

# The Last Word

## Professional Word Processing For the Atari XL/XE



- Dual 40/80 Column Display
- High Speed Editing
- Up to Ten Files in Memory
- SpartaDOS X Integration
- DOS 2.5 and MyDOS Support
- Advanced Macro Feature
- Comprehensive File Manager
- Customisable Keyboard
- Flexible Print Formatting
- Spelling-Checker
- And Much, Much More...

Version 3.21

By Jonathan Halliday

For  
Atari XL/XE  
Computers  
with 64K  
or more



# The Last Word

*The Last Word is one of the most advanced word processors ever written for the 8-bit Atari. It was conceived in the late 1980s, written in the late 1990s, and spent nearly a decade lying unpublished in a disk box on top of a wardrobe. Then, in November 2008, the disks were rediscovered and the program enjoyed well-received publication on the Internet. But in the ten years which had elapsed since version 2.1 of the Last Word was written, the Atari world had changed beyond recognition. Applications, operating systems and hardware were all much more sophisticated than in the past. So began a development cycle which resulted in the first word processor for the Atari 8-bit to feature both 40 and 80 column displays, working at high speed without any additional hardware.*

*Since its initial release, The Last Word has undergone continuous development and testing, and is used by Atari enthusiasts around the world.*

*Version 3.1 of the program won the "Application of the year 2009" award, voted for by members of the ABBUC forum. Here is a sample of some of the other accolades LW has received:*

- *"Your word processor is the finest one ever seen on A8 machines."*
- *"Awesome work!"*
- *"A monumental accomplishment."*
- *"An amazing piece of software."*
- *"This is fantastic. Voted 'Best software of the Year!' by me."*

*Credits:*

*The Last Word 3.21 was developed using:*

- ATASM
- WUDSN IDE for Eclipse
- Atari800WinPlus
- Atari800MacX
- Altirra
- Aspeq
- SpartaDOS X
- SIO2SD
- VBXE2
- MyIDE

*Earlier versions were developed using the MA65 assembler for SpartaDOS, the XEDIT text editor (both available at [www.atari8.co.uk](http://www.atari8.co.uk)) and SpartaDOS X.*

*Special thanks:*

*Paul Fisher, Konrad Kokoszkiewicz (KMK), Sebastian Bartkowicz (Candle 'O'Sin), David Whyte, Claus Bucholz, Cabell Clarke, Mark Grebe*



# The Last Word

Professional Word Processing  
for the Atari XL/XE

With dual 40 and 80 column displays.

Version 3.21

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Title screen and fonts by Paul Fisher.



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## **1 INTRODUCTION**

### **1.1 OVERVIEW OF THE LAST WORD**

The Last Word (LW) is one of the most powerful word processors ever written for the 8-bit Atari. The program combines many of the advanced features found in the best "classic" Atari 8-bit word processors and combines them into one package, adding support for the latest disk operating systems. This means LW offers:

- Full 80 column editing on-screen (switchable to 40 columns at any time)
- Horizontally scrolling editing window of up to 240 columns
- Editing of up to 10 files simultaneously on expanded memory machines
- Sophisticated keyboard macro language
- 80 column print preview
- Spelling checker (130XE only)
- Versatile and flexible Cut and Paste features
- Search and replace, including reverse search and global replace
- Consistently responsive editing, regardless of position in the text
- Comprehensive on-line help system
- Feature-packed file selector/disk menu which is the equal of many dedicated file management programs and includes up to 80 filenames in a scrolling window, support for SpartaDOS X directories with time/date stamps, batch file deletion, renaming and copying, and much more
- User-definable tab ruler
- Customizable, plain-text printer drivers
- Plain-text configuration files
- Completely redefinable keyboard layout
- Microsoft Windows® compatible keyboard shortcuts
- All international characters visible on the screen
- Support for SpartaDOS X, MyDOS, DOS 2.5 and many DOS 2 derivatives
- Runs with only 64K
- Comprehensive print formatting commands
- Automatic heading levels
- Indents, hyphenation, and much more...

### **1.2 ABOUT THE MANUAL**

This manual assumes basic familiarity with the Atari screen editor and keyboard. Command keystrokes are enclosed in angle brackets ("`<`" and "`>`") which should NOT be typed in. Where two or more keys need to be pressed together, these keys are linked with the plus sign "+".

### **1.3 HARDWARE REQUIREMENTS**

LW will run on most stock XL/XE Ataris. The minimum requirements are:

- 64K of memory
- Floppy disk drive
- DOS 2.5 (supplied on the distribution disk)

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However, for enhanced performance, the following specification is recommended:

- 128K – 1088K of RAM
- SIO2SD, SIO2PC, MyIDE, IDEa or other high-speed disk storage
- SpartaDOS X (version 4.42 or above recommended, 128K required)
- RAM disk (optional)
- High quality LCD or CRT monitor
- Parallel printer

Although LW will function on a 64K Atari, only single file editing is allowed and the cut and paste and macro buffers are extremely small. On expanded memory machines, LW will consume up to 256K for its own use and allow the loading of extensions, complex macros, and a large paste buffer.

## 1.4 STARTING LW

Boot the computer with the LW disk in drive 1 while holding down the <Option> key. (If you don't hold down <Option> and the BASIC "Ready" prompt appears, type DOS and press <Return>). The DOS menu will appear. LW should be started with Binary Load (option L) on the DOS 2.5 menu. Press "L" and type "LW.EXE", then press <Return>.

**Note: LW 3.x is NOT compatible with DOS XE, or with any DOS which uses RAM under the Operating System.**

When LW loads, it looks on the default drive ("D:" if using DOS 2.5, MyDOS, or the DOS logged drive if using SpartaDOS X) for the following files, and if it finds them, loads them. If a file isn't found, default "built-in" values are used.

LW.SYS	System configuration file: sets up memory usage, keyboard buffer, keyboard redefinition and path for help and system files.
LW.CFG	Configuration file: contains editor settings, preferences, and default drive settings.
LW.FNT	Standard graphics 0 font which will be used in the editor and throughout the program.
LW.F80	Special 80 column font for 80 column editing mode.
LW.PDR	Plain-text printer driver file, which can be edited in LW.
LW.MAC	Macro file, containing automated, user-written command sequences. If a macro is defined for the "@" key, it will be run immediately. See section 8.
LW.EXT	Machine code extensions (expanded memory machines only). Contains extra program functionality such as character maps, calculators, etc.

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## 1.4.1 LOADING LW FROM SPARTADOS X

Under SpartaDOS X, LW is launched by typing

**X LW.EXE**

**Note:** LW 3.x is NOT compatible with versions of SpartaDOS prior to SpartaDOS X. Also, SpartaDOS X MUST be configured to use BANKED memory in order to work with LW. This means you can't run SpartaDOS X and LW on a machine with less than 128K.

With SpartaDOS X, you can specify a file to edit on the command line after the program name, such as:

**X LW.EXE LETTER.TXT**

LW will attempt to load LETTER.TXT automatically. If the file isn't found, LW will start up with an empty editing screen, and the message "Not found".

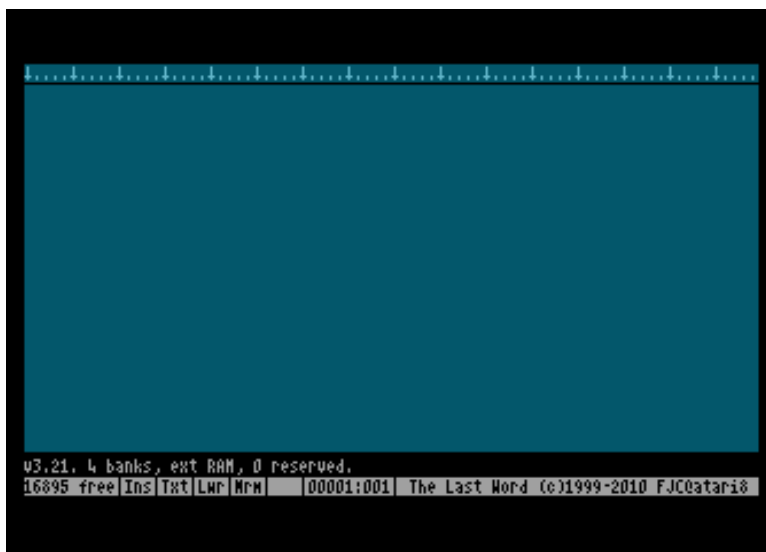
**Note:** LW 3.21 no longer uses SpartaDOS X's ZCRNAME "crunch" routine to read the command line. This means any device names on the command line (apart from the path to LW.EXE itself) must be "CIO legal". See section 10.6.3 for further information, and instructions on how to use SDX device names in LW.

## 1.5 BASIC OPERATION

You can begin using LW without reading this manual. If you get stuck, press the <HELP> key, then a number 1 to 9 or 0. If you don't read the manual, however, you'll be missing out on a huge amount of invaluable information.

### 1.5.1 THE EDIT SCREEN

To begin using LW, load the program as described above and take a moment to familiarize yourself with the editing screen. The first thing you'll notice is that there are 80 columns of text on the screen.



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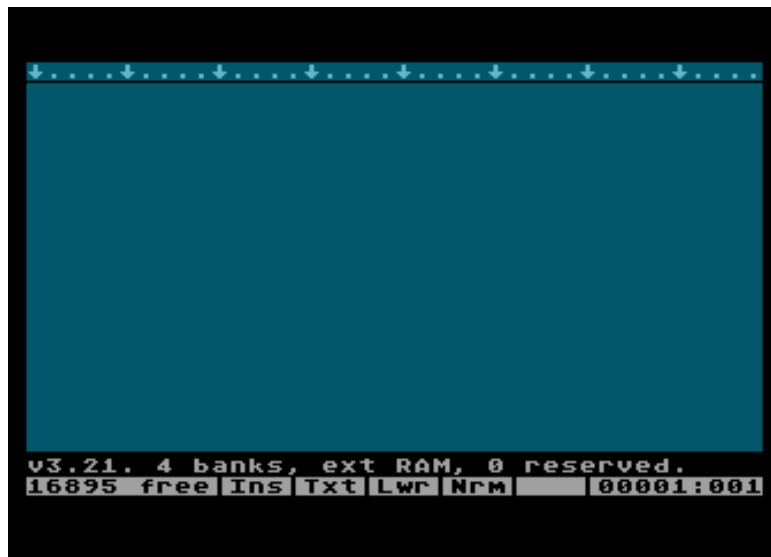
LW defaults to an 80 column display, but you can get the 40 column display back at any time (and make the program default to 40 columns). To switch to a 40 column display, press:

<Shift+Ctrl+W>

At the lower left of the screen, you'll see:

**80 Columns [Y/N]?**

Press the "N" key, and for the moment, just press <Return> when you see the "Width" prompt. A 40 column display will then appear:



You can get the 80 column display back by performing the same procedure in reverse: type <Shift+Ctrl+W>, type "Y" for 80 columns, then press <Return> at the "Width" prompt.

In this manual, many illustrations depict LW's 40 column display. This is merely for reasons of clarity, and operation of the program is essentially identical in 40 and 80 column modes.

On both 40 and 80 column screens, you'll see a tab ruler line along the top (which scrolls horizontally if you define a screen wider than the limits of the display) below that a 20 line editing window, and, at the foot of the screen, two lines for status information. The flashing cursor indicates the current typing position.

Until you press a key, the first line of status information (the message line) will show the version # of the program, the number of text banks, whether the internal buffers are in low or banked memory, and the number of banks reserved for extensions. Thereafter, the message line will default to the name of the file currently in memory (preceded by the bank number if there is more than one buffer set up). Until you load a file or save the contents of the text buffer under a different name, the default filename will be UNNAMED.TXT (followed by the bank number if there is more than one text bank).

Entering text in LW is easy: just type as you normally would, pressing <RETURN> only at the end of a paragraph and letting the program wrap words at the ends of lines.

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Cursor keys, <DELETE/BK SP>, and <INSERT> keys behave exactly as you would expect.

You might notice that 80 column mode isn't quite as fast as 40 column mode. This is a natural result of the 80 column display being rendered entirely as a bit-mapped graphical display. However, LW still keeps up with your typing and doesn't "drop" keystrokes. This is because it has its own type-ahead keyboard buffer. Note that if you're using SpartaDOS X and the DOS keyboard buffer (KEY.COM) is turned on when you run LW, the SpartaDOS keyboard buffer will supersede LW's built in buffer. To force use of the LW keyboard buffer (which doesn't buffer auto-repeated keys, preventing the cursor from "running away"), simply ensure the SDX keyboard buffer is turned off ("KEY OFF") before running LW, and include "BUFFER ON" in LW.SYS.

**NOTE: The latest version of SpartaDOS X has a revised KEY.COM which doesn't buffer held-down keys. This version is more compatible with LW than previous incarnations of the SDX keyboard buffer, and is highly recommended.**

### 1.5.2 SAVING AND LOADING TEXT

To save the text in memory to disk for the first time, press <Ctrl+S> Save text. A prompt will appear with a default filename. Either press <RETURN> to accept this name, or type a new one: the old one will disappear automatically. After you press <RETURN>, your text will be written to disk. If an error occurs, you'll be informed. To abort the save operation, just press <Esc>.

If you type no extender, LW will append one of your choosing before opening the file. The default extender and that defined in the supplied configuration file "LW.CFG" is ".TXT". You can change this, however, or disable it altogether by using the "FILEEXT" statement in the configuration file.

The first time you save a file, the name you give it becomes the default for subsequent save operations. Once the file has been saved once, pressing <Ctrl+S> subsequently will "silently" save the file to disk with the original name it was saved under. To save the file with a different name or to a different folder on disk, use

<Shift+Ctrl+S> Save As

which always brings up the **Save As>** prompt.

When using "Save As", if LW finds a file on disk of the same name, you will be warned. The program will ask:

[Filename] **exists: Overwrite** **[Y/N]**?

If you type "Y", the existing file will be overwritten. Typing "N" will return you to the editor without doing anything.

To load previously written text, press:

<Ctrl+L> Load text

A prompt will appear with a default drive specifier. Type the name of the file you wish to load (you needn't type a drive specifier), and press <Return>.

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**NOTE:** The drive specifier which appears at the “Load” prompt (as well as many other file load prompts in the program) reflects the drive currently logged by LW’s Disk Menu, and NOT the default or currently logged drive as DOS sees it. The device name will disappear when you start typing, but will be prepended to the filename you enter unless you specify a different device ID.

### 1.5.3 TEXT BANKS

If you have a machine with at least 128K of RAM running SpartaDOS X, DOS 2.5 or MyDOS, LW will try to use the extra banks of memory for additional text buffers for the editing of up to ten files at once. You can switch between these banks with:

<Shift+Ctrl+n>

where “n” is one of the number keys, with “0” denoting the tenth bank. The program is smart enough not to overwrite any RAMdisks which are installed, so even if you have extra memory, LW may still present you with only one text bank if there are RAMdisks present.

You can see how many text banks are active by pressing:

<Shift+Ctrl+?>

which will display:

*n banks, [low/banked] RAM, n reserved.*

This command reports how many text buffers are available, whether the program has its internal buffers in main (“Low RAM”) or extended (“Banked RAM”) memory, and how many (if any) of the selected memory banks are reserved for use by extensions.

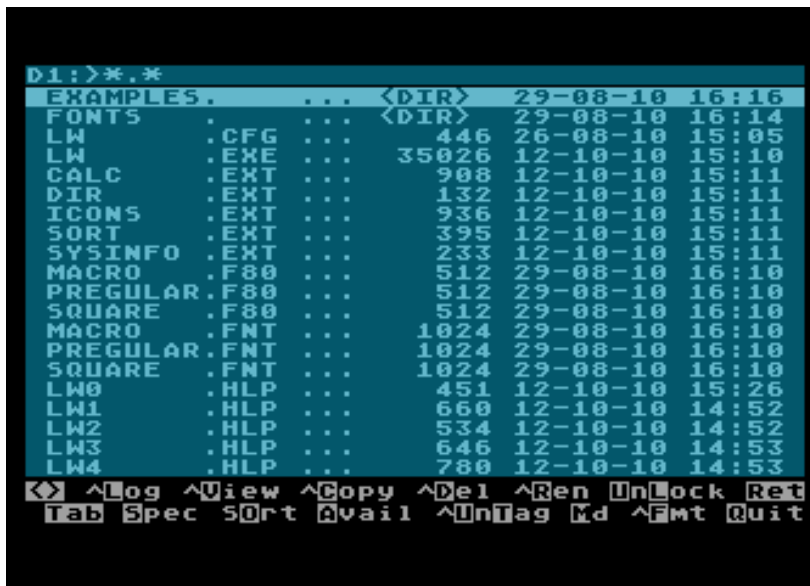
See “Using Multiple Text Buffers” in Chapter 8 for more information

### 1.5.4 THE FILE SELECTOR

What if you can’t remember which files are on the disk? LW has a file selector which is accessible from any filename input dialogue. Just press the <Tab> key when the program is waiting for a filename and the file selector will appear, listing all the files in the current folder on disk.



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Just highlight the file you want and press <Return> to load it. See "THE DISK MENU" in Chapter 4 for more information about the file selector.

## 1.5.5 BASIC CONFIGURATION

You can configure LW to suit yourself. Pressing:

<Shift+Ctrl+O> Save configuration

will allow you to save the configuration to disk. The file will automatically be given the default extender CFG, and you should call the file LW.CFG if you want your new preferences to be available the next time you boot the program.

As described above, LW normally wraps words to the next line if they don't fit as you type. You can turn this feature off with:

<Ctrl+W> Word wrap toggle

By default in LW, <RETURN> characters appear as curved arrows. You can make them invisible with:

<Shift+Ctrl+CLR> Toggle visible returns

These are just a few of the settings saved in the configuration file. For further information on configuring LW, see section 9.

## 1.5.6 LEAVING THE PROGRAM

To finish using LW and go to DOS, type:

<Shift+Ctrl+Q> Quit

From the editor and respond "Y" to the prompt.

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From the file selector, simply press “Q” to exit to dos.

If any text in memory hasn't yet been saved, you'll be offered the chance to save before the program shuts down.

## 2 EDITOR COMMANDS

LW's commands are all accessed by key combinations. Once you become familiar with LW's keystrokes, a huge number of commands becomes instantly available.

### 2.1 CURSOR MOVEMENT

The following commands allow rapid cursor movement around the text:

<Ctrl+LEFT ARROW>	Cursor left
<Ctrl+RIGHT ARROW>	Cursor right
<Ctrl+UP ARROW>	Cursor up
<Ctrl+DOWN ARROW>	Cursor down
<Tab>	Next tab stop (if in Over-Type Mode)
<Ctrl+A>	Start of line
<Ctrl+Z>	End of line
<Shift+LEFT ARROW>	Previous start of word
<Shift+RIGHT ARROW>	Start of next word
<Shift+UP ARROW>	Previous start of paragraph
<Shift+DOWN ARROW>	Start of next paragraph
<Shift+Ctrl+UP ARROW>	Screen up
<Shift+Ctrl+DOWN>	Screen down
<Ctrl+H>	Top of screen, then top of file
<Ctrl+E>	End of file

### 2.2 TEXT ENTRY MODES

These commands affect various setting in the editor:

<Shift+Ctrl+INS>	Toggle Insert and Over-type modes. In Insert mode, text after the cursor is pushed along as you type, and closes up when you press <DELETE>. In Over-type mode, new text overwrites existing text. Notice that the operation of the <TAB> key differs depending on which mode the editor is in: in Over-type mode, the <TAB> key simply skips to the next tab stop, whereas in Insert mode, <TAB> inserts spaces up to the next tab stop.
<CAPS>	Toggle upper/lowercase.
<Ctrl+CAPS>	Forced control key mode toggle. Allows entry of control codes without pressing <Ctrl+ESCAPE> or <Shift+ESC> first. The current case is saved when you save the configuration (see later), and becomes the default next time you load the program.
<Shift+Ctrl+CAPS>	"International Lock" mode. This mode allows typing of all the alpha control characters (Ctrl+A through Ctrl+Z) without first pressing <Shift+ESC>. You need to turn off International Lock mode again by pressing <Shift+Ctrl+CAPS> in order to access functions such as Save <Ctrl+S> and Load <Ctrl+L>. International lock mode is designed to make it easier for

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	European users to type long strings of characters using the international character set.
<Shift+CAPS>	Uppercase lock.
<INVERSE>	Toggle inverse video on and off.
<ESCAPE>	Cancel block marking if active, or enter control character. Also cancels string input and abandons operations.
<Ctrl+ESCAPE>	Enter control character in editor or input dialogue. Does NOT cancel string input or abandon operation.
<Shift+ESCAPE>	Same as <Ctrl+ESCAPE>.
<Ctrl+W>	Turn word-wrap on and off. Saved in config file.
<Shift+Ctrl+W>	Set screen editing width. Using this command, you can select the display mode (40 or 80 characters), and type the number of characters per line you want - anything from 5 to 240. If the line length becomes longer than the physical width of the screen, the screen will become a horizontal as well as a vertical window onto your text. Setting the editor line length to the same length as printed lines means you can set tables out almost exactly as they will print. You can skip setting the number of columns by just pressing <Return>, and the value will be set to match the physical width of the screen. The screen mode is saved in the config file.

### 2.3 INSERTING AND DELETING TEXT

The following commands allow simple insertion and deletion of text:

<DELETE>	Delete character to left of cursor (closes up text to the right of the cursor in insert mode), or marked block.
<Ctrl+INSERT>	Insert a space at the cursor (pushes existing text along to the right).
<TAB>	Insert spaces to next tab stop if in Insert Mode. If the editor is in overtype mode, the cursor is advanced to the next tab stop without inserting any spaces into the text.
<Ctrl+DELETE>	Delete character under the cursor (closes up text to the right of the cursor when in insert mode).
<Shift+DELETE>	Displays the prompt:

#### Delete **W**ord, **L**ine, **S**entence, **P**aragraph?

Respond by pressing the highlighted letter, or <ESCAPE> to cancel. Pressing <RETURN> defaults to DELETE LINE. Deleted text will fill up the paste buffer from the beginning.

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	Paste the text back into the main buffer with <Ctrl+V> or <Shift+INSERT>.
<Shift+INSERT>	Insert previously deleted text
<Ctrl+V>	Paste, or insert previously deleted text (same as above)
<Ctrl+CLEAR>	Erase all text
<Shift+CLEAR>	Erase all text (same as above)

### 2.4 MOVING AND COPYING WITH TEXT BLOCKS

The following commands allow blocks of text to be marked, then moved, copied or deleted:

<Ctrl+M>	Mark or highlight block. Before a block can be copied, moved or deleted, it must be marked. Use this command to define the starting point of your block. "Mrk" is displayed on the status line while marking is active. Subsequently, as you move the cursor, the text between the marked beginning and the cursor position will be inverted. You can also mark the end of a block, then cursor back to the beginning. Several other block commands only work once a block has been defined in this way. To un-mark a highlighted block of text, press <Ctrl+M> again or <Ctrl+ESCAPE>.
<Ctrl+X>	Cut block. Use this command once a block has been marked as outlined above. The marked text will be copied from the main buffer to the paste buffer, providing the block is not too large. Note that any text already in the paste buffer will be overwritten. The text will then be erased from the main buffer, and block mode is cancelled. You can paste text back with the Paste command.
<Ctrl+C>	Copy block. This copies text to the paste buffer exactly like the Cut option, but the text also remains in the main buffer, still highlighted.
<DELETE>	Delete block. This deletes a marked block without copying it to the paste buffer. Because text deleted this way is irretrievable, you are first asked for confirmation. Note that the block to be deleted may be of any length, regardless of paste buffer size.
<Shift+Ctrl+I>	Write block to a file. Supply a filename at the prompt and the block - which may be of any length - will be written to disk. The file will have the extension "BLK" unless you supply a different one. This option, along with the merge command, allows for the transfer of large blocks of text between different files.
<Ctrl+I>	Insert, or merge, file. Allows a file to be inserted into the middle of the text in memory. The filename you type will have the usual text file extender appended to it unless you supply another. If the file you attempt to insert exceeds in size the available space, the text will remain unchanged.

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<Ctrl+N>	Displays the cursor position, size of the file in bytes, and the number of words and bytes in the file (or the block if any text is marked)
<Ctrl+Y>	Convert block to lowercase
<Shift+Ctrl+Y>	Convert block to uppercase
<Ctrl+]>	Invert text in block
<Ctrl+[>	Un-invert text in block

### 2.5 FINDING AND REPLACING TEXT

LW has extensive search features which work both forwards and backwards through the text. Searches can be either case sensitive or insensitive. Search and replace operations can be performed either individually or on the whole file, with or without confirmation.

<Shift+Ctrl+F>	Define find string. This option allows you to type in the text you wish to search for (up to 30 characters).
<Ctrl+F>	Find string. This will move the cursor to the next occurrence of the previously defined string.
<Ctrl+U>	Upwards find string. Searches backwards for the previously defined string.
<Shift+Ctrl+R>	Define replace string
<Ctrl+R>	Replace string. Once a string has been "found" with <Ctrl+F> or <Ctrl+U>, this command will change it to the "replace" string.
<Ctrl+G>	Global search and replace. Allows you to type a search string and a replace string, then attempts to replace each occurrence of the search string with the replace string. Unless the command is run from a macro, the first time the string is found, a menu will appear, asking if you wish to

#### **C**hange, **A**ll, **T**o **E**nd, **S**kip?

Press the highlighted letter of the option you want, or <ESCAPE> to cancel. "Change" replaces the string and moves to the next occurrence. "All" will change all occurrences of the string throughout the entire document, looping around to the start of the document when it reaches the end. "To End" does a global replace, but without looping around to the top of the document. "Skip" simply ignores the text and moves on to the next occurrence of the string.

LW always returns you to the original point in the document after a global replace operation. When a global replace is in progress, the

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display is not updated to show each replacement. However, a counter displays a running total of the number of replacements made, and you can cancel the operation at any time with the Break key.

Whether or not search/replace operations are case sensitive is one option set with the <Shift+Ctrl+U> set options command. If "Match Case" is false ("N"), LW will not differentiate between upper and lower case when searching. You can also deselect the use of wildcards using this command, allowing for literal searching for the inverse "?" character.

### 2.5.1 SEARCHING WITH WILDCARDS

In find strings, the inverse question mark (?) will match any character, just as in DOS filenames:

**Find>TH?S?**

will match both "THESE" and "THOSE". Wildcards in replace strings leave the relevant characters in the text unchanged, so:

**Find>(?)**

**Change to>(?.)**

will place a dot after any single, unknown parenthesized character.

Search strings may be surrounded by spaces to ensure that only whole words are matched. In the case of words followed by punctuation symbols, a macro to perform multiple search/replaces through the text could be written. See macros (section 8).

Note that in order to search/replace the inverse question mark literally, you must turn wildcard searching off with the "Set Options" command (see above).

## 3 ADDITIONAL EDITOR FEATURES

LW includes many features to aid in the editing of text, such as bookmarks, pagination guides, and tabulation. The range of facilities available makes LW one of the most complete word processors for the Atari.

### 3.1 COUNTING WORDS

LW's fast word count will instantly tell you how many words are in the current document.

<code>&lt;Ctrl+N&gt;</code>	Will display the position of the cursor in the file and the number of bytes in the file (in the form n of n). It also displays the number of words in the file and a byte count (if text is marked, it will display the number of words and bytes in the marked text).
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Unlike many other word processors, LW's word count only counts actual text and not embedded printer commands. Anything typed in reverse video is ignored by the word count. Unfortunately this does mean that header/footer definitions and filename arguments are still counted, since these are typed in normal video, so you will need to allow for this when counting words.

### 3.2 EDITED TEXT INDICATOR

If text in any LW memory bank has been changed without being saved, an asterisk will appear to the left of the filename on the message line. This is to remind you to save any vulnerable work. The reminder will vanish once your text has been saved, or if the last character in the text buffer is deleted.

### 3.3 TABULATION

LW's tab ruler can be set up with your own tab stops, which can then be saved with the configuration file. These are the commands for editing the tab ruler:

<code>&lt;Shift+TAB&gt;</code>	Set tab at cursor position.
<code>&lt;Ctrl+TAB&gt;</code>	Clear tab at cursor position.
<code>&lt;Shift+Ctrl+TAB&gt;</code>	Reset default tab stops.
<code>&lt;Shift+Ctrl+E&gt;</code>	Erase ALL tab stops.

#### 3.3.1 TABULATION MODES

In insert mode, the `<TAB>` key will insert as many spaces as necessary to get to the next tab stop. In over-type mode, `<TAB>` will just skip over existing text and on to the next tab stop.



### 3.4 BOOKMARKS

LW has a system of invisible markers which make navigating your text simplicity itself. If you're working on a section of text which you want to leave but will need to return to later, mark it with a place marker.

<Ctrl+B>	Set bookmark at cursor position. Asks for which bookmark (1-4) to set.
<Shift+Ctrl+G>	Go to bookmark. Asks for number of the bookmark to find. Providing the marker has been set, and doesn't reside in text which has been deleted, the cursor will jump to the position of the relevant marker.

Bookmarks are saved with the file if you're working in **document mode**.

### 3.5 TEXT AND DOCUMENT MODES

LW can save files in two different formats: Text files (.TXT) and Document files (.DOC). While TXT files are plain text files, DOC files contain the tab line and any place markers which have been set. You won't see the header information in LW because it is always hidden, and LW can sense on loading whether a file is a DOC or TXT file regardless of its file extension. If you want to use LW to edit source code files for compilers, etc, you should always save files as plain text (TXT) files.

When you save a file, LW will include the DOC header information only if the program is in "Doc" mode. You can tell by looking at the status bar which mode the program is in, and you can toggle between Doc and Text mode with the *User Options* command (see below).

### 3.6 USER OPTIONS

Several options and toggles are accessed using:

<Shift+Ctrl+U> User Options

This command presents a list of options which are either switched on or off. The current state of the item appears to the right of the prompt.

Option	Meaning	Default
Match case [N] (Y/N)?	Differentiate between upper and lowercase characters when searching	Off
Warnings [Y] (Y/N)?	Display warning before abandoning file edits or overwriting an existing file	On
Wildcards [Y] (Y/N)?	Use "?" as a wildcard character in search and replace operations	On
Padding [N] (Y/N)?	Display false spaces in the editor	On
Doc mode [N] (Y/N)?	Operate in document mode	Off

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To leave an option as it is and step on to the next, press <Return>. Press <Y> to switch the option ON, <N> to switch it off, and <Esc> to return to the editor at any point.

### 3.7 EDITING MULTIPLE FILES

On expanded memory machines, LW allows you to edit several files at once. Setting up LW for your memory configuration is explained later in Configuring LW (section 9). Using DOS 2.5, MyDOS or SpartaDOS X without a custom LW.SYS file which sets up expanded memory, LW will use any RAM banks not in use by RAMdisks. You can control which and how many banks LW uses by creating a suitable LW.SYS configuration file. This step is essential when using a DOS not directly supported by LW: with an unsupported DOS, LW will work out how much memory is attached to the machine, but won't use any banks unless told to do so. This way, you can set up a RAMdisk to use certain banks, and tell LW to use the rest. The supplied SYS files incorporate various sample memory set-ups. To use them, rename the config file you want to use to LW.SYS and reload LW from DOS. If you use one of the supported DOSes, however, LW does all the work for you.

You can access extended text banks with:

<Shift+Ctrl+n>      Select memory bank

where <n> is a number from 1 to 9, or 0, which denotes 10. Note that banks beyond 5 can only be accessed when LW is configured for machines expanded to 192K and beyond (see section 9: Configuring LW). Bank 1 (main memory) is ALWAYS the main bank, so you can see that a maximum of 9 banks of expanded RAM can be made available. Each bank has the same 16K capacity and its own set of place markers and its own filename. You can cut and paste between banks with ease, and by keeping all the files of a large document in separate banks and by using the include bank print commands from the main file, you can keep track of pagination as if you were editing a single, contiguous file.

If your Atari XL/XE has no extended RAM (or you chose not to use extended memory), you'll only have one 16K text bank and the paste, macro, and disk directory buffers will all be very small (only about 1K each).

### 3.8 HANDLING LARGE FILES

Although the largest text buffer LW can provide is around 18K when using a machine with extended memory (as well additional banks which are fixed at 16K in size), it's still possible to handle much larger files by splitting them across banks. Text banks can therefore hold separate files, different segments of the same large file, or a mixture thereof. Even if you're using a machine with no extended memory and only one 16K bank, it's still possible to edit larger files.

When you load a file into a text bank, the message "Linked" will display if the file didn't fit completely into memory. The buffer will contain as much of the file as would fit, together with 255 bytes of free space for editing (Note: because of the way LW works, any file longer than the total buffer size minus 255 bytes will be classed as "Linked", even if the file would otherwise have fit into the buffer).

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To protect against accidental obliteration of the original file on disk when only the first segment has been loaded, linked segments will not “Auto” save with <Ctrl+S>. Instead, <Ctrl+S> ALWAYS brings up the “Save As” prompt, as does <Shift+Ctrl+S>. Thus the user will always be warned before overwriting an existing file. Beyond that, it’s up to the user to ensure that segments are saved in the correct order.

So – having loaded the first part of a segmented file, we can proceed in one of two ways:

1. Edit the first segment, save it under a new name, then repeat the process until all segments of the original file have been loaded, edited, and appended to a new file.
2. Load all segments of the original file into separate banks, edit them simultaneously, then save the segments in order, either to a new file or overwriting the original.

In either case, the procedure for LOADING the second and subsequent segments of a linked file is to follow the filename with the “,C” (comma, then “C”) switch (without quotes). For example:

**Load>REPORT.DOC,C**

This simply loads the next segment of the file, providing that the filename given is always that of the original file. The name of the “Last File Loaded” can be obtained on the input line with <Ctrl+L>, which is useful shortcut when loading successive segments of the same file. The final segment of a file, when loaded, will not display the “Linked” message and thereafter the “,C” switch will simply cause an end of file error.

The “,A” switch should be appended to the filename when saving all but the first segment of a linked file. For example:

**Save As>D:REPORT.DOC,A**

This will cause the contents of the buffer to be appended to the file on disk (the “,A” switch also works with file copying on the disk menu). As a time saver, the “,A” switch will automatically be appended to filenames when saving all but the first segment of a linked file. And to assist further with the saving sequence of segmented files, the filename on the message line is followed by the number of the loaded segment. For example:

**2:D:THESIS.TXT[2]**

This denotes bank 2, containing the second segment of THESIS.TXT. In this case, even if the contents of buffer 2 are saved under a new name (without the “,A”) switch, the [2] suffix will remain until another file is loaded into that bank or the text buffer is cleared.

Although the linked file feature of LW offers a partial solution to the problem of editing large files, the best way to organize your files is to keep them small enough to fit comfortably into the text buffers. With the include file feature of the print formatter, it’s easy and good practice to keep files below 16K and link them together when printing. The main reason for including segmented file support in LW was to enable the conversion of large, unmanageable files into smaller ones. There’s a macro called SPLIT.MAC on the distribution disk which will perform precisely this task.

### 4 DISK OPERATIONS

LW allows full manipulation of files and directories, and has support for many different DOS packages. The disk menu allows viewing, loading, deleting, renaming and copying of files at the touch of a key. The menu displays a paged window, showing up to 80 filenames at a time. Files can be previewed on screen just as they appear in the editor without being loaded into memory.

#### 4.1 DISK OPERATIONS FROM THE EDITOR

In addition to the <Ctrl+L>oad, <Ctrl+S>ave and <Shift+Ctrl+S>ave As... commands, the following file handling features are available from the editor:

- |                |   |
|----------------|---|
| <Ctrl+I>       | Insert, or merge, file. Allows a file to be inserted into the middle of the text in memory. The filename you type will have the usual text file extender appended to it unless you supply another. If the file you attempt to insert exceeds in size the available space, the text will remain unchanged.   |
| <Shift+Ctrl+I> | Write block to a file. Supply a filename at the prompt and the block - which may be of any length - will be written to disk. The file will have the extension "BLK" unless you supply a different one. This option, along with the merge command, allows for the transfer of large blocks of text between different files.  |
| <Ctrl+J>       | View file. From the editor, this allows you to enter a filename and view the file in a scrolling window on the screen, complete with word-wrap. Pause the listing with <Ctrl+1> or by holding down one of the three console keys. Viewing can be aborted at any time with the <Break> key. If you include the ",P" switch after the filename, the text will be displayed in paged rather than scrolling format. |

#### 4.2 THE DISK MENU

The functions of the disk menu are accessed by pressing the highlighted keys on the menu at the foot of the screen. The highlight bar is moved with the cursor keys, pressed either with or without <Ctrl>. When you reach the limits of the screen in any direction, the display will "page" to the next screen of files.

- |                |   |
|----------------|---|
| <Ctrl+D>       | Call up the disk menu from the editor screen. The program will read in the current directory and display up to 80 filenames (if in 80 column mode) on the screen. |
| <Shift+Ctrl+H> | As above, but allows the user to specify the drive, path and file mask before calling the disk menu.  |

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The screenshot shows a directory listing with columns for file names, sizes, dates, and times. The files listed include EXAMPLES, FONTS, LW, CALC, DIR, ICONS, SORT, SYSINFO, MACRO, PREGULAR, SQUARE, and LW0 through LW4. The menu at the bottom includes options like ^Log, ^View, ^Copy, ^Del, ^Ren, ^Lock, ^Ret, ^Tab, ^Spec, ^Sort, ^Mail, ^Unlog, ^Id, ^Fmt, and ^Quit.

The following options are available on the menu, selected by pressing the highlighted letter:

**1-0** Catalogue drive. 1-9 denote the corresponding drive number, and 0 denotes an unnumbered drive ("D:"). This is important if you want to open MyDOS subdirectories.

**^Log** Log drive. Follow with 1-9 for drives 1-9, 0 for no drive number ("D:"), or letters A: through O: if using SpartaDOS kernel device names (see section 10.6.3).

**Spec** Set the directory search mask. Use this to narrow or expand the criteria for the directory search.

If the disk menu was called with <Ctrl+D> from the editor, <Return> will load the file under the cursor. If the disk menu was called with <Tab> while entering a filename on the input line, <Return> will return the highlighted filename for use in the current load or save operation (if you were currently saving or outputting a file, you'll be returned to the original input line with the selected filename replacing the originally displayed filename).

**Ret** Select the filename under the highlight bar.

**View** View the file under the selector bar. Same as view from the editor without the ",P" switch.

**Note:** You can also obtain a paged listing (same as from the editor using the ",P" switch) by pressing <Ctrl+V>.

**Del** Delete the file under the selector bar. If the deletion is successful, the filename is removed from the list. Press <Ctrl+D> to delete all tagged files.

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### **Ren**

Asks for a new name and renames the highlighted file. The entry in the list is changed to the new name. Wildcards are supported. Press <Ctrl+R> to rename all tagged files.

### **Copy**

Asks for the name of the new file into which you want to copy the contents of the highlighted file. You can type a new drive number, add a subdirectory path if your DOS supports them, and include wildcards. If you want to make a copy of the file under the same name but on a different drive, type the drive identifier, then ".\*.\*". Files of any length may be copied, even those which won't fit into the LW editor. NOTE: The copy operation utilizes the unused part of the current text bank as a buffer. The more unused memory there is, the faster the copy operation will be, so you will want to be in the bank with plenty of unused memory before you copy anything. A completely full bank actually has 1 spare byte, so copy will still work with it, albeit agonizingly slowly!

The destination filename for Copy can take two switches: ",A" will cause the source file to be appended to the destination file, and ",N" will bypass the check for already existing destination file(s), unless warnings have already been disabled in the editor options (<Shift+Ctrl+U>). In the unlikely event you need to combine both switches, simply end the destination file spec with a comma, followed by both switches (e.g. ",AN").

Press <Ctrl+C> to copy all tagged files. Wildcards are fully supported. For example, you could tag all files on the disk and then press <Ctrl+C> to copy them to "D2:\*.BAK". All files on the destination drive will have the .BAK extender. To copy a selection of files to drive 8 without being warned if the destination files already exist, tag the files you want to copy, press <Ctrl+C>, then type:

D8:\*.\*,N

or even:

D8:,N

The files will be copied with their original names, overwriting any files on drive 8 with the same names.

### **Md**

Create a new directory in the current directory, providing the DOS used supports subdirectories.

### **Esc**

Exit the directory menu.

### **UnLock**

Lock or unlock the highlighted file. Note that U and L should be pressed *without* the <CONTROL> key.

### **^UnTag**

Tag/Untag the highlighted file with <T>. <Ctrl+T> will tag all files, while <Ctrl+U> will untag all files.

### **^Format**

Format the disk. You'll be asked for confirmation first.

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<b>Quit</b>	Leave the program and go to DOS.
<b>Sort</b>	This option will present a menu asking whether to sort the directory by name, extender, date, size, or none. Any other key will leave the setting, which is saved in the configuration, unaltered. "None" will turn off the sorting function.
<b>Avail</b>	Under DOS 2.5, displays the number of free sectors remaining on the disk. With SpartaDOS X, this option displays the number of free bytes on the disk.
<b>Tab</b>	<p>When using SpartaDOS X, press &lt;Tab&gt; to toggle between short and long format directory listings.</p> <p>In version 3.21 of LW, the directory format is automatically and temporarily changed to short (DOS 2.5 style) when listing a directory on a patched hard drive (Hn:) when the program is used on an emulator.</p>

### 4.2.1 ADDITIONAL COMMANDS

There are several additional commands not listed on the disk menu.

<Ctrl+H>	Cursor home. Moves cursor to the first filename in the directory.
<Ctrl+E>	Moves the cursor to the last filename in the directory.
<Shift+Ctrl+UP ARROW>	Moves the cursor up by a screenful of filenames
<Shift+Ctrl+DOWN ARROW>	Moves the cursor down by a screenful of filenames

### 4.2.2 SUBDIRECTORY FEATURES

The following options only work with DOSes which support subdirectories.

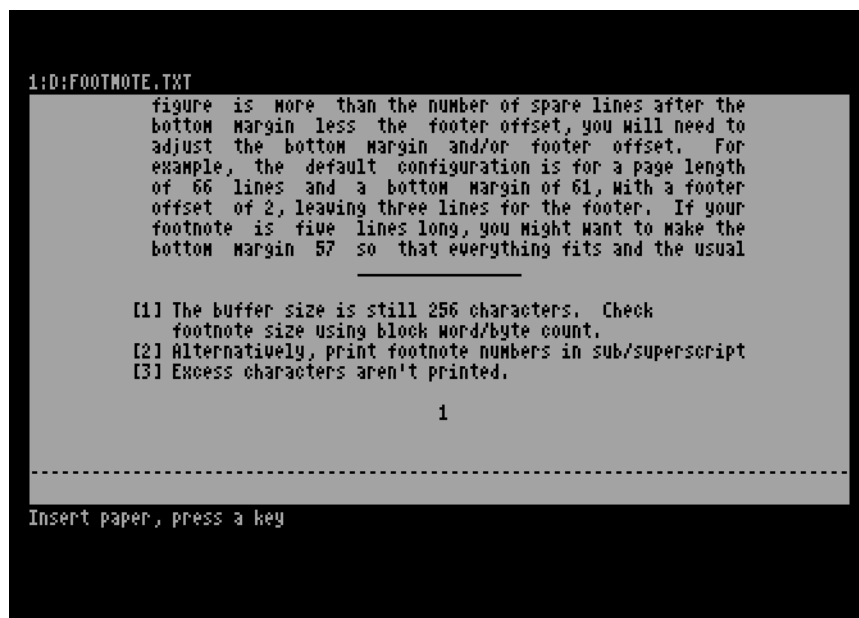
<b>Return</b> or >	Catalogue the highlighted directory. Only used with Subdirectory oriented DOSes.
<	Go back up one level towards the root directory. DOS-specific, as above.

## 5 PRINTING WITH LW

LW's print processor is one of the most comprehensive of any Atari word processor. Useful features abound to make life easier when printing complex documents.

### 5.1 PREVIEWING TEXT

<Shift+Ctrl+P> Preview printed pages. Text is sent to a 20 line, 80 column window almost exactly as it will appear when printed. Page breaks appear as rows of dashes, and page wait is active if selected. Pause the output with <Ctrl+1> or by holding down <SELECT> or <OPTION>. Pressing <START> at any time will skip to the next page, and <BREAK> will return you to the editor.



### 5.2 KEEPING TRACK OF PAGINATION

<Ctrl+?> "Where's the cursor on the printed page?" This is an innovation also seen on TextPro, and simply prints the page and line number of the text under the cursor.

### 5.3 EDITOR PRINT COMMANDS

< Ctrl+P> Print text. This brings up a menu of 3 choices. Pressing "P" will send text straight to the printer. Choosing "S" previews text in exactly the same way as <Shift+Ctrl+P> from the editor. "D" allows you to type a filename and send formatted output to disk or another device (default filename extender is "PRN"). Note that the preview screen always becomes active when printing documents. Output can be abandoned by pressing <BREAK>.



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All the above commands will read any included files (see later) unless you comment out include statements. This means that you can always know exactly where you are on the printed page, even in documents made up of many different files.

### 5.4 EMBEDDED COMMANDS

LW has a wealth of print formatting commands which will allow you to tailor your printed output exactly to your needs. Formatting commands follow these simple rules:

- Formatting commands consist of 1 or 2 letter alphanumeric symbols, entered in **reverse video**, often followed by numeric or textual arguments.
- Formatting commands may be in either upper or lowercase.
- **Numeric arguments of formatting commands are entered in reverse video.**
- String arguments (footer lines, header lines and filenames) are entered in normal video.
- Stage 1 formatting commands, either singly or grouped together, must be the first things on a line. They may be optionally terminated with a <Return>. Note: if a string of Stage 1 formatting commands end in <Return>, a blank line will NOT be output in the printed document.
- Only Stage 2 formatting commands may appear inside header and footer strings. Stage 1 formatting commands are not allowed.
- Formatting commands must not contain extraneous spaces.

Here are some examples of print formatting commands:

**l20**<Return>

Sets the left margin to 20.

**l20r60**hello<Return>

Sets the left margin to 20, the right to 60, then prints "hello." 20 spaces from the left of the page.

**fc**Page #<Return>

Defines a running footer which prints the current page number, centred on the line.

#### 5.4.1 STAGE 1 COMMANDS

The following commands, entered as inverse characters in upper or lower case, affect the size and layout of the page. Generally, they should be the first things on a line. Where numeric arguments are required (n), these are entered, also in reverse video, directly after the command. Several commands may be placed together consecutively on a line. Commands may be followed by a <RETURN> (which will NOT print).

**a**<n> First page to print. **a2** will start output at page 2. Default is 1.

**b**<n> Set bottom margin, default 61. This is measured in lines from the top of the page, and is the last line on which body text will print. With a page length of 66, a bottom margin of 61 will print 5 blank lines at the foot of each page. Ensure you leave enough lines to

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print your footer (if any), which may be up to 8 lines long. If the footer doesn't fit, it won't print.

**f**<[n]text>

Define running footer to be printed at the bottom of each page. <n> is an OPTIONAL offset, in lines, from the bottom page margin, and should be typed in inverse video immediately before the text of the footer. For example:

**f3Footer**<Return>

Will print the running footer "Footer" 3 lines below the last line of the printed page. Actual footer text should be in normal video, except where Stage 2 formatting commands appear (Stage 1 commands cannot appear in headers or footers), and must end with a <Return>. Use the **f** symbol to print the page number. A footer or header can consist of up to 8 lines, each terminated by a <Return>. These lines must each be preceded by the **f** symbol and must be defined on consecutive lines. If the footer is redefined elsewhere in the text, the lines already defined are discarded. To get rid of a footer, just include **f**<Return> in your text.

**g**<n>

Get text bank. Should be on a line on its own, followed by <Return>. The contents of the text bank will be read and printed in place of the command.

**g**<fspec>

Get file from disk. This command should be on a line on its own, terminated by a <Return>. The contents of the file will be read and printed in place of the command. This works very quickly, even when reading a file from disk, because a double-buffering system is used to eliminate slow single-byte read commands.

Any formatting commands in the included files will be carried out. The advantage that this method has over the link commands of many word processors is that the file which links to other documents will still be in the edit buffer when printing is completed. You can have a main file with include statements and using the "where's the cursor?" command and print preview, always see the correct pagination. Note that due to memory constraints on buffering this command is NOT nestable, i.e. an included file may NOT in turn include another, although an included BANK may include a FILE.

**h**<n/text>

This defines a running header to be printed at the top of each page, and works identically to the **f**ooter command. The optional number specifies the offset from the top of the page, and the default value is 2.

**jl**

Justify text left. All text following this command will be aligned with the left margin.

**jr**

Justify text right. All text following this command will be aligned with the right margin.

**jc**

Justify centre. All following text will be centred on the page.

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<b>ff</b>	Justify fully. All following text will be aligned flush with both the left and right margins.
<b>k</b>	Add-in #1
<b>l&lt;n&gt;</b>	Set the left margin. The default is 10.
<b>m&lt;n&gt;</b>	Margin outdent by <n> chars, as in this line. This outdents the next line of text. Subsequent lines revert to the normal margin. The line is properly lengthened to fill the extra space. This paragraph uses a paragraph indent and a margin outdent on the first line, creating a hanging indent. NOTE: To aid in alignment, the outdented part of the line will be unaffected by full justification. Also, an outdented line cannot be centred or flushed right.
<b>n&lt;n&gt;</b>	New page. The optional argument will make the command begin a new page only if fewer than <n> lines remain on the current page.
<b>p&lt;n&gt;</b>	Page length. This is the overall length of the page, including the top and bottom margins. Default is 66.
<b>q</b>	Add-in #2
<b>r&lt;n&gt;</b>	Set Right margin. This is the rightmost column in which text will print. Default is 70.
<b>t&lt;n&gt;</b>	Set top margin, default 5. This sets the number of blank lines which will print at the top of each page. Leave enough lines for your running header, if you've set one up.
<b>v&lt;fspec&gt;</b>	Verbose include file. This sends the named file to the printer regardless of its contents. The file could be a printable bit-image, enabling you to include graphics in your document (this won't show on the preview screen, however). If you include a graphic, ensure you adjust the page length and bottom margin accordingly.
<b>w&lt;n&gt;</b>	Turn page wait on <b>1</b> , or off <b>0</b> . The default may be either, depending on the configuration. Used for single sheet printing, it will pause and wait for a keystroke at the end of each page. This also works during print preview. Press escape at the prompt to abandon the print/preview operation. Note that the key press is NEVER taken from a macro. This is so that page prompts won't steal subsequent macro keystrokes and knock a macro out of step when printing is finished.
<b>y&lt;n&gt;</b>	Line spacing, default of <b>1</b> means no blank lines between each line of text. <b>2</b> will print in double-spacing.
<b>z&lt;n&gt;</b>	Last page to print. Stops printing at page <n>.
<b>&gt;&lt;n&gt;</b>	Left paragraph indent. All following text up to the next <Return> will be indented by <n> spaces from the left margin.

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- <n>** Right paragraph indent. All following text up the next <Return> will be indented by <n> spaces from the right margin.
- [<n>** Left header/footer margin, default 10. This works like the **[** command, but sets the margin for the headers and footers, which don't obey the normal left margin. The reason for this is in case the left and right margins are altered within the text. If these alterations crossed a page boundary, headers and footers which shared those margins might not be properly aligned.
- ]<n>** Right header/footer margin, default 70. As above, but for the right margin.
- ?<n>** Set starting page number, default is **1**. To begin numbering a document with a page number of 3, set <n> to **3**.
- @<n>** Page select. <n> is the number of pages to skip during printing, and defaults to 0. Use this command with a parameter of **1** to print only the odd pages in a document, **2** to print every third page, etc. To print the even pages, set page select to **1** and use **a2** to start printing at page 2 Useful for creating multi-pass double-column documents or pages where the headers and footers are offset for binding purposes. You can print the odd pages with blocked right footers, then set up blocked left footers and print the even numbered pages.
- [<n>** Set heading level. <n> can range from **1-9**. This prints an automatic section heading in place of the command. You can follow the command with a space and a line of text for a title.

Say you structured your text as follows (with your body text between these headings):

**11 TRANSPORT**  
**12 BUSES**  
**12 TRAINS**  
**11 AMENITIES**  
**12 LIBRARIES**  
**12 LEISURE**  
**13 SWIMMING**  
**13 OTHER SPORTS**

The printout will be:

**1 TRANSPORT**  
**1.1 BUSES**  
**1.2 TRAINS**  
**2 AMENITIES**  
**2.1 LIBRARIES**  
**2.2 LEISURE**  
**2.2.1 SWIMMING**  
**2.2.2 OTHER SPORTS**

The print formatter will work out the section headings when you print the text, so you don't need to renumber the headings whenever you reorganize the document.

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**&** Reset heading levels. This character simply resets all heading levels to their initial values of 1. Allows you to use more than one sequence of headings in a document.

### 5.4.2 STAGE 2 COMMANDS

The following commands can appear anywhere on a line, even in headers and footers, and affect individual lines of text or characters. Some take parameters, but most don't (many are "toggles" in the sense that the first occurrence of the character turns a feature on, and the next occurrence turns it off again). A handy way to enter these commands which saves pressing the inverse key two times is to enter them in conjunction with the <Select> key.

**#** Print page number. Embed in header and footer lines to print the current page number.

**c** Centre line. Following text on the line is centred. This command can be used to centre header/footer text or any individual lines. The centred line should end in a <Return>. This command need not be first character on the line - you can have text blocked left, centred and edged right all on the same line. NOTE: This command is NOT that same as centre justify, which works on ALL following text. If you centre or edge right individual lines in paragraphs justified by the Stage 1 justify command, justification will be suppressed on that line.

**d** Toggle double strike on or off. Block any text you want printed in boldface in <d> characters, i.e. **d**this is bold**d**. This feature is set up by the printer driver editor. Your printer may not support boldface, however.

**e** Edge right. Forces subsequent text on the line up against the right margin. You can precede the edge right command with a centre command to create centred and edged-right text on the same line. See *Centre Line*.

**i** Toggle italics on or off (see *double-strike*).













**s**<n> Toggle print style. <n> is 1-5 (also in reverse video). This sends one of 5 non-printing control sequences to the printer. These sequences are set up in the printer driver editor and can each consist of any codes you like, up to 7 bytes each. Handy for selecting fonts or print styles not supported by print style directives (see later). You would turn on print style #1 with <s><1>, and then turn it off with <s><1> again.

**u** Toggle underline on or off (see *double-strike*).

**o**<n> Output ASCII char. This outputs the ASCII code <n>. The character is NOT counted as a printable character, so it won't affect the formatting or word-wrap. Handy for sending any control codes to the printer which aren't covered by the printer driver.

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	<code>&lt;n&gt;</code>	Send printable code. Works like <i>output ASCII</i> , but the character is counted as printed matter by the formatter and appears on the preview screen as a question mark. Handy for printing any international characters not supported by the printer driver.
		Soft hyphen (dash). Insert in the middle of especially long words. When these words won't fit onto a line during printing, the word will be broken where the soft hyphen is embedded, and a hyphen printed at the end of the line. If the word fits onto the line, no hyphen is printed.
		Hard hyphen (underscore). Normal hyphens between words allow the line to be split at that point. Use a hard hyphen instead to prevent this happening.
		Hard space (can also be an inverse space). Use hard spaces between words to force them to always be printed on the same line. A quick way to enter a hard space is with <code>&lt;Shift+Ctrl+SPACE&gt;</code> .
		Ignore to closing brace <code>]</code> . Everything up to the next inverse closing brace is ignored by the print processor.
		Comment line: everything until the next <code>&lt;Return&gt;</code> is ignored by the print processor.
		Toggle superscript on or off
		Toggle subscript on or off
		Add-in #3
		Add-in #4
		Add-in #5
		Add-in #6

### 5.4.3 CREATING HANGING INDENTS

It's easy to create hanging indents using LW's paragraph indent and margin release commands. Say you wanted to indent the next paragraph by 15 columns, but have the first line flush with the original left margin. Just include the line:

**>15m15**`<Return>`

### 5.5 OTHER PRINT FEATURES

Extraneous spaces following the end of a line not terminated by a `<Return>` are suppressed at the beginning of the next line. This means sentences with two or more spaces following the full stop will not leave extra spaces at the start of the next line, should the line break occur directly after the full stop.

Missing arguments and illegal commands will produce error messages and halt printing.

### **5.5.1 INTERNATIONAL CHARACTERS**

LW supports the Atari international character set with printed output which directly matches the preview display. Characters with ASCII codes from 0-26, and codes 96 and 123, can be re-defined so they send the actual codes to the printer which correspond to the foreign characters in the Atari international character set. You can set up any characters you like, but unless they correspond to the standard international set, they won't be represented correctly on the preview screen. This feature is set up with the printer driver editor (see PRINTER DRIVERS).

### **5.6 CONFIGURING THE PRINT FORMATTER**

The print formatter defaults for the following margins can be set in the CFG configuration file:

LEFT/RIGHT MARGIN  
LEFT/RIGHT HEADER/FOOTER MARGIN  
TOP/BOTTOM MARGINS  
HEADER/FOOTER OFFSETS

See Section 9, Configuring LW, for more information.

### 6 CONFIGURING LW FOR YOUR PRINTER

You can customize LW's print styling commands to suit any kind of printer. Toggles can be set up for italics, bold, underlining, superscript and subscript, and up to 5 further styling commands can be defined for any purpose you can think of.

#### 6.1 PRINTER DRIVERS

LW uses printer driver files (with the extension "PDR") to configure itself for various printers. At run-time, LW will attempt to load LW.PDR, so you can have the settings in this file available every time you run the program. If LW.PDR can't be found, LW uses its own default printer driver, which supports no special formatting and will send documents to the printer completely "clean". You can load printer drivers at any time during an editing session with:

<Shift+Ctrl+D>      Load printer driver. Just type a filename as usual - ".PDR" will be appended if you supply no extender.

Printer driver files translate the styling commands for italics, underline, boldface, etc., as well as international characters, into codes specific to your printer.

#### 6.2 CREATING A PRINTER DRIVER

Although previous versions of LW used the LWPD.COM printer driver editor, that program is no longer necessary when editing LW 3.x printer drivers, which are now stored as plain text files. Several printer drivers are supplied with the program, but it's easy to write your own if you know the escape codes for your printer.

Printer driver commands must be placed one per line in the printer driver file and terminated with <Return>. The following statements are available:

Statement	Arguments	Comments
UNDERLINE ON!OFF	n,n,n...	Underline on and off
ITALIC ON!OFF	n,n,n...	Italics on and off
BOLD ON!OFF	n,n,n...	Bold on and off
SUPERScript ON!OFF	n,n,n...	Superscript on and off
SUBScript ON!OFF	n,n,n...	Subscript on and off
INTERNATIONAL ON!OFF	n,n,n...	International character set on and off
CRLF	n,n,n...	Carriage return/linefeed codes
INIT	n,n,n...	Printer initialisation codes
CODE	char,n	Assign international character code
STYLE[1-5] ON!OFF	n,n,n...	Styles 1 – 5 on and off

Let's step through creating a printer driver for an EPSON compatible STAR LC-10 printer (not that you need to, since an EPSON driver is supplied, but it will do as an example).

##### 6.2.1 PRINT TOGGLES

Start LW with an empty text file. In your printer manual, find the codes for "ITALICS ON". For the EPSON compatible example, the sequence is 27, 52. In the editor, type:



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### **ITALICS ON 27,52 <Return>**

Italic off would be 27,53, so on the next line needs to be:

### **ITALICS OFF 27,53 <Return>**

All 6 pairs of ON/OFF toggles (underline, italic, bold, superscript, subscript and international font) work the same way. In a document, the first **I** in a file will turn italics on, the second off, the third on again, and so on. The only exceptions are the "International ON|OFF" code sequences. These are automatically sent before and after any international characters in the document. This means you can select any font built-into the printer, without affecting the rest of your text when printing non-international characters.

## **6.2.2 CONTROL STRINGS**

The CRLF statement allows you to set up a code string for the carriage return/linefeed sequence you want to send to the printer at the end of every line. For an EPSON compatible printer, you would type:

### **CRLF 13,10**

This will send an ASCII carriage return and linefeed sequence to the printer at the end of each line. The ICD Printer Connection sends the line feeds for you, however, so most of the time you can just have:

### **CRLF 155**

This is Atari's normal End of Line character and is the default in LW, so unless you want the CRLF sequence to be anything other than 155, you needn't include a CRLF instruction in your printer driver.

The INIT code is just sent to the printer at the top of every document you print. You might want to send a printer reset code every time you print. To do so, type:

### **INIT**

Follow this with a space and a comma-separated list of the escape codes for "Reset Printer" in your printer manual. If you don't want an initialization string sent to the printer, simply remove the "INIT" line from the printer driver file.

## **6.2.3 INTERNATIONAL CHARACTERS**

LW includes 29 special "International" characters. These are the characters <Ctrl+A> to <Ctrl+Z>, <Ctrl + comma>, <Ctrl + full stop> and <Ctrl+ semi colon>. When using a font which redefines these characters and accented or "International" characters, it's important to be able to coax the same accented character out of the printer. However, EPSON international codes and ATASCII codes are rarely the same, so using the CODE statement, you can assign an ASCII code to any of the 29 international character codes.

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### CODE 1,129

Will sent ASCII code 129 to the printer every time <Ctrl+A> is encountered in the document. You need to set up the codes for all 29 characters in the same way.

The STAR LC-10 manual has various character sets, selectable from software or DIP switches. We're interested in IBM character set #2, since it contains most of the Atari international character set in the codes 128-255. Normally these print as italicised versions of normal characters, so you will want to select the IBM set #2 with the DIP switches. There is a main bank of 12 DIP switches on the LC-10. To get the characters we want out of the printer, set switch 1-6 (Printer Mode) to ON (Standard), and 1-7 to OFF (Graphics). The other switches can be set according to your preferences. There is one character still missing from the printer's character set ("u" with an acute accent) which has to be coaxed out by software. The country-specific character set we need for the "u" acute can't be selected with the DIP switches, so the printer driver needs to send out the appropriate codes before printing international characters. We can do this with the INTERNATIONAL statement:

### INTERNATIONAL ON 27,82,12

### INTERNATIONAL OFF 27,82,0

Every time an international character is sent to the printer, ASCII 27,82,12 will first be sent to the printer, selecting IBM character set #2. Once the international character has been sent, the original character set will be selected with 27,82,0.

## 6.2.4 STYLES

You can also set create up to five print style toggles for printer features not covered by the italic, double-strike and underline commands:

### STYLE1 ON 27,52

### STYLE1 OFF 27,53

The above example defines style 1 as an italics on/off toggle, although this is not useful since we already have an italic on/off command.

Note that the "style" format has been changed in version 3.21 of LW, and printer drivers from previous 3.x versions *will not work with version 3.21 if they include style definitions*. Styles in older printer drivers need to be re-written to conform to the new system. The reason the system was changed was to enable the print formatter to selectively turn off printer character styling before printing header and footer lines. In prior versions of LW, the formatter made no attempt to keep header/footer and body text character styling separate from one another, with the result that character styling in the headers could inadvertently cross over to the body text and vice-versa. This long-standing problem is a compelling reason to upgrade to the latest version of LW.

Save your printer driver with <Ctrl+S> and call it LW.PDR if you want it to load as the default every time you start LW.

The procedure for most EPSON compatibles should be very similar to the method outlined above, although unfortunately I haven't had access to such equipment while writing this manual.

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I used to use a Canon BJ-200ex bubble-jet printer set up in Epson emulation mode with an ICD Printer Connection, and the EPSON.PDR printer driver worked perfectly with the Canon once the DIP switches were set correctly.

I've supplied the EPSON printer driver along with drivers for all the Atari printers. Although I don't own an Atari printer, I was able to figure out the codes they use by making AtariWriter Plus think I had one hooked up, then printing to disk and studying the output. Note that not all Atari printers support features like italics and boldface. I trust these drivers work well with the actual equipment.

Some work may be required to coax international characters out of your printer. However, even if your printer doesn't support them, there are plenty of utilities for downloading fonts to printers. Just download a font which emulates the Atari international character set, set up a printer driver, and you're good to go. Being able to print international characters without fuss was one of the key reasons that LW was written in the first place. I wanted a word processor which had them visible on the screen and didn't require special commands in the middle of a document.

### 7 THE SPELLING CHECKER AND OTHER EXTENSIONS

Users running LW on a machine with at least 128KB have access to extensions supplied with the program. Extensions are files ending in \*.EXT, and are small executable files invoked with <Ctrl+;> (Control and the semi-colon key). Extensions will only work if you have allocated space for them, and this space is taken from the main text bank when LW is using extended RAM. Therefore, as a minimum requirement, LW.SYS should contain the following lines:

```
BANKED ON
BANKS 1,2,3,4,5,6,7,8,9
EXTPAGES <n>
```

where <n> is a number between 1 and 7 (7 being the maximum size allowed). SpartaDOS X users have the option of leaving out the BANKED ON and BANKS <list> lines, since if DOS has sufficient free extended banks, the program will automatically use them.

Many extensions will run in 1KB of space, the one exception being SPELL.EXT, which requires all seven pages (1.75KB). SPELL.EXT also requires two “reserved” extended 16KB banks. An example LW.SYS designed to facilitate the use of SPELL.EXT would be:

```
BANKED ON
BANKS 1,2,3,4,5,6,7,8,9,10,11,12
EXTPAGES 7
RESERVE 2
```

Note that reserved banks are taken from the pool of RAM specified with the BANKS command. Therefore (assuming you have sufficient RAM), if you want ten text banks and two reserved banks, you should specify banks 1 to 12 (two of these banks will be reserved, and one will automatically be allocated for buffers, leaving nine extended banks plus the main bank, i.e. ten text banks).

LW 3.21 is supplied with the following extensions:

SPELL.EXT	Spelling checker
SORT.EXT	Line sorting utility
CALC.EXT	Calculator
DIR.EXT	Utility to import disk directories into the editor
ICONS.EXT	Icon menu system
INFO.EXT	Utility to manage multiple text banks, obtain word counts, etc.

All extensions will run in 4 EXTPAGES, except SPELL.EXT, which requires 7.

#### 7.1 CHECKING SPELLING

To use the spelling checker, it's necessary to place the twenty-six dictionary files (LWA.DCT – LWZ.DCT) in a folder accessible by the LW path. One might, for example, place the files in D3:>LW>SPELL> when using SpartaDOS X with a hard disk. The LW path would then need to contain the following entries:

```
D3:>LW;D3:>LW>SPELL
```

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Placing the dictionary folder last in the path is sensible, especially if creating dictionaries from scratch, since if a dictionary file doesn't exist, it will automatically be created using the path's last entry.

Naturally one can define the path in LW.SYS, or using an environment variable if using SDX:

```
SET LWPATH=D3:>LW;D3:>LW>SPELL
```

If the LWSDXDEV environment variable is set to 1, the above might read:

```
SET LWPATH=C:>LW;C:>SPELL
```

So, with the system set up, to spell check a file, simply load it into the editor, press <Ctrl+>, type "SPELL", and press <Return> (note, this assumes the extension files are also accessible via the LW path, i.e. stored in the LW folder using the example above). The spelling checker will immediately begin to check the document, highlighting misspelled words, offering the chance to correct them or add them to the dictionary, or ignore them for the duration of the spelling check.

Pressing <Break> at any time (or <Esc> at a prompt) will abort the check.

The spelling checker is supplied with very basic (English) dictionary files. The intention is that users build dictionaries which reflect their personal vocabulary. Each dictionary file (representing one letter of the alphabet) can be a maximum of 16KB in size. This should be enough for a total of 30-40,000 words. Word lists are stored with the first letter omitted, and in alphabetical order. A blank line represents the initial letter on its own (for example, "I"). It's quite easy to import word lists from other sources, simply by ensuring they are less than 16KB in size, alphabetically sorted, and lacking their initial letter.

It's hoped that support will be added for international dictionaries in the future. Right now, international characters are supported, but not as the first letters of words.

Note that the spelling checker (like many of the other extensions) ties its functionality to <Ctrl+T> until you run a different extension. Therefore, any time you want to spell check a file, just press <Ctrl+T>.

## 7.2 OTHER EXTENSIONS

Other extensions work in much the same way as the spelling checker. They are all loaded with <Ctrl+>, and some automatically execute.

- ICONS.EXT adds an icon menu to LW, accessed with <Ctrl+T>.
- CALC.EXT accepts numeric expressions (with parentheses) and displays the results on the message line
- INFO.EXT displays information about all text files being edited
- SORT.EXT sorts marked lines of text into order (use <Shift+Ctrl+T> to reverse the sort order)
- DIR.EXT simply loads the specified directory listing into the editor at the insertion point.

### 8 MACROS

LW's Macro facility is among the most powerful of any 8-bit word processor. Macros allow you to automate frequent tasks, redefine the keyboard layout, call up passages of text with a single keystroke, create interactive menu systems, and construct entirely new commands by combining existing features of the program. What's more, macros can now be attached to standard command keystrokes, so they can work like built-in features of the program. Macros can even disable screen updates and prompts while they work, so all you see is the end result.

LW's macro commands are really a superset of the commands found in the Public Domain word processor TextPro, and any users familiar with the way macros work in that program will have little difficulty in understanding how they are implemented in LW. Macros are written as plain text files (NOT \*.DOC document files) containing one macro definition after another with no spaces or EOL characters in between. A macro is defined as follows:

<Macro ID>■<Macro Definition>

Where Macro ID is the keystroke the macro is called with, the equate symbol is an inverse equals sign, and Macro Definition is simply the string of characters and commands the macro issues. Macros are NOT terminated with <Return>. The end of a macro definition is merely marked by another definition following it or by the end of the macro file.

Macro files can be up to 4K in length when using "Banked" memory, otherwise the size limit is 1K. Macros can "chain" other macro files, and even selectively run macros in the target macro file.

#### 8.1 LOADING MACROS

Macros are loaded with the <Shift+Ctrl+M> Load Macros command. If the file contains a macro attached to the "&" character, this "autoexec" macro will be run immediately after the macro file has loaded, unless you add the ",N" switch after the macro filename on the input line.

When the macro load command is issued from within a running macro, it's possible to pre-select a different macro to run instead of the "&" macro. See the pre-select macro command later in this chapter for details.

When LW first starts, it looks for the macro file LW.MAC and tries to run the "@" macro if one exists. This "start-up" macro is only ever run when the program first loads LW.MAC. SpartaDOS X users can disable the start-up macro from the command line or even select a different macro in LW.MAC to execute at start-up. Users of other DOS packages can disable autoexec and start-up macros by holding down the <Option> key during the loading process.

### 8.2 RUNNING MACROS

There are several ways to execute macros:

- Pressing <Ctrl+Q>, then the key the macro is attached to.
- Holding down <Option> then pressing the keystroke the macro is attached to.
- Pressing the key combination the macro is attached to.

Command keystrokes (those keystrokes which normally execute editor commands such as Load and Save when not preceded by <Shift+Esc>) are now scanned against macro definitions BEFORE they are scanned against the list of internal commands. This means you can now write a macro which totally supersedes a built-in command. You can, for example, attach a macro to the <Ctrl+L> keystroke, and this macro will override the “Load” command. Note that the load command will be completely lost unless you implement a way of calling the <Ctrl+L> command in another way. The only way you can now override a macro which replaces an internal command and get the internal command back from the keyboard is by holding down <Start> while typing the command keystroke.

The basic rules of macro execution are as follows:

- Press <Ctrl+Q> then <key> to run any macro attached to a non-inverse alphanumeric character (that’s any character which isn’t a command keystroke)
- Press <Option+key> to run any macro attached to any character (inverse or normal) which isn’t a command keystroke
- Press <keystroke> on its own to run a macro attached to one of LW’s command keystrokes (the macro supersedes the built-in command)

The <Start> key serves two functions:

<Start>	Pressed and released on its own will run the <#> macro, should one exist. This is another throwback to TextPro. However, in LW 3.2, use of the Start key has been augmented. Holding down <Start> while pressing another key combination will by-pass macro scanning. This means you can selectively run the underlying built-in command, even if its keystroke has been “stolen” by a macro definition.
---------	--

“EXAMPLES.MAC” on the distribution disk provides a template which you can modify for your own needs.

#### 8.2.1 AUTORUN MACROS

LW has two kinds of “autorun” macros: The Startup macro and the Autoexec macro. The Startup macro is attached to the “@” key and is only run when LW first loads: therefore, the “@” needs to be defined in LW.MAC.

The second kind of autorun macro is the autoexec macro, which should be defined on the “&” key. This macro is run when a macro is loaded during an editing session with the <Shift+Ctrl+M> command. Note that the autoexec macro will not be run in LW.MAC when it is loaded at startup (the startup macro is run instead); if LW.MAC is

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re-loaded later in an editing session, however, the autoexec macro (&) will be run instead of the startup macro.

You can disable the startup macro (@) in one of several ways:

- Specify the "/M" switch on its own on the SpartaDOS X command line
- Hold down <Option> while LW is loading

You can disable the autoexec macro (&) as follows:

- Hold down <Option> when loading a macro with <Shift+Ctrl+M> (press <Option> after pressing <Return> and hold it down until the macro file has loaded).
- Specify the ",N" switch immediately after the macro filename when issuing the <Shift+Ctrl+M> command.

### 8.3 WRITING AND EDITING MACROS

Because macros tend to contain lots of control codes, it's best to load in the special macro editing font before you start. It substitutes special alphabetic characters for the control codes and makes macros much more readable. Load the macro font with:

<Shift+Ctrl+N> then type MACRO and press <Return>

The above will work in either 80 or 40 column modes because there's a macro font for each mode: MACRO.F80 for 80 column mode and MACRO.FNT for 40 column mode. You may find it much preferable to switch to 40 column mode when editing macros simply because the 40 column font is easier to read and accuracy is important when writing macros.

Switch to 40 column mode with:

<Shift+Ctrl+W>

You may need to go through the procedure to load the 40 column macro font if you haven't already done so.

All the examples here are illustrated by screen shots of the macros in 40 column mode with the MACRO.FNT character set loaded.

### 8.4 SPECIAL MACRO COMMANDS

As with TextPro, the special macro commands are entered as INVERSE <Ctrl+KEY> characters, and are only available from within macros. You type these with <Ctrl+ESCAPE> followed by either <INVERSE>, <Ctrl+KEY>, then <INVERSE> again, or <SELECT+Ctrl+KEY>, which is another TextPro feature which has been emulated to make the typing of the odd inverse character less of a hassle.

<Select+Ctrl+A>     Ask for Input String. This command obtains string input from the user on the command line. Follow the command with message, ending in <RETURN>, just as you would with the macro print message command. This message becomes the input prompt. Any following text appears as the default contents of the input field. To actually get input from the user, you MUST include the



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<Ctrl+L>ine Input macro command as normal. The macro will then pause, allowing the text entry until <RETURN> is pressed. The input is sent to the paste buffer and overwrites its contents, even if a null string was entered. If the <Ctrl+B>branch Macro is used before the Ask command, the branch will occur if the input string was EMPTY.

The input string can be pasted into the document in the same way as any normal paste operation. It can also be inserted into a filename/search/replace input line with the <Ctrl+V> command (see below).

The Ask for Input command has virtually unlimited scope for macro development, allowing the creation of truly interactive, professional looking applications. Just remember that the contents of the paste buffer are lost when this command is used.

<Select+Ctrl+B> Branch to macro. Use this macro to create a branching condition. Follow with a macro identifier prior to the following macro commands, and the branch will according to the following conditions:

Key Code	Command	Branch
<Shift+Ctrl+M>	Load Macros	To target macro in loaded macro file
<Ctrl+F>	Find String	If string is NOT FOUND
<Shift+Ctrl+G>	Go to Bookmark	If bookmark NOT FOUND
<Select+Ctrl+C>	Macro Confirm	If user responds "N"
<Select+Ctrl+A>	Macro "Ask"	If user enters null string
<Select+Ctrl+Z><n>	Select bank	If text bank not found
<Ctrl+L>	Load Text	If "Linked Load"

See the <Ctrl+Z> command for more conditional branching commands.

<Select+Ctrl+C> Confirm (Y/N). Follow with a message terminated with <RETURN>. LW will print the message, followed by a question mark, then "(Y/N):". The user responds with the appropriate key. "Y" will allow the macro to continue. "N" will terminate all macros (even if the macro running is nested), or, if a branch macro is pending after a <Ctrl+B>branch command, that macro will be run. NOTE: Before the introduction of "macro conditionals" in later TextPro versions, that program's <equivalent "Y/N" command, <SELECT+Ctrl+A>sk, always attempted to run the "&" macro if "N" was pressed. LW does NOT include this feature: use the <Ctrl+B>branch to pre-select a macro to run if "N" is pressed.

<Select+Ctrl+J> Macro menu. Follow with a line of text terminated with <RETURN>. The text should be in the form of some kind of small

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menu. This message will be printed, then the program will run the macro attached to the next key pressed.

The macro menu has been augmented somewhat since version 2.1 of LW. Since the macro menu command is by definition the last command in a macro, it's now possible to add two extra parameters after the menu text. On a new line, type all the valid keystrokes for the menu options, ending in <Return>. Then, on the next line, type the ID characters for the macros you want each keystroke to run (in the same order), ending the line with <Return>.

For example, you could say:

```
#<INV Ctrl+J>Load, Save, Print<Return>
LSP<Return>
LSP<Return>
```

The above macro will display:

**Load, Save, Print**

when <Start> is pressed, and wait for a keystroke. Pressing <L> will run the macro attached to the inverse L character, <S> the macro on the inverse S character, and <P> will attempt to run the inverse P macro. This way, you can keep all your macros off commonly used keystrokes, but still invoke them using simple keystrokes from within menus.

**Note:** It's still possible to omit these two extra lines of information, and the menu will simply run the macro attached to whichever key the user presses.

- |                 |   |
|-----------------|---|
| <Select+Ctrl+K> | Get key. Simply waits for a key, then continues the macro.  |
| <Select+Ctrl+L> | Accept line. In either the editor or an input dialogue, this character will pause the macro and allow user keyboard input until <RETURN> is pressed or the macro is stopped with <BREAK>. Note that many features of the editor, including the icon bar, are disabled in Accept Line mode. If you run another macro whilst in accept line mode, the current macro will be abandoned and accept line mode terminated. NOTE: TextPro input mode always works in OVERTYPE mode - LW accept line mode works IN WHATEVER MODE THE EDITOR IS IN AT THE TIME. Also, the colon delimiters of TextPro are NOT supported by LW. |

The Accept Input command no longer filters out cursor movement other than left/right as did Version 1.0. Only a few commands - mostly those requiring input - are now disabled during macro input mode. This change was implemented to allow interactive macros far greater scope. A macro can now, for example, pause while the user marks a block of text, then, when return is pressed, operate on the defined block.

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<Select+Ctrl+V>	Print message. Follow with text terminated by <RETURN>. LW will print the message, which will clear on the next keystroke.																								
<Select+Ctrl+X>	Execute macro. Follow with a macro identifier. LW will attempt to execute the macro in the form of a SUBROUTINE or PROCEDURE. This means when the executed macro terminates, the calling or parent macro will resume from the next instruction following the execute command. Macros calls can be nested in this way up to a depth of 128.																								
<Select+Ctrl+Z>	Set toggles and test flags. Follow with one of the characters below: <table><tr><td>U</td><td>Put the keyboard into uppercase.</td></tr><tr><td>L</td><td>Put keyboard into lowercase.</td></tr><tr><td>I</td><td>Set insert mode.</td></tr><tr><td>O</td><td>Set overtype mode.</td></tr><tr><td>R</td><td>Set reverse video mode.</td></tr><tr><td>N</td><td>Set normal video mode.</td></tr><tr><td>K</td><td>Start block marking</td></tr><tr><td>1-9 or 0 (0=10)</td><td>Select the appropriate text bank when multiple banks are set up. Bank 1 is always the MAIN (unextended) bank, and 2-10 correspond to banks of extended memory.</td></tr><tr><td>B</td><td>Select the text bank the program was in when the macro was started.</td></tr><tr><td>H</td><td>Hide the screen display.</td></tr><tr><td>U</td><td>Turn the screen on again.</td></tr><tr><td>X</td><td>Clear "Edited Text" ("*") flag.</td></tr></table>	U	Put the keyboard into uppercase.	L	Put keyboard into lowercase.	I	Set insert mode.	O	Set overtype mode.	R	Set reverse video mode.	N	Set normal video mode.	K	Start block marking	1-9 or 0 (0=10)	Select the appropriate text bank when multiple banks are set up. Bank 1 is always the MAIN (unextended) bank, and 2-10 correspond to banks of extended memory.	B	Select the text bank the program was in when the macro was started.	H	Hide the screen display.	U	Turn the screen on again.	X	Clear "Edited Text" ("*") flag.
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H	Hide the screen display.																								
U	Turn the screen on again.																								
X	Clear "Edited Text" ("*") flag.																								

These parameters should be in normal video and each setting requires a separate <Select+Ctrl+Z>.

As well as setting flags, the <Select+Ctrl+Z> command can also test certain conditions:

M	Test for block marking.
S	Test if any text is already selected.
C	Test for file edits since the text in memory was last saved.
A	Test if file has already been saved.

You would precede these tests with a macro branch command. The branch will occur if the above conditions are FALSE.

### 8.4.1 DISABLING THE SCREEN FROM MACROS

You can use the:

<SELECT+Ctrl+Z> set toggles command

to turn the display on and off from within a macro. Follow with an "H" to "hide" any screen updates, and a "V" to make them visible. Nothing is actually printed to the

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screen when the display is disabled - the display will immediately change to reflect any changes made by the macro when it is switched on again. This is a great way to make macros run as if they were built-in commands, bypassing the prompts that usually whizz by on the command line. Certain commands - such as print, view, spool, disk menu and the four macro commands which display prompt information - re-enable the display automatically. The display is automatically re-enabled when the macro finishes executing if it has not already been turned back on.

### 8.4.2 SPECIAL CHARACTERS

<Ctrl+P>	Entered in a filename dialogue will enter the device, path and name of the current file.
<Ctrl+N>	Entered in a filename dialogue will enter name of current file without device.
<Ctrl+V>	<p>When pressed in ANY input dialogue (unless preceded by &lt;Ctrl+ESCAPE&gt;), &lt;Ctrl+V&gt; will place the contents of the paste buffer (or as much of it as will fit) into the input line. Using this method, if you previously captured text with the Ask for Input command, it can be transferred into any LW command which requires input. Similarly, you could cut text from the document and feed it into an LW command. Note that if the input dialogue is associated with a filing operation, the string will appear in uppercase.</p> <p>NOTE: &lt;Ctrl+B&gt; to insert the contents of the paste buffer has been dropped in this version. Use &lt;Ctrl+V&gt; instead.</p>
<Ctrl+L>	Will insert the name of the last file loaded in any bank (see "Linked Files").

In order to make these new commands as flexible as possible, the device/path/name and path/name variables are now accessible from ANY input dialogue. Precede them with <Ctrl+ESCAPE> to type them literally.

### 8.4.3 ENTERING OTHER COMMANDS FROM MACROS

While <Ctrl+Q> is used to start macros from the editor, from within a macro, <Ctrl+X> does this job. This means that FROM MACROS, <ESCAPE> PERFORMS ITS USUAL JOB OF PRECEDING CONTROL CHARACTERS. If you want to enter any command code from within a macro as part of your text rather than as a command, just precede it with an <ESCAPE> character in the macro. Many LW commands are attached to <Shift+Ctrl> key combinations. Obviously these have no ASCII equivalents, so how are these commands denoted in macros? Simple - from a macro, just think <INVERSE Ctrl> instead of <Shift+Ctrl>. So, to enter the <Shift+Ctrl+F> ind string command from within a macro, you would type an: <INVERSE Ctrl+F> instead, or: <SELECT+Ctrl+F> This is why the special macro commands use only those characters that relate to illegal <Ctrl+Shift> key presses.

When a macro is running, the only keys read from the keyboard are get key commands, confirm commands, text entered during accept line mode, and characters pressed during printing when page wait is on. The "Press a key" prompt after a file

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view/print operation requires a keystroke from the active macro to clear it and return to the editor.

### 8.4.4 THE SPECIAL MACRO FONT

The font MACRO.FNT/MACRO.F80 font on the distribution disk can be loaded by typing:

<Shift+Ctrl+N> New font, typing MACRO <RETURN>. This works in both 80 and 40 column modes. These fonts define all the control keys as special, heavy characters instead of international characters in order to make editing macros a little easier.

### 8.4.5 KEYBOARD CONVENTIONS FOR MACROS

Understanding how the keys in LW work may seem complex at first, so before we step through some example macros, let's recap:

- <Ctrl+ESCAPE> or <Shift+ESC> allows you to enter control codes into the editor or into an input dialogue, as <ESCAPE> does in the text editor. To get the escape code itself (which appears in LW as a curved downward pointing arrow) in the text, press <Ctrl+ESCAPE> or <Shift+ESCAPE> twice.

**NOTE: In version 3.2, you can press <ESCAPE> on its own twice in succession in the editor to enter the escape character into the text.**

- You can also press <Shift+Ctrl+ESC> to put the Escape character directly into the text.
- <Ctrl or Shift+ESCAPE> pressed when text is marked will unmark the text, as will <BREAK>, <ESCAPE> or any text typed.
- The <ESCAPE> symbol in a macro duplicates <Ctrl or Shift+ESCAPE> typed at the keyboard. To make a macro put the <ESCAPE> symbol into the editor, include two consecutive <ESCAPE> symbols in the macro.
- <Ctrl+Q> pressed at the keyboard runs macros from the editor.
- In macros, special macro commands and <Shift+Ctrl> commands are entered as INVERSE <Ctrl+KEY> COMMANDS.

The best way to consolidate our understanding of macros is with a couple of examples. Studying the macros supplied on the distribution disk will also help you to understand the LW macro language.

## 8.5 CREATING AND EDITING MACROS

Because macros tend to contain lots of control codes, it's best to load in the special macro editing font before you start. It substitutes special alphabetic characters for the control codes and makes macros much more readable. Load the macro font with:

<Shift+Ctrl+N> then type MACRO and press <Return>

The above will work in either 80 or 40 column modes because there's a macro font for each mode: MACRO.F80 for 80 column mode and MACRO.FNT for 40 column mode.

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You may find it much preferable to switch to 40 column mode when editing macros simply because the 40 column font is easier to read and accuracy is important when writing macros.

Switch to 40 column mode with:

<Shift+Ctrl+W>

You may need to go through the procedure to load the 40 column macro font if you haven't already done so.

All the examples here are illustrated by screen shots of the macros in 40 column mode with the MACRO.FNT character set loaded.

### 8.6 EXAMPLE MACROS

The best way to illustrate the creation of macros is with some useful examples.

#### DUAL FONT LOADER

When loading fonts into LW, only the font relevant to the current display mode is normally loaded, i.e. if LW is in 80 column mode and you specify a font to load, only the 80 column (.F80) font is loaded, while the 40 column font remains unchanged. You can, however, load the "other" font by specifying the file extender when loading fonts. For example, if LW is in 40 column mode and you load the "MACRO.F80" font, the underlying 80 column font will be loaded while the current 40 column font will remain unchanged.

What if you wanted to load both the 40 and 80 column fonts at the same time? We can write a macro which will function as a new command for loading both types of font.

We'll put the macro on the <Option+A> keystroke, so create an empty file and type the letter "a". Then type <Shift+Esc>, <Select+=> to get the assignment character. Now we can type the commands which actually make up the macro.

The first thing we want to do is capture the name of the font set to load. We do this using the Macro Ask command. So we type <Shift+Esc>, <Select+Ctrl+A> to get the macro ask character. This is followed by the input prompt we wish to appear on the screen. Type:

#### Font Set

Press <Return> to end the string. Next, we need to stop the macro issuing keystrokes until the user has a chance to type the name of the font set and press <Return>. This is done with the macro input command, so we type:

<Shift+Esc>, <Select+Ctrl+L>

Now press <Return> - this adds the <Return> which the macro will issue to terminate the user's input (when the user presses <Return> while the macro is suspended during input, that <Return> is not issued to the input line: it merely tells the macro we have finished entering text. That's why we have to issue the <Return> character explicitly to terminate text input to the macro ask command).

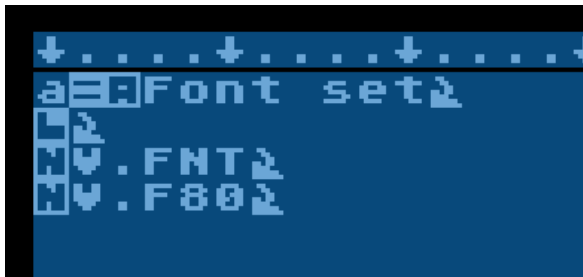
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The string captured by the macro ask command is stored in the paste buffer. It's stored there because it allows the resulting text to be easily inserted into the document. We can also place the contents of the paste buffer back into the input line of another command, using the <Ctrl+V> (Paste) command. That's what we're going to do now: place the font name the user provided into the Load Font command's input line.

So the next character we need in the macro is <Shift+Esc>, <Select+Ctrl+N>. We then type <Shift+Esc>, <Ctrl+V>, followed by .FNT, and finally a <Return>. This simply adds ".FNT" to the name the user typed, signifying that we wish to load the 40 column font. To load the corresponding 80 column font, we type the same line again, except that this time we add ".F80".

A screenshot of the completed macro is shown below.



Save the macro as "FONTSET.MAC" and then load it with <Shift+Ctrl+M>. Now, when you press <Option+A> and type – for example – MACRO at the "Font set" prompt, LW will load both the 40 and 80 column versions of the MACRO font (if either font can't be found on disk, the macro will simply terminate).

We can refine this macro further by hiding screen updates. By placing the <Select+Ctrl+Z> set options command in the macro, followed by H immediately before the first <Select+Ctrl+F> Load Font command, we can turn off the screen at that point. We could place <Select+Ctrl+Z> followed by V to turn it on at the end of the macro, although in this case it's not really necessary since screen updates are automatically re-enabled when a macro ends or is prematurely terminated by an error or the <Esc> or <Break> keys.

The revised macro looks like this:



In operation, the macro is now indistinguishable from a built-in command.

## TRANSPOSE CHARACTERS

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LW doesn't have a command to transpose mistyped characters, but we can create this command using a macro.

Note: this macro is included in the LW.MAC macro supplied on the distribution disk, along with macros to transpose words and paragraphs.

We'll write the transpose adjacent characters macro first.

We'll put this macro on <ESCAPE> <Ctrl+T> for transpose. To make entry of this macro easier, first type <Ctrl+CAPS> to go into "control" mode. This feature disables LW's commands, enabling you to type control keys without preceding them with <Ctrl+ESCAPE>. If you need to make corrections, type <Ctrl+CAPS> again to turn off control mode.

Now, with an empty editor as before, type <Ctrl+T>.

Now type <SELECT+EQUALS SIGN>.

Type <Ctrl+M>. This means we are about to mark a block.

Now type <Ctrl+RIGHT ARROW>. When the macro runs, this will define the character under the cursor as a marked block. Next, type <Ctrl+C>. This is the Cut Marked Text command, and will send that character to the paste buffer.

Now type <Ctrl+RIGHT ARROW> again to move the cursor over the next character. Next, type <Ctrl+P>. This will paste the original character to the right of the character that followed it. Finally, type <Ctrl+LEFT ARROW> to move the cursor back to its original position.

We'll finish with a message for a neat effect.

Type <SELECT+Ctrl+V> (the "print message" command) then type "Characters Transposed", and end with <RETURN>.

You'll now need to take the editor out of control mode by typing <Ctrl+CAPS>. Save the macro, then load it as described previously. Now when you press <ESCAPE>, then <Ctrl+T>, then character under the cursor will swapped with the one to its right, and a message to that effect will be displayed.

### 8.7 MACRO SUMMARY

As you can see, the scope of the macro language is governed only by your imagination. If you think of something LW doesn't do, chances are it's possible to construct the feature you want using a macro. And LW is fast enough to make your macros execute seamlessly, as if they were built-in features of the program. You can have your address or other frequently used text passages attached to a macro, or have a macro which merges in sections of text from disk at the cursor position. Check the supplied macro files to get an idea of the diverse applications of macros.



### 9 CONFIGURING LW

You can configure LW so that it always loads with the settings you prefer. You can even load different configurations part way through an editing session. You can set up everything from screen colour to additional banks of RAM for text.

LW supports two kinds of configuration files. LW.SYS is loaded when the program first starts and contains information about the memory configuration, keyboard buffer and keyboard redefinition. LW.SYS is read once when the program starts and any settings it contains cannot be changed once the program is loaded.

#### 9.1 CONFIGURATION OPTIONS IN THE EDITOR

The following commands toggle or set up various LW features, and these settings are all saved in the configuration file. They can all be set up from the configuration program, with the exception of the tab ruler. Not all the options in the configuration program can be altered from the editor during an editing session: only those options which are likely to need changing once the program is up and running are available.

<Ctrl+W>	Toggle word-wrap
<Shift+Ctrl+W>	Set screen resolution (40 or 80 column) and the maximum line length (5-240 characters)
<Ctrl+TAB>	Clear tab stop at current column
<Shift+TAB>	Set tab stop at current column
<Shift+Ctrl+E>	Erase all tab stops
<Shift+Ctrl+TAB>	Reset default tab stops
<Shift+Ctrl+INS>	Toggle Insert/Over-type modes
<CAPS>	Toggle Upper/Lower case
<Shift+Ctrl+U>	User options

Several settings from the disk menu are also saved in the config file:

<S>pec	Set the directory filename mask
<1-0>	Set the current drive #
<Tab>	Directory style

Use the following commands to load and save different configurations during an editing session:

<Ctrl+O>	Load config
<Shift+Ctrl+O>	Save config

Unless you supply your own filename extender, ".CFG" will be appended during both save and load.

One other command from the editor is:

<Shift+Ctrl+N>	Install/Load alternative character set
----------------	--

The character set information isn't saved in the config file. To make a character set of your choice load a run-time, rename it "LW.FNT" and put it on your LW disk.

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## 9.2 .CFG CONFIGURATION FILES

CFG files contain user preferences such as screen colours, screen width and resolution, default drive number, filespecs, etc. Many of these settings can be changed via commands in the editor, and the current configuration can be saved as a CFG file at any time with the <Shift+Ctrl+O> command.

If a file called "LW.CFG" resides on the default drive when the program is loaded, this configuration file is always used at startup. This way, you can keep all your most commonly used settings in LW.CFG, and load different configurations during an editing session with <Ctrl+O>.

CFG files are plain text files consisting of lines ending in <Return>. Each line takes the form of a keyword, followed by a space, and then one or more numeric or textual arguments separated by commas or spaces.

The full list of CFG file keywords is shown below:

Numeric Settings	Argument	Comments	Default
TMARGIN	0-255	Set default top printed margin	5
BMARGIN	0-255	Default bottom margin	61
LMARGIN	0-255	Set left margin	10
RMARGIN	0-255	Set right margin	70
PAGELEN	0-255	Set page length	66
HFLEFTMARG	0-255	Set left header/footer margin	10
HFRIGHTMARG	0-255	Set right header/footer margin	70
SPACING	0-255	Set line spacing	1
HEADOFF	0-255	Set header offset	2
FOOTOFF	0-255	Set footer offset	2
EOLCHAR	0 or 219	Set end-of-line character (internal code)	219
PADCHAR	0 or 125	Set false space character (internal code)	0
TEXTCOL	0-255	Set text luminance	10
SCREENCOL	0-255	Set editor screen colour	148
PROMPTCOL	0-255	Set message line text luminance	10
BORDERCOL	0-255	Set border colour	0
BARCOL	0-255	Set progress bar colour	184
KEYDELAY	0-255	Set initial key delay	30
KEYREPEAT	0-255	Set key repeat rate	3
TABWIDTH	0-255	Set default tab width	5
FILESORT	0-4	Set file sort type: 0 = no sort 1 = sort by name 2 = sort by extender 3 = sort by date/time 4 = sort by size	0
PAGEWIDTH	5-240	Set editor column width	

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Flags (ON/OFF)	Argument	Comments	Default
80COLUMNS	ON   OFF	Set 80 / 40 column mode	ON
PAGEWAIT	ON   OFF	Set page wait mode during printing	OFF
WORDWRAP	ON   OFF	Word wrap on/off	ON
INSERT	ON   OFF	Insert mode on/off	ON
CASESENS	ON   OFF	Case sensitivity (search and replace)	OFF
CAPSLOCK	ON   OFF	Caps lock on/off	OFF
KEYCLICK	ON   OFF	Set key click noise on/off	ON
SIONOISE	ON   OFF	Set I/O noise on/off	ON
WILDCARDS	ON   OFF	Set wildcards in search/replace on/off	ON
ATTRACT	ON   OFF	Enable/Disable OS colour cycling	ON
DOCMODE	ON   OFF	Set document/text mode	OFF
SDXDIR	ON   OFF	Set long directory style (SDX only)	OFF
Text Settings	Argument	Comments	Default
FILEEXT	<EXT>	Set default text mode extender. Should be entered WITHOUT leading period.	TXT
DRIVE	Dn:	Set default drive ID	D:
FILESPEC	<filemask.ext>	Set default file mask for disk menu	*.*

A good way to understand CFG files is to load the LW.CFG file into the editor. You might also save the current configuration with <Shift+Ctrl+O>, giving it the name TEST.CFG to see how any settings you have altered in the editor are reflected in the CFG file. There's nothing to stop you loading a CFG file into the editor and changing it manually, although you should take care not to introduce syntax errors into the file. Some settings – like the default print margins – require you to edit the CFG file by hand, since there is no command in LW to changed them.

**Note:** Prior to version 3.0, LW configuration files were binary files and were edited using the supplied configuration editor. Now, however, LW's config files are plain text files and the configuration editor is no longer required. Note also that configuration (.CFG) files from earlier versions of LW are totally incompatible with version 3.0. However, configuration files from 3.0 are “upwardly compatible” with those of version 3.1 and 3.2.

### 9.2.1 THE DEFAULT DRIVE

The DRIVE instruction in a configuration file sets the default drive in LW. This is the device ID which is added to any filenames you type without Dn: at the front. It is also used as the drive number when cataloguing files using the disk menu.

#### DRIVE D1:

The above line simply sets the default drive to drive 1.

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### 9.3 THE LW.SYS FILE

The LW.SYS file is read once when LW first starts up. The information in the file is used to set-up LW's memory configuration and other settings that can't be changed once the program has finished setting itself up. LW.SYS must be written as a plain text file in the editor. Most of the time, the memory configuration commands in LW.SYS will be unnecessary, since the settings it affects are usually automatically configured. However, there may be occasions when it's desirable to override these settings. LW.SYS is also necessary if you wish to manually disable LW's built-in keyboard buffer or remap the keyboard, or define the LW search path on non-SpartaDOS X systems.

LW.SYS may contain the following instructions:

Instruction	Arguments	Comments	Default
BANKED	ON!OFF	Turn banked memory usage on or off	ON (with supported DOSes)
BANKS	n,n,n,n...	Specify banks to be used (from LW's internal list)	Depends on available memory
RESERVE	n	Reserve # banks for extensions	0
ETXPAGES	n	Reserve # pages for extension code	0
BUFFER	ON!OFF	Turn internal keyboard buffer on or off	ON (unless SDX buffer installed)
PROGBAR	ON!OFF	Turn the file I/O progress bar on or off	ON
PATH	Dn:<path>	Set LW search path	none
KEY	code, ATASCII	Attach code "ATASCII" to key code "code" (advanced)	none
COMMAND	Command #, ATASCII code	Assign keycode to internal command (advanced)	none
LOADCFG	[Dn:][path]filename[.ext]	Specify config file to load when LW first starts	LW.CFG
LOADPDR	[Dn:][path]filename[.ext]	Specify printer driver to load when LW first starts	LW.PDR
LOAEXT	[Dn:][path]filename[.ext]	Specify extension to load when LW first starts	LW.EXT
LOADMAC	[Dn:][path]filename[.ext]	Specify macro file to load when LW first starts	LW.MAC
LOADFNT	[Dn:][path]filename[.ext]	Specify 40 column font to load when LW first starts	LW.FNT
LOADF80	[Dn:][path]filename[.ext]	Specify 80 column font to load when LW first starts	LW.F80
DOCEXT	<ext>	Define the default file extension for files saved in Document mode.	LWD

### 9.3.1 CONFIGURATION PROFILES USING LW.SYS

As of LW 3.2, the facility to specify the default files other than LW.\* are loaded at start-up means that different LW.SYS files can be used to select different configurations when LW is first run. Using SpartaDOS X, this feature becomes even more powerful, since the location and name of LW.SYS can be specified on the command line with the /S switch. See the section on SpartaDOS X for more information.

### 9.3.2 CONFIGURATION USING A SUPPORTED DOS

When using LW with a supported DOS (DOS 2.5, MyDOS, and SpartaDOS X), the program will automatically detect any extended memory on the machine and avoid those banks used by DOS/RAMdisks (providing the default RAMdisk drivers are used with DOS 2.5 and MyDOS). While manual configuration of the memory banking scheme should be unnecessary under these circumstances, it's still possible to override the default settings.

Using a supported DOS, LW will scan the hardware to establish how many extended memory banks are installed in the system, then subtract from the resulting list those banks used by DOS (the only exception is SpartaDOS X, which helpfully provides its own built-in list of unused banks). The result is a list of the *free* banks on the system, rather than a list of all the banks installed on the machine. You may specify a selection of banks from this list as follows:

#### **BANKS 1,2,3,4**

Under DOS 2.5, MyDOS or SDX, this line will tell LW to use the first four banks from the list of *free* banks the program generated when it first initialized (the banks are ordered numerically according to the PORTB banking value, and are numbered beginning at 1). If there aren't enough free banks to fulfil the amount requested by "BANKS", as many as are available will be allocated. In the above example – assuming there were at least four free banks on the target machine – LW would allocate one bank for the macro/paste/directory buffer (which it always does when using extended memory, before allocating any other banks as text buffers), three banks for extra text buffers, and it would enlarge the main text buffer to 19K.

**Note:** When using banked RAM, LW's macro buffer is 4K in size, the paste buffer is 6.5K, and the disk directory buffer provides room for a maximum of 255 files.

The RESERVE instruction is intended to allocate banks of extended memory for use by machine code extensions. It's envisaged that in the future, applications such as proof-readers and table of contents generators will be written as extensions for LW. The extensions load at \$3300 and must first have space allocated for them with the EXTPAGES statement, which merely allocates the specified number of 256 byte memory blocks (to a maximum of 12) above \$3300 to house the executable code of extension programs (this memory is taken from the 19K main text buffer: extensions are only available when LW is using BANKED memory).

**EXTPAGES 4**  
**RESERVE 1**

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The above statements in LW.SYS will reserve four pages of RAM from main memory at \$3300 for extension code, and a single bank of extended RAM for use by extensions which require it. If there is insufficient extended memory, or if LW is not using banked memory, these instructions will have no effect.

Another example:

```
BANKED ON  
BANKS 1,2,3,4,5,6  
RESERVE 1  
ETXPAGES 8
```

On a 320K machine running DOS 2.5 with a 64K RAMdisk installed, the LW.SYS file above will configure LW with four extended text buffers, and one bank for the macro/paste/directory buffers, reserving a single bank (actually the last in the list) for use by extensions. Since LW is using banked memory, the main text buffer would be 19K. However, the EXTPAGES statement has reserved 8 pages (2K) at \$3300 for use by extension executable code, reducing the size of the main text buffer to 17K.

You can disable banked memory use altogether by including the following line in LW.SYS:

```
BANKED OFF
```

This will cause LW to ignore any BANK, EXTPAGES or RESERVED statements in LW.SYS. The main (and only) text buffer will be 16K in size and the paste, macro and directory buffers will each be only 1K long. This is the same configuration LW will adopt when run on a standard 64K XL/XE machine.

### 9.3.3 CONFIGURATION USING OTHER DOS PACKAGES

When LW is loaded on a system using an unsupported DOS (anything other than SpartaDOS X and DOS 2.5 or MyDOS with the standard RAMdisk drivers), it makes no assumptions about whether the operating system is using extended memory for RAMdisks or other purposes. Therefore the default behaviour of the program under these circumstances is NOT to use banked memory. To use banked memory when running LW under an unsupported DOS, you MUST create a custom LW.SYS file containing the following line:

```
BANKED ON
```

Since LW can't differentiate between used and free banks when running under an unsupported DOS, the internal list it builds when it first starts up is of ALL the extended memory banks present on the system. Therefore, if you wish to configure LW to use only specific banks of extended memory while co-existing with any installed RAMdisks or other parts of DOS residing in extended RAM, you must first know which banks of RAM are used by the operating system and specify only UNUSED banks after the "BANKS" statement.

Examples:

```
BANKED ON  
BANKS 1,2,3,4
```

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The above LW.SYS file used with an unsupported DOS on a 128K machine will cause LW to allocate three extended text banks, a 19K main text bank, and a single extended bank for its macro/paste/directory buffer.

**BANKED ON**  
**BANKS 5,6,7,8,9,10,11,12**  
**RESERVE 1**

In the above example, assuming LW is running on a 320K machine under an unsupported DOS which is using the lowest four banks of extended memory as a RAMdisk, LW will allocate one bank for its macro/paste/directory buffer, six banks for extended text buffers, and reserve a single bank for use by extensions. It will do this while *avoiding* the lowest four banks of extended RAM (those in use by the operating system's RAMdisk, and having the banking values \$23, \$27, \$2C, \$2F).

Clearly when using unsupported RAMdisks with LW, careful planning is required. However, when using an unsupported DOS with no RAMdisks or other components residing in extended memory, it's safe to have an LW.SYS consisting of just a "BANKED ON" instruction. This will simply cause LW to use as many banks as it needs (up to a maximum of 16), yielding up to ten text banks. If there aren't 16 banks fitted to the system, LW will simply use as many as it can find.

### 9.3.4 THE SEARCH PATH

The search path allows you to access LW's config, macro, printer driver and font files from specified drives/paths on the system without typing the pathnames every time you load the files.

**PATH D8::D1:>LW**

This line in a SYS file will cause LW to first search the current directory of drive 8 followed by the folder "LW" on drive 1 when loading fonts, macros, printer drivers and config files, when no other path has been supplied. Note that if the file is not found by searching the specified paths, the default drive will ALWAYS be searched last. Note also that LW's default drive is not necessarily the same as DOS's default drive (usually "D:"). LW's default drive specifier is the same as the disk menu drive number and is prepended to all filenames for which no device identifier has been explicitly provided. If for any reason you want to ensure that the default DOS drive is searched, include "D:" (without quotes) as an entry in the path.

### 9.3.5 THE KEYBOARD BUFFER

The fifth kind of instruction in LW.SYS is the "BUFFER" statement (followed by ON or OFF). This simply turns the keyboard buffer on or off. The keyboard buffer will always default to on, unless it detects that another keyboard buffer (such as the SpartaDOS X keyboard buffer) is active.

## 9.4 USING MULTIPLE TEXT BUFFERS

Multiple buffers can allow the loading of up to 160K of text in memory at any one time. The files are always kept separate (unlike AtariWriter Plus), but may be linked together when printed by using include bank commands. You can also append text banks when saving using the /A switch on the command line. By having "include bank #"

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commands in the main bank (bank #1), you can keep track of pagination with the <Ctrl+?> command, or preview the whole document with <Ctrl+V> without once having to access a file.

From the main program, banks are selected with:

<Shift+Ctrl+n> Select bank command

where <n> is any one of the number keys. <1> always calls up the main (unexpanded) bank, while the other 9 numbers can be set up any way you wish. From macros, these same numbers follow the <SELECT+Ctrl+Z> Settings command.

### 9.5 CUSTOM FONTS

Several alternative character sets are supplied on the disk. Many fonts are supplied in both 80 and 40 column versions. 80 column fonts are 512 bytes long and have “.F80” extenders, while 40 column fonts are in standard Atari format and have the extender “.FNT”. These can be loaded at any time with <Shift+Ctrl+N>. Depending on whether the editor is in 40 or 80 column mode, leaving the font extender off the filename will automatically load the font appropriate to the editor mode. You can, however, “force” loading of 40 or 80 column versions of a font by specifying the extender on the input line. The MACRO.FNT/MACRO.F80 font is most suited to editing macros, since the control characters are specially emboldened and easy to distinguish from alphanumeric characters in the 80 column version. The other fonts provide many different styles and weights, and all provide full international characters.

### 9.6 CUSTOMISING THE KEYBOARD

LW allows you to customise the keyboard in two ways: by using macros, and by using a custom keyboard layout (in the LW.SYS file). Redefining the keyboard using the macro is the best way to reassign keystrokes, while a keyboard definition file allows you to totally remap the keyboard (to create a DVORAK layout, for example).

#### 9.6.1 THE KEYBOARD TABLE

First, let's look at the KEY statement, which should appear in the LW.SYS file.

**KEY** n,n

The KEY statement takes two numeric arguments. The first number is an index to the hardware scan code table. The scan code table is 256 bytes long, and is divided into four groups of 64 bytes. The first 64 bytes represent normal keys (without Shift or Control), the next 64 bytes are the Shifted characters, and the next 64 bytes are Control characters. The final 64 bytes represent keys pressed while both Shift and Control are held down together (<Shift+Ctrl> keys in this manual). LW's keyboard table is exactly like the table contained in the Atari's operating system ROM, except for the Shift and Control block (the Atari OS's keyboard table is only 192 bytes long).

The table on the following page shows the entire default key mapping of LW. The keys are shown in the left column, and the grey columns represent the code offsets for the normal, shifted, control and Shift+Ctrl characters. When writing complex macros, this table is a useful means of finding out what character to use in a macro to – for example – feed <Ctrl+6> to the editor.



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Key		Normal		Shift		Ctrl		Shift+Ctrl
i	0	108	64	76	128	12	192	200
j	1	106	65	74	129	10	193	200
;	2	59	66	58	130	123	194	200
F1	3	28	67	8	131	19	195	200
F2	4	29	68	5	132	12	196	200
k	5	107	69	75	133	11	197	200
+	6	43	70	92	134	30	198	200
*	7	42	71	94	135	31	199	200
o	8	111	72	79	136	15	200	143
Invalid	9	200	73	200	137	200	201	200
p	10	112	74	80	138	16	202	144
u	11	117	75	85	139	21	203	149
Return	12	155	76	155	140	155	204	155
i	13	105	77	73	141	9	205	137
-	14	45	78	95	142	28	206	223
=	15	61	79	124	143	29	207	252
v	16	118	80	86	144	22	208	200
Help	17	200	81	200	145	200	209	200
c	18	99	82	67	146	3	210	200
F3	19	30	83	1	147	4	211	200
F4	20	31	84	26	148	22	212	200
b	21	98	85	66	149	2	213	200
x	22	120	86	88	150	24	214	200
z	23	122	87	90	151	26	215	200
4	24	52	88	36	152	180	216	164
Invalid	25	200	89	200	153	200	217	200
3	26	51	90	35	154	5	218	163
6	27	54	91	38	155	182	219	166
Esc	28	27	92	27	156	27	220	200
5	29	53	93	37	157	181	221	165
2	30	50	94	34	158	253	222	162
1	31	49	95	33	159	200	223	161
,	32	44	96	91	160	0	224	128
Space	33	32	97	32	161	32	225	160
.	34	46	98	93	162	96	226	224
n	35	110	99	78	163	14	227	142
Invalid	36	200	100	200	164	200	228	200
m	37	109	101	77	165	13	229	141
/	38	47	102	63	166	224	230	221
Inverse	39	129	103	129	167	129	231	129
r	40	114	104	82	168	18	232	146
Invalid	41	200	105	200	169	200	233	200
e	42	101	106	69	170	5	234	133
y	43	121	107	89	171	25	235	153
Tab	44	127	108	159	172	158	236	220
t	45	116	109	84	173	20	237	148
w	46	119	110	87	174	23	238	151
q	47	113	111	81	175	17	239	145
9	48	57	112	40	176	185	240	168
Invalid	49	200	113	200	177	200	241	200
0	50	48	114	41	178	176	242	169
7	51	55	115	39	179	183	243	167
Backspace	52	126	116	156	180	254	244	222
8	53	56	117	64	181	184	245	192
<	54	60	118	125	182	125	246	219
>	55	62	119	157	183	255	247	222
f	56	102	120	70	184	6	248	134
h	57	104	121	72	185	8	249	136
d	58	100	122	68	186	4	250	132
Invalid	59	200	123	200	187	200	251	200
Caps	60	130	124	131	188	132	252	132
g	61	103	125	71	189	7	253	135
s	62	115	126	83	190	19	254	147
a	63	97	127	65	191	1	255	129

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By working out where in the table the key combination you want to redefine resides, you can totally remap the keyboard. For example, you could have the following line in LW.SYS:

### KEY 10,97

This will redefine the <P> key so that when you press it, the lowercase letter “a” will be produced. Note that this means that pressing <P> will produce the letter “a” *everywhere in the program*. The most useful application for this would be to produce things like DVORAK keyboard layouts.

Something to consider when redefining the keyboard in this way is that for every key you redefine, you need to redefine its “complement”, otherwise you will have two keys producing the same code (as well as one code you can’t access any more).

Note that the 1200XL’s function keys are fully supported by LW, and you can assign the commands of your choice to the twelve possible key combinations.

### 9.6.2 REMAPPING COMMANDS USING MACROS

The second way of redefining the keyboard takes advantage of LW’s macro capability and has the advantage that each key will still produce the expected character. Using macros, however, it’s possible to translate a command keystroke into a different one before it gets processed by the program.

Looking again at our Windows cut and paste shortcuts, consider the following macro (we’ve already loaded the MACRO.FNT character set before typing in the text):



There are five macros in this file. The first is mapped to <Ctrl+X>, and simply issues <Ctrl+C> whenever <Ctrl+X> is pressed in the editor. The second issues <Ctrl+P> when <Ctrl+V> is pressed and so on. The last two macros assign keys to the two functions whose original keystrokes have now been reassigned.

### 9.6.3 REMAPPING COMMANDS USING THE VECTOR TABLE

With version 3.21 of LW comes the facility to remap the keyboard by changing the internal command table. This is accomplished via the “COMMAND” statement in LW.SYS. The command statement takes the form:

COMMAND <command number>,<key code>

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“Command Number” refers to the numbered internal command in the range 0 to 100, corresponding to the table below. “Key Code” is the ASCII code you wish to associate with that command.

Command Number	Function	Default Key Code
0	Cursor up	28
1	Cursor down	29
2	Cursor left	30
3	Cursor right	31
4	Page up	223
5	Page down	252
6	Macro toggles	154
7	Cut selected text	24
8	Set tab stop	159
9	Clear tab stop	158
10	Change found string	18
11	Paste text	22
12	Delete line	156
13	Mark text	13
14	Paste text	157
15	Cop selected text	3
16	Quit application	145
17	Convert character/block to lower case	153
18	Toggle visible returns	253
19	Convert character/block to upper case	25
20	Extension hook 1	20
21	Extension hook 2	148
22	Find string	6
23	Reverse find string	21
24	Home cursor	8
25	End of text (EOF)	5
26	Start of line	1
27	End of line	26
28	Sentence right	96
29	Sentence left	0
30	Word right	94
31	Word left	92
32	Insert tab/next tab stop	127
33	Paragraph left	95
34	Paragraph right	124
35	Backspace	126
36	Insert space	255
37	Delete character	254
38	Toggle visible returns	219
39	Convert selected text to reverse video	174
40	Convert reverse video text to normal	172
41	Toggle insert/overtyping mode	222
42	Select bank 1	161
43	Select bank 2	162
44	Select bank 3	163
45	Select bank 4	164
46	Select bank 5	165
47	Select bank 6	166

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48	Select bank 7	167
59	Select bank 8	192
50	Select bank 9	168
51	Select bank 10	169
52	Toggle word wrap	23
53	Save marked text	137
54	Load printer driver	132
55	Set find string	134
56	Go to bookmark	135
57	Load macros	141
58	Load font	142
59	Set replace string	146
60	Set display width	151
61	Go to drive/path	136
62	View file	10
63	Load file	12
64	Save file	19
65	Erase all text	125
66	Global search and replace	7
67	Disk menu	4
68	Load configuration file	15
69	Merge text	9
70	Enter escape character	27
71	Print file	16
72	Preview file	144
73	Reset tabs	220
74	Display version number and info	221
75	Save As...	147
76	Save configuration	143
77	Erase all tabs	133
78	Word count	14
79	Run macro	17
80	Define bookmark	2
81	Load extension	123
82	Change colours	11
83	Set options	149
84	Show position in printed document	224
85	Go to window number	180
86	Previous window	181
87	Next window	182
88	Extension hook 3	183
89	<undefined>	184
90	<undefined>	185
91	Help	176
92	Macro "ask" command	129
93	Alternative macro ask command	251
94	Macro input command	140
95	Macro print message	150
96	Macro confirm	131
97	Macro menu	138
98	Macro get key	139
99	Macro execute subroutine	152
100	Macro define conditional branch	130

The entries marked <undefined> simply point to an RTS instruction, and associating a key code with them will simply have the effect of requiring <Ctrl+Esc> to be pressed before typing the character in a text file. The “Macro” entries should not be changed since they are in any case attached to the “illegal” <Shift+Ctrl> keystrokes which cannot be typed on the Atari keyboard (it makes no sense, after all, to be able to invoke macro commands directly from the keyboard).

Redefining the editor functions in this way means that existing macros will not work. Indeed, the “COMMAND” statement is intended for the advanced user who wishes to – for example – remove all the command functionality from the <Ctrl+key> combinations. Note that if you want to dispense with an editor function entirely so that it cannot be called up, just attach a repeated key code which is already attached to a command higher up the list (i.e. with a lower command number). Since the command table is scanned from the beginning, the second occurrence of the same key code will never be reached.

**Note: for a list of ASCII key codes and their mappings to the keyboard, see the Keyboard Table chart in the previous section.**

### 9.6.4 1200 XL KEYS

1200XL users can assign LW commands to function keys. The 1200XL's four function keys appear in the scan code table and should be defined in the same way as other keys using the KEY command.

## 10 DOS PACKAGES AND LW

LW works with and configures itself for many of the popular DOS packages for Atari XL/XE computers. Supported DOSes include:

Atari DOS 2.5  
MyDOS 4.5  
SpartaDOS X (using BANKED memory)

Even if your DOS isn't in this list, LW may well work with it, providing it follows the same basic CIO protocols as Atari DOS and does NOT use any RAM under the operating system.

**Note:** up to and including version 2.1, LW used to work with disk-based versions of SpartaDOS, Atari DOS XE, and many other DOS packages which used RAM under the computer's operating system. However, since LW 3.0 uses the 14K of RAM between \$C000 and \$FFFF, it will no longer work with any DOS which uses the same memory space. If you need to use LW with SpartaDOS 3.21 or DOS XE, download a copy of LW 2.1 at [www.atari8.co.uk](http://www.atari8.co.uk).

### 10.1 MEMORY REQUIREMENTS

Whichever DOS you use, you must ensure that it has a MEMLO setting (\$2E7,\$2E8) no higher than \$2000. For this reason, LW works best with SpartaDOS X which – when using BANKED memory (as it must with LW) – boasts an impressively low MEMLO.

LW works well with DOS 2.5 and MyDOS using normal sector buffer configurations. Resident handlers and TSR programs are unlikely to work with LW using these DOS packages.

As well as all conventional memory from \$2000 to \$9FFF, and the cartridge memory from \$A000 to \$BFFF, LW also uses 14K of RAM under the operating system between \$C000 and \$FFFF. LW will switch out internal BASIC when using DOS 2.5 or MyDOS, but SpartaDOS X users must run LW with the “X” command, since the library must be disabled.

### 10.2 ATARI DOS 2.5

These systems require no special handling by LW and special DOS features such as subdirectory and command line support will be inactive. LW will disable internal BASIC automatically with this DOS. By default, LW will use all available extended memory (not occupied by a RAMdisk) for extra text buffers under DOS 2.5.

### 10.3 ATARI DOS XE

LW 3.0 will not work with DOS XE.

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### **10.4 MYDOS 4.5**

This DOS works well with LW. Subdirectory names are preceded by a colon on the disk menu, and traversal of the directory tree is catered for, as well as the creation and deletion of subdirectories. To display the contents of the active directory, don't forget to remove the drive number from the device spec by first pressing <0> on the disk menu.

LW will correctly detect and avoid RAMdisks under this DOS. With careful configuration, it's possible to have a large RAMdisk present and ten text banks alongside one another on machines with sufficient RAM.

### **10.5 DISK-BASED SPARTADOS**

LW 3.0 does NOT work with disk-based versions of SpartaDOS. You must use SpartaDOS X with LW 3.0.

### **10.6 SPARTADOS X**

SpartaDOS X provides by far the best operating environment for The Last Word (and, indeed, for most productive applications). SDX's wealth of features makes for flexible operation and efficient file management. LW supports SDX command line arguments and environment variables for maximum configurability.

When running LW with SpartaDOS X, you can specify command line options as follows:

**X LW [file[,file...]] [/M[macro]] [/Ddrive] [/Ssys\_file] [/Q] [/X] [/T] [/Ppath]**

M : Disable autorun macro or run macro "macro"  
D : Set default drive  
S : Set SYS filespec  
Q : Disable title screen (when no filenames are given on command line)  
X : Load "Clean" (without any config, font, printer drivers or macros)  
T : Show title screen (when filenames are given on command line)  
P : Set Search Path

(Note there is no space between the /M and /P switches and their arguments. If you set the LW search path on the command line, it will override the LWPATH environment variable. The argument for the /P switch takes exactly the same as the argument for the SET LWPATH command. See the next section for a full explanation. Note also that you cannot combine switches: each individual switch must be preceded by "/"

**X LW.EXE TEST.DOC /M% /PD1:>LW>**

The command line above cause LW to attempt to load the file "TEST.DOC". If the file doesn't exist, an empty file will be presented in the editor bearing the name "TEST.DOC". LW will also attempt to run the "%" macro in LW.MAC. Finally, the LW search path (LWPATH) will be set to "D1:>LW>" (see the Section 9.3.4: "The Search Path" for a detailed description of the path).

**X LW.EXE /SD3:>TEXT>TEXTEDIT.SYS /Q**

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The above command line will load LW with the title screen off and will attempt to load the file TEXTEDIT.SYS on drive 3 in the TEXT folder, instead of LW.SYS.

### **X LW.EXE README /T**

This command line will attempt to load the file README.TXT when LW starts, and will display the title screen (which is usually deactivated when filename arguments are provided on the command line).

### **X LW.EXE /PC:>LW**

The command line above will set the LW path to "C:>LW". Note the drive letter is only permissible when LW is in SpartaDOS X device name mode (see section 10.6.3).

**Note that while it is possible to explicitly set the default drive number/letter using both the LWDRIVE environment variable (see below) and the /D switch, under SpartaDOS X, LW's default drive will always default to the current DOS logged drive (this is a change new to version 3.21).**

LW's keyboard buffer will deactivate automatically if the program detects that the SDX keyboard buffer is ON. If you prefer to use LW's built-in buffer, be sure to do a "KEY OFF" at the SDX command prompt before loading the program. You could write a batch file as follows:

```
KEY OFF  
X LW  
KEY ON
```

The above will ensure the SDX key buffer is off, run LW, then turn the key buffer on again. However, the latest SDX keyboard buffer is so similar to the LW buffer that you might as well use the SDX buffer.

### **10.6.1 SPARTADOS X ENVIRONMENT VARIABLES**

Several of the LW settings which can be changed via the SpartaDOS X command line can also be set via SDX environment variables for maximum convenience. To set up the LWPATH variable, you would include a line similar to the following in your CONFIG.SYS:

```
SET LWPATH=D8:;D1:>LW
```

This will cause LW to first search the current directory of drive 8 followed by the folder "LW" on drive 1 when loading fonts, macros, etc, when no other path or drive ID has been supplied. Note that if the file is not found by searching the paths in LWPATH, the default drive will ALWAYS be searched last.

As of version 3.21, if LW is in SDX device name mode, the following will perform the same job as the previous example:

```
SET LWPATH=H:;A:>LW
```

Another point to note about the search path is that since it is also part of the LW.SYS file, **it's possible that the path defined via a PATH command in LW.SYS might immediately overwrite the path defined via the LWPATH environment variable when**



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LW loads. Careful synchronisation of configuration files is clearly required. If you want to make sure only the path in LWPATH is used, remove all PATH lines from you CFG files.

The following environment variables can be used to set LW parameters:

**LWPATH**  
**LWSYS**  
**LWDRIVE**  
**LWSPLASH**  
**LWSDXDEV**

Some examples:

**SET LWSYS=D3:TEXT.SYS**

The above line in CONFIG.SYS tells LW to load TEXT.SYS on drive 3 instead of LW.SYS when it first loads.

**SET LWDRIVE=D2:**

The line above sets LW's default drive to drive 2.

**SET LWSPLASH=1**

The above line tells LW to display the splash (title) screen at all times, regardless of whether filenames are supplied on the command line. Setting LWSPLASH to 0 will permanently turn off the title screen.

### **10.6.2 SPARTADOS X MEMORY CONFIGURATIONS**

LW 3.0 requires that SpartaDOS X is using "BANKED" memory. This is because the program loads under the operating system (making a "USE OSRAM" configuration unusable), and if SpartaDOS X uses conventional (LOW) memory, MEMLO will be too high for LW to load. So, unless you have more than 128K fitted to your machine, you must boot SDX with a CONFIG.SYS which contains the following line:

**USE BANKED**

If your Atari has *more* than 128K, SDX will automatically use BANKED RAM unless you tell it otherwise.

As with DOS 2.5 and MyDOS, LW will automatically detect the number of RAM banks not used by DOS and will grab up to ten of them for its own use. If you have a RAM disk set up (with RAMDISK.SYS), LW will avoid this too, only using those areas of memory DOS has certified as unused.

### **10.6.3 SPARTADOS X DEVICE NAME MODE**

Brand new to LW version 3.21 is the ability to use SpartaDOS X "kernel" device names throughout the program. This feature is disabled by default, since it also prevents access to standard Atari CIO device names. In SDX device name mode, all device identifiers in the program are converted to SpartaDOS drive letters or kernel device

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names. This means that "D:" refers to drive 4, not the DOS logged drive. "A:" refers to drive 1. You can still refer to "Dn:" by supplying the drive number after "D:", however.

In SDX mode, you also have automatic access to the other kernel devices simply by typing their name. Thus, to load the CONFIG.SYS file from the CAR: device, simply enter CAR:CONFIG.SYS at the load file prompt. To catalogue the contents of the CAR: device, press <S> at the disk menu and enter "CAR:\*.\*".

A side-effect of SpartaDOS X device mode is that a mounted PC folder can no longer be accessed via the "H:" device when LW is being run on an emulator. If you want to access an emulated hard disk in this way, you must run LW in Atari OS device name mode, which is the default.

Another consideration of SDX device mode is that any pathnames in the PATH variable (either in LW.SYS or defined with the /P command line switch), or embedded filenames in documents (such as linked files or macros) should conform to the chosen device naming convention. For example, trying to include "D:CV.TXT" with the include file command when printing will attempt to load CV.TXT from drive 4 when LW is in SDX device name mode. If you always include drive numbers (e.g. "D3:") this isn't such a problem, since that notation will work in either mode.

The situation is much more inconvenient, however, if you alter all your configuration files to include SDX kernel device names, and then deactivate SDX device name mode. For example, LW would interpret "PATH=C:>DOS>" in LW.SYS as referring to the cassette handler, or an attempt to load "E:NOTE.TXT" as a reference to the screen handler. So it's important to pick Atari OS mode or SDX kernel mode and stick to it. That's why the new feature is deactivated by default.

Switch on SDX device name mode by defining the following line in CONFIG.SYS:

**SET LWSDXDEV=1**

Of course you could also simply type the command at the DOS prompt before running LW.

It's a deliberate move to make this setting only available through SpartaDOS X mechanisms, since it is irrelevant to any other DOS. To deactivate SDX device name mode from the command line, simply type:

**SET LWSDXDEV=0**

Or

**SET LWSDXDEV**

Or simply don't define the variable in CONFIG.SYS at all.

### 10.6.4 ACCESSING DRIVE LETTERS FROM THE DISK MENU

Because drives can be referred to by letters instead of numbers when LW is in SDX device mode, the disk menu has a new command:

**^Log**

Pressing <Ctrl+L> allows a drive number *or letter* to be typed. Thus you can quickly and logically log drives using letter IDs when using SpartaDOS X. Note that you can still press the number keys to log drives, and numbers 1 through 0 are also accepted by the Log command.

## 11 LW COMMAND SUMMARY

Below is a complete list of every command in the LW editor and print formatter. In the first section, editor commands are described with their equivalent macro commands (where different) in the third column. Where no macro command is listed, the command is the same from within macros. Remember that macro commands which duplicate <Shift+Ctrl> keystrokes are entered as INVERSE <Ctrl> keystrokes.

### 11.1 EDITOR COMMANDS

COMMAND	FUNCTION	MACRO EQUIVALENT
Ctrl A	Start of Line	
Ctrl B	Set Bookmark	
Ctrl C	Copy Marked Block	
Ctrl D	Disk Menu	
Shift+Ctrl D	Load Printer Driver	INVERSE Ctrl D
Ctrl E	End of File	
Shift+Ctrl E	Erase all Tab Stops	INVERSE Ctrl E
Ctrl F	Find String	
Shift+Ctrl F	Select Find String	INVERSE Ctrl F
Ctrl G	Global Search & Replace	
Shift+Ctrl G	Go to Bookmark	INVERSE Ctrl G
Ctrl H	Home/Start of Text	
Shift+Ctrl H	Set Disk Menu filemask/path	INVERSE Ctrl H
Ctrl I	Merge File	
Shift+Ctrl I	Write Block to Disk	INVERSE Ctrl I
Ctrl J	View File	
Ctrl K	Change Screen Colours	
Ctrl L	Load File	
Ctrl M	Mark Text Block	
Shift+Ctrl M	Load Macros	INVERSE Ctrl M
Ctrl N	Show Number of Words	
Shift+Ctrl N	Load Font	INVERSE Ctrl N
Ctrl O	Load Configuration	
Shift+Ctrl O	Save Configuration	INVERSE Ctrl O
Ctrl P	Print File	
Shift+Ctrl P	Preview File	INVERSE Ctrl P
Ctrl Q	Run Macro	
Shift+Ctrl Q	Quit Application	INVERSE Ctrl Q
Ctrl R	Replace Found String	
Shift+Ctrl R	Select Replace String	INVERSE Ctrl R
Ctrl S	Save File	
Shift+Ctrl S	Save As...	INVERSE Ctrl S
Ctrl T	Extension hook 1	
Shift+Ctrl T	Extension hook 2	INVERSE Ctrl T
Ctrl U	Find String Upwards	
Shift+Ctrl U	Set Options	INVERSE Ctrl U
Ctrl V	Paste Text	
Ctrl W	Word Wrap Toggle	
Shift+Ctrl W	Set Screen Mode and Width	INVERSE Ctrl W
Ctrl X	Cut Marked Text	
Ctrl Y	Char/Block Lowercase	

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COMMAND	FUNCTION	MACRO EQUIVALENT
Shift+Ctrl Y	Char/Block Uppercase	INVERSE Ctrl Y
Ctrl Z	End of Line	
Ctrl -	Previous Line	
Ctrl =	Next Line	
Ctrl +	Column Left	
Ctrl *	Column Right	
Shift -	Paragraph Left	
Shift =	Paragraph Right	
Shift +	Word Left	
Shift *	Word Right	
Shift+Ctrl -	Screen Up	
Shift+Ctrl =	Screen Down	
Ctrl [	Sentence Left	
Ctrl ]	Sentence Right	
Shift+Ctrl [	Un-Invert marked text	
Shift+Ctrl ]	Invert marked text	
TAB	Next Tab Stop	
Ctrl TAB	Erase Tab Stop	
Shift TAB	Set Tab Stop	
Shift Ctrl TAB	Reset Default Tab Stops	
ESCAPE	Abort or enter control char	
Ctrl ESCAPE	Enter Control Character	[ESCAPE]
Shift ESCAPE	Enter Control Character	[ESCAPE]
Ctrl ?	Display Print Position	
Shift+Ctrl ?	Display Program Information	[SEE "SET" COMMAND]
Ctrl ;	Display Cursor Position	
Ctrl <	Erase All Text	
Shift <	Erase All Text	
Shift+Ctrl <	Toggle Visible Returns	
Ctrl >	Insert Space	
Shift >	Paste Deleted Text	
Shift+Ctrl >	Toggle Insert/Over-Type	[SEE "SET" COMMAND]
Ctrl DELETE	Delete Char at Cursor	
Shift DELETE	Del Word/Line/Sent/Para	
RETURN	End of Paragraph	
CAPS	Toggle Upper/Lower Case	[SEE "SET" COMMAND]
Ctrl CAPS	Control Lock	
Shift CAPS	Uppercase Lock	
Shift+Ctrl CAPS	International Lock	
INVERSE	Inverse/Normal Toggle	[SEE "SET" COMMAND]
Shift Ctrl INV	Convert Normal/Inverse	[NONE]
Shift Ctrl SPC	Hard Space	
Ctrl 1	Pause Listing	[NONE]
Ctrl 2	Toggle visible returns	Inverse 2
Ctrl 3	End of File (End of Text)	Inverse 3
Ctrl 4	Go to Text Bank	Inverse 4
Ctrl 5	Previous Text Bank	Inverse 5
Ctrl 6	Next Text Bank	Inverse 6
Ctrl 7	Extension hook 3	Inverse 7
Ctrl 0	Help	Inverse 0
Shift+Ctrl 1	Select Main Text Bank	[SEE "SET" COMMAND]
Shift+Ctrl 2-0	Select Extended RAM Bank	[SEE "SET" COMMAND]

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COMMAND	FUNCTION	MACRO EQUIVALENT
START	Run # Macro (If pressed with character, runs built-in command on that key)	
SELECT+CHAR	Enter Inverse Character	
OPTION+Key	Run Macro	
HELP	Help System	

### 11.2 SPECIAL KEYS

These characters have special meanings when entered on the command line unless preceded by <Ctrl+ESCAPE> (<ESCAPE>,<ESCAPE> from macros):

KEY	FUNCTION
Ctrl+P	If typed when a filename is requested, prints the device/path/name of the current file in the editor.
Ctrl+N	If typed when a filename is requested, prints just the path/name of the current file.
Ctrl+L	If typed when a filename is requested, prints the complete path name of the last file loaded into any bank.
Ctrl+V	Inserts the contents of the paste buffer into the input line
ESCAPE or BREAK	Abandons input.
Ctrl or Shift+ESCAPE	Allows entry of control characters on the input line.

## 11.3 MACRO COMMANDS

The following commands are only available from within macros and are entered in inverse video.

COMMAND	FUNCTION																																		
INV Ctrl A	Macro Ask command. Follow with prompt message ending in return and optional default input string. Follow with an Accept Line command <INV Ctrl+L>.																																		
INV Ctrl B	Branch Macro <macro key>. Selects a macro to run after negative confirm, a macro load, negative find string/next/go to bookmark. Also runs the selected macro if a load operation results in an incomplete (linked) load.																																		
INV Ctrl C	Confirm (Y/N). Continues macro if "Y" pressed, else aborts or runs pre-selected macro.																																		
INV Ctrl J	Macro Menu <menu text><RETURN>. Prints message and runs macro attached to next key press.																																		
INV Ctrl K	Wait for a key from user																																		
INV Ctrl L	Accept Line Mode. Accepts keyboard input until <RETURN> is pressed. Also works in input dialogues.																																		
INV Ctrl V	Print message <message><RETURN>.																																		
INV Ctrl X	Execute macro <macro key>.																																		
INV Ctrl Z	Set options/test conditions <option>. Follow with one of the following characters (in normal video) to set various options and test various conditions:																																		
	<table> <tr> <td>U</td><td>Uppercase</td></tr> <tr> <td>L</td><td>Lowercase</td></tr> <tr> <td>R</td><td>Inverse</td></tr> <tr> <td>N</td><td>Normal</td></tr> <tr> <td>I</td><td>Insert Mode</td></tr> <tr> <td>O</td><td>Over-Type Mode</td></tr> <tr> <td>H</td><td>Hide screen updates</td></tr> <tr> <td>V</td><td>Make screen visible</td></tr> <tr> <td>K</td><td>Start marking text at cursor position</td></tr> <tr> <td>1</td><td>Select Main Text Bank</td></tr> <tr> <td>2-0</td><td>Select Extended banks 2-10</td></tr> <tr> <td>X</td><td>Clear Edited Text Flag</td></tr> <tr> <td>B</td><td>Switch to text bank editor was in when macro was called</td></tr> <tr> <td>M</td><td>Test for block marking (even if nothing selected: precede with branch command)</td></tr> <tr> <td>S</td><td>Check for selected text (precede with branch command)</td></tr> <tr> <td>C</td><td>Check for changes to text since last save (precede with branch command)</td></tr> <tr> <td>A</td><td>Check if file has already been saved (precede with branch command)</td></tr> </table>	U	Uppercase	L	Lowercase	R	Inverse	N	Normal	I	Insert Mode	O	Over-Type Mode	H	Hide screen updates	V	Make screen visible	K	Start marking text at cursor position	1	Select Main Text Bank	2-0	Select Extended banks 2-10	X	Clear Edited Text Flag	B	Switch to text bank editor was in when macro was called	M	Test for block marking (even if nothing selected: precede with branch command)	S	Check for selected text (precede with branch command)	C	Check for changes to text since last save (precede with branch command)	A	Check if file has already been saved (precede with branch command)
U	Uppercase																																		
L	Lowercase																																		
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N	Normal																																		
I	Insert Mode																																		
O	Over-Type Mode																																		
H	Hide screen updates																																		
V	Make screen visible																																		
K	Start marking text at cursor position																																		
1	Select Main Text Bank																																		
2-0	Select Extended banks 2-10																																		
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C	Check for changes to text since last save (precede with branch command)																																		
A	Check if file has already been saved (precede with branch command)																																		

### 12 PRINT FORMATTING COMMANDS

These commands affect the printed document, and are entered in inverse video, in lower or upper case. All numeric arguments should also be in inverse video (use <SELECT+KEY> to enter a single character in inverse video). Filenames and header/footer lines should be entered as normal text, terminated with <RETURN>.

COMMAND	FUNCTION	DEFAULT VALUE
A<n>	First page to print	1
B<n>	Bottom Margin	61
C<line>	Centre Line	
D	Double strike Toggle	
E<line>	Edge Line Right	
F<line>	Define Running Footer	
G<file>	Include File	
G<n>	Include Text Bank	
H<line>	Define Running Header	
I	Italic Toggle	
J<n>	Justification	0
L<n>	Left Margin	10
M<n>	Margin Outdent	
N<n>	New Page (conditional #)	0
O<n>	Output Control Code	
P<n>	Page Length	66
R<n>	Right Margin	70
S<n>	Print Style Toggle	
T<n>	Top Margin	5
U	Underline Toggle	
V<file>	Verbatim dump to Printer	
W<n>	Page Wait	0
X<n>	Output Printing Code	
Y<n>	Line Spacing	1
Z<n>	Last Page to Print	
><n>	Left Paragraph Indent	
<<n>	Right Paragraph Indent	
[<n>	Left Head/Footer Margin	10
]<n>	Right Head/Footer Margin	70
?<n>	Set Starting Page Number	1
#	Insert Page Number	
@<n>	Skip <n> Pages During Print	
!<n>	Heading Level	
&	Reset Heading Levels	
(	Ignore to next )	
—	Hard Hyphen	
;	Comment line	
-	Soft Hyphen	
.	Hard Space	
UP ARROW	Superscript Toggle	
DOWN ARROW	Subscript Toggle	



### **13 PROGRAMMER'S TECHNICAL NOTES**

This section first outlines LW's memory map, then goes on to discuss some of the general ideas behind the program. It isn't a guide to writing extensions for LW (please refer to the extension developer's documentation). If you're having problems running LW, you'll want to check out the section on memory usage. I'll also be talking about various tricks that LW employs, and why it has turned out the way it has.

#### **13.1 ASSEMBLY LANGUAGE ADD-INS**

From version 2.1 onwards, LW has presented assembly language programmers with the interesting opportunity to writing their own machine code routines to extend the functionality of the software. These pure machine code files must adhere to strict guidelines, and are (as of version 3) only available when using extended RAM. Add-ins (or extensions) are loaded at \$3300 and can be up to 3K in size. They can hook into editor keystrokes, the reset routine, the print formatter, etc, and potentially provide anything from a character map to a spelling checker.

A toolkit for writing add-ins is available with the retail version of The Last Word, and will include a full equate list for the program, example add-ins, code samples, and guidelines for writing your own modules.

#### **13.2 MEMORY USAGE**

Although the LW.COM executable is around 34K, about 6K is initialisation code which is jettisoned once the program is up and running. 14K of the program code goes straight under the OS ROM between \$C000-\$CFFF and \$D800-\$FFFF, and memory between \$2000 and \$3200 is a mixture of program code, data and buffers. When using BANKED memory, the main text buffer occupies memory from \$3900-\$7FFF (depending on the size of the add-in buffer which resides at \$3300 when active), and the \$4000-\$7FFF area is a window onto any text buffers which reside in banked memory. When banked memory is turned off, the main text buffer occupies the area \$4000-\$7FFF, \$3300-\$3FFF being used by internal buffers.

LW also uses several other regions for data storage, including the entire upper half of page zero (\$80-\$FF) and \$5A-\$5D. ALL memory from \$400 to \$6FF is used by LW for buffers. This area includes the OS cassette buffer, which you're (hopefully) unlikely to need. Note that it's no longer possible (as of version 3.0) to re-enter LW using "Run at Address" from the DOS menu. This is because the program unhooks itself completely from beneath the OS ROM when you exit to DOS.

You should ensure that no resident handlers use memory from \$400-\$6FF, otherwise conflicts with LW will certainly occur. Similarly, and TSRs or resident handlers must not extend about \$2000. SpartaDOS X set-ups can provide very low MEMLO values which can allow for resident handlers to be installed. However, with DOS 2.5 systems, there's unlikely to be any room for additional sector buffers, etc.

One of LW's largest memory demands is for the 80 column screen display, which consumes about 9K of RAM. For this reason, it has proved quite a feat to shoe-horn all of LW's functionality into the remaining memory space. Even so, LW still remains true to its original remit: that it should run on an unexpanded 800XL.

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One thing which has allowed LW to be crammed into such a small amount of code is the placing of almost all the program's variables in Page Zero RAM. The entire upper half of Page Zero is used by LW. This is made possible by the fact LW makes no calls to the OS's floating point arithmetic routines, which require \$D4-\$FF for themselves. In fact, LW doesn't even make any calls to CIO for screen output: it uses its own sophisticated formatted print routine. The screen editor device is abandoned when the program starts and only opened again upon exit to DOS. This use of page 0 instead of absolute addresses makes LW between twenty and thirty percent smaller than it might otherwise have been. It also means the program runs significantly faster than it would had it relied more heavily on absolute addresses.

There are other techniques which save on code space. LW uses many memory locations as flags, which are only ever on or off. These flags are tested using the 6502 "BIT" instruction, which means only bit 7 needs to be set or cleared. So instead of storing 0 in the flag to clear it and 128 to set it, to clear it I use:

LSR <address> which puts a 0 in bit 7 with only 2 bytes of code.

To set it, I have used:

```
SEC
ROR <address>
```

Which is only 3 bytes (providing <address> is on page 0). The other bits in the byte are of no significance, although occasionally more precision is required if both bits 6 and 7 of the byte are used. Bit 6 is also tested with the "BIT" command and will be transferred to the overflow flag. Branching is done with "BVC" and "BVS". These techniques don't really yield space savings when long strings of flags are being cleared: it's as easy to load a 0 and store it in the flags. But when widely dispersed flag sets/clears are necessary, the savings can soon mount up.

### 13.3 PROGRAM DESIGN

LW handles the text in memory in a special way in order to achieve its speed. While many word processors hold text contiguously in memory, LW uses a pointer system to ensure that the free memory in the buffer is always directly in front of the cursor. Therefore, when you type, there is no slowdown in the editor regardless of the size of the file. The text is moved through memory as you move the cursor through the it. When the screen refresh routine hits the location of the cursor, it jumps over the free memory in the buffer and displays the rest of the text, which is right at the top of the buffer.

Although LW is written in compact assembly language, it is still a modular program. Hardly any code is duplicated and – to save space – subroutines are used instead of in-line macro code. The reduction in code size achieved by using subroutines can be considerable. In spite of the fact LW 2.1 was thought to be a "finished" program in 2000, eight years later there were still significant space savings and efficiency gains to be had from continuous revision of the source code.

This 80 column version of LW comes some 20 years after my first experiments with the 8-bit Atari. I began programming in BASIC, then I moved on to C, and finally to Assembler. Having looked at CC65, Action!, PL65, and many other languages, I honestly think that machine code is still the best language to use when compactness is as critical a factor as it has always been with LW. After many years trying to get the

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Atari Macro Assembler to co-operate with SpartaDOS X, I finally wrote my own Macro Assembler. The result - MA65 – was used in emulation until quite recently to compile LW. It was only when the superb WUDSN IDE cross-development platform for Eclipse was published that I finally ported LW's 20,000 lines of source code to the PC, where I continued to develop the software using the superb WUDSN plug-in for the Eclipse platform, along with the ATASM cross-assembler. It now only takes a second to compile the whole program. Nevertheless, MA65 remains my disk-to-disk assembler of choice on the Atari platform.

### **13.4 DEVELOPMENT AND TESTING**

After nine years of thinking about writing a word processor, I finally began LW at the start of 1999. It took only 3 months to get a fully working version, and a further 2 months to produce one which was reliable. It was this test period, during which I used LW to write utility macros and the bulk of this documentation, that highlighted bugs and design faults for later correction. During this time probably hundreds of complete re-compilations were done. The program culminated in version 2.1 in 2000.

After version 2.1 was published (to an audience of none!) in 2000, there was a hiatus of eight years while my Atari lay in a storage box on top of a wardrobe. Then, in November 2008, a nostalgic conversation with a friend who was also interested in programming led me to retrieve the Atari. Amazed to find it still worked, I soon set about porting my files over to the PC using the fantastic new gadgets that had become available in the intervening time, and by the turn of the year LW 2.1 finally found publication. It drew such interest among Atarians that it became obvious the program would have to be updated to take advantage of all the new hardware that had been developed. 320K was now virtually the minimum amount of memory fitted to an Atari XE, while 1MB was common. Disk storage was almost unlimited thanks to SIO2IDE, SIO2SD, SIO2PC, and SIO2USB, and emulation meant the program development time could be dramatically lessened. The number one feature people wanted to see in a new word processor for the Atari8 was a fast 80 column display which didn't use any hardware add-ons. The 80 column display only took a few weeks to write. Then I began to see other things I could improve...

### **13.5 WHY LW CAME INTO BEING**

As well as being popular gaming machines, the Atari 8-bit line of computers have a huge catalogue of "serious" application titles, including many word processors. The most popular commercial offerings back in the Eighties included AtariWriter (and later, AtariWriter Plus), Paperclip, The First XLEnt Word Processor, and Superscript, although there were also dozens of other, less "heavyweight" word processors. Many public domain and open source text editors and word processors were also written for the Atari 8, including Speedscript and TextPro, the latter going through many incarnations and being one of the few word processors to offer tight integration with SpartaDOS, the advanced disk operating system by ICD. AtariWriter 80 and TurboWord used 80 column displays (most Atari 8 word processors were limited to the Atari's 40 column screen), although these programs required special hardware in the form of the XEP-80 device.

I got my first Atari 8 – a 65XE – in the late Eighties while still at school and as soon as I got a disk drive I began using TextPro for word processing. At the same time, I started to learn to program: first using Atari BASIC, then Turbo BASIC XL, then C and finally Assembly Language. Having written a database, a drawing program, various SpartaDOS utilities, and a Macro Assembler, it was always my ambition to write a

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word processor for the Atari 8 which coupled the innovative and flexible approach of public domain programs like TextPro with the robustness and professional, commercial-quality presentation of PaperClip and AtariWriter.

In 1989 I began sketching out rough ideas on paper, but it wasn't until nearly ten years later that I'd acquired the necessary skills in Assembly Language to actually start writing the program. After six months and hundreds of hours of work, version 1.0 of The Last Word was complete. At the time, the program was only 19K long, occupied no memory under the Operating System ROM (making it compatible with SpartaDOS 3.2 and DOS XE), and included several innovations, such as a ten line scrolling print preview window in 80 columns, a keyboard macro language, a built-in mini DOS menu, the ability to load several documents at once on an expanded memory machine, and a non-linear text buffer model which overcame the sluggishness many word processors exhibited when inserting and deleting text at the top of large files.

The finished program was sent off to New Atari User (formerly Page 6) Magazine in mid 1999, but by that time the title's publication was sporadic at best and I never heard anything back from Les Ellingham, the magazine's editor. At around the same time, New Atari User ceased publication entirely, and without access to the Internet, what contact I had with the Atari fraternity was completely severed. However – and somewhat incredibly – I was still using the Atari as my main (and only) computer for word processing. Since I still enjoyed programming, I continued to update the program up to version 2.1 which was completed in 2001. I felt that the program did just about everything it had set out to do and I couldn't think of anything else I wanted to add to it.

In the same year a 286 IBM PC compatible came into my possession, and The Last Word was somewhat overshadowed by Windows 3.1 and Word for Windows 2.0. Even though I was still somewhat behind the times, the PC opened up a whole new world and began to make writing programs for the Atari seem like a rather pointless exercise (especially without any kind of user base for my software). Within a couple of years, with access to the Internet and a more powerful Windows computer, I began to concentrate on PC construction and maintenance. The Atari was consigned to a box on top of a cupboard and for years I thought no more about it.

It wasn't until late 2008 after a nostalgic conversation with a friend who, like me, had fond recollections of 6502 assembly language programming that I decided to retrieve the Atari and find out if there were still any Internet forums dedicated to the old computer. I was surprised to discover there was still a thriving online Atari community, and astonished by the number and variety of technological developments that had been devised in the intervening years.

Fortunately, my 65XE (which had been upgraded to 130XE standard some fifteen years previously) and XF551 disk drive were both still fully functional (not to mention surprisingly well preserved) and it wasn't long before I'd bought an SIO2SD device, transferred most of my 5¼" floppy disks to the PC, and ran The Last Word 2.1 on an emulated Atari for the first time. Soon afterwards, I set up a website at [www.atari8.co.uk](http://www.atari8.co.uk) and released the word processor, along with the macro assembler and some other utilities. After adopting the forums at [www.atariage.com](http://www.atariage.com) as my second home, I received immediate (and mostly positive) feedback on the word processor, although I was also alerted to a fatal bug which meant the program wouldn't work on NTSC Ataris. Fortunately the bug was easily fixed and LW soon built up a following among fans of "serious" Atari applications.

Although I'd always considered version 2.1 of LW the "final" version, people soon came up with new things they'd like to see included in the program. Far and away top

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of the list was support for 80 column displays (including devices such as XEP-80 and VBXE). I was reluctant to try this, not least because I didn't have access to the necessary hardware and emulator support for XEP-80 and VBXE was limited at the time. The only alternative was to attempt a software 80 column display driver, which I was hesitant to do since I couldn't see it being fast enough. However, after some discussion with Claus Bucholz and having borrowed some ideas from his Ace-80 display driver, I figured out something that worked with similarly impressive speed. Key to the efficiency of the 80 column display is the way in which it only redraws those areas of the screen which have changed following edits. It also uses a dynamic display list to handle scrolling.

The original intention was to have two separate versions of the program: one which worked in 80 columns and another which worked in 40 columns. However, not only did it soon become difficult to synchronise the development of two different versions of the program, but an easy way became apparent to switch between the two display modes. Thereafter, LW had a dual display and to my knowledge is the only Atari 8-bit word processor capable of switching from a 40 to an 80 column display and back again at any time, and without any hardware add-ons, and without changing the cursor position in the current document.

A side-effect of the 80 column display was an increased memory footprint, which necessitated the positioning of 14K of the program code under the Atari's Operating System ROM. This meant the program was no longer compatible with DOS XE and disk-based versions of SpartaDOS. However, this change also allowed for extra features to be added to the program, and during the first half of 2009 most of the program was revamped and support was added for long SpartaDOS time/date stamped filenames on the disk menu, and for splitting large files across text banks.

One of the most important enhancements to the program was the font collection designed by Paul Fisher. This large selection of matching 80 and 40 column font pairs, specially created for LW, together with the new title screen and product logo, lent the program an even more professional edge and elevated the quality of the product beyond all expectations. Paul's contribution to the design side of The Last Word 3.0 cannot be overestimated, and I hope to make use of his considerable flair and skill in future projects.

In June 2009, having up until then developed the program entirely using my own XEDIT text editor and MA65 Macro Assembler – initially on real hardware and latterly under emulation on the PC – I migrated to the ATASM cross-compiler and the newly released WUDSN integrated development environment. Fond as I was of using my own Atari-based development tools, there was no doubt that developing under WUDSN more than doubled my productivity, and by mid October 2009 The Last Word 3.0 (now almost 32K in size) was at last ready for release.

The Last Word would never have seen the light of day if it wasn't for the encouragement and help I've received from members of the Atari community in Europe and the United States. Special thanks must go to Paul Fisher and Konrad Kokoszkiewicz, without whom the completion of the program as it stands would have been impossible. I must also thank all the beta testers – in particular David Whyte – who spent time reporting bugs and making suggestions on the AtariAge forums; thanks to Sebastian Bartkowicz and Cabell Clarke for help with SpartaDOS, and to Claus Bucholz for the source code and inspiration provided by Ace-80, Marcin Prusisz for my SIO2SD and SIO2IDE, and to Mark Grebe for his continued improvements to the Atari800MacX emulator.

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So what's next for The Last Word? With the advent of video enhancements such as VBXE, larger memory capacities as standard on Atari 8 computers, almost unlimited mass storage, and readily available flash cartridges, the time seems right for a fully WYSIWYG word processor for the Atari 8. Many commendable attempts at graphical operating systems (or applications employing GUIs) have been made on the Atari since the mid Eighties. One of the earliest was Diamond GOS by Alan Reeve, which closely emulated the look and feel of GEM on the Atari ST. Sadly it was let down by a lack of application support, which seems to be where many GUI operating systems fall down. More recently we've seen many ambitious GUIs, but none have seemed quite as cohesive and useable as GEOS on the Commodore 64, which was written in the 1980s. My intention is ultimately to make The Last Word the centrepiece application for a new Atari GUI which is able to take advantage of the hardware enhancements we've seen over the past few years.

In the meantime, I hope to release various add-ons for LW 3.21 such as a spelling-checker, character map, and a programmer's toolkit. There'll also be a special VBXE-compatible edition of LW at some point, offering clearer 80 column fonts and faster operation in 80 column mode. There's also the possibility of a cartridge-based version of the program one day, or at least a cartridge version of the GUI it will eventually run on.

### **13.6 DEVELOPMENT**

There are still many features I'd like to implement in future versions of LW. These include:

- Display drivers so that a single version of the program can be configured to use the VBXE or XEP-80 display devices.
- Larger, seamless text buffers capable of holding files up to 32K.
- Drop-down menus and dialogue boxes.

If I have learned anything while writing The Last Word, it's that no program is ever truly "finished". Even if a program is free of bugs, there's always room for improvement, and the desire to fit one extra function into the available space. Experience has also shown that writing a complex, professional application which is reliable and capable of working with a variety of different disk operating systems and memory configurations is a huge undertaking. I shudder to think of the man hours which I've put into this program. A decade after the program was originally written, new bugs were still surfacing in the original code. A large portion of the past year of development has been devoted to bullet-proofing the basic functionality of the software.

Fortunately, writing a program like this is also a lot of fun. The several hours I spent writing an algorithm to convert the SpartaDOS X bytes per sector / free sector count to the number of kilobytes free on the disk were oddly compelling, and the satisfaction felt when the code finally worked made all breakpoints and single-step tracing worthwhile.

The 8-bit Atari has been part of my life – on and off – for over twenty years, and I hope I'm still tinkering with the 130XE twenty years from now. Meanwhile, I think the PC on which I'm typing this manual will be a distant memory by then.

### **13.7 CORRESPONDENCE**

Any enquiries, bug reports, etc, should be addressed to me, Jonathan Halliday at [jon@atari8.co.uk](mailto:jon@atari8.co.uk).