have to rewind the cassette in order to allow the program to access the rest of the Printer Driver Generator, which is recorded after A.FX4.

Note that you should not attempt to save on to the Printer Driver Generator cassette. Use a separate cassette for this purpose.

Screen instructions

The first screens in the program contain general instructions as to how to use the program, and you are given the choice as to whether to look at them or not.

Entering codes

As you work through the program you will frequently be asked to enter codes which the driver can use to control the printer. The Generator accepts codes in three forms: decimal, hexadecimal (commonly known as hex), or characters.

The codes used are based on ASCII (American Standard Code for Information Interchange). For information on ASCII and on the relation between decimal and hexadecimal numbers, see the *BBC Microcomputer System User Guide.*

For example, the code to control a printer function might be '75'. Translated into hex this becomes '&4B' (the '&' shows that it is hex, not decimal). As an ASCII code the number '75' or '&4B' is the character 'K'.

So in response to a question from the Generator we could answer: `75` or `&4B` or `"K"` – and the meaning would be exactly the same. If you use a character in this way it must be placed between double quotes.

For detailed information on entering codes, see the notes at the end of this book. For most purposes, however, the following rules will be sufficient:

- If you are entering more than one code leave spaces between the codes.
- If you are entering two or three codes the first code must be `ESC`.

If you enter a code and the program replies with an error message such as `Invalid answer`, check the code you have entered. For information on error messages see the notes at the end of this book.

For second thoughts, press ESCAPE

Many of the questions in this program require a series of several answers. In such cases, if you have already given some of the answers and then decide that you need to change them, you can go back to the beginning of the question by pressing **ESCAPE** .

When you go through the question a second time, the default answers will be those you gave the time before.

In some cases, pressing **ESCAPE** takes you back more than one question. These cases are noted in the commented list of questions in this chapter.

QUESTION – Do you wish to load an answer file?

These are files which give standard answers for a selection of printers. The answer files available are listed at the end of chapter 3.

Type: `N` **RETURN**
or `Y` **RETURN**

Whenever the program asks for a `YES` or `NO` answer, you may type the word in full or abbreviate it to `N` or `Y`, as is done from now on in this manual.

If you type `N`, the program goes on to the next question.

If you type `Y`, the program asks you to type the relevant filename.

Type: `filename` **RETURN**

and the computer loads the answer file. From now on, standard answers will be suggested for all questions. If you want the standard answer, just press **RETURN** . If you want a different answer, type it in and press **RETURN** . As you begin to type, the standard answer will disappear.

QUESTION – Include printer initialisation?

Some printers require an initialisation code to be sent to them before they can begin working. Check your printer manual.

Type: `N` **RETURN**
or `Y` **RETURN**

If you type `N`, the program goes on to the next question.

If you type Y, the program asks you to give the code sequence for initialising the printer. This need not begin with ESC.

If the sequence contains more than one code, leave a space between codes. If your printer requires more than seven codes, see the notes at the end of this book. Press **RETURN** when you have finished.

Example:

```
ESC "I" 1
```

This could also be typed:

```
ESC &49 1 or ESC 73 1
```

since the ASCII code for 'I' is &49 (hex) or 73 (decimal).

ESCAPE returns the program to `Include printer initialisation?`

QUESTION – Does printer have auto line feed?

The question is whether the printer executes a line feed automatically after a carriage return, or whether it needs a separate command for the line feed.

Type: N **RETURN**
or Y **RETURN**

ESCAPE returns the program to `Include printer initialisation?`

QUESTION – Include italics?

Does your printer have italics, and if so do you want to include this facility in your printer driver?

This is the first question which depends partly on personal choice. With all such questions you have to balance the usefulness of having the facility against the amount of memory it takes up in the driver.

Memory for printer drivers is very limited, so each time you add a facility the Generator adds up the amount of memory it uses. When you have finished the program, the Generator will tell you how much memory is left. If you have taken up too much memory your driver will not work, so you will have to make another, leaving out some facilities.

However it is unlikely you will need all printer facilities in the same document, so you can conveniently make yourself several drivers for the same printer if this problem arises.

Type: N **RETURN**
or Y **RETURN**

If you type N, the program goes on to the next question.

If you type Y, the program asks you to give the code(s) to start and stop italics.

The code to stop italics must be one which performs this function alone.

Type in the code(s) in each case and press **RETURN**. Remember that you may use a character in double quotes, a decimal number, or a hex number (preceded by '&').

ESCAPE returns the program to `Include italics?`

QUESTION – Include alternative font?

Does your printer have an alternative font, ie a set of characters in a different typeface from the normal, such as double-sized characters? If so, do you want to include the facility of using them in your printer driver?

Type: N **RETURN**
or Y **RETURN**

If you type N, the program goes on to the next question.

If you type Y, the program asks you to type in the code(s) to start alternative font and to return to normal font. Type in the codes, pressing **RETURN** after each.

Examples:

```
Code(s) to start
alternative font? ESC "M"

Code(s) to start
normal font? ESC "P"
```

ESCAPE returns the program to `Include alternative font?`

QUESTION – Include bold type?

If you type N, the program goes on to the next question.

If you type Y, the program continues:

```
Does printer auto-bold?
```

If you type N, the program replies:

```
Then bold isn't possible
Press RETURN to continue
```

If you type Y, the program asks you to type the codes to start and stop bold. Type each code, pressing **RETURN** after each. The program goes on to the next question.

ESCAPE returns the program to `Include bold type?`

QUESTION – Include underlining?

If you type N, the program goes on to the next question.

If you type Y, the program asks you various questions about your printer's underlining facilities. In order to answer them, you will need to know the following:

- Whether your printer auto underlines.
- If it does not, whether code 8 causes it to back space.
- If it does, the codes needed to start and stop underlining.

ESCAPE returns the program to `Include underlining?`

QUESTION – Include super/subscripts?

If you type N, the program goes on to the next question.

If you type Y, the program continues:

```
Does the printer have
super/subscript/normal modes?
```

The question distinguishes between those printers which can switch modes so that any character printed while the computer is in superscript mode, for example, will appear as a superscript; and those printers which require specific half line feed commands to print superscripts and subscripts.

If you type N, the program asks you for the codes for half line feed and reverse half line feed. Type each code, pressing **RETURN** after each. The program goes on to the next question.

If you type Y, the program asks you for the codes for subscript, superscript and normal.

Type each code, pressing **RETURN** after each. The program goes on to the next question.

ESCAPE returns the program to `Include super/subscripts?`

QUESTION – Include microspacing?

If you type N, the program goes on to the next question.
If you type Y, the program continues:

```
Is HMI code adjustment required?
```

With most printers no adjustment is required to the HMI (horizontal motion increment) codes. In some cases you may find that when microspacing is active the column of text is wider than when not microspaced. If that happens you should answer Y to this question.

Type: Y **RETURN**
or N **RETURN**

The program then asks you for the code(s) to prefix setting of HMI.

Type the prefix code(s) and press **RETURN**. (This may not be longer than two codes.)

ESCAPE returns the program to `Include microspacing?`

QUESTION – Give the codes for obtaining $, # and £. If the character is not available on your printer just give it in quotes.

Each of the questions appears in turn as you answer the one before and press **RETURN**. The program then goes on to the next question.

As before, you may give the code in the form of a number in decimal or hex, or a character in double quotes. You may use up to seven codes here.

To take the example quoted in the last chapter, if your printer prints a pound sign whenever you place a hash (#) on the screen, you can answer the third question above with:

- The character itself: `"#"`
- The ASCII number in hex: `&23`
- The ASCII number in decimal: `35`

ESCAPE returns the program to the first code.

QUESTION – Include extended character set?

The extended character set is not to be confused with the alternative font. Extended characters are those which are available on the printer in the same typeface as the normal characters, but cannot be used directly from the microcomputer keyboard without entering their codes.

If you type `N`, the program continues:

```
Do you want 'exact space' (Y/N) ?
```

Exact space should ideally be part of every driver. It is used when the space character is in effect part of a composite word or name, and so should not become lengthened or transferred to another line when formatting. Examples in which the 'exact space' character would be used are Louis XIV and Model B.

Type `Y` **RETURN**
or `N` **RETURN**

The program goes on to `Repeat the dialogue?` below.

If you type `Y` in response to the question `Include extended character set?`, the program asks you for the size of your extended character set (2, 4, 8, 16 or 32).

What the program needs to know is how many characters there are in your printer's extended character set– or, more usefully, how many of those you want to have access to through your printer driver.

The principle on which the driver works is that you should be able to print out a given extended character by placing another character in your VIEW file with one of the highlight codes in front of it. For example you could design your printer driver in such a way that every time you wanted to print the degree symbol you would use the character `Q` with a highlight code before it. Eighty-five degrees would then appear in the VIEW file as `85*Q` and would be printed as 85°.

In order to allow you to select pairs of characters like this and to specify codes that will cause the printer to print them, the Generator displays a standard set of character pairs at this point in the program.

How many character pairs it displays opposite each code depends on how many extended characters you specify – 2, 4, 8, 16 or 32. If you specify 32 the program allows you one character for each of the 32 codes. At the opposite extreme you could specify only two characters and the result would be a table in which each of the two characters could be activated by any one of 16 keyboard characters. *Note* that in every case the exact space (@) character is compulsory.

The illustration below shows another possibility: four character codes which can each be activated by any one of the eight characters opposite to it.

```
Include extended character set ? YES
Extended set size (2/4/8/16/32) ? 4

@:   D:ä   H:`   L:_
P:¨  T:Pt  X:™   \:½   32 EXACT SPACE

A:Ä  E:ö   I:è   M:ü
Q:   U:ñ   Y:¥   |:¾   5 degree

B:ö  F:ü   J:è   N:à
R:¶  V:§   Z:µ   >:©   16 section

C:ü  G:ß   K:†   O:ç
S:¢  W:®   {:¼   ?:ƒ   25 U umlaut
```

Notice how the character pairs are displayed. The left character in each pair is the access character, and the right character is the wanted character. The selected character pair is on a white background, and the code to tell the printer to print it is on the white panel to the right.

In general if you place the access character in your VIEW file after `HT 2 130` the result will be to print the wanted character – always assuming the wanted character is in your printer's character set and that you have specified the correct code for it. Notice that the degree symbol mentioned above is paired with `Q`.

To use the display proceed as follows.

If you do not want to change any characters or codes press **RETURN** and the program will go on to the next question.

To change a character or code

Move the cursor to the character pair concerned by means of the arrow keys at the right of the keyboard. Press **TAB** (or the access character).

The white background shifts to your selected character pair (if it is not there already) and the cursor moves to the code panel on the right.

If the code there is already correct, press **RETURN** . To change the code, type in the new code and press **RETURN** .

At this point if you have finished all your amendments to the extended characters you can move on to the next question by pressing **RETURN** .

To move a character pair from one set to another

You may wish to select more than one wanted character out of the same row of characters as set out on the screen.

To do this place the cursor in the row of character pairs where you wish the wanted character to appear.

Press **COPY** . The word copy appears at the cursor space.

Press the access character of the pair you have selected.

Press **RETURN** .

A new character pair appears with a different symbol as the access character, accompanied by the selected wanted character. The symbol is now the access character for this pair, so you should make a note of it. The cursor is now in the code panel for you to type in the code as before and press **RETURN** .

If you change your mind about the moved character, you can restore the original pair by moving the cursor back to that location and pressing **TAB** .

At this point again you can move on to the next question by pressing **RETURN** .

The standard mapping for extended characters is as follows:

Access	Wanted	Access	Wanted
@	Exact space	P	Umlaut
A	A umlaut	Q	Degree symbol
B	O umlaut	R	Paragraph symbol
C	U umlaut	S	Cent
D	a umlaut	T	Spanish exclamation mark
E	o umlaut	U	Tilde

F	u umlaut	V	Section symbol
G	Schafer's s	W	Registered mark
H	Grave accent	X	US ™ symbol
I	e acute	Y	Yen
J	e grave	Z	Greek Mu
K	Dagger	[	A quarter
L	Double underline	\	A half
M	u grave	]	Three quarters
N	c cedilla	?	Old English S

Note that the driver does not allow you to redefine the 'exact space' character (@). See the explanation at the beginning of this question.

ESCAPE returns the program to `Include extended character set?`

QUESTION – Is there a prefix sequence?

Some printers, such as the Flowriter with IBM option and Epson FX80, require no prefix. Others such as the Facit require a prefix but no postfix (see below). Others still require a case shift to shift in and out of the extended set. These last need both a prefix and a postfix.

If you type `N`, the program goes on to `Repeat the dialogue?` below.

If you type `Y`, the program asks you for the prefix codes. Type the prefix code(s) and press **RETURN**.

ESCAPE returns the program to `Include extended character set?`

QUESTION – Is there a postfix sequence?

If you type `N`, the program goes on to the next question.

If you type `Y`, the program asks you to give the postfix code(s). Type the postfix code(s) and press **RETURN**.

ESCAPE returns the program to `Include extended character set?`

QUESTION – Repeat the dialogue?

If you type `N`, the program goes on to the next question.

If you type Y, the program goes back to `Include printer initialisation?`

The default answers shown by the questions will be the ones you have just given.

ESCAPE returns the program to `Include extended character set?`

QUESTION – Save file of answers?

If you type N, the program goes on to the next question.

If you type Y, the program continues:

`Enter filename:`

Type the filename and press **RETURN**. The program goes on to the next question.

If you type N, the program goes on to the next question.

If you want to save the answer file, you should remove the Printer Driver Generator cassette from the cassette recorder and insert a blank cassette before typing the filename and pressing **RETURN**. When you have saved the answer file, you can place the Printer Driver Generator cassette in the cassette recorder again.

QUESTION – Assembly listing?

At this point you can if you wish display a listing of the printer driver you have specified in assembly code on the screen, or you can print it out.

If you type N, the program goes on to the next message.

If you type Y, the program continues:

`On the printer?`

Answer Y or N and the code will be displayed or printed. If it is displayed on the screen you can make it pause while you inspect it by holding down **SHIFT** while you press **CTRL**.

You will see the following on your screen:

```
Printer (filename)

      Assembling - please wait

      0 bytes free

Relocating
Done
```

If you have exceeded the permitted number of bytes the message will be something like:

```
5 bytes too big
Repeat the dialcgue?
```

at which point you can end the program by replying N or start again by replying Y.

QUESTION – Save this printer driver?

If you type N, the program goes on to Repeat the dialogue? below.

If you type Y, the program asks you to type in the name of your printer driver file. Type in the name you wish to call the printer driver and press **RETURN** .

The program ends.

If you type N, the program ends.

If want to save the printer driver, you should remove the Printer Driver Generator cassette from the cassette recorder and insert your own cassette before typing in the name of your printer driver and pressing **RETURN** .

The program ends.

QUESTION – Repeat the dialogue?

Type: Y **RETURN**
or N **RETURN**

If you type Y, the program starts again.

If you type N, the program ends.

Note that this question applies only to disc users.

5 Using the printer drivers

This section applies both to ready-made and to self-generated printer drivers.

Loading

Return the computer to VIEW by typing `*WORD` **RETURN**.

Type: `NEW` **RETURN**

Place the disc with your printer driver file in the disc drive.

Type: `PRINTER filename` **RETURN**

When the driver is loaded, the words `Printer default` at the top of the screen are replaced by `Printer ...` followed by the name of the driver. For example `Printer FL016`.

Return the computer to VIEW by typing `*WORD` **RETURN**.

Type: `NEW` **RETURN**

Place the cassette with your printer driver file in the cassette recorder.

Type: `PRINTER filename` **RETURN**

When the `Searching` message appears press the PLAY button. When the driver is loaded, the words `Printer default` at the top of the screen are replaced by `Printer ...` followed by the name of the driver. For example `Printer FL016`.

Microspacing

If you wish to use microspacing (assuming your printer can do it and that you have built it into the driver) type:

`MICROSPACE` **RETURN**

Setting up the printer

If your printer is of the serial RS423 type, the computer must be switched to this type of output, since it defaults to parallel. To select for RS423 output type:

`*FX5,2` **RETURN**

Depending on what transmission speed your printer accepts you may have to set the baud rate. This is done with a command beginning `*FX8` followed by a digit selecting the rate as follows.

75	–	`*FX8,1`	2400	–	`*FX8,5`
150	–	`*FX8,2`	4800	–	`*FX8,6`
300	–	`*FX8,3`	9600	–	`*FX8,7`
1200	–	`*FX8,4`	19200	–	`*FX8,8`

Highlight codes 128 and 129

128 and 129 are codes which VIEW sends to the printer driver to activate highlight effects. If you need only underlined type, bold type and microspacing, you will not need to reset these highlight codes at all. Leaving VIEW at its default setting of 128 and 129 will allow you to use highlights within the text as follows.

For underlined type use a highlight 1 code before and after the words involved:

`_underlined type_` is printed <u>underlined type</u>

For bold type use a highlight 2 code before and after the words involved:

`*bold type*` is printed **bold type**

Extended highlights

If you have specified highlights such as superscripting and subscripting, italics and extended characters in your printer driver you will need to reset highlight 2. The method is to use a stored command, as described in *Into VIEW* and the *VIEW Guide*.

Switch VIEW into text mode by pressing **ESCAPE**. Place the cursor before the point where you want the extended highlights to be active.

Press **SHIFT** **f0** (EDIT COMMAND)
Type: `HT` **RETURN**
Type: `2 130`

You should now have the stored command: `HT 2 130` in the text, which switches the highlight 2 code sent by VIEW to the printer driver from 129 to 130. The effects available will be as follows.

Highlight	Effect
_	Switch underlining on or off. Automatically cancelled at end of line.
***	Switch bold on or off.
+	Next character is part of the extended character set.
*_	Begin subscripting. Automatically cancelled at end of line.
**	Begin superscripting. Automatically cancelled at end of line.
**_	Return to normal printing after superscripting or subscripting.
*__	Switch alternative font on or off.
_	Switch italics on or off.
*___	Reset all functions to off. You should use this at the start of all documents.
__	This is used by ViewIndex only.

Examples

`_underlined type_` is printed <u>underlined type</u>

`***bold type***` is printed **bold type**

`65*Q` and `Fa*Oade` are printed 65° and Façade

`123*_4**_5` is printed $12_{3}4_{5}$

`123**4**_5` is printed $12^{3}4_{5}$

Copying a printer driver

It is a good idea to make a copy of the printer driver you will use often on to a separate disc or cassette. The procedure is as follows.

Type:

`*TAPE` **RETURN**

`PRINTER filename` **RETURN**

`*SAVE filename 400+100` **RETURN**

Type:

`*COPY 00 filename`

if you have a single disc drive or

`*COPY 01 filename`

if you have a dual disc drive.

Booting the printer driver (disc only)

The *Disc Filing System User Guide* describes a way in which you can cause files to 'auto-start', ie to load and run without going through the normal procedures.

Clearly this could be an advantage when using printer drivers. Once you set up a disc in this way, all you have to do at the start of a word processing session is to hold down **SHIFT** while you press and release **BREAK** and your printer driver will be loaded and your `*FX` commands entered for you.

Auto-starting is done by creating a special file called !BOOT and setting the disc options so that this file is used immediately.

The method of creating a !BOOT file using `*BUILD` is described in the *Disc Filing System User Guide.* In practice it is simplest to create one using VIEW. For example suppose you have created a driver for the Facit which you call 'FACIT'.

First you should copy your Facit driver from the Generator disc on to a blank disc. Once you have done so, place the disc with the copy driver on it in the disc drive, get into VIEW text mode and make up text as follows.

```
PRINTER FACIT
*FX5,2
*FX8,5
```

Then save this text on to your disc with the filename !BOOT. (`*FX5,2` selects serial printing, and `*FX8,5` sets a baud rate of 2400.)

All that remains is to set the disc option so that the disc filing system causes this file to `*EXEC`.

Type: `*OPT 4 3` **RETURN**

From now on whenever you start your word processing session you have only to insert the driver disc, and hold down **SHIFT** while you press and release **BREAK**. The driver will be loaded and the `*FX` commands will be entered automatically.

But why stop there? Screen mode commands can be entered in the same way along with the `*TV` command to stop the screen flickering. Many people also like to set up the function keys with similar commands. A typical set of files on the driver disc (apart from the driver itself) might be as follows.

File: !BOOT

`*TV0,1`	To stop screen flicker
`MODE 3`	To set `MODE 3`
`NEW`	To open text mode
`PRINTER FACIT`	To load the Facit driver
`*FX5,2`	To set serial printing
`*FX8,5`	To set baud rate 2400
`*EXEC KEYS`	To use the file KEYS

File: KEYS

(This file is created on the disc in the same way as !BOOT.)

`*KEY 0 *EXEC!BOOT|M`	To use !BOOT without pressing **BREAK**
`*KEY 1 *FX5,2|M*FX8,5|M`	To use the `*FX` codes
`*KEY 2 PRINTER|M*FX8,7|M`	To change to the default driver at 9600 baud in order to use another printer
`*KEY 10 OLD|M*TV0,1|MMODE3|M`	To program the **BREAK** key

The result of this file would enable you to use the !BOOT file again by pressing function key f0, to re-enter the *FX commands by pressing function key f1, to change to another printer which uses only the default driver by pressing function key f2, and if you should touch BREAK by accident it will no longer wipe out your text.

Interrupting printing

It is possible to interrupt printing by pressing ESCAPE, but this can sometimes produce unwanted effects. For example if you press ESCAPE immediately after the computer has sent a command to print in bold, the printer will be left switched on to bold type.

If you subsequently start printing another file, the printer will at first print everything in bold, because it is set to do so. Only when it receives the first signal to print bold will it switch to normal type, reversing the bold and medium type through the document. The same can apply to other toggled functions.

The simplest remedy is to switch the printer off and on again when you interrupt printing like this.

Note however that if your printer requires an initialisation code and you switch it off and on, it will not work again correctly until it is re-initialised – either by reloading the printer driver or by resetting all the highlight functions.

Printing from memory

The Printer Driver Generator disc and cassette contain the program MPRINT which has two functions:

- It allows you to print a series of files, using any version of VIEW, and to include a print-out of the contents of memory among them.
- It allows you to print from memory with VIEW version 1.4.

Loading MPRINT has no effect on text in memory. It is placed in an area of memory normally reserved for user-defined characters, which are not needed in VIEW.

Note that MPRINT does not work with the 6502 Second Processor.

Loading MPRINT

Place the Printer Driver Generator disc in the drive. Switch into command mode by pressing **ESCAPE**.

Type: `*MPRINT` **RETURN**

When the cursor returns MPRINT is loaded.

Place the Printer Driver Generator cassette in the recorder.

Type: `*/MPRINT` **RETURN** or `*RUN MPRINT` **RETURN**

When the message `Searching` appears press PLAY on the recorder.

When the cursor returns MPRINT is loaded.

Using MPRINT

To include a print-out from memory among a list of files type:

`PRINT file1 file2 "" file3` **RETURN**

or

`SHEETS file1 file2 "" file3` **RETURN**

To print from memory using VIEW 1.4 type:

`PRINT ""` **RETURN**

or

`SHEETS ""` **RETURN**

Simulating a print-out on the screen

Highlights in VIEW occupy space on the line in text mode, but occupy no space when the text is printed out. So a certain amount of estimating has to be done when, for example, aligning the bold headings of a table with the figures below them. Where only a few highlighted headings are concerned this is easily done,

but if several highlights are used in succession it can be quite difficult to work out the result. The mathematical example below illustrates the point.

Formula 2

$$y_q = 3\left(\frac{x + d^{n-2}}{b_n}\right)$$

Note that y_q is the height at point Q

Here bold and underlined type, superscripts and subscripts combine in the same expression, all parts of which must be correctly aligned with each other if the text is to make sense.

```
HT 2 130
  *___

  ***Formula 2***
                          Note that
  y*_q**_ = 3(_x + d_**n-2**_)      y*_q**_ is the
            b*_n**_                  *_height at
                                  *_point Q

HT 2 129
```

With relatively complex text such as this the only way is to compose it, see how it prints out, and adjust it accordingly. This can be done very conveniently with the help of the Screen Driver program, which simulates a print-out on the screen.

The Screen Driver is included in the Printer Driver Generator disc and cassette. It works like a printer driver, except that when you type PRINT or SHEETS the text is reproduced not on a printer but on the screen – along with bold and underlined type, italics, superscripts and subscripts. When designing text with highlights in it, therefore, one has only to load the Screen Driver before starting, and use it a few times to check that everything comes out in the right place.

Loading the Screen Driver

Loading the Screen Driver clears all text from memory, so if you need your text, SAVE it before going any further.

Place the Printer Driver Generator disc in the drive. Type:

*TOSCRN **RETURN**

When the Printer default message changes to Printer SCREEN the Screen Driver is loaded.

Place the Printer Driver Generator cassette in the recorder. Type:

*/TOSCRN **RETURN** or *RUN TOSCRN **RETURN**

When the message Searching appears, press PLAY on the cassette recorder.

When the Printer default message changes to Printer SCREEN the Screen Driver is loaded.

Using the Screen Driver

Before displaying a simulated print-out it is important to switch the computer into an appropriate screen mode.

MODE 3 which most people use for text processing is suitable for displaying bold, underlined and italic type, but will not show superscripts and subscripts.

MODE 0 shows all the highlights: bold, underlined and italic type, superscripts and subscripts. Although it uses more memory than other modes, this matters only if you are simulating a print-out from text in memory. If you are using named files the memory requirement is relatively small.

MODE 7 will not work with the Screen Driver.

To display your text first insert highlights and HT commands where appropriate. The commands PRINT (abbreviation P) or SHEETS may be used, as in printing.

To display the whole text in memory type:

PRINT **RETURN**

The first lines of the text appear. To continue press the Space Bar. When the text is completed VIEW returns to the command mode display.

To display the text in memory page by page type:

SHEETS **RETURN**

This command works in exactly the same way as if you were printing the text out. The page number is displayed. To show the page press any alphanumeric character except M or Q. To miss out the page press M. To stop the display press Q.

To display text from files saved on disc or cassette use the command **PRINT** or **SHEETS** with the filename(s) concerned, just as you would when printing out. Files will be displayed in the same way as text in memory, as described above.

Notes

Form of entry for codes

The form in which the code is entered may be a decimal number, the equivalent hex number, or a character which has the equivalent ASCII code. Characters must be entered in double quotes.

For example the same information would be given to the Generator by the decimal code `78`, the hex code `&4E` and the character `"N"`.

Sequences of codes

In most cases it is only necessary to enter one, two or three codes.

Where a sequence of two or three codes is used, spaces must be left between the codes, and the first code must normally be `ESC`.

Examples:

```
&3F
ESC 1D
ESC "I" 22
```

Codes for toggled functions

Underline, bold, italics and alternative font are toggled functions in that they require codes to start them and stop them.

If the starting sequence is a single code the stopping sequence must also be a single code.

If the starting sequence is multiple (ie two or three codes long), the stopping sequence must be multiple too. As mentioned above, spaces must be left between codes and the starting code must normally be `ESC`.

If both starting and stopping sequences are three codes long, they may only differ in their third codes.

Longer sequences of codes

There are four questions which can accept answers in the form of much longer sequences. The first of these asks for the printer initialisation sequence, and the others ask for the access sequences for $, # and £.

With these longer sequences there is no obligation to use `ESC` as the starting code, and the number of codes which may be used in an answer to these questions can most helpfully be thought of as limited to seven.

However the maximum number may in practice be greater than seven, since wherever `ESC` is used in the sequence the two codes following it do not count against the limit.

So if an answer follows the pattern: `ESC code code ESC code code ESC code code ...` it is possible to use as many as 21 codes. If `ESC` appears only as the first code, the limit is ten codes. If `ESC` is not present at all, the limit is seven codes.

Example:

```
ESC "[" "1" "0" "0" "#" ESC "[" "1" "1" "0"
```

This sequence (which happens to be the JP101 code for the pound sign) is allowed, since the two codes following `ESC` in each case do not count against the limit.

Code error messages

`Invalid answer`	You have entered too many codes, or you have entered more than one code and the first code is not `ESC`, or you have entered an impossible number for your code.
`Single/multiple code clash`	In a toggled function you have entered a single code for starting and a multiple code for stopping, or vice versa.
`On/off may only differ in the last code!`	In a toggled function you have entered three codes for starting and three for stopping, but the sequences differ in more than the last code.

The horizontal motion increment (HMI)

Printers which are capable of microspacing move along the print line in increments of one hundred-and-twentieth of an inch. When microspacing, the same number of these units is added to all spaces in the justified line to produce a more even appearance than is possible using whole letter spaces. (See chapter 2 for a discussion of microspacing.)

The printer driver tells the printer how many units are to be used in this way, but in practice most printers will only allow N units if they are told to allow N+1 units.

The Generator therefore normally uses N+1 and the question: `Is HMI code adjustment required?` means in effect 'Does your printer need to be told N units, rather than the usual N+1?'

If you cannot find the answer in your printer manual, assume that no adjustment is needed (ie the printer needs N+1) and use the driver to print out a piece of justified text without microspacing. Then try it again with microspacing.

If the lines are the same length, you have guessed correctly. If they are longer with microspacing, your printer needs the HMI code adjustment, since the N+1 code is causing it to space the line too widely.

Index

Alternative font 6, 8, 10, 15, 27, 35
Answer files 1, 7, 10, 12, 13, 22
ASCII 7, 12, 14
Assembly listing 22, 23
Auto bold 16
Auto-booting drivers 28–30
Auto line feed 8, 10, 14
Auto underlining 8, 16

BASIC 3, 11
Baud rate 26
Bold type 4, 6, 8, 10, 16, 27
Booting drivers 28–30
BREAK 28–30

Cassettes 1, 11, 22, 23, 25, 28, 31, 33, 34
Character set, extended 6, 9, 10, 18–21, 27
Codes (answer) 7, 10, 12–14, 35–37
Codes (highlight) 4
Copying printer drivers 28
Copying the Generator 11

Daisy wheel printers 5, 10
Discs 1, 11, 22, 23, 25, 28, 31, 33, 34
Dollar sign 6, 9, 10, 17, 18
Drivers (copying) 28
Drivers (definition) 3
Drivers (list) 1, 10
Drivers (loading) 25

Epson FX80 1, 10, 21
Error messages 13, 36
ESCAPE 13, 30
Exact space 18
*EXEC 29
Extended character set 6, 9, 10, 18–21, 27
Extended highlights 26, 27

Facit 8105 1, 7, 10
Font, alternative 6, 8, 10, 15, 27, 35
Function keys 29, 30
*FX commands 26, 29, 30

Generator programs 1, 11

Hash sign 6, 9, 10, 17, 18
Hexadecimal 7, 12, 14
Highlights 4, 26, 27
Horizontal motion increment (HMI) 17, 37
HT 4, 27

Initialisation 8, 10, 13, 14, 30
Instructions (screen) 12
Interrupting printing 30
Invalid answer 13, 36
Italics 6, 8, 10, 14, 15, 27, 35

JP101 1, 10
Juki 6100 1, 10

Line feed 8, 10, 14
Loading the Generator 11

Matrix printers 5, 10
Memory 23, 30, 31
MICROSPACE 25
Microspacing 5, 6, 9, 10, 17, 25
MODE 33
MPRINT 2, 30, 31

On/off may only differ in the last code 36

Parallel printers 26
Postfix 21
Pound sign 6, 9, 10, 17, 18
Prefix 21
PRINT 31–34
PRINTER 1, 25, 29
Printer driver generator programs 1, 11
Printer drivers (copying) 28
Printer drivers (definition) 3
Printer drivers (list) 1
Printer drivers (loading) 25
Printer initialisation 8, 10, 13, 14, 30
Printers and facilities 5, 6, 10, 26
Programs 1

Resetting highlights 4, 27
Ricoh Flowriter 1600 1, 10, 21
RS423 26

Saving answer files 22
Saving printer drivers 23
Screen driver 2, 31–34
SHEETS 31–34
Serial printers 26
Single/multiple code clash 36
Space, exact 18
Superscripts and subscripts 6, 8, 10, 16, 17, 27

*TOSCRN 33
*TV 29

Underlining 4, 6, 8, 10, 16, 27

VIEW 2, 3, 4, 5, 18, 19, 25–28, 30, 31, 34
ViewIndex 27

*WORD 25

Index

0449.384