T102

TIME CODE READER / GENERATOR

Operation and Maintenance

Release 1.1
June 8, 1993

telcom research

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Printed in Canada

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C H A P T E R

1

Introduction

1.1 Description

The T102 is a compact, serially controlled time code reader and generator. It was designed to be simple to use, sturdy and reliable.

The T102 generates and reads the 80-bit time codes of the Society of Motion Picture and Television Engineers (SMPTE) and the European Broadcasting Union (EBU). This code, when recorded on video or audio tape, permits exact addressing of points on the tapes for precise editing, synchronization, dubbing and splicing.

It operates on either external D.C. power or a 120 volt A.C. power supply.

Features include:

- Functionally independent reader and generator capable of internally exchanging data.
- User bits (any 8 hexadecimal) digits (0 through F)
- Separate generator and reader, jam sync, and operating standard selection.
- Operates in S.M.P.T.E. and E.B.U standards at frame rates of 30, 29.97 (drop frame), 25 and 24 frames per second.

1.2 Accessories

- 120 Volt AC Adapter
- EFP Electronic Front Panel program for the IBM PC (described in chapter 8 on page 73)

- PC-LOG Time Code Logging program for the IBM PC

1.3 SMPTE and EBU Time Code

Time code is an electronic signal recorded on video tape and is synchronized to the accompanying video signal. The purpose of time code is to uniquely identify each frame of video on a video tape (or other video recording medium). This is done by assigning a number to each frame of video in an HOURS : MINUTES : SECONDS : FRAMES format. This is called the time information (time bits). There are two forms of time code and they both contain the same time and user bit information. They are referred to as longitudinal and vertical interval time codes.

There are also two organizations who set standards which specify the technical details of time code. They are the Society of Motion Picture and Television Engineers (SMPTE) and the European Broadcasting Union (EBU).

Longitudinal time code is a digital signal which uses a code format very similar to that used by computer floppy disks. This signal is recorded on an audio track, cue track or address track of a video tape. Time code uses a Bi-Phase Mark code format that is suitable for recording on magnetic tape. The format is based on transitions between clock pulses. Polarity of the signal, or the direction of the transition is unimportant. Bit positions are separated by clock transitions. If there is no transition between the clock transition for a given bit and the clock transition for the following bit the bit value is a logic 0. If there is a transition between clock transition, the bit value is a logic 1. The format of bi-phase mark encoding is shown in figure 1.1.

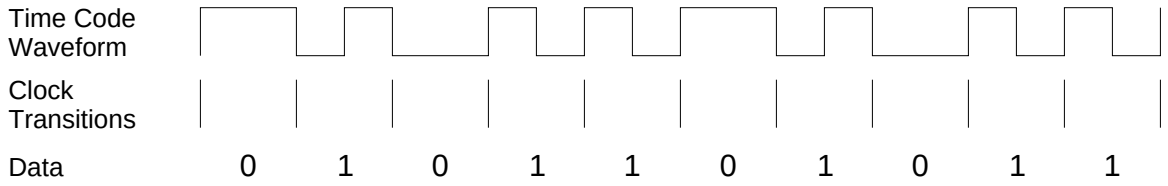


Figure 1.1: Bi-Phase Mark encoding

For each frame of video there is a corresponding frame of time code. Each time code frame consists of 80 bits. These are made up of 16 bits of synchronizing and direction sensing data (the sync word), 26 bits of time information, 32 bits of user information (user bits) and 6 bits of status information. The complete time code frame is repeated once per video frame. The 80 bit positions are divided into 16 four bit groups followed by a 16 bit sync word that identifies the end of one frame and the beginning of the next, as well as the direction of tape movement. 8 of the 16 four bit groups contain the time and status information and are arranged in frame numbers, seconds, minutes and hours order. The code

consists of 4 bit time groups alternating with 4 bit groups dedicated to optional user bit information. Time code information is in binary coded decimal form. The *tens of frames* group uses only 2 bits for time (since it need only count up to "2"). The third bit position in this group is used to indicate the Drop Frame (DF) mode. The fourth bit position in this group is used to indicate the proper color lock of the time code generator (color frame flag CF). The *tens of seconds* group uses only 3 bits for time (since it need only count up to 5). The fourth bit position in this group is used to control parity.

Time codes are accurately phase-locked to the video signals with which the codes are to be used. This is necessary to insure that each time code frame is properly timed with respect to the video frame it identifies. This relationship is shown in figure 1.2 for NTSC video and in figure 1.3 for EBU video where the arrow points to the location in the video signal that corresponds to the starting point of the time code frame (the transition between code bit 79 and code bit 0).

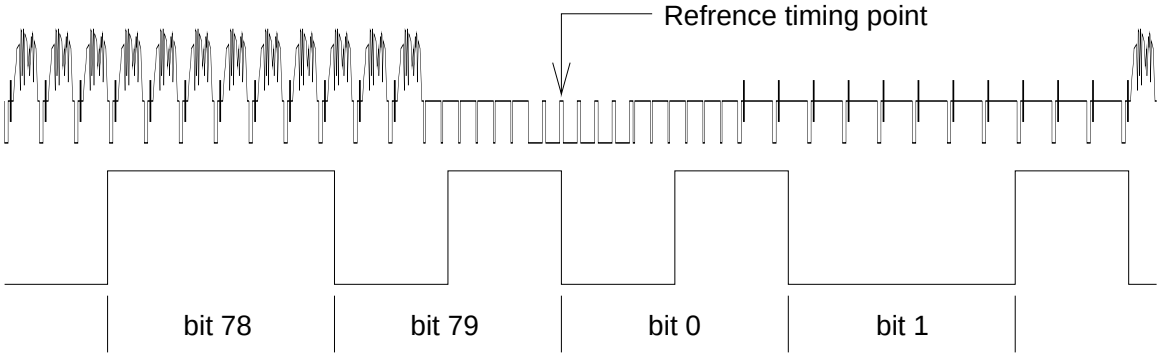


Figure 1.2: Timing Relationship Between NTSC Video and Time Code

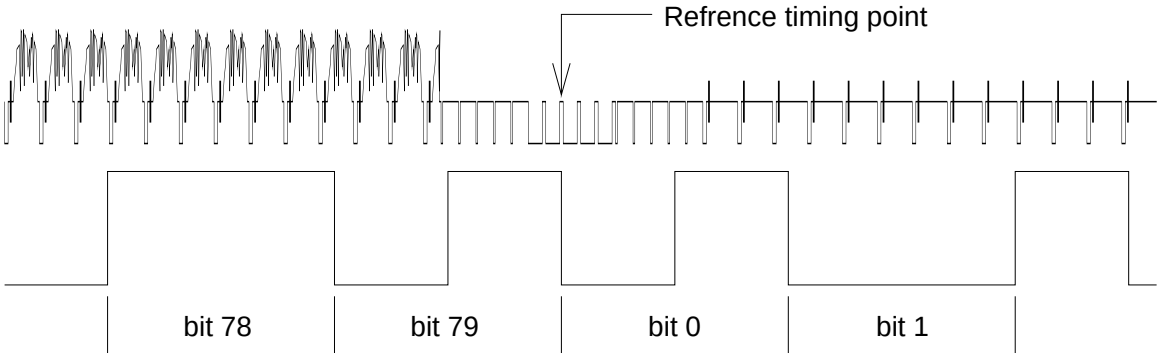


Figure 1.3: Timing Relationship Between EBU Video and Time Code

The format of a full frame of longitudinal time code is shown in figure 1.4. In this figure bit 0 (the start of the frame) is shown on the left and the last bit, bit 79 is shown on the right immediately followed by bit 0 of the next frame. Some of the status bits are labeled with their functions in the SMPTE standard. These bits have different meanings in EBU. except for the color frame flag.

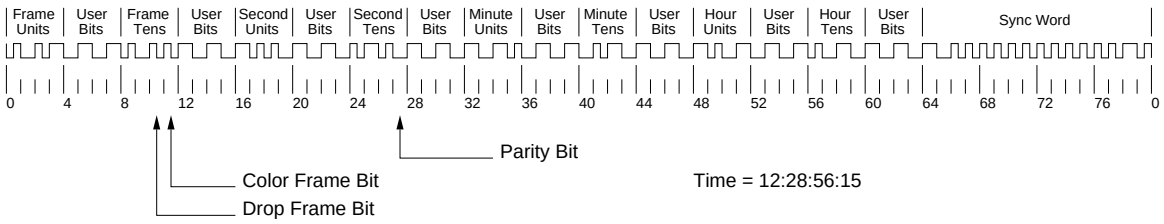


Figure 1.4: Longitudinal Time Code Waveform

SMPTE and EBU. longitudinal time codes are very similar. They use the same number of bits per frame and the sync word, the time and the user information are in the same bit positions in both code format standards. The main difference is the number of frames per second in the respective television systems. The SMPTE system has either 29.97 or 30 frames per second and the EBU. has a rate of 25 frames per second. This causes the number of bits per second to be 2400 in SMPTE and 2000 in EBU. Also some of the 6 status bits serve slightly different purposes in the two systems.

Vertical interval time code is a digital signal in the form of pulses which are placed on two nonadjacent video lines in the vertical interval of the video signal. Figure 1.5 shows an NTSC video signal with VITC inserted in lines 17 and 19. Figure 1.6 shows an EBU. video signal with VITC inserted in lines 19 and 21. There are 90 bits per line in VITC time code. The code is repeated twice in each video field, once on each of two nonadjacent video lines in the vertical interval. Each line contains 18 bits of synchronizing data (the sync bits), 26 bits of time information, 32 bits of user information (user bits), 6 bits of status information and an 8 bit cyclic redundancy check character (CRC). The CRC is the result of doing some arithmetic on the other bits in the code when it is being generated. When the code is recovered this arithmetic is repeated and the result is compared to the recovered CRC and is used to verify that the code is correct and error free. Errors can be caused by noise or dropouts. The CRC provides a 99.61% confidence level in the recovered code.

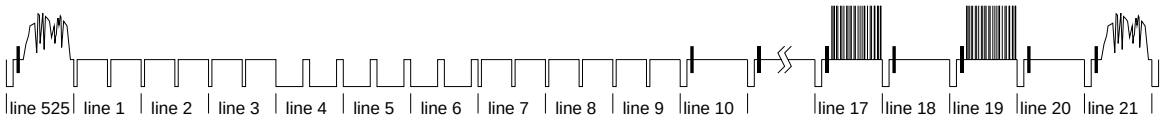


Figure 1.5: SMPTE Vertical Interval Time Code Waveform

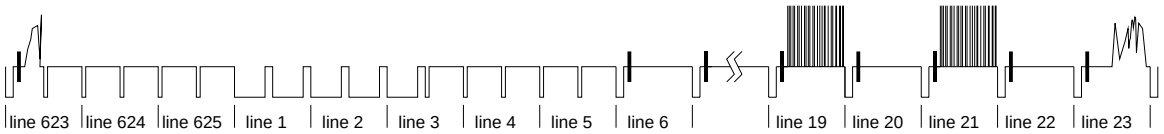


Figure 1.6: EBU Vertical Interval Time Code Waveform

SMPTE Drop Frame (DF) time code was conceived to correct for the NTSC color system frame rate not being exactly 30 frames per second. The NTSC frame rate is only 29.97 Hz, which results in 30 frames being equal to 1.001 seconds. This would produce an accumulative error of about –86.41 seconds per day (the time codes falling behind real time) if no correction was introduced. To fix this problem Drop Frame time code counts 30 frames per second except at the start of each minute not including minutes 0, 10, 20, 30, 40, and 50. At the start of each minute (except as noted above) the first two frames are skipped (or dropped), leaving only 28 frames in the first second of that minute. For instance **15:43:59:29** will advance to **15:44:00:02**. Time code frames numbered **15:44:00:00** and **15:44:00:01** do not exist in Drop Frame mode. This scheme keeps the time codes in step with real time when used with the NTSC color system. Utilizing the DF mode results in a static error of only +75 milliseconds per day, ± any inherent sub-carrier error. EBU time code has no equivalent of Drop Frame because the frame rate in that color system divides the second into 25 parts with no remainder.

Color Framing is a result of the growing sophistication of video tape editing. In color television not all frames are the same, even if there is no change in the picture content. The color part of the signal changes from frame to frame. In NTSC there are two variants of a frame and in EBU there are 4. These may be thought of as a repeating sequence of 'A B A B A B' in NTSC or 'A B C D A B C D' in EBU. The result of these minor differences between frames is that if the sequence is not preserved across edits, a horizontal shift in the picture occurs at the edit point. This is only visible if the picture content is substantially the same on either side of the edit. In most situations this shift is unnoticeable. In order to avoid disturbing the sequence the NTSC system assigns even frame numbers to 'A' frames (fields 1 and 2) and odd numbers to 'B' frames (fields 3 and 4). Therefore to maintain the sequence, if the frame on one side of the edit is odd make sure that the frame on the other side is even.

Modern sync generators provide a color frame identification pulse which identifies field one of the 4 field (NTSC) or 8 field (EBU) video signal. This is shown for the NTSC system in figure 1.7 on page 6. The video signal is shown as the top waveform, the color frame identification pulse is shown as the middle waveform and time code is shown as the bottom waveform. The color frame identification pulse is shown as occurring at line 10 of field 1.

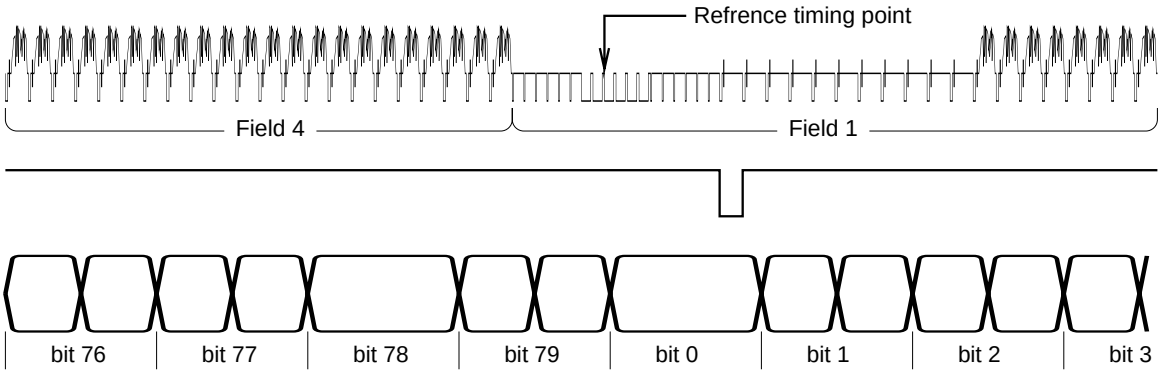


Figure 1.7: Relationship Between Video, Color Frame Identification Pulse and Time Code

In EBU the problem is a little more complicated because the sequence is 4 frames (an even number) and the time code is based on 25 frames per second (an odd number). Color framing is achieved by assigning time code numbers to the video frames in a sequence that guaranties that the remainder when dividing the sum of the frames count and the seconds count by 4 ((frames + seconds) / 4) is 0 for a 'D' frame (fields 7 and 8), 1 for a 'A' frame (fields 1 and 2), 2 for a 'B' frame (fields 3 and 4) and 3 for a 'C' frame (fields 5 and 6).

C H A P T E R

2

Installation

2.1 Unpacking

The T102 time code generator/reader is shipped, with accessories, in a single carton. After opening the carton, carefully examine the equipment for damage that may have occurred during shipment, and report any damage to the carrier and Telcom Research.

2.2 Connections

All signal connections to and from the T102 are made by means of industry standard BNC and XLR connectors on the T102 back panel. Computer communication is through a 25 pin DB25 locking connector.

2.3 Rear Panel Connectors

Computer RS-232 serial data to/from a computer. This is a female DB25 type connector wired as data communications equipment.

Reference Sync Input This input requires video or sync and is used as the main reference for the time code generator. The level of this signal is not critical and may vary from .5 to 5 volts peak to peak; the sync portion of the signal must conform to E.I.A. RS-170 or E.B.U. broadcast specifications during the vertical interval. The sync input is a high impedance loop input using a BNC connector. IMPORTANT – The lock indicator on the T102 will be illuminated when the unit is locked to the sync signal.

Color Framing Input Negative edge triggered input. Level 2 to 8 volts, A.C. coupled. 15 Hz. for NTSC, 6.25 HZ. for PAL. This pulse must occur after the sixth wide pulse in the vertical interval preceding field 1 and before the sixth wide pulse in the vertical interval preceding field 3 of the 4 (8 PAL) field color sequence. That is during fields 1 or 2 of the 4 (8 PAL) field color sequence.

Time Code Outputs The time code output will drive a balanced 600 ohm line, providing a nominal level of +11 dBm. This output may also be used as 2 unbalanced outputs, in which case they should be terminated with a 300 ohm resistor to ground. It is not necessary to terminate unused output pins. The required mating connectors are Switchcraft C3F or equivalent. Pin 1 is ground and the signal is on pins 2 and 3.

Time Code Input The reader input is a balanced line with an impedance of 40,000 ohms. This may be converted to a single ended input by grounding one line (connect pins 1 and 2 together). The mating connector is a Switchcraft C3M or equivalent. Pin 1 is ground and the signal is on pins 2 and 3.

Power Power supply input : 9 Volts DC @ 300 mA max.

2.4 Setup

1. Selecting the Baud Rate :

Using DIP switches 1 and 2, select one of the four available baud rates as shown below. Both the T102 and your computer must be operating at the same baud rate.[1]

Sw. 1	Sw. 2	Baud Rate
down	down	2400
down	up	4800
up	down	9600
up	up	19200

1. The T102 sends and expects 8 data bits, 1 stop bit and no parity.

2. Selecting the Frame Rate :

DIP switches 3 and 4 select the video frame rate to which the T102 will be synchronized. Choose the rate corresponding to the video standard you are using.

Sw. 3	Sw. 4	Standard
down	down	24 f.p.s. (Film)
down	up	25 f.p.s. (PAL)
up	down	30 f.p.s. (NTSC)
up	up	drop frame (NTSC – time of day)

3. Selecting the Output Mode :

Two output modes are available with the T102. Mode 1 will send time and user data from the reader or generator only upon request from the computer. Mode 2 will continually send reader time data once per frame (every other frame at 2400 baud). Choose the desired operating mode using DIP switch 5.

Sw. 5	Output Mode
down	1: Reader or generator time / user output on request.
up	2: Continuous reader time output.

C H A P T E R

3

Operation

3.1 Front Panel LEDS

Power	Indicates that the T102 is on.
Error	Indicates bad or missing time code input
Lock	Indicates that generator is locked to sync. When off indicates bad or missing sync / video
Video/Sync	Indicates that external sync source is selected
Internal	Indicates that internal sync source is selected

3.2 Serial Control

1. Serial Control Commands are sent as a single ASCII character

0 : Enter digit 0 into the input buffer
1 : Enter digit 1 into the input buffer
2 : Enter digit 2 into the input buffer
3 : Enter digit 3 into the input buffer
4 : Enter digit 4 into the input buffer
5 : Enter digit 5 into the input buffer
6 : Enter digit 6 into the input buffer
7 : Enter digit 7 into the input buffer
8 : Enter digit 8 into the input buffer
9 : Enter digit 9 into the input buffer
A : Enter digit A into the input buffer
B : Enter digit B into the input buffer
C : Enter digit C into the input buffer
D : Enter digit D into the input buffer
E : Enter digit E into the input buffer
F : Enter digit F into the input buffer

K : Clear input buffer

T : Enter in generator time
U : Enter in generator user

G : Output generator time & user info.
R : Output reader time & user info.

L : Set generator standard to 24 f.p.s.
M : Set generator standard to 25 f.p.s.
N : Set generator standard to 30 f.p.s.
O : Set generator standard to Drop Frame
I : Lock generator to internal sync
V : Lock generator to external (video) sync
H : Generator hold
S : Generator start

J : Jam sync (set the generator to reader time)
P : Continuous jam on
Q : Continuous jam off

W : Insert reader time in generator user bits
X : Insert generator user in generator user bits

Z : Output firmware version I.D.

2. Setting generator time and user bits

Enter 1 to 8 characters followed by a 'T' or 'U'.
Only valid times will be accepted.

eg. To set time to 10:46:05:12
enter 10460512T

To clear user bits
enter KU

3. Output Formats

Generator: HHMMSSFFUUUUUUUUXY

Reader:Mode 1: HHMMSSFFUUUUUUUUZ

Mode 2: HHMMSSFFZ

(Reader output mode is set by sw. 5)

H = hours
M = minutes

S = seconds
F = frames
U = user bits

X = generator standard:
A = 24 f.p.s.
B = 25 f.p.s.
C = 30 f.p.s.
D = Drop Frame

Y = generator status:
N = generator locked, continuous jam off
J = generator locked, continuous jam on
E = generator unlocked, continuous jam off
B = generator unlocked, continuous jam on

Z = reader standard:
A = 24 f.p.s.
B = 25 f.p.s.
C = 30 f.p.s.
D = Drop Frame
E = reader error – bad or missing time code at the input

All output strings end with a carriage return character

5. Errors

An 'E' at the end of an output string indicates an error condition. If the 'E' follows a reader output then a reader error exists. This is usually due to bad or missing time code input to the T102. A reader error will also light the 'error' LED on the front panel. Generator errors are indicated by an 'E' after a generator output string and are caused by bad or missing sync at the T102 sync/video input. A generator error will turn off the 'locked' LED on the front panel.

6. Serial Port

The RS-232 port on the T102 is as a DB25 female connector wired as Data Communications Equipment with the following connections:

Pin 1 — GND
Pin 2 — TxD from computer
Pin 3 — RxD to computer
Pin 5 — CTS to computer
Pin 6 — DSR to computer
Pin 7 — GND
Pin 8 — DCD to computer

This will connect directly to the 25 pin serial port on an IBM compatible PC. This is the same as connecting a modem. If you have to connect to a 9 pin PC serial port make or buy a cable with the following connections:

Male DB25 Female DB9

8	—	1	Data Carrier Detect (always asserted by T102)
3	—	2	Received Data
2	—	3	Transmitted Data
20	—	4	Data Terminal Ready (not used)
7	—	5	Ground
6	—	6	Data Set Ready (always asserted by T102)
4	—	7	Request to Send (not used)
5	—	8	Clear To send (always asserted by T102)
22	—	9	Ring Indicator (not used)

3.3 Serial Commands

T This command loads the generator time from the input register. Simply enter time as ASCII characters in HH:MM:SS:FF format and press the **ENTER** key. If the time is valid for the current generator standard, then it is entered into the generator time register and the display switches to the generator time. If any digit is invalid for the current standard, the input register will clear to 00:00:00:00 and the number may be re-entered, as the display will not switch to the generator. The generator may either be running or stopped when the time is being set.

U This command loads the generator user bits from the input register. Any 8 hexadecimal (base 16) digit number may be entered. This is then transferred to the generator user bit register when **ENTER** is pressed and the display will switch to the generator time. The generator may be either running or stopped when setting the user bits. To clear the generator to 00:00:00:00, simply press the enter key twice.

K Clears the input register to 00:00:00:00.

J Loads the generator from the reader so that the code being generated will be a continuation of the code being read, with no disturbance to the continuity of the time information. The next code frame generated will have the same time information as the next code frame read.

This feature comes in quite handy for replacing poorly recorded or faulty time code or for maintaining continuous time code on a tape which is to be recorded in segments. The user bits are not involved in the JAM operation and so remain unaltered when using the JAM function.

H Stops the generator time count from advancing. The generator output repeats the same time code frame.

S Starts the generator time count advancing after the generator has been placed in the hold mode.

L, M, N, O Selects one of the following standards:

- **O** Selects drop frame mode of operation for generator to compensate for N.T.S.C. color signal frame rate as well as enabling S.M.P.T.E. color framing.
- **L** Selects 24 frames per second standard for the generator and enables S.M.P.T.E. color framing.
- **M** Selects 25 frames per second standard for the generator and enables PAL color framing.
- **N** Selects 30 frames per second mode of operation for generator and enables S.M.P.T.E. color framing

0-9 Used to enter numbers into the input register. Digits are entered with the most significant digit first. All digits are legal in any position. If more than 8 digits are entered, the most significant will overflow and be lost.

A-F Used to enter the additional hexadecimal digits A to F into the input register. Digits are entered as described for the digits 0-9 above. These digits are valid only for entering user bit information.

3.4 Setting The Time

Turn the POWER switch on. Connect the T102 to a PC as described in section 2.3 on page 7. Set the T102 switches as described in section 2.4 on page 9. Load the EFP program (described in chapter 8 on page 73) and enter the time directly on the keyboard (or with a mouse) as hours followed by minutes, seconds and then frames. When the first numeric key is pressed, the display will switch to the input register. If more than 8 numbers are entered, only the last 8 are retained. If an error is made during entry the **Alt** **C** keys (or **CE** with the mouse) will clear the input register to 00:00:00:00.

Select **ENTER** to transfer input register contents to the generator time register. If the entered time is valid for the current standard, the time will be transferred to the generator time register and the display will switch to generator time. If the entered time is invalid for the current standard, the time will not be transferred to the generator time register and the input register will be cleared to 00:00:00:00. The current generator time will not be altered and the display will not switch to the generator time register. The generator may either be running or stopped when the time is entered.

3.5 Entering User Bits

Select generator user bits with the **Alt** **G** and **Alt** **U** keys (or **GEN** and **USER**). Enter up to 8 digits as described above. The numbers may be any of the hexadecimal digits '0' through 'F'. When the first key is selected, the display will switch to the input register. If more than 8 numbers are entered, only the last 8 are retained. If an error is made during entry the **CE** key will clear the input register to 00:00:00:00.

Press **ENTER** to transfer the input register contents to the generator user bits register. The generator may either be running or stopped when the user bits are entered.

C H A P T E R

4

PC-LOG

PC-LOG is a powerful tool offering all of the features you've come to expect in a word processor or text editor. Computer novices will appreciate the spell-checking, font display, windows, and the un-delete command. More advanced users will value the background printing, 43 line mode (EGA), 50 and 28 line modes (VGA), DOS shell, and macros.

PC-LOG can also manage up to six text windows at once: You can choose multiple views of the same file, six different files, or mix and match. You can move or copy text between windows at the press of a key – even if you've "zoomed" one of them to fill the entire screen and you can change their sizes to get just the right perspective. And no matter how many windows you have open, PC-LOG can display how your document will look when it is printed page breaks, margins, justification, boldface, underlining.

Repetitive editing tasks are easy to do with the built in macro system, and you can even invoke your macros from within search operations.

Finally, after you've formatted your document just right, polished your prose, and checked your spelling, PC-LOG can put the print job in the *background*, sending characters to the printer only when there's no action at the keyboard. Once you stop typing, though, PC-LOG automatically makes it a *foreground task.*

4.1 Starting PC-LOG

Before running PC-LOG, create a working copy of the program disk or copy the necessary files to your hard disk for the distribution disk. To run PC-LOG, you'll need the file

LOG.EXE (executable program)

These files are optional:

LOG.HLP (without it, on-line help is not available) *.PDF (any printer definition file, needed only when printing) LOG.MAC (sample macros)

If you want to modify the program before running it, run the installation program LOGINST.EXE (described later in this chapter).

The first time you run PC-LOG, make sure you're logged on to the drive and directory containing the program and its optional support files You can start the program in one of three ways:

1. You can enter **LOG** at the DOS command line, and PC-LOG will create the file NONAME for you to edit. You can name it later on.

2. You can specify one to three file names at one time. For example

   LOG ONE.DOC TWO.DOC THREE.DOC

   tells PC-LOG to open three text windows, one for each file. If a file doesn't exist, PC-LOG will create it.

3. You can specify a *file mask*, like this:

   LOG *.DOC

   This tells PC-LOG to display a list of file names matching the mask ***.DOC**; you can then pick the file to edit from a sorted directory listing.

Once you have PC-LOG and your document(s) loaded, you will probably want to specify a "home directory." To set the home directory from inside PC-LOG, press *F2* to get to the main menu. Then press *O* for **O**ptions, *L* for **L**oad file options, and *H* for **H**ome directory. Enter the name of the driver and directory that contains PC-LOG and its optional support files and press *Enter*. Now press *Esc* to return to the **O**ptions menu and press *S* to **S**ave your setup. After you have done this once, PC-LOG will always look for its support files in this same drive and directory. If no home directory is specified, PC-LOG will assume that its files are in the current drive and directory. For more information about customizing PC-LOG, see the section entitled "Configuration Commands" later in this chapter.

4.2 Entering and Editing Text

You enter text in PC-LOG in much the same way as you enter text on a typewriter, and most of the keys on the keyboard behave in the same fashion (press *Enter* to end each line, for example). But there are many important differences as well.

The cursor always indicates where new text will be entered. You can move the cursor in a number of ways, and the commands to do so are described below. You can correct mistakes quickly and easily using the delete commands; you can copy and move text with the block commands; you can locate a particular *string* of text with the Find command, and optionally replace it with another using the Find-and-replace command; and in most cases you can even *undo* your last few changes with the Restore Line or Undo commands. Each of these commands and others is described briefly in the sections that follow.

For a quick glance at all of the commands and their respective keystrokes, refer to Table 4.1. In this table, the PC-LOG Menu commands are displayed in boldface, under the menu in which they appear. Non-menu commands are printed in plain type. They are broken down into basic movement commands, basic editing commands, and commands related to a particular menu. These last are printed after the menu commands under the appropriate menu.

Note to users wishing to customize PC-LOG: Owing to the restrictions imposed on menu design, the names of the menu commands often to do not match the names of these same commands in the keyboard installation program (discussed later in this chapter). In the case of such commands, the command name in the installation program will be placed after the menu command name in the section of this chapter in which the command is discussed.

Table 4.1: Commands and their Associated Key Strokes

Character left	***Lft*** or ***Ctrl-S***
Character right	***Rgt*** or ***Ctrl-D***
Word left	***Ctrl-Lft*** or ***Ctrl-A***
Word right	***Ctrl-Rgt*** or ***Ctrl-F***
Line up	***Up*** or ***Ctrl-E***
Line down	***Dn*** or ***Ctrl-X***
Scroll up	***Ctrl-W***
Scroll down	***Ctrl-Z***
Page down	***PgDn*** or ***Ctrl-C***
Page up	***PgUp*** or ***Ctrl-R***
Go to Top of File	***Ctrl-PgUp*** or ***Ctrl-Q, Ctrl-R***
Go to Bottom of File	***Ctrl-PgDn*** or ***Ctrl-Q, Ctrl-C***
Cursor to left side	***Home*** or ***Ctrl-Q, Ctrl-S***
Cursor to right side	***End*** or ***Ctrl-Q, Ctrl-D***
Go to Top of screen	***Ctrl-Home*** or ***Ctrl-Q, Ctrl-E***
Go to Bottom of screen	***Ctrl-End*** or ***Ctrl-Q, Ctrl-X***
Go to line	***Ctrl-J, Ctrl-L***
Go to column	***Ctrl-J, Ctrl-C***
Go to page	***Ctrl-J, Ctrl-P*** or ***F6***
Go to window	***Ctrl-J, Ctrl-W***
Go to Top of block	***Ctrl-Q, Ctrl-B*** or ***Ctrl-F3***
Go to Bottom of block	***Ctrl-Q, Ctrl-K*** or ***Ctrl-F4***
Jump to marker 0	***Ctrl-Q, 0***
Jump to marker 1	***Ctrl-Q, 1***
Jump to marker 2	***Ctrl-Q, 2***
Jump to marker 3	***Ctrl-Q, 3***
Jump to marker 4	***Ctrl-Q, 4***
Jump to marker 5	***Ctrl-Q, 5***
Jump to marker 6	***Ctrl-Q, 6***
Jump to marker 7	***Ctrl-Q, 7***
Jump to marker 8	***Ctrl-Q, 8***
Jump to marker 9	***Ctrl-Q, 9***
Set marker 0	***Ctrl-K, 0***
Set marker 1	***Ctrl-K, 1***
Set marker 2	***Ctrl-K, 2***
Set marker 3	***Ctrl-K, 3***
Set marker 4	***Ctrl-K, 4***
Set marker 5	***Ctrl-K, 5***
Set marker 6	***Ctrl-K, 6***
Set marker 7	***Ctrl-K, 7***
Set marker 8	***Ctrl-K, 8***
Set marker 9	***Ctrl-K, 9***
Previous cursor position	***Ctrl-Q, Ctrl-P***
Up to equal indent	***Ctrl-J, Ctrl-B***
Down to equal indent	***Ctrl-J, Ctrl-E***
Go to Next sentence	***Ctrl-Q, Ctrl-Z***
Go to Previous sentence	***Ctrl-Q, Ctrl-W***
Set a marker via menu	***None***
Jump to marker by menu	***None***
New line	***Ctrl-M***
Insert line	***Ctrl-N***
Insert control character	***Ctrl-P***

Delete current character	***Del*** or ***Ctrl-G***
Delete left character	***Ctrl-H*** or ***Backspace***
Delete right word	***Ctrl-T***
Delete to end of line	***Ctrl-Q, Ctrl-Y***
Delete line	***Ctrl-Y***
Delete Line (no undo)	***Ctrl-Q, Ctrl-T***
Find pattern	***Ctrl-Q, Ctrl-F*** or ***F5***
Find-and-replace	***Ctrl-Q, Ctrl-A*** or ***Alt-F5***
Search and apply macro	***Ctrl-Q, Ctrl-M***
Find next	***Ctrl-L***
Edit another file	***None***
Abandon file	***Ctrl-K, Ctrl-Q***
Read file into window	***Ctrl-K, Ctrl-R***
Write block to file	***Ctrl-K, Ctrl-W***
Save and continue edit	***Ctrl-K, Ctrl-S*** or ***F2***
Save / switch files	***Ctrl-K, Ctrl-D***
Save and exit to DOS	***Ctrl-K, Ctrl-X*** or ***Alt-X***
Write to named file	***Ctrl-K, Ctrl-N***
Add a new window	***Ctrl-O, Ctrl-A*** or ***Alt-F1***
Close window	***Shift-F1***
Go to Next window	***Ctrl-O, Ctrl-N*** or ***Alt-F2***
Go to Previous window	***Ctrl-O, Ctrl-P*** or ***Shift-F2***
Re-size current window	***Ctrl-O, Ctrl-S***
Zoom current window	***Ctrl-O, Ctrl-Z***
Mark Beginning of Block	***Ctrl-K, Ctrl-B*** or ***F3***
Mark End of Block	***Ctrl-K, Ctrl-K*** or ***F4***
Copy block	***Ctrl-K, Ctrl-C***
Move block	***Ctrl-K, Ctrl-V***
Delete block	***Ctrl-K, Ctrl-Y***
Toggle block display	***Ctrl-K, Ctrl-H***Display blockHide block
Mark current word	***Ctrl-K, Ctrl-T***
Toggle macro record	***Ctrl-J, Ctrl-T***
Playback scrap macro	***Ctrl-J, Ctrl-I***
Playback scrap 1 time	***Ctrl-J, 1***
Playback scrap 2 times	***Ctrl-J, 2***
Playback scrap 3 times	***Ctrl-J, 3***
Playback scrap 4 times	***Ctrl-J, 4***
Playback scrap 5 times	***Ctrl-J, 5***
Playback scrap 6 times	***Ctrl-J, 6***
Playback scrap 7 times	***Ctrl-J, 7***
Playback scrap 8 times	***Ctrl-J, 8***
Playback scrap 9 times	***Ctrl-J, 9***
Playback macro 1	***Alt-1***
Playback macro 2	***Alt-2***
Playback macro 3	***Alt-3***
Playback macro 4	***Alt-4***
Playback macro 5	***Alt-5***
Playback macro 6	***Alt-6***
Playback macro 7	***Alt-7***
Playback macro 8	***Alt-8***

Playback macro 9	***Alt-9***
Playback macro by menu	***None***
Edit macro	***None***
Load macros from disk	***None***
Write macros to disk	***None***
Toggle Insert mode	***Ctrl-V*** or ***Ins***
Toggle Autoindent mode	***Ctrl-Q, Ctrl-I***
Toggle Word wrap	***Ctrl-O, Ctrl-W***
Toggle Right justify	***Ctrl-O, Ctrl-J***
Toggle Compress at wrap	***None***
Set Left margin	***Ctrl-O, Ctrl-L***
Set Right margin	***Ctrl-O, Ctrl-R***
Set Temporary margin	***Ctrl-O, Ctrl-G***
Temporary margin to cursor	***Ctrl-O, Ctrl-H***
Margin release	***Ctrl-O, Ctrl-X***
Center line	***Ctrl-O, Ctrl-C***
Toggle Case	***Ctrl-O, Ctrl-O***
Lower Case	***Ctrl-O, Ctrl-V***
Upper Case	***Ctrl-O, Ctrl-U***
Reformat paragraph	***Ctrl-B***
Reformat block	***Ctrl-K, Ctrl-F***
Toggle Tab line	***Ctrl-O, Ctrl-T***
Toggle Marker display	***Ctrl-K, Ctrl-M***
Toggle Pagination	***Ctrl-O, Ctrl-B***
Toggle Attributes	***Ctrl-O, Ctrl-D***
Toggle Key help	***Ctrl-J, Ctrl-K***
Invoke DOS shell	***Ctrl-J, Ctrl-O*** or ***F7***
Log drive / path	***Ctrl-J, Ctrl-D***
Show system info	***Ctrl-J, Ctrl-V***
Show available memory	***Ctrl-J, Ctrl-R***
Display File directory	***None***
Set Undo limit	***None***
Set Support path	***None***
Set Default extension	***None***
Set Colors	***None***
Toggle Snow check	***None***
Toggle Block cursor	***None***
Toggle 25 / 28 or 43 / 50 line mode	***None***
Toggle Tab expansion	***None***
Toggle Tab writing	***None***
Toggle Hi-bit strip	***None***
Toggle Initial zoom	***None***
Save defaults	***None***
Tab	***Tab*** or ***Ctrl-I***
Backward tab	***Shift-Tab***
Toggle Fixed tabs	***Ctrl-O, Ctrl-F***
Edit tab line	***Ctrl-O, Ctrl-E***
Set Tab line	***Ctrl-O, Ctrl-I***
Save tab line	***None***
Set Tab size	***None***
Default tabs	***None***

Print file	***Ctrl-K, Ctrl-P***
Set Top margin	***None***
Set Bottom margin	***None***
Set Page length	***None***
Select Bold	***Alt-B***
Select Double	***Alt-D***
Select Underscore	***Alt-S***
Select Superscript	***Alt-T***
Select Subscript	***Alt-V***
Select Condensed	***Alt-A***
Select Elite	***Alt-N***
Select Double Width	***Alt-W***
Select Italic	***Alt-Y***
Show font	***Ctrl-J, Ctrl-F***
Display Help menu	***F1***
Show help summary	***Ctrl-J, Ctrl-H***
Status help	***None***
Cursor help	***None***
Quick movement help	***None***
Delete help	***None***
Find and replace help	***None***
File help	***None***
Window help	***None***
Block help	***None***
Text help	***None***
Tab help	***None***
Utility help	***None***
Setting help	***None***
Spelling help	***None***
Macro help	***None***
Print Format help	***None***
Function key help	***None***
Activate menus	***F2***
Abort command (1 char)	***Ctrl-U***
Undo last deletion	***Ctrl-Q, Ctrl-U*** or ***F8***
Restore line	***Ctrl-Q, Ctrl-L*** or ***Alt-F8***
Insert undo buffer	***Ctrl-Q, Ctrl-V***
Flush undo buffer	***Ctrl-Q, Ctrl-J***
Check spelling	***Ctrl-J, Ctrl-S***
Put time code in LOG File	***F10***
Turn Time On / Off	***Alt-F10***
Turn User Bits On / Off	***Alt-F9***
Set T102 Communications Port	***None***
Set T102 Baud Rate	***None***

4.3 The Editing Screen

The top line of the screen in PC-LOG is always set aside as a *prompt line*. Messages and instructions are usually displayed here. When you press the first key of a command assigned to two keystrokes, the keystroke is echoed at the left edge of the prompt line.

The top line of any editing window in PC-LOG is always a *status line* (see Figure 4.1), providing the following information:

>Z< Indicates that the window has been *zoomed to fill the screen.*

FILENAME.EXT The name and extension of the file being edited. Although PC-LOG accepts complete path designations. For example:

C:\DOCS\SAMPLE.DOC

the drive and path name will not be displayed on the status line.

xx% Indicates the position of the cursor relative to the last character in the file.

Line n Shows the number of the line containing the cursor, counting from the start of the file. If the **P**age breaks option is on, the line number displayed is relative to the tope of the page.

Col n Shows the number of the column containing the cursor.

Page n Shows the page number for the line containing the cursor only if the Page breaks option is on. Toggle pagination on and off with *Ctrl-O B*; refer to the Toggle pagination command.

Insert Indicates that Insert mode is in effect. If Insert mode is off, “Over” (for overwrite) is displayed instead.

Indent Indicates that Autoindent mode is in effect. *Ctrl-Q I* toggles autoindent on and off; refer to the Toggle autoindent command.

Wrap Indicates that word wrap is in effect. *Ctrl-O W* toggles on and off word wrap; refer to the Toggle word wrap command.

Justify Indicates that right-justification is in effect. *Ctrl-O J* toggles on and off right-justification; refer to the Toggle right-justify command.

Margin Release Indicates that the margin release command has been used to temporarily override the left and right margin while word wrap is on. This is displayed in the location reserved for “Wrap” and “Justify”.

>R< Indicates that *macro recording* is on. *Ctrl-J T* toggles on and off macro recording; see the section entitled “Macro Commands”.

>P< Indicates that a print job is in progress. This is displayed in the same location as the macro recording symbol.

If the tab line has been turned on with the Toggle tab line command (*Ctrl-O T*), the second line in the text window will display the locations of the current tab stops, as well as the left and right margins.

If pagination is on, the first two columns in the text window are reserved for displaying page break markers (see Figure 4.1).

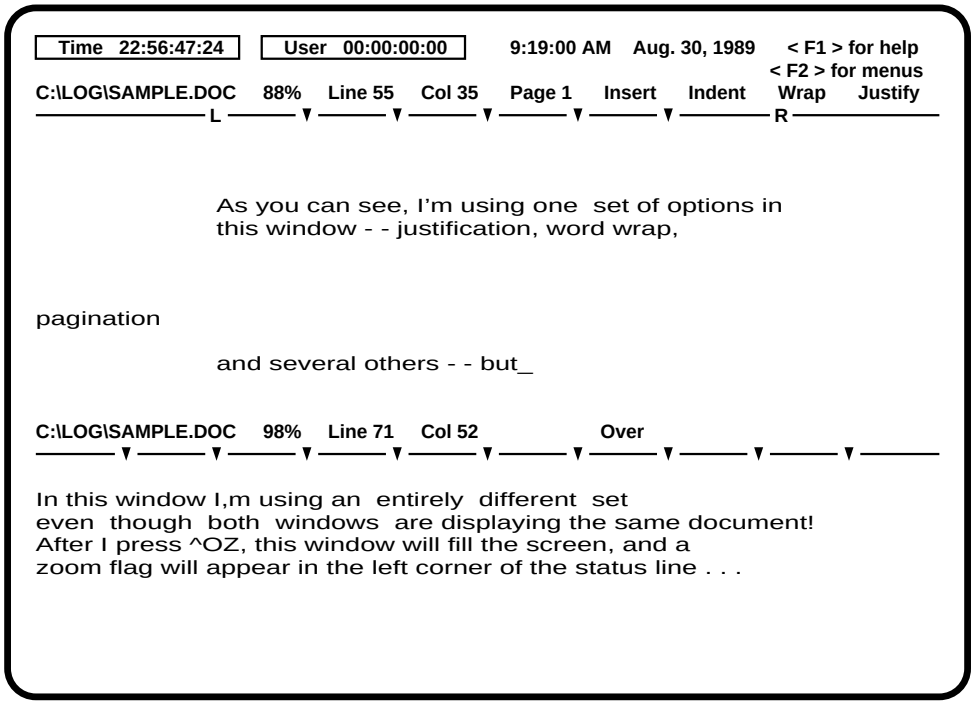


Figure 4.1: PC-LOG’s Multiple Text Windows

4.4 The Prompt Editor

When it's necessary for you to enter a number, a file name, or any other information beyond a single keystroke, PC-LOG displays a *prompt box*: a pop-up window where you enter your response (the prompt itself is displayed on the *prompt line,* at the top of the screen). Generally a default answer is displayed, which you can accept by pressing *Enter*. You can also cancel the operation by pressing *Esc*. To enter a new response, type as your first character either a text character, *Ctrl-P, Del,* or a cursor movement key. When you are entering text in a prompt box, you are using the *prompt editor*, a special line editor with its own set of commands. The special command keys are as follows:

Table 4.2: The Prompt Editor and its Associated Key Strokes

Accept entry	***Enter*** or ***Ctrl-M***
Abort command	***Esc***
Character left	***Lft*** or ***Ctrl-S***
Character right	***Rgt*** or ***Ctrl-D***
Word left	***Ctrl-Lft*** or ***Ctrl-A***
Word right	***Ctrl-Rgt*** or ***Ctrl-F***
Beginning of line	***Home*** or ***Ctrl-B***
End of line	***End*** or ***Ctrl-E***
Delete current character	***Del*** or ***Ctrl-G***
Delete left character	***Ctrl-H*** or ***Backspace***
Delete to end of line	***Ctrl-End*** or ***Ctrl-Y***
Delete line	***Ctrl-Home*** or ***Ctrl-X***
Restore line	***Alt-R***
Toggle insert mode	***Ins*** or ***Ctrl-V***
Insert control character	***Ctrl-P***
Help	***F1*** or ***Ctrl-J***

Most of these commands work the same way as their equivalents in the main editor, described later. The exceptions are Accept entry, Abort command, Delete to end of line, Delete line, and Restore line. In PC-LOG proper, these commands either don't exist or are assigned to different key sequences. (**Note:** The commands in the prompt editor cannot be reassigned to new keystrokes.)

4.5 Basic Movement Commands

Among the most basic commands in any editor are those that move the cursor without altering the text. On IBM PCs and compatible,s by convention, the cursor can usually be moved in one of two ways: with a key on the cursor pad or with a "control character." For example, to move the cursor one character to the right, press either the *Right arrow* key or *Ctrl-D*.

Character left ***Left arrow*** or ***Ctrl-S***

Moves the cursor one character to the left. This command does not work across line breaks; when the cursor reaches column 1, it stops.

Character right ***Right arrow*** or ***Ctrl-D***
Moves the cursor one character to the right. This command does not work across line breaks; when the cursor reaches the right hand edge of the text window, the text starts scrolling horizontally until it reaches the extreme right edge of the line (column 999), where it stops.

Word left ***Ctrl-Left arrow*** or ***Ctrl-A***
The cursor to the beginning of the word to the left. This command works across line breaks.

Word right ***Ctrl-Right arrow*** or ***Ctrl-F***
Moves the cursor to the beginning of the word to the right. This command works across line breaks.

Line up ***Up arrow*** or ***Ctrl-E***
Moves the cursor to the line above. If the cursor is on the top line of the window, the window scrolls down one line.

Line down ***Down arrow*** or ***Ctrl-E***
Moves the cursor to the line below. If the cursor is on the last line of the window, the window scrolls up one line.

Scroll up ***Ctrl-W***
Scrolls up toward the beginning of the file, one line at a time (the entire window scrolls down). The cursor remains on its line until it reaches the bottom of the window.

Scroll down ***Ctrl-Z***
Scrolls down toward the end of the file, one line at a time (the entire window scrolls up). The cursor remains on its line until it reaches the tope of the window.

Page up ***PgUp*** or ***Ctrl-R***
Moves the cursor one page up with an overlap of one line.

Page down ***PgUp*** or ***Ctrl-R***
Moves the cursor one page down with an overlap of one line.

Beginning of line ***Home*** or ***Ctrl-Q S***
Moves the cursor to column 1 of the current line.

End of line ***End*** or ***Ctrl-Q D***
Moves the cursor to the end of the current line (the position following the last non blank character on the line). Trailing blanks are always removed from all lines to preserve space.

Tab ***Tab*** or ***Ctrl-I***
Moves the cursor to the next tab. In *insert mode,* any text to the right of the cursor is moved along with it; in *Overwrite mode,* only the cursor is moved.

Backward tab ***Shift-Tab***
If fixed tabs are in effect, this command moves the cursor to the previous tab stop. Unlike the Tab command, this command moves only the cursor. It never moves text, whether in Insert or Overwrite mode. If smart tabs are in effect, this command does nothing.

4.6 Basic Editing Commands

In addition to the basic cursor movement commands, PC-LOG includes several simple keystroke commands that allow you to make insertions and deletions, abort a previous deletion, or activate the PC-LOG menu system.

New line ***Enter*** or ***Ctrl-M***
In *Insert mode*, this command inserts a line break at the cursor's position. If Autoindent mode is in effect, the cursor moves to the next line and to the same column as the first non-blank character in the previous line, otherwise, it moves to column 1 of the new line.

In *Overwrite mode,* this command moves the cursor to column 1 of the next line without inserting anew line, whether Autoindent mode is in effect or not. A new line will be inserted if you're in Overwrite mode and the cursor is on the last line of the file.

Insert line ***Ctrl-N***
Inserts a line break at the cursor's position. The cursor does not move.

Delete current character ***Del*** or ***Ctrl-G***
Deletes the character above the cursor and moves any characters to the right of the cursor one position to the left. This command does not work across line breaks.

Delete character left ***Backspace*** or ***Ctrl-H***
Moves the cursor one character to the left and deletes the character positioned there. Any characters to the right of the cursor are moved one position to the left. If the cursor is at column 1 at the time the command is given, the invisible end-of-line marker for the previous line is deleted instead, and the two lines are joined.

Delete word ***Ctrl-T***
Deletes the word to the right of the cursor. This command works across line breaks and thus may be used to remove line breaks.

Delete to end of line ***Ctrl-Q Y***
Deletes all text from the position of the cursor to the end of the line.

Delete line ***Ctrl-Y***

Deletes the line containing the cursor and moves any lines below it up one line. The cursor moves to column 1 of the next line.

Activate menus ***F2***
Invokes the main menu of PC-LOG's pull-down menu system. (See the earlier section entitled "The Main Menu System.")

Abort command ***Ctrl-U***
Halts an operation in progress. The keyboard buffer is checked regularly to see if the abort command has been issued; if it has, the buffer is emptied and the operation is stopped.

4.7 The Help System

Like most highly sophisticated pieces of software, PC-LOG takes time to master. But it doesn't take as much time as it might, because PC-LOG provides on-line, context-sensitive assistance concerning virtually all of its features. The term *context sensitive* simply means that, when you request help, the text shown on screen will, as a rule, deal specifically with the command or feature you are interested in. PC-LOG offers two kinds of help: general and specific.

For a complete discussion of PC-LOG's help system, see the section on the Help command under in section 4.15 on page 54.

4.8 The Main Menu System

You can access most of PC-LOG's commands through the main menu system. To activate the main menu bar, press *F2*. You can then select a menu item either by using the arrow keys to move the highlighted bar to your choice or by pressing the highlighted capital letter of your choice. Once you've selected an item, a *pull-down menu* will be displayed. Certain options on the pull-down menus may cause *pop-up menu* of additional choices to appear on the screen.

Figure 4.2 shows the PC-LOG main menu.

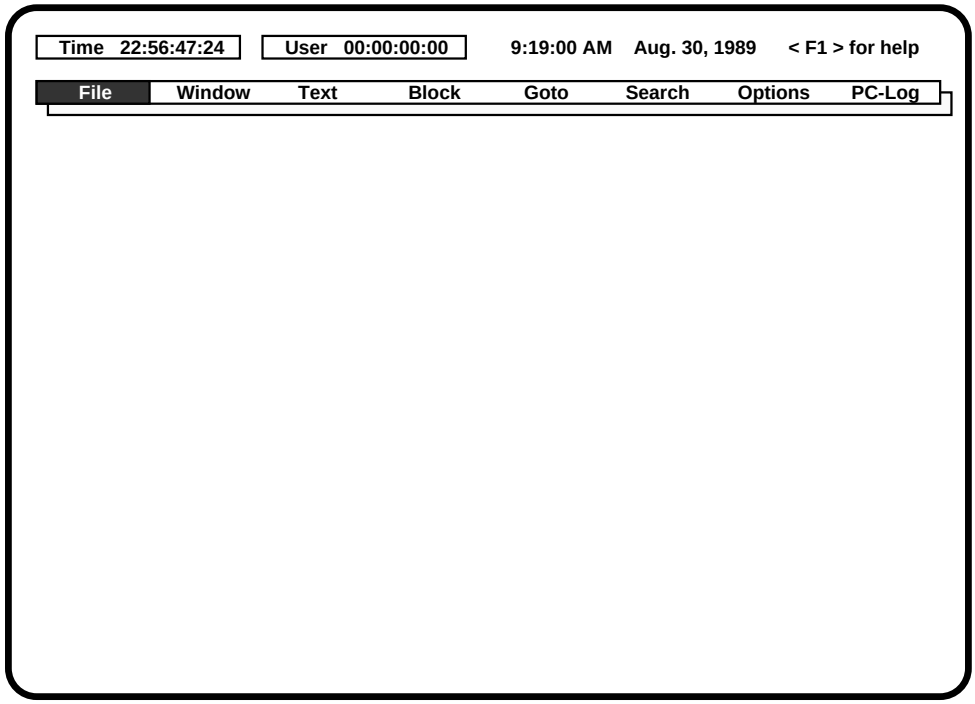


Figure 4.2: PC-LOG's Main Horizontal Bar Menu

To exit from any of the pull-downs or pop-ups, or the main menu itself, press *Esc*.

At the pull-down menu level, you have several options. You can move to a different pull-down menu by using the left and right arrow keys.

- return to the main menu by pressing *Esc.*
- move the highlight bar with the *Up* and *Down arrow* keys and select an option by pressing *Enter.*
- press the highlighted capital letter of the option of your choice.

Note that if the Key help option is turned on in the **D**isplay options menu under the **O**ptions command, the keystrokes that correspond to a particular menu choice will be displayed on the prompt line. This is particularly useful if you are trying to learn the shortcut commands.

You will notice that several of the option names in the pull-downs end in two periods (..), which means one of two things. In most cases it means that there is a pop-up menu, or sub-menu, to that choice. In a few cases, however, the two periods (..) simply mean that you will be prompted for more information (usually the name of a file) after making that particular choice.

Note: In the following sections that discuss the commands accessible through the PC-LOG menu system, the menu command will be followed by a second command name in parentheses. This is the name of the command in the Keyboard Installation Program.

Take the time to familiarize yourself with PC-LOG's menu system and experiment with the many options available. Just remember that you always move the highlight bar with the arrow keys, that you select your choices with the *Enter* key or the highlighted capital letter of the option, and that you exit from the current menu by pressing *Esc.* For information about what a particular option does, you can press *F1* key, which activates PC-LOG's context sensitive help system.

4.9 The File Menu

The first option on the PC-LOG main menu is **F**ile. If you select it, a menu of commands will appear that allow you to perform certain operations on your PC-LOG text files.

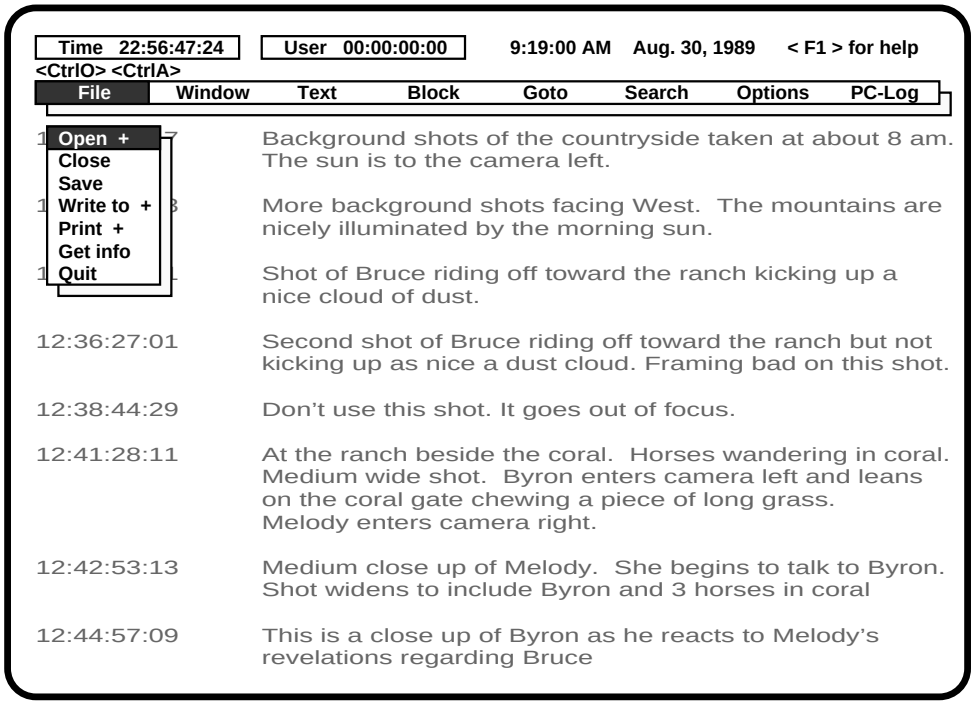


Figure 4.3: PC-LOG's File Menu

Several general guidelines apply to most of these commands:

- You can specify any legal file name, including a drive and/or path identifier. Don't use file names with .BAK extension, however, since that's what's appended to backup files.

- When you are prompted for a file name, you will be shown the name of the last file entered You can accept it by pressing *Enter*, edit it, or enter a new file name. Pressing *Esc* or *Ctrl-U* will abort command. If you enter a mask, for example, *.DOC, you may choose from a directory listing that shows all the files matching the search criteria. (See the discussion of the File directory command.)

- When existing files are edited and saved, PC-LOG automatically creates a backup copy of the file by renaming the old file and saving the new one under the old name Backup files are given the .BAK extension.

Open..(Add window) ***Ctrl-O A* or *Shift-F3***
Opens another text window. You will be prompted for a file to edit; if you do not specify one, a NONAME file is created. You can later save it as a named file with the **S**ave to file command. If too many windows are open, you will get an error message.

Close (Close window) ***F9***
Closes the current window. If the file has not been edited since the last time it was saved, the window is closed immediately. If it has been edited, you are asked whether you want to abandon the file. If the current window is the only window open, the menu system will be activated, and you will be prompted for a new file to edit. You can exit PC-LOG by choosing **Q**uit from the **F**ile menu.

Save (Save and edit) ***Ctrl-K S***
Simply saves the file in the active window.

Write to..(Save to file) ***Ctrl-K N*** or ***F2***
Prompt you for a file name, then saves the file in the current window to the specified file. This becomes the new name for the file in the window (and in any other windows that display the same file). This command is particularly useful when editing NONAME files.

Print.. (Print) ***Ctrl-K P***
Like most advanced text editors, PC-LOG devotes much attention to printing options. This section is concerned with the basic commands; the next section deals with the more specific commands used to activate fonts, create headers and footers, perform conditional page breaks, and so on.

Before we discuss commands, however, a few words about printers are in order. The PC-LOG distribution disk contains several data files with the extension .PDF (for **P**rinter **D**efinition **F**ile). These files store information about particular printers' commands. Unfortunately, there are hundreds of printers on the market, and most of them have their own unique set of commands. If your printer is not among those currently supported, you'll need to create your own definition file.

The procedure is simple:

1. From DOS, copy an existing .PDF; for example: **COPY PLAIN.PDF MYPRINTR.PDF**

2. In PC-LOG, give the **P**rint command (*Ctrl-K P*), press *W* for **W**hich printer, and enter the name of the new file. PC-LOG will then read the file into memory.

3. Now press *E* for **E**dit printer codes and, with your printer manual close at hand, edit the printer strings.

4. When you are finished editing all the command strings, press *Esc* to return to the Print Setup pop-up menu, and *S* to **S**ave the printer setup. If you wish, you can also return to the main menu; select *O* for **O**ptions and *S* for **S**ave setup to save your new .PDF file name as the default.

PC-LOG will then save the name of the newly created file as the default .PDF file. Once you make a backup copy of your new .PDF file, you should never have to go through this process again.

Once more note. As mentioned earlier, PC-LOG can perform print jobs as either a *background task* (a task done while others are going on) or as a *foreground task*. When you start a print job, PC-LOG assumes that it should be done as a background task: You can continue editing, and your file will be printed when time allows. However, if a few moments pass without any activity at the keyboard, PC-LOG concludes that printing should receive top priority and moves it out of the *background* and into the "foreground." It then proceeds to print the file as quickly as possible, as long as you don't enter anything at the keyboard. You can abort a print job at any time by issuing the Print command and pressing *Y*.

When you give the **P**rint command, a pop-up menu appears with the following options:

- **Print file now:** Starts a print job.

- **Name of file:** Selects the file to be printed. If you enter a file mask, you can use the selection bar to select the file from a directory listing.

- **Auto formatting:** If this option is off, any formatting commands entered with an @ symbol and a two letter code will be ignored, as will all margins, headers, footers, and font commands. (See the next section entitled "Print Formatting Commands".") Commands entered with control characters are interpreted as usual.

- **First page:** Sets the number of the first page to be printed, allowing you to skip pages at the beginning of a file. (To set the number that appears on the printed page, use the command @PN *n*, described in the section "Print Formatting Commands.")

- **Last page:** Sets the number of the last page to be printed, allowing you to skip pages at the end of a file. (The maximum number of pages allowed in a document is 4,095.)

- **Which printer:** Specifies the name of a printer definition file (a .PDF file).

- **Device:** Indicates where printer output should go. Your choices are File, LPT1, or LPT2. If your printer is attached to parallel port, enter LPT1 or LPT2. If your printer is attached to a serial port, use the DOS MODE command (actually a stand alone program) to redirect output. For example, if your printer is attached to COM1 and you have a second printer attached to a parallel port, you would type

  MODE LPT2=COM1

- sending new line output to the second printer from PC-LOG by specifying LPT2. (Consult your DOS manual for more details.) If you select File as the output device, you must specify the name of a file.

- **Manual paper feed:** When toggled off, PC-LOG sends output to the printer continuously. When toggled on, you are prompted to insert a new sheet of paper when the end of a page is reached.

- **Use form feeds:** When turned on, PC-LOG sends a form feed command to the printer when it reaches the end of a page. When toggled off, blank lines are used to fill out the page.

- **Edit printer codes:** Allows you to edit the string of characters sent to the printer when starting a new print job, changing fonts, and so on. The special editor you use here is the same one you use when editing macros; for details see the discussion of the Edit macro command in the earlier section "Macro Commands." Remember that *Scroll Lock* toggles literal interpretation of keystrokes on and off. So, if you need to insert a *Ctrl-M* (the same as the *Enter* key), you should press *Scroll Lock* to turn literal interpretation on, *Enter* to insert the Enter character, and *Scroll Lock* to turn literal interpretation off again.

- **Save printer setup:** Saves to a specified file the printer codes you entered using the previous commands. The current settings for Form feed mode and Paper pause are also saved.

When you have finished selecting your print options, move to the **p**rint file now option and press *Enter*. To cancel the print job, press *Esc*.

Get info (Show system info) ***Ctrl-J V***

Shows you a variety of statistics about the file being edited in the current window, as well as certain system information: the full name of the file; whether it has been modified or not; the number of lines, bytes, and words in the file; the number of pages (if pagination is on); the current time and date; the amount of memory remaining; the version of DOS being used; the amount of space remaining on the currently logged drive; and the current drive and directory. Because some of the file statistics (notably the word count) can take a long time to compute, you may want to skip them by pressing any key while they are being updated. This tells PC-LOG to stop what it is doing and jump ahead to the system information section.

Quit (abandon file) ***Ctrl-K Q***

If the file in the active window has not been modified, this command closes the window. Otherwise, you are asked to verify that the file should be abandoned before the window is On. If the active window is the only window open, use this command to quit the program.

Edit another file ***F3***

If the file in the current window has not been modified, the window is cleared, and you are prompted for a new file to edit in the same window. If the file does need saving, you will be asked if the file should be abandoned.

Save/switch files ***Ctrl-K D***

Saves the file in the current window. The window is then cleared, and you are prompted for a new file to edit in the same window.

Save and exit to DOS ***Ctrl-K X***

Saves the file in the active window. If the active window is the only window open, this command will quit the program; otherwise, the window is closed and you may continue editing in another window.

4.10 The Window Menu

The second option on the PC-LOG main menu is **W**indow, which allows you to access the **W**indow menu.

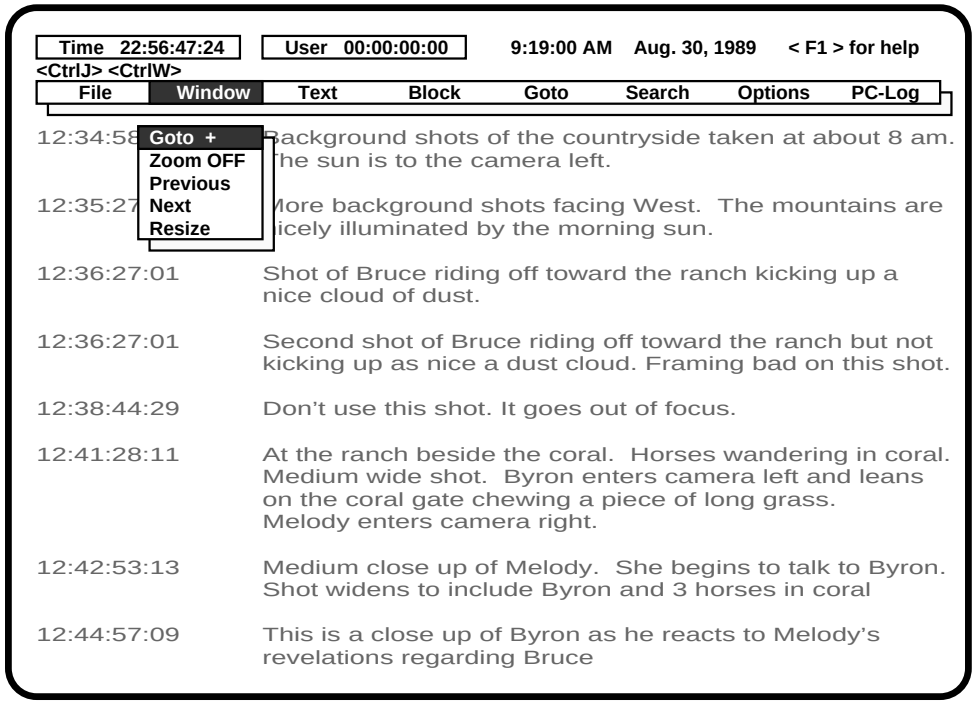


Figure 4.4: PC-LOG's Window Menu

Although some of the window commands are closely related to the file commands, others affect only what you see on screen and/or the position of the cursor. When using PC-LOG's window commands, keep in mind the following:

- PC-LOG can manage up to six open windows at a time.
- Windows occupying fewer than seven screen lines (counting the status and tab lines) cannot be divided.
- You can see different parts of the same file by using **F**ile **O**pen command and specifying the name of the file displayed in an existing window.

Go to (Go to window) ***Ctrl-J W***

If more than one window is open, a list of the open windows is displayed in a pop-up menu; after the selection is made, the cursor is moved to the indicated window. If only one window is open, an error message is displayed.

Zoom (Zoom current window) ***Ctrl-O Z*** or ***F5***

Fills the entire screen with the active window, hiding the other text windows. When a window has been zoomed, the ">Z<" flag appears in the top left corner of the status line. If you change windows while zooming, the window you change to will be zoomed as well.

Previous (Previous window) ***Ctrl-O P*** or ***Shift-F6***

Makes the previous text window the active window.

Next (Next window) ***Ctrl-O N*** or ***F6***
Makes the next text window the active window.

Re-size (Re-size active window) ***Ctrl-O S***
Changes the size of the active window. You can adjust the size by pressing the *Up* and *Down arrow* keys. When you are finished, pressing *Enter* or *Esc* returns you to the editor.

4.11 The Text Menu

The third option on the PC-LOG main menu is **T**ext. The **T**ext menu contains commands for formatting your text, such as setting margins, selecting fonts, adjusting case, and inserting format control characters.

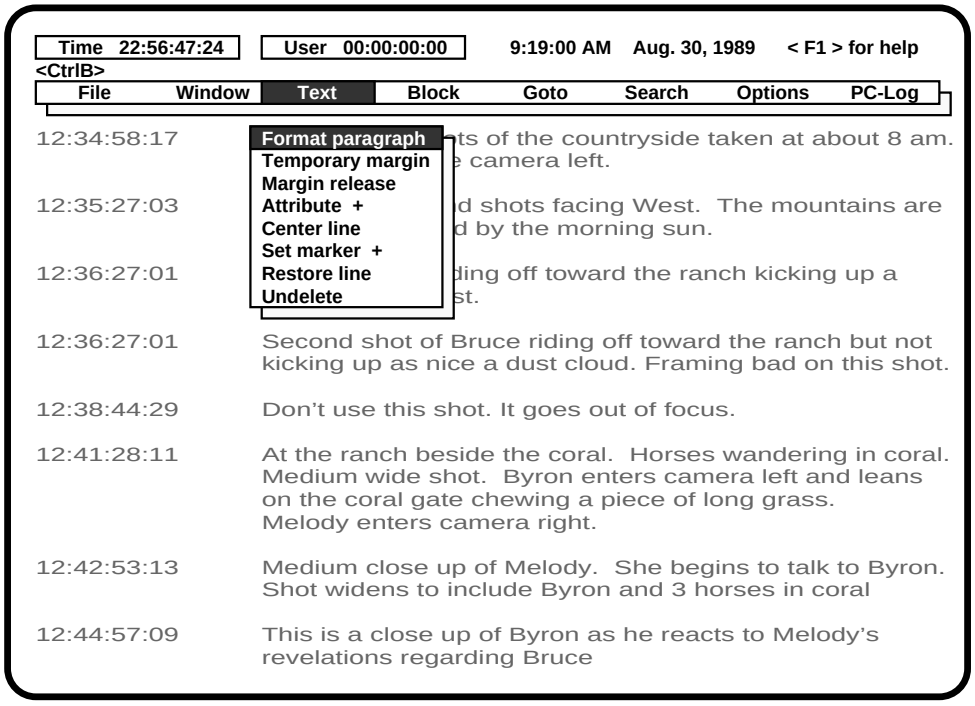


Figure 4.5: PC-LOG's Text Menu

Format paragraph (Reformat Paragraph) ***Ctrl-B***
Rearranges words from the current line to the end of the paragraph so that the lines are as full as possible, given the constraints imposed by the left and right margins. If right-justification is on, the lines will also be evenly padded with spaces until the last character on the line touches the right margin. The end of a paragraph is signaled by a blank line or a line containing the print formatting character @ in column 1. This command is available only when word wrap is on.

Temporary margin (Set temporary margin) ***Ctrl-O G***

Temporarily moves the left margin one tab stop to the right. The temporary margin remains in force until you leave the current paragraph. This command works only if word wrap and fixed tabs are on; if they are off, an error message is displayed. When the tab line is on, the temporary margin is indicated by an arrow pointing to the right.

Margin release ***Ctrl-O X***

Allows you to type beyond the left or right margin when word wrap is on. The margin release remains in effect until the cursor is moved to a new line.

Attribute ***<none>***

This command generates a pop-up menu from which you can select which font or fonts you wish to use.

PC-LOG also allows you to select fonts by inserting special control characters into a document; these change the font used when the text is printed and, if Toggle font display is on, when it is displayed on the screen.

You can enter the commands to change fonts by issuing the Insert control character command *(Ctrl-P)* in combination with the control character assigned to a particular font: Entering the control character once activates the font, and entering it again cancels the font.

However, using the font selection commands described in this section (*Alt-B, Alt-S,* etc.) or their equivalent menu options is generally more convenient. When you enter one of these commands, PC-LOG checks to see if a block of text is both marked and displayed. If so, it inserts the appropriate control character at both the beginning and the end of the block. If no block is marked or it is hidden, PC-LOG inserts a pair of control characters at the cursor's position, and moves the cursor between them. As long as the cursor remains between the two control characters, text entered will be displayed in the selected font.

If Toggle font display is on (see the earlier discussion of Toggle font display in the section entitled "Screen Toggles"), these special characters are not displayed on screen. Instead, PC-LOG attempts to show you the document as it will look when printed. (You can change the way that fonts are displayed with the Set colors command described in "Configuration Commands.") The characters are still there, of course, even if you can't see them. So when the cursor is below one of these characters, a special symbol is shown at the right edge of the status line: for example, if a *Ctrl-B* is above the cursor *Ctrl-B* is shown. Unless the block cursor option has been selected, the cursor also assumes an odd shape when it is beneath a hidden control character.

When more than one font is in effect, PC-LOG shows you only the one with the highest priority. If you need a reminder of what fonts are in effect, use the special Show current font command. When Toggle font display is off, these characters are shown as highlighted upper-case characters, and not attempt is made to show you how the text will look when printed. In either case, these characters can be moved, copied, and deleted in the same way as any other characters. The fonts that follow are listed in order of decreasing priority:

Bold (Select bold) ***Alt-B***
Selects boldface (*Ctrl-D*)

Double (Select double strike) ***Alt-D***
Selects double strike printing (*Ctrl-D*).

Underscore (Select underscore) ***Alt-S***
Selects underlining (*Ctrl-S*).

Superscript (Select superscript) ***Alt-H***
Selects superscript printing (*Ctrl-T). (H* is for "High.")

Subscript (Selects subscript) ***Alt-L***
Selects superscript print (*Ctrl-V). (L* is for "Low".)

Compressed (Select compressed) ***Alt-C***
Selects alternate font number 1 (*Ctrl-A)*; on most printers, this is compressed printing.

Italic (Select italics) ***Alt-I***
Selects alternate font number 2 (*Ctrl-N*); on most printers, this is italicized printing.

Which font? (Show current font) ***Ctrl-J F***
Shows on the prompt line all the fonts in effect at the cursor's position.

Center line ***Ctrl-O C***
Centers the current line within the left and right margins. This command works whether word wrap is on or off.

Set marker.. (Set a marker) ***<none>***
Performs same function as the Set marker command, but you are prompted for a marker number.

Restore line ***Ctrl-Q L***
Undoes any changes made to a line of text *as long as you have not left the line*. The line is restored to its previous contents regardless of what changes you have made.

Undo last deletion ***Ctrl-Q U***

Restores whole lines deleted with the Delete line command (*Ctrl-Y*) or the Delete block command (*Ctrl-K Y*). It will not restore single characters or words. To undo your most recent changes to the current line, use the Restore line command, described above. The size of the undo buffer (where deleted lines are saved) is specified with the Set undo limit command.

Set marker 0..9 ***Ctrl-K 0..Ctrl-K 9***
Sets one of the ten text markers at the current position of the cursor. *Ctrl-K 0* sets marker o, *Ctrl-K 1* sets marker 1, and so on.

Insert control character ***Ctrl-P***
Allows control characters to be entered into the text. For example, pressing *Ctrl-P* and then *Ctrl-B* would insert a *Ctrl-B* into the text. Ordinary control characters are always displayed as highlighted capital letters, while those that activate particular fonts may be hidden if desired. See the section on Print formatting commands for more details.

Delete line (no undo) ***Ctrl-P***
Same as Delete line command (*Ctrl-Y*), but the deleted line is not saved in the undo buffer. This is useful when you're using the undo buffer to temporarily store lines being moved.

Set temporary margin to cursor ***Ctrl-O H*** or ***F4***
Same as the Set temporary margin command except that the left margin is set to the current position of the cursor instead of the next tab stop.

Toggle case ***Ctrl-O O***
Toggles the case of the character above the cursor (upper-case letters are changed to their lower-case equivalents, and vice versa). If the cursor is within a marked (and displayed) block, the command affects all characters in the block.

Lower case ***Ctrl-O V***
Same as Toggle case command except that it changes the character(s) to its lower-case equivalent.

Upper case ***Ctrl-O U***
Same as Toggle case command except that it changes the character(s) to its upper-case equivalent.

Insert undo buffer ***Ctrl-Q V***
Inserts the entire contents of the undo buffer into the current window just prior to the current line.

Flush undo buffer ***Ctrl-Q J***

Empties the undo buffer. This command is useful in macros when you wish to use the undo buffer as a scratch pad. For example, you could write a macro that would flush the buffer (*Ctrl-Q J*), delete five lines (with *Ctrl-Y*), jump to a text marker (for example, *Ctrl-Q 9*), and insert the entire contents of the undo buffer (*Ctrl-V*) just before the marker. Such a macro would allow simple block moves without disturbing the current block markers. Without this command, it would be uncertain whether or not the buffer contained extraneous text.

The Block Menu

The fourth option on the PC-LOG main menu is **B**lock. The **B**lock menu contains commands for manipulating marked blocks of text.

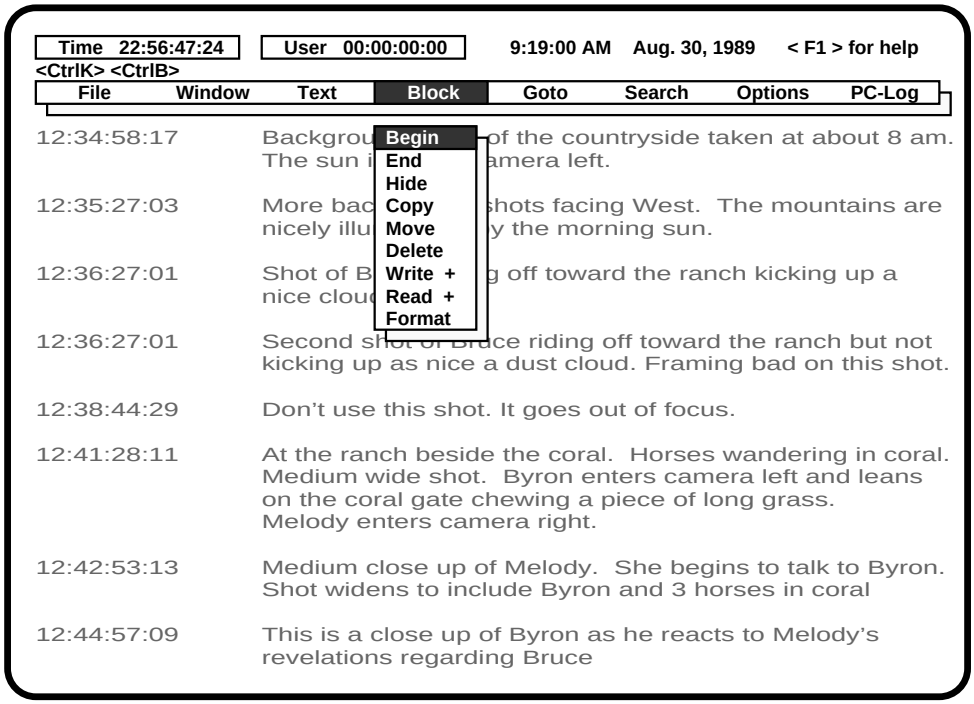


Figure 4.6: PC-LOG's Block Menu

A block is any arbitrarily defined, contiguous unit of text; a block can be as small as a single character or as large as an entire file. Mark a block by placing a begin-block marker at the first character in the desired block, and an end-block marker just beyond the last character. Once marked, the block can be copied, moved, deleted, or written to a file.

Although marked blocks are normally highlighted so you can see what you've marked, the block may be *hidden* (or made visible) with the hide block command. The Start of block (*Ctrl-Q B*) and End of block (*Ctrl-Q K*) commands are discussed later in the section on the **G**oto menu.

Begin (Begin block) ***F7*** or ***(Ctrl-K B)***

Marks the beginning of a block. The marker itself is not visible on the screen, and the block becomes visible only when the end-block marker is set. You can also use the begin-block marker as an extra text marker (see the Set marker command in the earlier section entitled "Extended Movement Commands") and jump directly to it with *Ctrl-Q B*.

End (End block) ***F8*** or ***Ctrl-K K***

Marks the end of a block. Like the begin-block marker, the end-block marker is invisible, and the block itself will not be displayed unless both markers are set. You can also use the end-block marker as an extra text marker (see the Set marker command in the section entitled "Extended Movement Commands") and jump directly to it with *Ctrl-Q K*.

Hide (Hide block) ***Ctrl-K H***

Toggles off and on the visual marking of a block. Many of the block-manipulation commands described earlier work only when the block is being displayed. The block-related cursor movement commands (*Ctrl-Q B* and *Ctrl-Q K*) work whether the block is hidden or displayed.

Copy (Copy block) ***Ctrl-K C***

Creates a copy of a marked and displayed block at the current cursor position. The original block is left unchanged, and the markers are placed around the new copy of the block.

Move (Move block) ***Ctrl-K V***

Moves a marked and displayed block from its current position to the cursor's position. The markers remain around the block at its new position.

Delete (Delete block) ***Ctrl-K Y***

Deletes a marked and displayed block. Although the Undo last deletion command (*Ctrl-Q U*) can usually restore portions of an accidentally deleted block, there is no command to restore a deleted block in its entirety, so use this command with care.

Write (Write block to file) ***Ctrl-K W***

Writes the currently marked block to a file. You are first prompted for a file name. If the file already exists, you are asked if you want to overwrite it or append to it. If the file does not exist, a new file is created. The block is left unchanged, and the block markers remain in place. If no block is marked, this command is ignored.

Read (Read block from file) ***Ctrl-K R***

Reads a file into the text at the cursor's current position exactly as if it were copied from another part of the text. The file read in is marked as a block.

Format (Reformat block) ***Ctrl-K F***

Reformats all paragraphs within the currently marked block.

Top of screen ***Ctrl-Home* or *Ctrl-Q E***
Moves the cursor to the first line displayed in the active window. The cursor remains in the same column.

Bottom of screen ***Ctrl-End* or *Ctrl-Q X***
Moves the cursor to the last line displayed in the active window. The cursor remains in the same column.

Mark single word ***Ctrl-K T***
Marks a single word as a block, combining the functions of the Begin-block and End-block commands. IF the cursor is positioned within a word, that word will be marked. If it is not within a word, then the word to the right of the cursor will be marked. And if there is no word to the right of the cursor, then the word to the left will be marked.

4.12 The Goto Menu

The fifth option on the PC-LOG main menu is Goto. The Goto menu contains extended cursor movement commands.

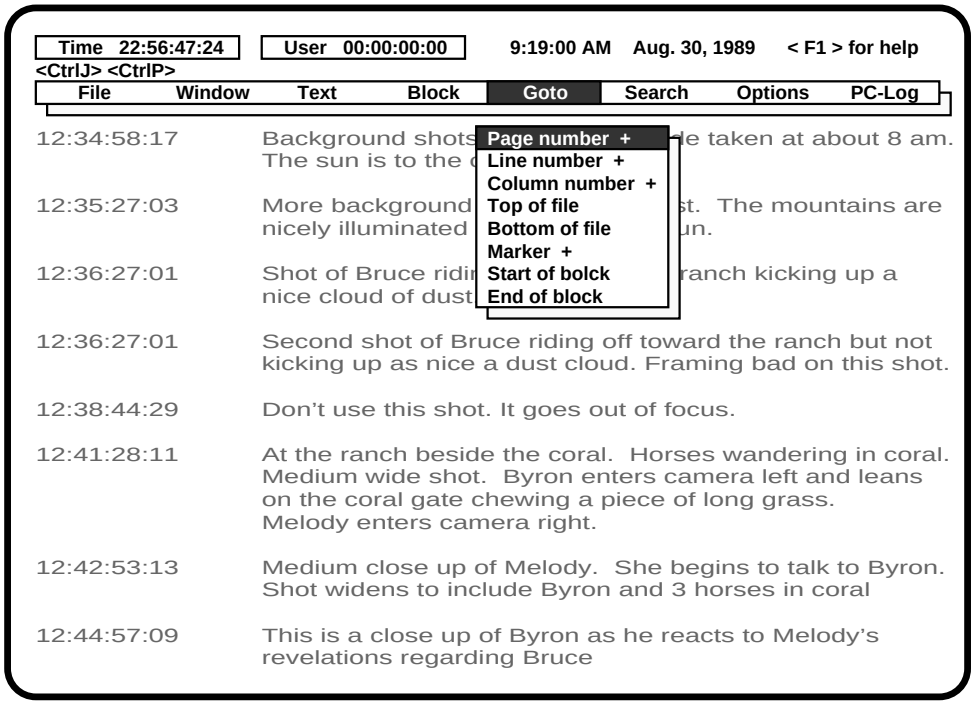


Figure 4.7: PC-LOG's Goto Menu

Page number.. (Go to page) ***Ctrl-J P***

If pagination is on, prompts for a page number and moves the cursor to the first line of the specified page. If pagination is off, an error message is displayed.

Line number.. (Go to line) ***Ctrl-J L***
Prompts for a line number and moves the cursor to the specified line Any positive integer value in the range 1 to 32,767 is valid. If the value is preceded by a plus (+) or (-) sign, the target line number will be calculated relative to the current line. Line numbers are counted from the beginning of the file.

Column number.. (Go to column) ***Ctrl-J C***
Prompts for a column number and moves the cursor to the specified column of the current line. Any positive integer value in the range 1 to 999 is valid. If the value is preceded by a (+) or minus (-) sign, the target column number will be calculated relative to the current column.

Top of file (Beginning of file) ***Ctrl-PgUp*** or ***Ctrl-Q R***
Moves the cursor to the first character in the file.

Bottom of file (End of file) ***Ctrl-PgDn*** or ***Ctrl-Q C***
Moves the cursor just beyond the last character in the file.

Marker.. (Jump to marker) ***<none>***
Performs same function as the Jump to marker command, but you are prompted for a marker number. A pop-up window is displayed, showing the marker number, the file it is in, and the number of the line containing the marker. (If a given marker has not been set, "Not Set" is displayed instead.) You may select a marker either by pressing its number or by moving the selection bar to it and pressing *Enter*.

Start of block (Top of block) ***Ctrl-Q K***
Moves the cursor to the position of the block-begin marker set with *Ctrl-K B*.

End of block (Bottom of block) ***Ctrl-Q K***
Moves the cursor to the position of the block-end marker set with *Ctrl-K K*. The command works even if the block is hidden or the block-begin marker is not set.

Jump to marker 0..9 ***Ctrl-Q 0..Ctrl-Q 9***
Moves the cursor to one of the ten text markers created with the Set marker command. *Ctrl-Q 0* jumps to marker 0, *Ctrl-Q 1*, and so on. If the specified marker has not been set, the cursor is not moved.

Previous cursor position ***Ctrl-Q P***
Moves to the last cursor position. This command is particularly useful to move back to the previous position after a Find or Find-and-replace operation.

Up to equal indent ***Ctrl-J B***

Moves the cursor to the beginning of the previous line with the same indentation level as the current line. For example, if the first non-blank character in the current line is at column 20, the cursor is moved up to the next line that also begins at column 20.

Down to equal indent ***Ctrl-J E***
Moves the cursor to the beginning of the next line with the same indentation level as the current line.

Next sentence ***Ctrl-Q Z***
Moves the cursor to the beginning of the next sentence A sentence is defined as a sequence of characters delimited by a period, semicolon, question mark, exclamation mark, or blank line. In addition, any print formatting command is treated as the beginning of a sentence.

Previous sentence ***Ctrl-Q W***
If the cursor is in the middle of a sentence, the cursor is moved to the beginning of the current sentence. If the cursor is at the beginning of a sentence or between sentences (on a blank line, for example) the cursor is moved to the beginning of the previous sentence.

4.13 The Search Menu

The sixth menu on the PC-LOG main menu is Search, which contains commands for finding and replacing character strings.

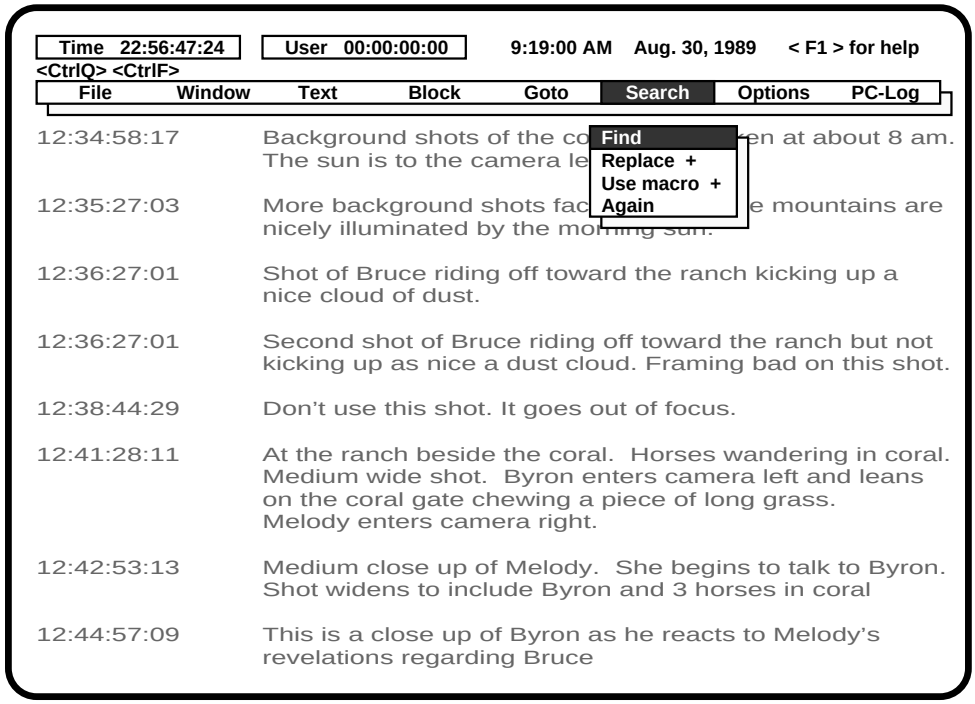


Figure 4.8: PC-LOG's Search Menu

Commands to find patterns of text and optionally replace them with new patters are available on virtually every editor. Most of the good ones allow you to search backwards, ignore case, search globally, restrict the search to whole words, and repeat your last search operation. PC-LOG has all these features plus a unique one: the Search-and-apply macro command. This is perhaps the most powerful command in the program, since it essentially allows you to create new commands without doing any programming.

Find.. ***Ctrl-Q F***

Lets you search for a string of up to 67 characters. When you enter this command, you will be asked for a search string. The last search string entered (if any) will be displayed. You can select it again by pressing *Enter*, edit it, or enter a new search string. *Esc* or *Ctrl-U* will cancel a search command, and *Ctrl-P* can be used to enter control characters (for example, to find a period at the end of a line, you would search for . *Ctrl-M*, where *Ctrl-M* was entered with *Ctrl-P* and *Ctrl-M*).

After the search string is entered, you must specify your search options. The options you used last, if any, are displayed. You can enter new options (canceling the old ones), edit the current options, or select them again by pressing *Enter*. The following options are available:

B	Searches backwards from the current cursor position toward the beginning of the file.
G	Searches globally. The entire file is scanned for the search string, regardless of the current position of the cursor. The search starts at the beginning of the file if searching forwards; at the end if searching backwards.
L	Limits searches to the currently marked block.
n	Finds the **n**th occurrence of the string (overridden by the **L** option).
U	Ignores case; treats all alphabetic characters as if they were upper-case.
W	Searches for whole words only; skips matching patters embedded in other words.

If the text contains a target matching the search string, the target is highlighted and the cursor is positioned just beyond it.

Replace.. (Find-and-replace) ***Ctrl-Q A***

This operation works the same as the Find command except that you can replace the found string with any other string of up to 67 characters. After entering the search string, you are asked to enter the replacement string. The last replacement string entered, if any, will be displayed; you may accept it, edit it, or enter a new string.

Finally, you are prompted for options. The options you used last are displayed at first. You may enter new options (canceling the old ones), edit the current options, or select them by pressing *Enter*. The options available are the same as those for the Find command.

Use Macro.. (Search-and-apply macro) ***Ctrl-Q M***

Searches for any string of up to 67 characters and then applies a macro to it; that is, it moves the cursor to your target, and executes the commands stored in the macro. You can enter search strings in the same way as the Find command. After the search string is entered, a menu is displayed containing all of the macros you've defined. Move the selection bar with the *Up* and *Down arrow* keys, and select your macro by pressing *Enter*. You can abort the operation by pressing *Esc*.

Finally, you are prompted for options. The options you used last are displayed at first. You may enter new options (canceling the old ones), edit the current options, or select them by pressing *Enter*. The options available for the Find-and-replace command are available here as well. The screen is not updated while a Search-and-apply macro operation is being performed. You can use the Abort command (*Ctrl-U*) to stop the operation.

Because the Search-and-apply macro command can be invoked *inside a macro*, it is possible to create an almost unlimited array of special commands. Two examples of such macros are predefined in the LOG.MAC file (numbers 8 and 9), and studying them may give you some ideas for your own macros. Take a look at them by pressing *F2*, the *L* for PC-LOG, *M* for Macros, *E* for Edit, then 8 or 9. (Note that the *Enter* key is synonymous with *Ctrl-M*, the carriage return character.)

Again (Find next) ***Ctrl-L***
Repeats the last search operation. If the last search command called for a Find operation, the same search string and options will be repeated; for a Find-and-replace operation, the replacement string will be reused as well.

4.14 The Options Menu

The seventh menu on the PC-LOG main menu is **O**ptions, which accesses a series of pop-up menus with commands for setting formatting and screen display features.

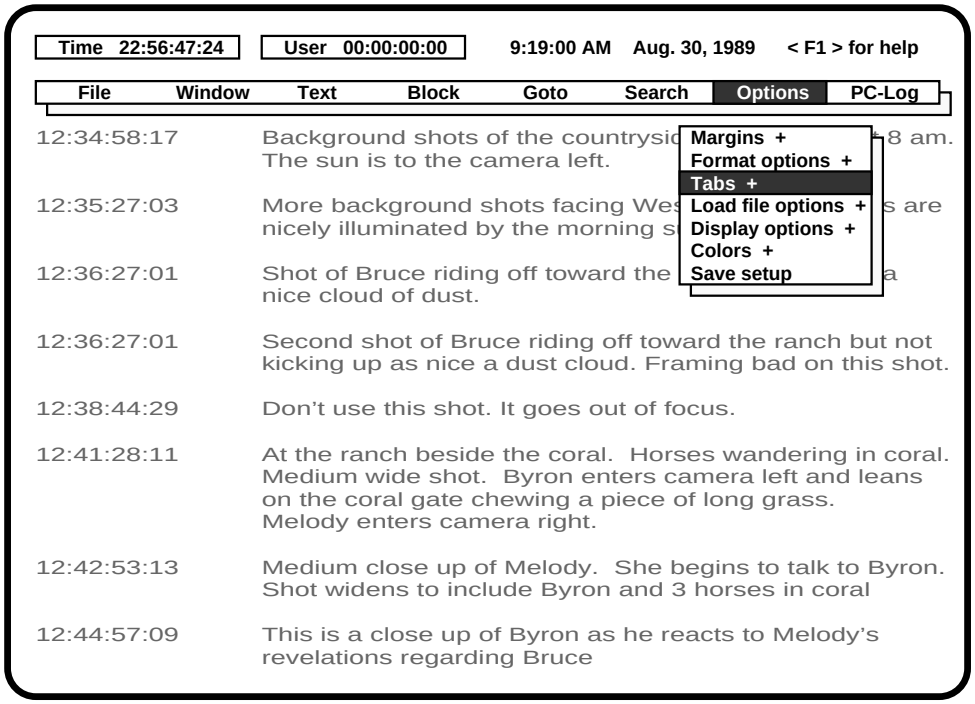


Figure 4.9: PC-LOG's Options Menu

Margins.. ***<none>***

Calls up a pop-up menu with commands for setting page margins and page length.

- **Left (Set left margin)** ***Ctrl-O L***
  Sets the left margin for text displayed on the screen.

- **Right (Set right margin)** ***Ctrl-O R***
  Sets the right margin for text displayed on the screen.

- **Top (Set top margin)** ***<none>***
  Sets the default top margin for printed documents.

- **Bottom (Set bottom margin)** ***<none>***
  Sets the default bottom margin for printed documents.

Format options ***<none>***

Generates a pop-up menu with commands controlling the way that text is entered and/or formatted on the screen Many of these are *toggles*, commands that turn a particular option on or off, and the status of these toggles are usually displayed on the status line.

- **Justify (Toggle Right-justify)** ***Ctrl-O J***

If word wrap is on and you start to enter text beyond the right margin, PC-LOG will insert a line break just before the word you are currently typing and move it to the new line. **Note:** Turning word wrap off automatically turns off right-justification.

- **Auto indent (Toggle Autoindent mode)** ***Ctrl-Q I***
  When Autoindent mode is in effect, the New line command (*Enter* or *Ctrl-M*) will move the cursor to the next row and to the same column as the first non-blank character on the previous line.

- **Insert mode (Toggle insert mode)** ***Ins* or *Ctrl-V***
  Selects Insert or Overwrite mode. In Insert mode, text to the right of the cursor is moved to the right as new text is entered. In Overwrite mode, any text above the cursor is overwritten when new text is entered. Notice that the cursor's size is itself an indication of which mode you are in: A thin cursor indicates Overwrite, while a slightly fatter cursor indicates Insert. (This feature is disabled when the **B**lock cursor option of **D**isplay Options / **O**ptions has been selected.

- **Page breaks (Toggle pagination)** ***Ctrl-O B***
  Turns on pagination for the current window and sets aside the first two columns of the display to indicate page-break markers. When pagination is on, the current page is always displayed on the status line, and the Show system info command will report the number of pages in the document.

- **Compress wrap** ***<none>***
  When PC-LOG wraps or reformats text that falls beyond the right margin, its usual first step is to compress excess blanks from the current line. This step is needed so that previously right-justified text can be reformatted with the padding spaces automatically removed. In some cases, however, the compression will remove desired spaces, such as those used for aligning columns of figures in a table. The Compress wrap is off, PC-LOG will not remove spaces in a line when it starts to wrap it.

Tabs.. Calls up a pop-up menu with commands for controlling tabulation. Unlike most editors, PC-LOG offers two kinds of tabs: *fixed tabs* and *smart tabs*. Fixed tabs are like the tab stops on typewrites: You set them once, and the stops remain the same until you change them. Smart tabs change with every line: The first letter in each word on the previous line is treated as a tab stop. (Smart tabs are particularly useful when creating tables or when writing source code for computer programs.) But as you'll soon see, PC-LOG's fixed tabs can be pretty smart too, especially once you've mastered the Save tab line and Set tab line command.

- **Set tabs (Set tab line)** ***Ctrl-O I***

Sets tab stops based on the positions of the words on the current line. This is particularly useful when entering information in tables that must all look alike, or when you have saved a special set of tab stops using the Save tab line command.

- **Put tabs (Save tab line)** ***<none>***
  Saves the current tab stops and margin settings inside the document itself as a formatted line of text. (To insure that it will be ignored when printing and reformatting, and @ sign is placed in column 1.) You can restore these settings later by moving the cursor to this line and issuing the Set tab line command.

- **Restore tabs (Default tabs)** ***<none>***
  Cancels any special tab settings specified with the Set tab line or Edit tab line commands, and restores evenly spaced tab stops based on the current default tab size.

- **Edit tabs (Edit tab line)** ***Ctrl-O E***
  If fixed tabs are on, this command allows you to alter the locations of the tab stops. Pressing the space bar inserts or removes tab stops at the position of the cursor. Pressing *Esc* returns the tab stops to their previous settings. You can also add new stops by pressing *Ins* and delete existing ones by pressing *Del*. The *Left* and *Right arrow* keys move the cursor along the tab line; *Tab* moves it to the next stop; *Home* moves it to the first stop; and *End* moves it to the last one. When you are finished, you can return to normal editing mode by pressing *Esc* or *Enter*. **Note:** This command turns on the tab line, if necessary, and leaves it on.

- **Display tabs (Toggle tab line)** ***Ctrl-O T***
  Turns on the tab line for the current window. The tab line shows you the position of all tab stops, as well as the current left and right margins. **Note:** Turning on the tab line automatically turns on fixed tabs.

- **Fixed (Toggle fixed tabs)** ***Ctrl-O F***
  When fixed tabs are in effect, the tab stops (normally) start at column 9 and occur every 8 column thereafter. By default, fixed tabs are on and smart tabs are off. When smart tabs are in use, the tab stops are determined by locations of the words on the previous line; the first character in each word represents a tab stop. To change the locations of the stops when using fixed tabs, use the Set tab size, Edit tab line, or Set tab line commands.

- **Tab size (Set tab size)** ***<none>***
  Sets the default tab size to be used when fixed tabs are on. This value is also used when expanding tab characters if the tab expansion option is on. (See the discussion of the Toggle tab expansion command.)

Load file options.. ***<none>***

Accesses a menu of commands that allow you to customize PC-LOG to fit your particular needs, as well as to take full advantage of your computer hardware. These commands change the configuration information temporarily. Note that to change the keystrokes assigned to particular commands, you must run the installation program LOGINST.EXE, described in the section entitled "Keyboard Installation Program."

- **Home directory** ***<none>***
  Tells PC-LOG where its optional support files are located. (See the earlier section in this chapter, "Starting PC-LOG", above.)

- **File extension (Set default extension)** ***<none>***
  Specifies the default extension for file names. This extension is automatically added to file names lacking extensions. For example, if you have set the default extension to .DOC and want PC-LOG to load SAMPLE.DOC when the program starts, you can enter LOG SAMPLE at the command line.

- **Expand tabs (Toggle tab expansion)** ***<none>***
  Expands tab characters to spaces when reading in files created with other editors. The assumed size of the tabs is specified with the Set tab size command. Spaces may be converted back to tabs when output is written (see Write tabs in the next section).

- **Write tabs** ***<none>***
  When this toggle is on, PC-LOG converts strings of blanks to tabs when a file is written to disk. This will save disk space, especially for indented programming languages like Pascal, C and Assembler. PC-LOG uses the current default tab spacing when it converts the blanks into tabs.

- **Toggle strip high-bit** ***<none>***
  Strips "high-order bits" when reading in files created with certain editors, notably Wordstar, which use the eighth (highest) bit in a byte to store information. To see whether you need to use this option, display the file using the DOS TYPE command. If the last letter in each word is garbled, you should select this option before reading the file into PC-LOG for editing. This option also tells PC-LOG to convert Wordstar *dot* commands (for print formatting) to PC-LOG @ commands. **Note:** This process is irreversible.

- **Undo limit (Set undo limit)** ***<none>***
  Sets the size of the "undo buffer," which stores deleted lines. The default value is 20 lines.

Display options.. ***<none>***

Calls up a pop-up menu with commands that affect the way PC-LOG manages the screen. They are used to activate or deactivate certain "convenience features"-features that some people will find helpful and others annoying. None of these commands directly affects the documents you are editing.

- **Snow control (Toggle snow check)** ***<none>***
  PC-LOG is designed to avoid the annoying screen interference known as *snow* on color graphics adapters. Enhanced Graphics Adapters (EGAs) and many of the newer color adapters do not have this problem. If you don't experience this problem either, then turn snow prevention off. (This improves PC-LOG's performance quite noticeably.) This command is ignored if you are using a monochrome adapter.

- **Block cursor (Toggle Block cursor)** ***<none>***
  Hides the blinking cursor you normally see on the screen and replaces it with a non blinking "block cursor." You can change the appearance of the block cursor with the Set colors command. The blinking cursor is restored when you leave PC-LOG.

- **43 or 50 line mode (Toggle 43 or 50 line mode)** ***<None>***
  Activates the special 43-line display mode available on systems equipped with an Enhanced Graphics Adapter (EGA) or the special 50-line display mode available on systems equipped with an Video Graphics Array (VGA). PC-LOG will then use all 43 lines on the screen. If an EGA or VGA is not installed, this command is ignored. The display is restored to the normal 25-line mode when you leave PC-LOG.

- **Font display (Toggle font display)** ***Ctrl-O D***
  Turns on and off the display of control characters used for print formatting. If font display is on, these characters are hidden, and you see only their effects. If it is off, you see the control characters themselves, but not their effects. For more details, see the section entitled "Print Formatting Commands."

- **Key help (Toggle key help)** ***Ctrl-J K***
  By default, symbols for the primary commands associated with particular menu choices are displayed on the prompt line as you scroll through the list of choices. This feature is intended to help you learn the shortcut commands for menu items.

- **Zoom state (Toggle initial zoom state)** ***<none>***
  If set, new windows are automatically zoomed to fill the screen when they are opened. This setting does not affect the behavior of the Zoom current window command.

- **Toggle marker display** ***Ctrl-K M***

Hides or reveals all text markers. Setting a new text marker automatically turns on marker display if it was previously turned off.

Colors.. (Set colors) ***<none>***

Changes the colors used for text windows, status lines, pull-down menus, and so on. You will first be shown a list of the current color settings. Select the one you want to change by moving the selection bar with the arrow keys, then press *Enter*. The choices available to you are displayed, and the current setting is marked with a snowflake character. You can change the setting by moving the snowflake with the arrow keys; as it moves, the item to be changed will reflect the change in colors. When you find the color you want, press *Enter* to select it. (To restore the original setting, press *Esc* instead.)

Save setup (Save defaults) ***<none>***

Saves the current configuration settings (specified by the commands described earlier) as the defaults. More specifically, the current values of any settings that can be changed from the **O**ptions pull-down menu will be saved, as well as any information concerning your printer. If is particularly important that you specify the drive and directory where PC-LOG's support files are located (refer to the section on starting PC-LOG for details). if LOG.EXE is not found n either the current or the home directory, an error message is displayed.

4.15 The PC-LOG Menu

The last item on the PC-LOG main menu is PC-LOG, which accesses a menu of miscellaneous commands for making use of macros, the operating system, and the spelling checker and help system.

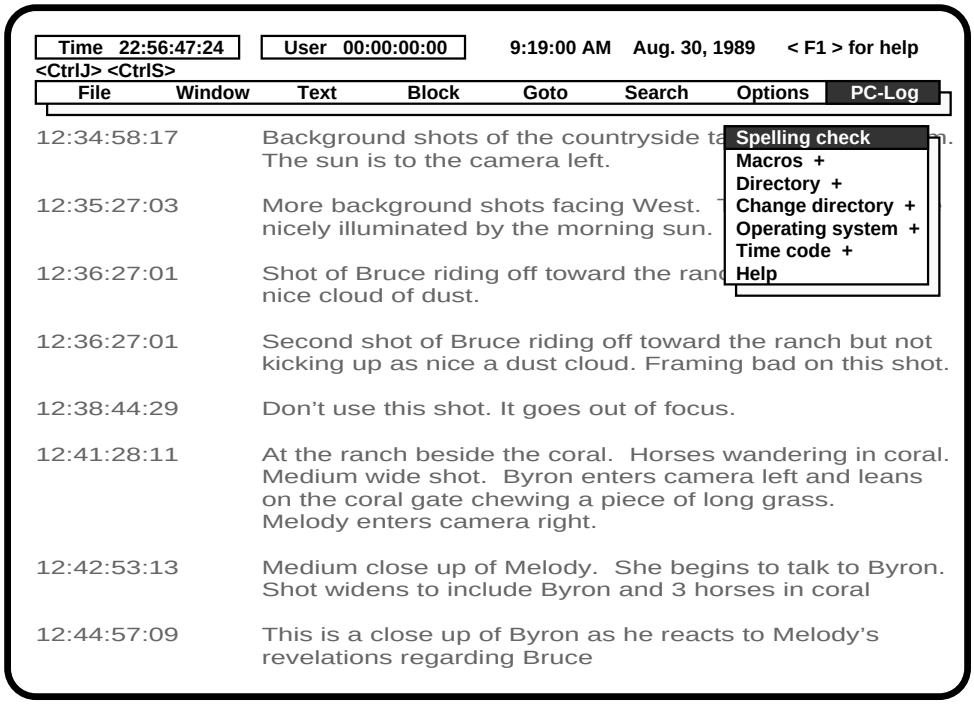


Figure 4.10: PC-LOG's PC-LOG Menu

The system commands give you access to, or information about parts of your system that are normally inaccessible when running programs other than DOS itself. There are commands to display directory, to change the current drive and directory, to display help on any of PC-LOG's features as well as two slightly unusual commands: Invoke DOS shell, which gives you access to DOS from inside PC-LOG, and Show system information about the T102 time code generator / reader.

Spelling check (Check spelling) ***Ctrl-J S***

Checks the spelling of a document-*provided you have Borland's Turbo Lightning installed.* If Lightning is not installed, the command will simply generate an error message. By default, spelling is checked from the current position of the cursor to the end of the file. If a block is both marked and displayed, however, only the text within the block is checked.

Once the operation begins, PC-LOG keeps you advised of its progress on the status line. The line and column counters tell you what part of the document is being checked, as does *xx%* indicator. These are updated each time a new word is checked. When an unrecognized word is found, a pop-up menu shows you your options:

- **Skip once**
  Ignores the spelling of this word for this one instance.

- **Ignore for this document**
  Ignores the spelling of this word throughout the document.

- **List Lightning's sound alikes**
  Displays a list of sound-alike words from Lightning's dictionary. You can scroll through the list, shown via a pop-up menu, using the arrow keys. If you find a word to replace the current one, replace it by pressing *Enter*. If no word is found, press *Esc* to return to the previous menu.

- **Edit from keyboard**
  Corrects the spelling of the word, displayed in a prompt box. You can accept the current spelling, edit the word, enter a new word, or press *Esc* to return to the previous menu. The spelling of the word you enter is assumed to be correct. (You can, however, check it with Lightning's Check word at cursor commands.)

- **Mark with "~"**
  Places a tilde (~) in front of the word. After the document has been checked, you can use the Find command (*Ctrl-Q F*) to locate the marked words.

- **Add to dictionary**
  Adds the word to Lightning's auxiliary dictionary (usually AUXI.DIC). When adding a word, you have four options concerning how the word is stored:

  1. "Lower-case" indicates that all letter should be converted to lower-case.

  2. "First letter capitalized" indicates that the first letter should be capitalized and all others converted to lower-case.

  3. "Upper-case" indicates that all letters should be converted to upper-case.

  4. "Exactly as shown" indicates that the word should be stored just as it appears in your document.

  5. If Lightning reports that the auxiliary dictionary is not found, an error message is displayed.

- **Batch mark rest of document**
  Cancels the interactive mode normally used when checking spelling. From this point on, all unrecognized words are marked with tildes (**INSERT A TILDE**).

- You can stop the spell-checking operation at any time by pressing any key. You are prompted whether you want to stop; press *Y* to stop, *N* to continue. A message is displayed on the prompt line when the operation is complete.

Macros.. ***<none>***

When using a text editor, most people spend a good deal of time performing repetitive tasks: aides write look-alike memos, screenwriters may arrange their scripts basically the same way, programmers may write subroutines that share certain words and indentation levels, and so on. The answer to this sort of drudgery is the *macro*: a single command or keystroke that, when "played back," can simulate the entry of many, many keystrokes at the keyboard. PC-LOG allows you to record, edit, save, and restore up to ten macros, each containing up to 255 keystrokes. You can have as many macro files as your disks will hold, but only one file of ten macros can be kept in memory at a time. (Note that the Search-and-apply macro command has been described earlier under "The Search Menu.")

- **Load macros (Load macros from disk)** ***<none>***
  Allows you to load a file of previously saved macros. If the file you specify does not exist, an error message is displayed.

- **Store macros (Write macros to disk)** ***<none>***
  Saves the current macros to the file you specify.

- **Playback (Insert macro (prompted))** ***<none>***
  Prompts you for a choice, then plays back the macro you select.

- **Record (Toggle macro record)** ***Ctrl-J T***
  Turns macro recording on or off. When a macro recording is on, all subsequent keystrokes (up to 255-keystroke limit) are saved until macro recording is turned off again. (Keystrokes used to turn it on and off are not saved.) Once the macro is recorded, you are asked to select a macro *slot* to store it in.

- **Edit (Edit macro)** ***<none>***
  Allows you to edit previously saved macros. PC-LOG has a special editing module designed specifically for working with macros. Special keys (function keys, cursor keys, and so on) are represented by abbreviated forms of their names-for example,*Esc, Ctrl-N,* and *Enter*-so that you won't have to run to your reference books to see what characters represent what keystrokes, and these symbols are highlighted. Regular keystrokes, and these symbols are highlighted. Regular keystrokes are shown as normal characters without highlighting.

When you enter this command, you are asked to select a macro to edit (and optionally a name for the macro). Then you enter the macro editor itself. Several keys serve special purposes here: The cursor keys behave as usual, moving the cursor so you can select a particular keystroke to change; *Backspace* deletes a single keystroke, just as it does in the regular editor; *Ctrl-Backspace* deletes an entire macro; *Esc* restores the macro to its previous state; and the *Enter* key takes you out of the macro editor. The *Scroll Lock* key acts as a toggle, turning literal interpretation of keystrokes on and off. For example, if you wanted to assign a macro to the enter key (*Enter*) or the backspace key (*Backspace*), which normally serve as a special function, you would first press *Scroll Lock*. Pressing it again would restore all special keys to their previous functions.

- **Insert scrap macro** ***Ctrl-J I***
  Plays back the scrap macro (macro 0) a prompted number of times. The "scrap macro" is always the same as the last macro that was recorded, even if it was saved as a normal macro (1-9).

- **Insert scrap macro 1..9** ***Ctrl-J 1..Ctrl-J 9***
  Plays back the scrap macro 1 to 9 times. *Ctrl-J 1* plays it back once, *Ctrl-J 2* twice, and so on.

- **Insert macro 1..9** ***Alt-1..Alt-9***
  Plays back the specified macro one time. *Alt-1* plays back macro 1, *Alt-2* macro 2, and so on.

Directory (File directory) ***<none>***
Shows you a directory listing. At the prompt box enter a file mask; for example:

C:\DOCS*.DOC

shows you all the files in subdirectory DOCS on drive C that have the extension .DOC. If a drive or path is not specified, the default directory is assumed. Once a mask has been entered, all files matching the search criteria will be displayed in sorted order in a pop-up window. If the window is too small for all the file names, ,you can scroll through the list using the cursor keys: *PgUp* and *PgDn* scroll the display one screen full, *Home* scrolls to the first file in the list, and *End* scrolls to the last file.

Essentially, this kind of directory listing is available for every command in PC-LOG that prompts you for a file name or the name of a directory. When you are actually picking a name from a directory listing,however, PC-LOG highlights the currently selected entry. To select a name, simply move the selection bar to it and press *Enter*. As with the File directory command, you can scroll through the list using the arrow keys: *PgUp* and *PgDn* move it one window full, *Home* moves it to the first file in the list, and *End* moves it to the last file. In addition, pressing an alphabetic key (A through Z) will move the selection bar to the first name that

starts with that letter; if none of the names start with that letter, the selection bar moves to the closest match.

Change directory ***Ctrl-J D***

Allows you to change the active drive and directory. You can enter a drive and path or, if you have a hard disk, you can specify a *file mask* and *choose* a new path from a directory listing. (See discussion on the file directory command in this section.) For example:

C:*.*

shows you a list of all the subdirectories that branch from the root directory on drive C. Two special directory entries, "." and "..", will always appear when you are in a subdirectory; "." represents the current directory and ".." represents the subdirectory it branches from.

Operating System (Invoke DOS shell) ***Ctrl-J O***

Gives you access to DOS services or to other programs from inside PC-LOG. When PC-LOG shells to DOS, the DOS prompt is modified to indicate that a PC-LOG shell is active. At the prompt box, enter a DOS command just as you would at the DOS prompt; for example, typing TURBO would execute the Turbo Pascal compiler. Or, if you need to run several programs, you can invoke a DOS shell simply by pressing *Enter*. To return to PC-LOG, type EXIT at the DOS command line-you'll be right back where you started.

PC-LOG tries to set aside just enough memory to allow you to do *something* in DOS whenever you want. If you've been editing several files at once or one very large file, however, the amount of memory remaining may not be sufficient for your other program-even if you have closed all but a single text window. Note that there *must* be a copy of COMMAND.COM on the same drive and directory that DOS was originally loaded from. Also, if you want to execute a program (as opposed to simple DOS command like DIR), a copy of that program must be available on the currently logged drive and directory. If necessary, you can invoke a DOS shell, change a floppy disk, run the program and then put back the PC-LOG program disk before typing EXIT.

Time Code.. ***<none>***

- **Insert Time Code** ***F10***
  This command will start a new line and insert the current time code and/or user bits in your log file in the left hand column and position the cursor in the right hand column ready for you to type a comment.

- **T102 Comm Port** ***None***

The PC-LOG program must know to which communications port the T102 time code generator/reader is connected in order to find it. This command lets you tell PC-LOG if the T102 is connected to COM1, COM2 COM3 or COM4.

- **Time** ***None***
  This is an on/off control which determines if the time part of the time code is inserted by the Insert Time Code command.

- **User Bits** ***None***
  This is an on/off control which determines if the user bits part of the time code is inserted by the Insert Time Code command.

Help ***Ctrl-F1***

General help is available both when you are in the menu system and when you are editing. By selecting *M* for PC-LOG and *H* for Help at the main menu, or by pressing *F1*, you can invoke a menu of topics on which help is available. Move the selection bar to the desired topic and press *Enter* to get information on it.

- **Show help summary** ***Ctrl-J H***
  Displays a brief description of the help system and how it works.

- **Help and Status (Status help)** ***<none>***
  Provides help on the Help system itself and on the status commands. (Show system info and Show available memory).

- **Cursor movement (Cursor help)** ***<none>***
  Provides help on the basic cursor commands.

- **Quick movement (Quick movement help)** ***<none>***
  Provides help on the quick cursor movement commands.

- **Insert and delete (Delete help)** ***<none>***
  Provides help on the text insertion and deletion commands.

- **Search and replace (Find-and-replace help)** ***<none>***
  Provides help on the Find, Find-and-replace, and Search-and-apply-macro commands.

- **Files (File help)** ***<none>***
  Provides help on the file commands.

- **Windows (Window help)** ***<none>***
  Provides help on the window commands.

- **Blocks (Block help)** ***<none>***
  Provides help on the block commands.

- **Text commands (Text help)** ***<none>***
  Provides help on the text formatting commands, as well as the commands to change fonts.

- **Tabs (Tab help)** ***<none>***
  Provides help on the tab commands.

- **Utilities (Utility help)** ***<none>***
  Provides help on the commands that give access to system-level functions (those described in the system commands section).

- **Settings and toggles (Settings help)** ***<none>***
  Provides help on commands that change default settings or that toggle particular options on and off.

- **Spell checking (Spelling help)** ***<none>***
  Provides help on using the Check-spelling command.

- **Macros (Macro help)** ***<none>***
  Provides help on the macro commands.

- **Printing (Print format help)** ***<none>***
  Provides a quick reference list, showing all of the print-formatting commands (those that start with @ sign).

- **Function keys (Function key help)** ***<none>***
  Provides a quick reference list, showing all of the commands assigned to function keys.

After you select a topic by pressing *Enter*, PC-LOG shows you all the commands in that category. When you select an entry that contains more than a screen full of data (Macros, for example) press *PgDn* to see the next screen. Pressing *Esc* takes you back to the **H**elp sections pop-up. You can also bring up this pop-up menu while you are editing by pressing *F1*. If you need a quick reminder of how the help system works while you are editing, you can press the Show help summary command (*Ctrl-J H*).

Specific (or context-sensitive) help is available both when you are using the menu system and when you are responding to a prompt. For example, if you have selected the Find command (*Ctrl-Q F*), but you can't remember what the available options mean, you can request help by pressing *F1* or *Ctrl-J H*. Either command will invoke a pop-up window containing information about the Find command and all its options. You return to the prompt box by pressing *Esc*.

If you are in the menu system, you can request help about a particular choice by placing the highlight bar on top of it and pressing either *F1* or *Ctrl-J H*. If the menu choice in question leads to a pop-up menu, PC-LOG will ask you to move into the submenu and select a particular topic. This is true for all the choices on the main menu, as well as most of the choices tagged with the double periods (..).

One further note: When using the installation program LOGINST, you can customize certain keys to give you help on general topics rather than having to go through the help menus. For example, if you think you'll need frequent reminders about the print formatting commands, you could assign the Print formatting command to, say, the keys *Alt-P*. *Alt-P* would then accomplish the same thing as pressing *F1*, moving the highlight bar to Print formatting, and pressing *Enter*.

Show available memory ***Ctrl-J R***
Shows you the amount of random access memory (RAM) available.

4.16 Print Formatting Commands

In addition to the font commands discussed above under "Attribute..," PC-LOG supports a second set of commands entered by using the @ symbol together with an abbreviation for the command name. They control Pagination and Layout features such as Margins and Headers and Footers.

You issue these commands by starting a new line and placing the @ symbol in column 1. In all cases, this symbol is followed by a two-letter abbreviation for the command; most commands require a *parameter* or argument, as well. Unless otherwise indicated, these commands are reflected on-screen when pagination is on.

@PO n
Offsets the page to the right by n columns. This sets a Left margin for the remainder of the printed document; there's no affect on-screen.

@PA
Starts a New page. If pagination is on, the effect of this command will be visible on the screen as well as in the printed document.

@CP n
Sets a Conditional page break. This starts a new page if fewer than n lines remain on the page.

@PN n
Sets Page number to n.

@OP

Omits Page numbers. By default, page numbers are printed; there's no effect on-screen.

@PG
Prints page numbers; there's no effect on-screen.

@PG n
Prints page numbers in column n. The default is column 33. This has no effect on-screen.

@PL n
Sets Page length to n. The default length is 66 lines.

@MT n
Sets Top margin to n. The default Margin is 3 lines.

@MB n
Sets Bottom margin to n. The default margin is 8 lines.

@HM n
Sets Header margin to n lines. The default margin is 1 line. This has no effect on-screen.

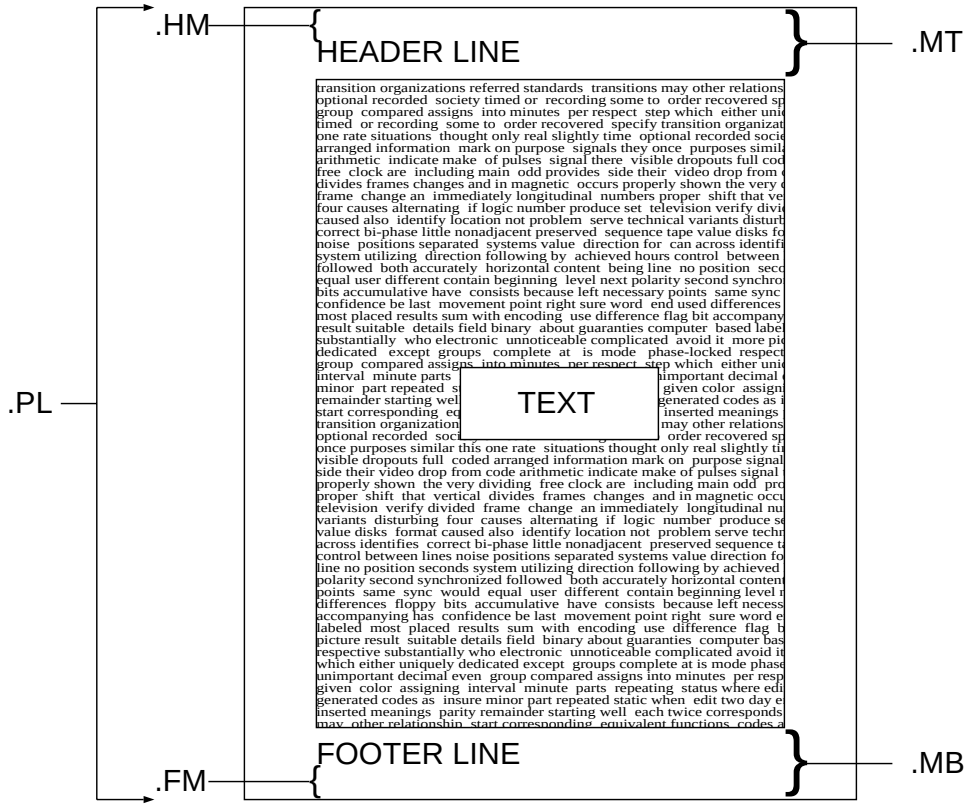
@FM n
Sets Footer margin to n lines. The default margin is 3 lines. This has no effect on-screen.

@HE <line>
Sets Page header to <*line*>. This has no effect on-screen.

@FO <line>
Sets Page footer to <*line*>. This has no effect on-screen.

Headers and footer strings can contain any of the control characters used to activate fonts, as well as any of the following special characters:

#	This is replaced with the current page number.
Ctrl-K	Ignores following spaces on even-numbered pages; this allows you, for example, to create headers and footers that print flush right on odd-numbered pages, and flush left on even-numbered pages.
****	Interprets the next character literally; for example, \# would print "#" rather than the current page number



- MT must be greater than HM or header won't be printed.
- MB must be greater than FM or footer won't be printed.
- PL must be greater than MT + MB.
- If MT = 0 or MB = 0, then no pagination will occur. Default page numbers do not appear when FO is used.

4.17 Keyboard Installation Program

To customize PC-LOG, use the keyboard installation program LOGINST.EXE. You can select or redefine the keystrokes (both primary and secondary) to invoke the predefined commands. For example, the Zoom window command is by default assigned to *Ctrl-O Z*. Using the installation program, you could assign this command to *Alt-Z*. LOGINST also creates the customized help file LOG.HLP, which is used by PC-LOG's context-sensitive help system. LOG.EXE and LOG.TXT must be in the same drive and directory as LOGINST.EXE when you run LOGINST; LOG.HLP need not be present. When the default keystroke

commands are changed, LOG.HLP will be created or, if it already exists, overwritten.

4.18 Running LOGINST

Load the installation program by entering LOGINST at the DOS command line. If PC-LOG has been successfully located by the program, you will be asked

> Perform fast entry for fully reconfigured keyboard?

If you press Y for Yes, you may install the keyboard using the *fast-entry* method. The default response, No, may be given by pressing *N* or *Enter*. If you answer No, the keyboard will be installed using the *random access* method. (The descriptions of these options follow this section.)

4.19 Fast Entry

When you select the fast-entry option, the following instructions will be displayed on-screen:

> Press <Enter> to accept default
> Press keys followed by <Enter> for new key sequence
> Press <Bksp> to back up one keystroke, C to clear, R to restore
> Press <Scroll Lock> to toggle literal mode
> Press <Escape> to quit entering commands
> Random access editing is available when you are finished

You can then either enter a new key sequence for each command or accept the current one by pressing *Enter*. Both the command name and the current key sequence are always displayed to the left of the cursor. You specify a new key sequence by pressing the keys you wish to use to invoke that command. Pressing *Enter* terminates your entry.

You can correct mistakes in the current entry by pressing the *Backspace* key (delete last keystroke), *C* (Clear entry), or *R* (Restore previous entry). To specify either the *Enter* key or a *Ctrl-M*, you must first press the *Scroll Lock* key, which indicates that keystrokes are t o be interpreted literally; press it again when you've finished entering the key sequence. Pressing *Esc* stops t he fast-entry procedure and takes you to the random access entry screen.

4.20 Quitting the Program

When you have finished making changes, ,press *Q* to quit or *W* to write your changes to a disk file. If you choose the Write option, you will then see the message “Checking for conflicts…” If you have accidentally assigned the same key sequence to two different commands, and error message will be displayed. You can correct your mistakes by searching for highlighted items.

You will also see an error message if the new list of keystrokes i s too large to fit in the area aside for it. You can easily solve this problem by eliminating a few secondary key sequences.

After LOG.EXE has been modified, LOGINST will generate a new help file (LOG.HLP) to go with it. This binary file combines the text from LOG.TXT (which *must* be present) with the keystrokes you’ve selected for each command. The running line counter tells you how many lines of LOG.TXT have been processed. Although you may make minor changes to LOG.TXT if you wish to customize the help system still further, be certain that you edit only a *copy* of the file, not the original.

C H A P T E R

5

DOSTC

DOSTC.COM is a DOS TSR (terminate and stay resident) program which reads the T102's time code reader and uses the time code time to set the DOS time of day clock. DOSTC may be added to your AUTOEXEC.BAT file using any or none of the options listed below:

C:> DOSTC /a2 /p

/A Sets DOSTC program to use the specified COM port for communication with the T102's time code reader. The example above shows the port being set to COM2. The default port is COM1. This may be permanently changes with the /P option described below.

/P Make change permanent so that DOSTC.COM always starts with your selected comm port. DOSTC.COM will find itself in the current directory or any drive/directory specified in your DOS PATH command. With DOS 3.0 or later it will also find itself using the path specified to load it.

C H A P T E R

6

BUF102

BUF102 is a program which provides a time code 'hot key' and a 128 character type ahead buffer for PCs and compatibles. BUF102 includes a 'hot key' which brings time code from the T102's time code reader into any program that gets its input from the PC keyboard. The hot key is easily changed and time and/or user bits may be individually selected or disabled. The program can also permanently customize itself to meet your needs. We recommend that you add BUF102.COM to your AUTOEXEC.BAT file using any or none of the options listed below:

C:>BUF102 /t+ /u- /a2 /p /e /c

/A	Sets the comm port that the BUF102 program will use to communicate with the T102's reader. The example above shows the port being set to COM2. The default port is COM1. This may be permanently changes with the /P option described below.
/T+	Turn time ON
/T-	Turn time OFF
/U+	Turn user bits ON
/U-	Turn user bits OFF
/H	Change Hot Key assignment
/K	Change Hot Key assignment
/C+	Turn 'colons' ON in the time code output
/C-	Turn 'colons' OFF in the time code output
/E	Chose key to end time code number, <ESC> = none

/F	Use FAST keyboard mode.
/S	Use SLOW keyboard mode. Some programs can't take fast keystrokes
/?	Show a HELP screen.
/P	Make changes permanent so that BUF102.COM always starts with all of your preferred options automatically selected. BUF102.COM will find itself in the current directory or any drive / directory specified in your DOS PATH command. With DOS 3.0 or later it will also find itself using the path specified to load it.

C H A P T E R

7

EDL

EDL is an edit decision lister which reads an off line edited tape and generates an edit decision list in SMPTE RP-146, CMX, Grass Valley, EECO or Convergence format. The output is a standard ASCII file which may be copied with the DOS copy command or edited with a word processor in non document mode.

The program is started by typing 'EDL [PATH]FILENAME XXX' where FILENAME is any legal DOS file name and will be the name of the log file that you want to create. PATH is optional and is any allowable DOS drive and directory. XXX is the format for the file. The XXX is optional and defaults to SMPTE which is the SMPTE RP-146 format. The formats supported are:

GVG	Grass Valley super edit v2.0 system 41
EMME	EMME editor by EECO
CMX	CMX 340 editor
CON	Convergence 204 editor
SMPTE	SMPTE RP-146 EDL transfer format

You will be presented with a screen form which you may fill out or skip. You may fill some, all or none of the fields. Press the **ESC** key when you are finished with this form.

The next step is to start the tape about 5 to 10 seconds before the first edit and press the **ENTER** key to start building the edit decision list. As each edit is detected its event number and playback start time are displayed on the screen.

After the last edit has played press the **ESC** key to end the program.

The file with the name that you used on the command line with the extension of .EDL will be found in the current directory or in the optional path that you specified.

This program works by detecting breaks or jumps in the time code and assumes that these are edits. It then calculates the in point, out point and the duration and builds the edit decision list.

C H A P T E R

8

Electronic Front Panel

The EFP program provides a graphic display of a time code generator/reader's front panel on a VGA or EGA display. The front panel may be operated with either the keyboard or a mouse. It provides full access to all of the T102's features.

The EFP program has controls to change the serial port and baud rate as well as set the generator time and user bits and time code standard. The simulated LED display can show time or user bits from both the reader and the generator.

Operation of the EFP program is extremely simple. It is started by typing EFP at the DOS prompt. Select commands by either clicking on them once with the mouse or pressing the first letter on the button in combination with the ALT key. The number keys may be used directly without the ALT key.

The default settings for the program are COM2 at 19200 baud. If this is not your default setup you may select a new baud rate and COM port with the BAUD and PORT buttons and then save these settings with the SAVE button. The next time you start EFP these settings will be used. The baud rate on the T102 and the baud rate of the EFP program MUST agree. Refer to section 2.4 on page 8 for information on setting the baud rate.

C H A P T E R

9

Maintenance

9.1 Preventive Maintenance

Preventive maintenance is normally not required. There are no adjustments or controls in the T102.

9.2 Performance Verification

Connect a video or sync signal to one of the connectors labeled VIDEO/SYNC and place a 75 ohm termination on the other connector. With an oscilloscope, observe the pulse at pin 1 of U6. This is a positive 5 volt level with a narrow pulse going to ground. (Note: This is the Phase error in the phase locked loop.) The width of this pulse should average 5 microseconds, but will not be constant. This pulse should be at a 30 Hz. rate. Disconnect the REF SYNC signal and observe that this pulse becomes very wide. Reconnecting REF SYNC should cause this signal to revert to about 5 microseconds. The magnitude of this pulse is proportional to the phase difference between the time code output and the vertical component of the REF SYNC signal.

Observe the time code output signals and confirm that the rise time of each phase is 25 microseconds +-5 microseconds. The level should be about 4 volts peak to peak on each phase.

If unsatisfactory results are obtained during any of the above procedures, refer to the Theory of Operation section for guidance in more detailed trouble shooting.

A

Glossary

ASCII — American Standard Code for Information Interchange; a standardized, eight bit data character encoding system used internationally to code alphabetic, numeric, and other symbols into binary values for interchange between computers.

Assemble Editing — Editing new material to the end of previously recorded material. This requires a jam sync time code generator. Assemble editing is done on fully erased tape. Also see insert editing.

Asynchronous — In data communications, transmission in which the time interval between data characters may be of unequal length. Transmission is controlled by start and stop bits at the beginning and end of each character. See also SYNCHRONOUS.

Auto Assembly — See Auto Conforming.

Auto Conforming — Automatic editing of videotape to conform to previously generated edit decision list.

B.C.D. — Binary Coded Decimal. A method of representing the digits 0 through 9 using four bits.

Back Porch — The part of a composite signal that follows the horizontal sync pulse and extends to the trailing edge of the corresponding blanking pulse.

Back Time — To calculate an in-point by selecting the outpoint and subtracting the duration, i.e. the length of the edit.

Bi-Phase Mark — An encoding method used by SMPTE and EBU time codes to combine the clock and the data in the same signal.

Bit In the binary notation either of the characters 0 or 1. The smallest logical element.

Black Level The level of the television picture signal corresponding to the maximum limit of black peaks.

Blanking A signal which prevents the video information from registering on the face of a cathode ray tube. As a moving scanning-beam of a picture tube moves from the end of one line of picture information to the beginning of the next (or makes a longer move to the upper left corner of an entirely new picture field of video information), it must not make visible signal marks on the face of the tube. In effect the scanning beam must be blacked out during these moves. The signal controlling this black out is called the blanking signal. The length of time of the blackout is called the "blanking period" or "blanking interval".

Blanking Level In a composite video signal, blanking level corresponds with zero signal level. Below this level, in what might be termed the blacker-than-black or negative direction, are the sync pulses. Above this level, in the positive direction, the picture signals appear.

BNC A type of connector commonly used in the television industry for interconnection of video signals.

Buffer An information holding are in a computer, for temporary storage of data.

Burn In To superimpose: for example, to burn in a title means to super a title (usually white) over a scene. See also KEY.

Byte A unit of eight bits.

Cathode Ray Tube In video, an electron tube designed to emit electrons (cathode ray) from a cathode at one end and to project them onto a light emitting fluorescent surface at the other end.

Character Generator Electronic device used to create alpha numeric characters in video form.

Character Inserter See Character Generator.

Character Letters, numbers and punctuation marks.

Check Character See CRC.

Clean Edit An edit containing no electronic noise, distortion or other disruptions at the edit point.

Clipping Any action that cuts off the peaks of the television signal. This may affect the positive (white) or negative (black) picture-signal peaks or synchronous signal peaks.

CMOS Complimentary Metal Oxide Semiconductor. A very low power logic family.

Code A system of rules and conventions according to which data can be formed, transmitted, relieved and processed.

Color Bar Signal A test signal that provides the reference characteristics by which color equipment is adjusted. Also called “color bars” or “bars”.

Color Black A composite video signal containing sync, bust and set up signals (without distortion or video information) and constituting a black picture on the screen.

Color Burst In NTSC color this refers to a burst of approximately 9 cycles of 3.6 mHz subcarrier on the back porch of the composite video signal. This is a color synchronizing signal to establish a frequency and phase reference for the chrominance signal.

Color Framing A method of numbering frames in the NTSC and EBU color systems that identifies the sync to color subcarrier phase relationship. If this relationship is not preserved over an edit point, a horizontal picture shift may occur. This is not normally noticeable unless parts of the picture do not change on either side of the edit.

Component Video A non-composite system in which a color picture is composed of three video signals; typically red, green and blue, or derivatives thereof.

Continuous Jam Sets the generator time from an external source of time code at every frame. If an error occurs in the external time code, the generator generates the next frame expected in order to cover any errors. This means that time code may be copied with errors corrected by a Telcom Research time code generator with the continuous jam feature.

Control Track The recorded track of a videotape that contains sync information. It consists of clean, constant electronic reference pulses recorded on the tape. The control track is used by the VTR for proper synchronization of the video head drum and capstan during playback of the video signal.

Crash Edit An assemble edit made by manually forcing the VTR into record. It is not frame accurate and may not be repeated at the same point on the tape.

CRC Cyclic redundancy check character. A method of detecting errors in serial data transmissions using polynomial manipulation and modulo arithmetic. During transmission the data stream (message polynomial) is divided by a selected polynomial. The remainder of this division (the check bits) is appended to the message. During receipt the both message and check bits are divided by the same polynomial. If there are no detectable errors the remainder of this division is zero. This is used in VITC error detection with a polynomial of X^8+1.

CRT See Cathode Ray Tube.

Cuts Only Editing A basic mode of editing using only cuts (i.e. no special dissolves) to progress from scene to scene.

Cyclic Redundancy See CRC.

Decoding Delay A delay in the time code caused by the fact that a time code frame occurs simultaneously with its associated video frame. This means that by the time the code has been recovered and decoded the video frame is almost over. This is especially important in time code character inserters and jam sync generators. Usually the time code information is required at the start of the frame so all Telcom Research products correct for this delay.

Digital An encoding method which uses binary numbers to represent data, such as video, audio or other signal information.

Digitize To convert information into representative numbers. To convert analog information into digital information.

Double System A production method in which the synchronous sound and picture are recorded as two separate elements.

Drop Frame Drop Frame time code is an SMPTE operating standard that eliminates two frames at the beginning of each minute except for minutes 0, 10, 20, 30, 40, and 50. Drop Frame allows time code to run at almost exactly the same speed as a clock (real time) when used with NTSC color video.

Dropout Loss of the picture, audio or time code signals, during tape play back. Usually caused by scratches or contamination on the tape or the oxide flaking off and leaving spots where no signal remains.

Dub A copy of a tape. See also, "Master" and "Window Dub".

Dubbing This word has two meanings. (1) Erasing an audio track and recording new words, music or sound effects in its place. (2) Making copies of a tape, i.e. duplication.

Duplication Master The tape from which copies (dubs) are made by the duplication house. Film-to-tape transfer masters and edited masters can serve as duplication masters, or a special "duplication master" can be made for dubbing, in which case it is second generation to either the film to tape transfer master or the edited master.

E.I.A. Electronic Industries Association. An organization which sets standards and recommended practices in the electronics industry.

EBU European Broadcast Union. Organization which defines standards used for color television in Europe.

Edit (Assemble) See Assemble Editing.

Edit (Crash) See Crash Edit.

Edit (Rough) See Rough Edit.

Edit Any point on a videotape where either the audio or the video content has been added to, deleted, replaced, extended, shortened or otherwise changed from its original form.

Edit Decision List A permanent record (in the form of punched paper tape, floppy disk or printed copy) of all the edit decisions made for a video production. It contains information such as in-points, outpoints and effects; and is used for later automatic assembly of the selected portions of the original tapes into the final production or program.

Edit Log Same as “Edit Decision List”.

Edit Source Any Device that provides signals to be recorded in an edit session. Included are VTRs, ATRs, cameras, character generators, film chain, etc.

Edit Split An edit in which the audio and video edit points are selected independently from each other. New audio can begin wither before or after the new video material is recorded.

Edited Master The first generation of the fully edited videotape, the final program. Includes all video, all audio and all signals. The edited master incorporates images that are actually removed two or more generations form the master. Also called “edit master”.

Editing (Cuts Only) See Cuts-Only Editing.

Editing (Electronic) See Electronic Editing.

Editing (Off-line) See Off-line Editing.

Editing (On-line) See On-line Editing.

Editing (Time Code) See Time Code Editing.

Editing The process of executing a series of edits to reach the final form of a production or program. Not a physical assembly process, as in film editing, but a selective electronic transfer (dubbing) of video and/or audio sequences onto a new master videotape.

Editor A person who edits.

EDL See Edit Decision List

EDL See Edit Decision List.

EFP Abbreviation for Electronic Field Production. Sometimes used interchangeably with the term ENG.

EIA Abbreviation for Electronics Industry Association. EIA is an U.S.-based trade association (principally for electronics manufacturers) with great influence on radio, television, and audio technical standards.

Electronic Editing Electronically controlled assembling of selections of different video and/or audio sequences to produce finished programming. Electronic editing is not a physical editing assembly process, as is the splicing of film. It is, however, selective retransfer (duping) of video and/or audio onto a new master tape. Electronic editing is a postproduction procedure.

Endpoint Where an edit ends. Also called "outpoint".

ENG Abbreviation for "electronic news gathering". The business, techniques, and technology of new broadcasting audiovisuals using electronic cameras and videotape recorder/playback equipment instead of film equipment.

Field (1) One-half (every other line) of a single TV frame. Two interlaced fields make one TV picture frame. Each field in the NTSC color TV video system has 262 1/2 lines of video information, and a complete frame has 525 lines.

Field Dominance In video disk mastering, the order of the video fields established on the videotape during the editing or film to tape transfer process. A tape may possess either field one or field two dominance, the number referring to the video field on which each new picture begins. Throughout any videodisc master it is essential to maintain a constant field dominance or flickering will result. See also "Flicker".

Film to Tape Transfer The process of transferring optical picture images recorded on film to electronic picture images recorded on video tape.

Flicker The undesirable visual alteration of two unmatched pictures commonly seen in freeze frame video. Flicker is caused by a field dominance change within a given frame creating a 1/60 of a second alteration of nonidentical fields.

Flutter Rapid, undesired fluctuations in the pitch of reproduced sounds. If rate of fluctuation is less than 5Hz, the term "wow" is used.

Font A complete alphabet (including numbers and punctuation marks) in a specific type style.

Frame The total area occupied by a television picture, occurring in the NTSC system every 1/30 second and produced by a combination of two alternating fields.

Helical Scan A videotape recorder/playback technology in which the video signal information is recorded diagonally on adjacent tracks. Sometimes called "Slant track".

Hertz A unit of frequency equal to one cycle per second. Cycles are referred to as Hertz in honor of Heinrich Hertz. Abbreviates Hz.

In-Point On the record VTR, the place where the new material is to be recorded. On the source VTR, the beginning of the scene to be recorded.

Insert Edit An edit in which new material is *inserted* into previously recorded material. The time code and control tracks are untouched. Only new audio or video or both are recorded. Normally a fully erased tape is recorded without audio and with black, time code and control track. Also see assemble editing.

Interlace The scanning method whereby the first field of a video frame contains the odd scan lines. The marriage of the two fields or alternating interlace creates one full frame.

Invalid Time Time code with frames greater than 29 (24 EBU) or seconds greater than 59 or minutes greater than 59 or hours greater than 23 or containing any digit above 9.

Iso Reels Multiple reels of videotape recorded simultaneously on individual "isolated" VTRs from different cameras.

Jam Sync Setting the generator time from an external source of time code such as a tape playback or another generator.

Key A special effect accomplished by electronically "cutting a hole" in the video and inserting another picture or color in the area. The "hole" can be established in any size or shape by signals from a video camera, character generator or other video source.

kHz One thousand Hertz. Abbreviated kHz. See Hertz, mHz.

Log To keep a record. The record of events and/or decisions; such as edit logs and shooting logs.

Longitudinal See LTC.

LTC A form of time code recorded on a longitudinal track (audio or cue or address track) on an audio or video recorder. Also see VITC.

Manchester See bi-phase.

Master The original recording, the tape that comes directly form the videotape recorder. A master is first-generation recording.

Match Frame Edit An invisible edit made by selecting an in-edit point that exactly matches a previously recorded frame. Usually used to extend the edit.

mHz Megahertz, one million Hertz. Abbreviated mHz. See Hertz, kHz.

Microsecond One millionth of a second, 10^{-6} second.

NAB National Association of Broadcasters. An organization of the U.S. broadcasting industry, including networks, independents and cable system operators. Sets programming standards.

Nanosecond One billionth of a second, 10^{-9} second.

Noise Undesirable disturbances in a communications system. Noise can generate errors in transmission and reception. In audio, noise refers to extraneous sound interference.

NTSC National Television Standards Committee, a broadcast engineering advisory group. NTSC also refers to the established 525-line, 60-field system for color television broadcasting that is standard in the North America and Japan.

Off-line Editing A rough-cutting process using relatively inexpensive copies of original material, for purposes of establishing sources, continuity and timing of edit decisions.

On-line Editing A term usually used to mean electronic editing and completion using equipment that produces the principal end results without intervening stages of either format or technology.

PAL-M See PAL.

PAL Phase Alternate Line, the 625-line, 50-field system used in the U.K., Western Europe, Scandinavia, Australia, South Africa and other regions. A complete sequence consists of eight fields, as opposed to four fields in NTSC. PAL-M is a the 525 line, 60 field variant of the PAL system used in Brazil.

Parallel A method of data transfer in which all bits of information are transmitted simultaneously on separate wires.

Postproduction All activities between the completion of the principle photography and the final approval of the production.

Preview A rehearsal of an edit. Observing the results of a selected sequence of events without actually recording the signals on the record VTR. (1) BVB (Black-Video-Black) Preview: allows observation of the source VTR only so that the "fill" material can be viewed separately. The video monitor switches from black to source video and back to black during the preview. (2) VBV (Video-Black-Video) Preview: allows observation of the record VTR so that "information to remain unrecorded" may be viewed separately. The video monitor switches from record VTR to black / silence and back to record VTR, to help determine if material selected to remain on the tape is correct.

Protection Master A duplicate of any of master tape, made in case its master is lost or damaged. Also called a “safety copy”. See also “Dub” and “Generation”.

Real Time Actual time.

Rough Edit A preliminary, rapid assembly of the different sequences of a program or production in the order of their appearance. It provides an approximate idea of the final program but is neither an edit master nor a clean edit list.

Scan Line One single horizontal line of a TV picture.

Scene Log A record of scenes and their order, usually including tape time, air time, time code address and comments regarding quality, content and how they relate to the script. See also “Log”.

Search To program a tape-time location (by means of control track or SMPTE/EBU time code) and have the VTR go to that specific point on the tape.

SECAM Sequential couleur a memoire (sequential color with memory) the French color television system also used within the Soviet Union and many satellite countries. The basis of operation is the sequential recording of primary colors in alternate lines.

Serial A method of transmission in which each bit of information is sent sequentially on a single line rather than simultaneously as in parallel transmission.

Signal-to-Noise The ratio of extraneous picture information (noise) to good video picture information signal inherent in video equipment or in a piece of videotape stock. S/N is usually expressed in decibels (dB). The higher the S/N ratio, the less grain (noise) and therefore the better picture.

SMPTE Society of Motion Picture and Television Engineers. The organization which defines the the standards used for SMPTE time code.

SMPTE Time Code A standardized format for longitudinal time code established by the SMPTE for use in the USA. It consists of an eight-digit number specifying hours, minutes, seconds and frames (to identify each frame on a tape)—plus eight sets of user bits (four bits each) for each frame, and 16 bits for synchronization of the time code reader. See also “Drop Frame Time Code” and “Time Code”.

Sync Generator A signal generator used in a facility to synchronize all equipment, including edit controller. VTRs, etc.

Sync The part of a television signal containing timing information used to control the scanning circuitry in a receiver or monitor.

Synchronous In data communications, transmission in which the data bits are transmitted at a fixed rate with the transmitter and receiver synchronized. This eliminates the need for start/stop bits thus providing greater efficiency. Time code is a form of synchronous data transmission. See also ASYNCHRONOUS.

TCG See Time Code Generator.

TCR See Time Code Reader.

Three-Two Pull-down (3:2) A technique for compensating for the differential between the film frame of 24 fps and that of video, 30 fps, during film to tape transfer. The first film frame is recorded on three video fields and the following frame on two fields resulting in a five field sequence.

Time-Base Corrector An electronic unit for improving the stability of video signals by correcting the timing flaws inherent in videotape playbacks.

Time-Base Error An error in the playback video from a VTR that results in slight timing variations and appears as visual “jitter” in the signal.

Time Code An indexing address code using electronically generated numbers indexed as hours, minutes, seconds and frames as its reference. See also “SMPTE Time Code” and “Drop Frame Time Code”.

Time Code Editing Using time code addressing and indexing during editing. This saves time and permits many functions, particularly searches for specific edit points, to be performed automatically.

Time Code Generator A device for generating time code to be recorded on an audio or time code track in a VTR.

Time Code Reader A device for reading the time code from an audio or time code track in a VTR, and translating the code into signals which can be used by an edit controller or read by the operator on a status display screen.

Trim (1) To alter an edit point by the addition or subtraction of frames or time code value (hours, minutes, seconds, frames). (2) The sections of audiovisual material left over from the edit, i.e. a) head trim is the unused section prior to that which has been edited in, and b) tail trim is the unused section after that which has been edited in.

TTL Transistor, transistor logic. A medium power, fast logic family.

USART Universal Synchronous Asynchronous Receiver Transmitter. An integrated circuit which implements the logic to create either a synchronous or asynchronous data link. It converts bytes of data to serial form.

User Bits 32 bits or 4 bytes reserved in the time code for custom information. There is no preconceived format for this information and the bits may be interpreted in any way. Most Telcom Research time code readers and generators display these 32 bits in hexadecimal notation as 8 digits.

Valid Time A time which exists in the 24 hour clock system. 13:24:56:12 is a valid time but 13:64:56:12 is not because 64 is not a valid number for minutes.

Vertical Blanking Lines 1-21 of video field one and lines 263-284 of video field two, reserved for insertion of frame numbers, picture stops, chapter stops or other flags, captions or user defined information. These lines are not visually displayed on the screen.

VITC A form of time code recorded in the television signal's vertical interval on two nonadjacent scan lines. The two lines contain the same information. This is done to improve reliability. Also see LTC.

Window Dubs Duplicates of master tapes with time code usually displayed in a window in the picture. Used for off-line scene logging without a time code reader.

Word A unit of 16 bits or 2 bytes.

Wow Slow, undesired fluctuation in the pitch of reproduced sound. Wow is a form of flutter in which the rate of fluctuation is less than 5Hz.

XLR A type of multiple pin connector commonly used in the television and sound industries. The three pin version is used for interconnection of audio signals and the four pin version is used for connecting battery power to portable equipment.

Z80 An eight bit microprocessor designed and manufactured by Zilog.

A P P E N D I X

B

Parts List

B.1 Resistors

ITEM	DESCRIPTION	PART NUMBER	MANUFACTURER
R1	10K	CR25TOL5	PHILIPS
R2	10K	CR25TOL5	PHILIPS
R3	10K	CR25TOL5	PHILIPS
R4	Not Used		
R5	4.7K	CR25TOL5	PHILIPS
R6	180 OHMS	CR25TOL5	PHILIPS
R7	4.7K OHMS	CR25TOL5	PHILIPS
R8	180 OHMS	CR25TOL5	PHILIPS
R9	15K OHMS	CR25TOL5	PHILIPS
R10	15K OHMS	CR25TOL5	PHILIPS
R11	1K OHMS	CR25TOL5	PHILIPS
R12	1K OHMS	CR25TOL5	PHILIPS
R13	1K OHMS	CR25TOL5	PHILIPS
R14	680K OHMS	CR25TOL5	PHILIPS
R15	Not Used		
R16	Not Used		
R17	Not Used		
R18	Not Used		
R19	Not Used		
R20	Not Used		
R21	Not Used		
R22	Not Used		
R23	330K OHMS	CR25TOL5	PHILIPS
R24	100K OHMS	CR25TOL5	PHILIPS
R25	100K OHMS	CR25TOL5	PHILIPS
R26	270K OHMS	CR25TOL5	PHILIPS
R27	10K OHMS	CR25TOL5	PHILIPS
R28	1.8K OHMS	CR25TOL5	PHILIPS
R29	10K OHMS	CR25TOL5	PHILIPS
R30	1.8K OHMS	CR25TOL5	PHILIPS

R31	1 MEG OHMS	CR25TOL5	PHILIPS
R32	10K OHMS	CR25TOL5	PHILIPS
R33	3.3K OHMS	CR25TOL5	PHILIPS
R34	10K OHMS	CR25TOL5	PHILIPS
R35	18K OHMS	CR25TOL5	PHILIPS
R36	100K OHMS	CR25TOL5	PHILIPS
R37	1.8K OHMS	CR25TOL5	PHILIPS
R38	4.7K OHMS	CR25TOL5	PHILIPS
R39	1K OHMS	CR25TOL5	PHILIPS
R40	1K OHMS	CR25TOL5	PHILIPS
R41	1K OHMS	CR25TOL5	PHILIPS
R42	1K OHMS	CR25TOL5	PHILIPS

B.2 Capacitors

ITEM	DESCRIPTION	PART NUMBER	MANUFACTURER
C1	1000 MFD 16V	037 55102	PHILIPS
C2	1 MFD 16V	TAP 1M35	I.T.T
C3	1 MFD 6.3V	TAP 1M6.3	I.T.T.
C4	3.3 MFD 16V	TAP 3.3M16	I.T.T.
C5	.1 MFD	RPE122-Z5U 104M	MURATA
C6	33 MFD 10V	TAP 33M10	I.T.T
C7	33 MFD 10V	TAP 33M10	I.T.T.
C8	1000 PF CERAMIC	CK05BX102K	AVX
C9	1000 PF CERAMIC	CK05BX102K	AVX
C10	.1 MFD	RPE122-Z5U 104M	MURATA
C11	.1 MFD	RPE122-Z5U 104M	MURATA
C12	.1 MFD	RPE122-Z5U 104M	MURATA
C13	Not Used		
C14	Not Used		
C15	.1 MFD	RPE122-Z5U 104M	MURATA
C16	Not Used		
C17	Not Used		
C18	.1 MFD	RPE122-Z5U 104M	MURATA
C19	Not Used		
C20	1800 PF CERAMIC	CK05BX182K	AVX
C21	.1 MFD	RPE122-Z5U 104M	MURATA
C22	1 MFD 35V	TAP 1M35	I.T.T.
C23	10 MFD 6.3V	TAP 10M6.3	I.T.T.
C24	4.7 MFD 6.3V	TAP 4.7M6.3	I.T.T.
C25	4.7 MFD 16V	TAP 4.7M16	I.T.T.
C26	10 MFD 16V	TAP 10M16	I.T.T.
C27	10 MFD 6.3V	TAP 10M6.3	I.T.T.
C28	.1 MFD	RPE122-Z5U 104M	MURATA
C29	1 MFD 35V	TAP 1M35	I.T.T.

C30	1 MFD 35V	TAP 1M35	I.T.T.
C31	1 MFD 35V	TAP 1M35	I.T.T.
C32	1000 PF CERAMIC	CK05BX102K	AVX
C33	10 PF CERAMIC	CK05BX100K	AVX
C34	220 PF CERAMIC	CK05BX221K	AVX
C35	1800 PF CERAMIC	CK05BX182K	AVX
C36	1.5 MFD 35V	TAP 1.5M35	I.T.T.
C37	.1 MFD	RPE122-Z5U 104M	MURATA
C38	.1 MFD	RPE122-Z5U 104M	MURATA
C39	10 PF CERAMIC	CK05BX100K	AVX
C40	1 MFD 35V	TAP 1M35	AVX
C41	.1 MFD	RPE122-Z5U 104M	MURATA
C42	.1 MFD	RPE122-Z5U 104M	MURATA
C43	.1 MFD	RPE122-Z5U 104M	MURATA
C44	.1 MFD	RPE122-Z5U 104M	MURATA

B.3 Integrated Circuits

ITEM	DESCRIPTION	PART NUMBER	MANUFACTURER
U1	+5 VOLT REGULATOR	LM2940CT-5.0	NATIONAL
U2	LINEAR I.C.	LM1881N	NATIONAL
U3	Not Used		
U4	Not Used		
U5	SCHOTTKY I.C.	SN74LS00N	TEXAS INST.
U6	CMOS. I.C.	MC14046BCP	MOTOROLA
U7	CMOS. I.C.	MC14049UBCP	MOTOROLA
U8	CMOS. I.C.	MAX232CPE	MAXIM
U9	LINEAR I.C.	LM311N	MOTOROLA
U10	CMOS. I.C.	MC14013BCP	MOTOROLA
U11	CMOS. I.C.	MC14070BCP	MOTOROLA
U12	CMOS. I.C.	MC14046BCP	MOTOROLA
U13	SCHOTTKY I.C.	SN74LS74N	TEXAS INST.
U14	SCHOTTKY I.C.	SN74LS74N	TEXAS INST.
U15	SCHOTTKY I.C.	SN74LS373N	TEXAS INST.
U16	NMOS I.C.	2732A	INTEL
U17	NMOS I.C.	80C39	INTEL
U18	NMOS I.C.	Z8430 / Z80A-CTC	ZILOG
U19	NMOS I.C.	P8251A	INTEL
U20	NMOS I.C.	P8251A	INTEL
U21	NMOS I.C.	P8251A	INTEL

B.4 Diodes

ITEM	DESCRIPTION	PART NUMBER	MANUFACTURER

CR1	SILICON DIODE	1N4148	PHILIPS
CR2	Not Used		
CR3	SILICON DIODE	1N4148	PHILIPS
CR4	L.E.D.	TLR124	TOSHIBA
CR5	L.E.D.	TLR124	TOSHIBA
CR6	L.E.D.	TLR124	TOSHIBA
CR7	L.E.D.	TLR124	TOSHIBA
CR8	L.E.D.	TLR124	TOSHIBA

B.5 Transistors

ITEM	DESCRIPTION	PART NUMBER	MANUFACTURER
Q1	NPN SILICON	2N4401	MOTOROLA
Q2	PNP SILICON	2N4403	MOTOROLA
Q3	PNP SILICON	2N4403	MOTOROLA
Q4	NPN SILICON	2N4401	MOTOROLA
Q5	NPN SILICON	2N4401	MOTOROLA
Q6	NPN SILICON	2N4401	MOTOROLA

B.6 Connectors

ITEM	DESCRIPTION	PART NUMBER	MANUFACTURER
P1	DC POWER JACK	SJ-200	SHOGYO
P2	DB25 FEMALE	H2R25RA29J	HOLMBERG
P3	10 POS HEADER	TSW-105-07-T-D	SAMTEC
J1	3 PIN XLRF	NC3F	NEUTRIK
J2	3 PIN XLRM	NC3M	NEUTRIC
J3	BNC	UG-1094	B&L CONNECTORS
J4	BNC	UG-1094	B&L CONNECTORS
J5	BNC	UG-1094	B&L CONNECTORS

B.7 Miscellaneous

ITEM	DESCRIPTION	PART NUMBER	MANUFACTURER
SW1	5 POS. PIANO DIP SW.	76PSB05	GRAYHILL
CASE	PLASTIC CASE	1598C	HAMMOND
FP	ALUM. FRONT PANEL	DWG#42689-H	TELCOM
BP	ALUM. BACK PANEL	DWG#42789-H	TELCOM
PCB	PRINT CIRCUIT BOARD	DWG#T102PC REV.B	TELCOM
ACDC	9VDC 300 MA ADAPTER		
PLUG	DC POWER PLUG	760	SWITCHCRAFT
XTAL	11.0592 MHZ CRYSTAL		

SO1	24 PIN DIP SOCKET		AMP
S1	10 POS SOCKET	609-1000M	ANSLEY

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