

The Last Word

Professional Word Processing
for the Atari XL/XE

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1 INTRODUCTION

1.1 OVERVIEW OF THE LAST WORD

Welcome to THE LAST WORD, the brand new word processor for Atari XL/XE computers, and one of the most powerful programs of its kind in the Public Domain. Although LW bears no relationship whatsoever to other Public Domain word processors like Speedscript or TextPro, it incorporates some of the best facilities found in these programs with those of commercial packages such as AtariWriter Plus and The First XLEnt Word Processor. This means LW offers:

- Up to 240 column editing
- Editing of up to 5 files at once on a 130XE
- Sophisticated keyboard macro language
- Easy icon-driven operation or keyboard shortcuts
- 80 column print preview
- Full cut and paste features
- Search and replace, including reverse search
- High speed operation, even with large files
- On-line help system
- Mini DOS-style menu
- Support for DOS 2.5, MyDOS, DOS XE, SpartaDOS and SpartaDOS X
- User-definable tab ruler
- Customizable printer drivers
- Fully configurable operation
- All international characters visible on the screen
- Comprehensive print formatting commands
- Automatic heading levels
- Indents, hyphenation and more...

Many commercial word-processors force you to use a particular DOS package, or are heavily copy-protected and impossible to transfer to another disk. LW was written to try and combine the unique features of several established word processors into a single, commercial quality program (possibly the last of its kind for the Atari Classic) which works with virtually any DOS or memory configuration.

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 "+".

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This documentation was written using LW, and incorporates several of the advanced page layout features of the program, such as hanging indents and external files. Studying these files will help you to understand LW's print formatter.

1.3 STARTING LW

To load LW from the distribution disk under DOS 2.5, you just need to put the disk in the drive and switch on the computer. Any external application cartridges should first be removed. LW will load automatically. You can also load LW from the DOS 2.5/MyDOS menu by selecting Binary Load and typing AUTORUN.SYS. The procedure for DOS XE is similar, but accomplished via the Machine Language Access Menu.

If you don't want LW to load automatically when you switch the computer on, rename AUTORUN.SYS to LW.COM. When LW loads, it looks on the drive #1 for the following files, and if it finds them, loads them. If a file isn't found, default "built-in" values are used.

LW.CFG	Configuration file: sets up memory usage, editor settings, directory information, and path for help files. Created with the configuration editor, LWCONFIG.COM
LW.FNT	Standard graphics 0 font which will be used in the editor and throughout the program.
LW.PDR	Printer driver file, created with the printer driver construction program: LWPD.COM.
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 6.

1.3.1 LOADING LW FROM SPARTADOS

If you use SpartaDOS or any other command line DOS, you will probably first want to rename AUTORUN.SYS to LW.COM. This file can then be run from the command processor as desired.

If you use SpartaDOS or SpartaDOS X, you MUST disable internal BASIC before running LW. With SpartaDOS, type

```
BASIC OFF
```

```
then
```

```
LW
```

If you use SpartaDOS X, load LW with the command

```
X LW
```

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An added bonus with SpartaDOS is that you can specify a file to edit on the command line after the program name, such as:

```
LW LETTER.TXT
```

Or

```
X LW LETTER.TXT
```

LW will attempt to load LETTER.TXT automatically. If the file isn't found, LW will present you with an empty file with the name that you typed on the command line. If you use SpartaDOS X, LW will look in the PATH for the configuration files listed above at run time and whenever these files are loaded during an editing session. See section 8.

1.4 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.

1.4.1 THE EDIT SCREEN

To begin using LW, load the program as described above and take a moment to familiarize yourself with the editing screen. You'll see a tab ruler line along the top (which scrolls horizontally if you define a screen wider than 40 columns), 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 will be the title and version # of the program; thereafter it will default to the name of the file currently in memory. Until you load a file or give it a name, it will be called UNNAMED.TXT.

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

When you're ready to save your text, you can follow one of two procedures, outlined below.

1.4.2 SAVING AND LOADING TEXT

To save the text in memory to disk, 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>.

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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 configuration editor.

The first time you save a file, the name you give it becomes the default for subsequent saves, which will NOT alter the default name. To load previously written text, press:

<CTRL+L> Load text

A prompt will appear with a default drive specifier. You can edit this with <DELETE> for another drive if necessary, then type a filename and press <RETURN>.

1.4.3 BASIC CONFIGURATION

You can configure LW to suit yourself. Pressing:

<SHIFT+CTRL+Q> 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 inverse curved arrows. You can make them invisible with:

<SHIFT+CTRL+CLR> Toggle visible returns

When words are wrapped, the screen line is padded out with "false spaces". These aren't actually part of the text and are just a guide. If you don't want to see them, toggle the feature with:

<CTRL+B> Toggle false spaces

These are just a few of the settings saved in the configuration. For further information on configuring LW, see section 7.

2 EDITOR COMMANDS

LW's commands are all accessed by key combinations. Once you become familiar with LW's keystrokes, a wealth of advanced 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 sentence
<SHIFT+RIGHT ARROW>	Start of next sentence
<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 or START>	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 & 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.
<CAPS>	Toggle upper/lowercase.
<CTRL+CAPS>	Forced control key mode toggle. Allows entry of control codes without pressing <CTRL+ESCAPE> first. The current case is saved when you save the configuration (see later), and becomes the default next time you load the program.
<SHIFT+CAPS>	Uppercase lock.
<INVERSE>	Toggle inverse video on and off.

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<CTRL+ESCAPE>	Allow subsequent control key to be entered as normal text (same as pressing <ESCAPE> in the normal Atari screen editor. Also de-selects a marked block of text.
<SHIFT+ESCAPE>	Alternative to <CTRL+ESCAPE>.
<CTRL+W>	Turn word-wrap on and off. Saved in config file.
<SHIFT+CTRL+W>	Set screen editing width. Type the number of characters per line you want - anything from 5 to 240. If the line length becomes longer than 40 characters, 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. Saved in 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
<CTRL+INSERT>	Insert a space at the cursor
<TAB>	Insert spaces to next tab stop (if in Insert Mode)
<CTRL+DELETE>	Delete character to right of cursor
<SHIFT+DELETE>	Delete a <W>ord, <L>ine, <S>entence, or <P>aragraph. Respond to the prompt 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. Paste the text back into the main buffer with <CTRL+P> or <SHIFT+INSERT>.
<SHIFT+INSERT>	Insert previously deleted text
<CTRL+P>	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:

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<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. 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+ESCAPE>.
<CTRL+C>	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+O>	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 (icon: hypodermic syringe). This option, which is always operative, 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.
<CTRL+N>	Number of words and bytes in block
<CTRL+Y>	Lowercase block
<SHIFT+CTRL+Y>	Uppercase block
<CTRL+[>	Un-invert text in block
<CTRL+]>	Invert text in block
<CTRL+K>	Kill paste. Empties the paste buffer

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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). The program will then move the cursor to the next occurrence of the string.
- <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.
- <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.
- <SHIFT+CTRL+R> Define 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, <I>gnore, Change <A>ll". Press the highlighted letter of the option you want, or <ESCAPE> to cancel. "Change" replaces the string and moves to the next occurrence. "Ignore" skips to the next occurrence. "Change All" replaces every occurrence in the file (you can interrupt this with the Break Key). Note that if the "Global" option has been set with <SHIFT+CTRL+H>, search and replace will automatically replace all occurrences of the text.

2.5.1 SEARCHING WITH WILDCARDS

In find strings, the 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.

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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 6).

2.5.2 SEARCH AND REPLACE MODES

Search and replace works in 2 modes: case-sensitive (Case on) and case insensitive (Case off: the default). The first only matches words of the exact same case, so that "THE" would not match "the". Case-insensitive mode ignores the case of letters during searches.

<SHIFT+CTRL+U> Set Search and Replace Options. This allows you to set whether search operations are case sensitive, whether they prompt for confirmation (global), and whether wildcards are allowed or simply treated as normal text.

3 ADDITIONAL EDITOR FEATURES

LW includes many features to aid in the editing of text, such as place markers, 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.

<CTRL+N> Will display the number of words in the document, together with the size of the document in bytes. If you use this command while text is marked, only the words in the block will be counted, and the number of bytes displayed will reflect the size of the marked block.

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, the word "Save" will appear in the middle of the status line. This is to remind you to save any vulnerable work. The reminder will vanish once your text has been saved.

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:

<SHIFT+TAB> Set tab at cursor position.

<CTRL+TAB> Clear tab at cursor position.

<SHIFT+CTRL+TAB> Reset default tab stops.

<SHIFT+CTRL+E> Erase ALL tab stops.

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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 PLACE MARKERS

LW has a system of 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.

<SHIFT+CTRL+S> Set place marker at cursor position. Asks for which place marker (1-4) to set.

<SHIFT+CTRL+G> Goto place marker. Asks for number of place marker to find. Providing the place 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.

3.5 POSITION IN FILE

Sometimes you need to know exactly the exact location of the cursor in a document:

<CTRL+;> Displays the number of bytes used by the document, together with the cursor position, starting at 1.

3.6 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 7). If LW is loaded "clean", i.e. with no configuration file (if the file "LW.CFG" cannot be accessed when the program is run), the program is set up for a standard, unexpanded machine with a single 15K text buffer. The default LW.CFG file duplicates these default settings. However, if you have an expanded 800XL, 65XE or stock 130XE computer with no RAM disk, you can replace LW.CFG with XE130.CFG. Copy XE130.CFG to your system disk and rename it LW.CFG. The next time you run LW, you will have FIVE text banks available, each of just over 15K in size. You can switch between these 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 7: 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 15K 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.

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For maximum convenience, you will be returned to the current text bank even after <RESET>, or an exit to DOS followed by a re-run.

Note that when configurations are loaded during an editing session with the <CTRL+Q> Load Config command, bank information in the configuration file is ignored. It is therefore impossible to change editing bank configurations after the program has loaded. This was done to preclude the possibility of losing unsaved text by accidentally locking out an expanded bank.

Using SpartaDOS, the X-Cart, or a modified DOS 2.5 or MyDOS, it is possible to configure LW to share expanded memory with one or more RAM disks. This is explained fully in section 7.

4 DISK OPERATIONS

LW allows full manipulation of files and directories, and has support for many different DOS packages. The mini DOS menu allows viewing, loading, deleting, renaming and copying of files at the touch of a key. The menu displays a scrolling window onto an alphabetically sorted directory list of up to 128 filenames. Files can be viewed 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 and <CTRL+S>ave commands, the following file handling features are available from the editor:

4.1.1 VIEWING 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.
- <SHIFT+CTRL+O> Spool file. This is the same as view file, but words are not wrapped and returns are never visible, regardless of the current editor settings. Useful for alternative help screens, etc. from within macros.

4.1.2 EXITING TO DOS

To finish using LW and go to DOS, type:

<CTRL+X> Exit to DOS

and respond "Y" to the prompt, first ensuring all your work has been saved. If you have MEM.SAV active or use Disk Based SpartaDOS, you can go from DOS straight back to your text by running at address \$2800.

4.2 THE LW DISK MENU

The various facilities on 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>. <SHIFT+CURSOR KEYS> will send the selector bar to the start or end of the directory.

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- <CTRL+D> Disk menu. This calls the mini-DOS menu, which reads in a full disk directory and displays up to forty entries at once on the screen.
- <SHIFT+CTRL+H> As above, but allows the user to specify the directory file mask before calling the disk menu.

The following options are available on the menu:

- <S>PEC Set the directory search mask. Use this to narrow or expand the criteria for the directory search.
- <CTRL+L>OAD Load the file under the selector bar.
- <V>IEW View the file under the selector bar. Same as view from the editor.
- <D>EL(ETE) Delete the file under the selector bar. If the deletion is successful, the filename is removed from the list.
- <R>EN(AME) Asks for a new name and renames the highlighted file. The entry in the list is changed to the new name, and correctly interprets any wildcards.
- <C>OPY 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!
- <M>KDIR Create a new directory in the current directory, providing DOS used supports subdirectories.
- <ESC> Exit the directory menu.
- <U>NLOCK Unlock highlighted file.
- <L>OCK Lock highlighted file.
- <F>ORMAT Format the disk.
- E<X>IT Leave the program and go to DOS.

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- DRIVE <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 enter MyDOS subdirectories.
- S<O>rt This option will present a menu asking whether to sort the directory by name, extender, or none. Any other key will leave the setting, which is saved in the configuration, unaltered. "None" will turn off the sorting function. With "Ext", name has second priority in the sort order, and vice-versa.

4.2.1 SUBDIRECTORY FEATURES

The following options only work with DOSes which support subdirectories.

- > 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

<CTRL+V> Preview printed pages (icon: magnifying glass over lined paper). Text is sent to a 10 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

<SHIFT+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 <CTRL+V> 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>.

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**.

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- 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>.
- Formatting commands must not contain extraneous spaces.

Here are some examples of print formatting commands (the letters enclosed in angle brackets are inverse):<l><2><0><RETURN>

Sets the left margin to 20.

<l><2><0><r><6><0>hello.

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

<f><c>Page <#><RETURN>Defines a running footer which prints the current page number.

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. <A><2> 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 print your footer (if any), which may be up to 3 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. 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 inverse <#> symbol to print the page number. A footer or header can consist of up to 3 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.

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- G<spec> 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 same file will be in the edit buffer after printing. 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.
- JF Justify fully. All following text will be aligned flush with both the left and right margins.
- L<n> Set the left margin. The default is 10. Take care not to do foolish things like making the left margin bigger than the right, etc. The print formatted includes some error checking, but will print garbage if you set impossible margins.
- M<n> 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.
- N<n> New page. The optional argument will make the command begin a new page only if fewer than <n> lines remain on the current page.
- P<n> Page length. This is the overall length of the page, including the top and bottom margins. Default is 66.
- R<n> Set Right margin. This is the rightmost column in which text will print. Default is 70.

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S<n>	Print style. <n> is 0-9. This sends one of 10 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).
T<n>	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.
V<fspec>	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.
W<n>	Turn page wait on <1>, or off <0>. 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.
Y<n>	Line spacing, default of 1 means no blank lines between each line of text. <2> will print in double-spacing.
Z<n>	Last page to print. Stops printing at page <n>.
><n>	Left paragraph indent. Used to indent the paragraph you're reading. All following text up to the next <RETURN> will be indented by <n> spaces from the left margin.
<<n>	Right paragraph indent. All following text up to the next <RETURN> will be indented by <n> spaces from the right margin.
[<n>	Left header/footer margin, default 10. This works like the <l> 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 <a> (first page to print) to <2>. Useful for creating multi-pass

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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 main text between these headings):

```
!1 TRANSPORT
!2 BUSES
!2 TRAINS
!1 AMENITIES
!2 LIBRARIES
!2 LEISURE
!3 SWIMMING
!3 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.

`&` 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. A handy way to enter these commands which saves pressing the inverse key two times is to enter them in conjunction with `<SELECT>`.

`#` 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

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<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 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. See Centre Line.
- I Toggle italics on or off. Works like <d>.
- U Toggle underline on or off.
- 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.
- X<n> Send printable code. Works like <o>utput ASCII, but the character is counted as printed matter by the formatter and appears on the preview screen as a question mark. Handy for printing the international character 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 <SHIFT+CTRL+SPACE>.
- (Ignore to closing brace “)”. Everything up to the next inverse closing brace is ignored by the print processor.
- ; Comment line: everything until the next Return is ignored by the print processor.
- UP ARROW Toggle superscript on or off.
- DOWN ARROW Toggle subscript on or off.

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LEFT ARROW	Add-in #3
RIGHT ARROW	Add-in #4
*	Add-in #5
%	Add-in #6

5.4.2 CREATING HANGING INDENTS

It's easy to create true 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>
```

Remember to type the line in inverse video.

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 with the configuration editor LWCONFIG.COM:

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

See Section 8, 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 10 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 THE PRINTER DRIVER EDITOR

The printer driver editor (LWPD.COM) should be loaded from DOS with BASIC disabled. (NOTE: With SpartaDOS, you can include the name of a printer driver file on the command line.) It has a simple menu interface which allows you to select the items you want to change with a wide highlight bar, and pick extra options from a menu at the foot of the screen by typing the highlighted letters. The options in the left column allow you to set up on/off toggles for italics and other printer features. Each code string can be up to 7 bytes in length. Just highlight the option with the cursor keys, press <RETURN>, and the codes from your printer manual, separated by commas. If codes are already present, you can edit them with a full range of cursor controls.

6.3 CREATING A PRINTER DRIVER

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).

First, run LWPD.COM without loading in a printer driver. You'll need your printer manual to hand. Move the highlight bar to "Italics ON" and press <RETURN>. "Codes" will appear on the status line. This is where you type the code sequence which switches on italics on your printer.

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In your printer manual, find the codes for "ITALICS ON". For the EPSON compatible example, the sequence is 27, 52. Type these two numbers separated by a comma, and press <RETURN>. Italic off would be 27,53: you enter this in the next category, directly below. All 5 pairs of ON/OFF toggles work in just 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 (see initialization string later).

The second column allows you to set up print styles, accessed from the LW print processor by <s><n> (both in inverse video), where n is any digit from 0-9. You can have 10 sequences of 7 characters each, which can set up any printer features you like. Below the second column is an entry called "Initialization". This is a string of up to 10 codes which will be sent to the printer at the beginning of every document. Initializing the printer is a useful precaution against toggles such as underline and boldface getting out of step if printing is halted before these features are turned off, then recommenced. The best thing to put in the initialization string are the codes to reset the printer, turning off all special features like underlining or proportional spacing. See the supplied printer drivers for examples (many Atari printers - the 1029 for one - have no print styling features, and therefore require no initialization strings). An alternative for the EPSON driver to that supplied is 27, 64, which is the command to reset the printer.

If you don't want an initialization string sent to the printer, delete any numbers under "Initialization" and press <RETURN>. At the bottom of the screen, we have toggles and codes for international characters. 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. In the printer driver editor, under "International ON", enter 27,82,12, and under "International OFF", enter 27,82,0. This will select the appropriate character set whenever international characters are printed.

The bottom line of the screen allows you to enter what actual code should be sent to the printer for each international character. Only 1 code is allowed for each letter, but remember that every character will be preceded and followed by the on and off code sequences if they are present.

Save your printer driver (press "s") and call it LW.PDR if you want it to load automatically at run-time. Now, if you run LW with this printer driver installed and type any international characters in your text, they should print out correctly on your LC-10.

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

I personally use a Canon BJ-200ex bubble-jet printer set up in EPSON emulation mode, and the printer driver described above works perfectly with the Canon once the DIP switches are set correctly.

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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. After years spent using print keys and a custom reversed-out character set with TextPro, I think I've finally come up with a more workable solution.

7 THE LW MACRO LANGUAGE

Macros are one of the most important features of LW. Macros allow entirely new commands to be created from the existing features of the program, and recalled at the touch of a key. The macro facility is similar to that seen on programs like TextPro and Superscript. Like TextPro, LW has macro commands which cannot normally be accessed from the keyboard.

Note: While the macro language is functionally similar to that of TextPro, the actual mechanics of the LW macro processor are entirely different. The numerous functional similarities are designed to make the transition from TextPro to LW as painless as possible.

LW macros follow exactly the same structure as TextPro macros - i.e. they are created from within the editor and take the form:<macro key><=><macro text>where <macro key> is any single character, <=> is an INVERSE equals sign, and <macro text> can be any combination of commands or text you want. While LW macros look a lot like those of TextPro and offer the same facilities, the commands are completely different and macros in LW run at a much greater speed. You can also set up null macros from LW, which are handy when writing recursive subroutines. Note that an active macro can be prematurely terminated with the <BREAK> key.

7.1 LOADING MACROS

Load a macro file with the command:

<SHIFT+CTRL+M> Load macro file. Type the name of the file and press return. Macros are saved as normal files from the editor. The macro file should not exceed 1K (1024 bytes). This is an important consideration if you are going to convert macros from TextPro, which has a 2K macro buffer. However, by avoiding large macro files and opting instead for smaller, interactive macros, problems of buffer size can be easily avoided.

7.2 RUNNING MACROS

Macros are executed in one of two ways:

- Pressing <ESCAPE>, then the key the macro is attached to.
- Holding down <OPTION>, then pressing the key the macro is attached to.

The <ESCAPE> activation approach allows macro activation to be captured by a keyboard buffer, if you have one.

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<START> Pressed on its own will run the <#> macro, should one exist. This is another throwback to TextPro.

The "@" key macro will be run at start-up (in the LW.MAC macro file) if it exists (this feature was also present in TextPro).

The way <ESCAPE> triggers macros is one reason <CTRL+ESCAPE> or <SHIFT+ESCAPE> is necessary to enter control characters in the editor and input dialogues. Another reason is that I wanted to make <ESCAPE> an abort key at all other times.

7.3 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.

<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 <CTRL+L> line 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+B> 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.

<CTRL+B> Branch to macro. Use this macro to create a branching condition. Follow with a macro identifier before a LOAD MACROS command, and the program will attempt to run this macro as soon as the new macros are loaded. Used before a FIND command, LW will branch to the macro if the string is NOT FOUND. Used before a GOTO MARKER/NEXT MARKER/PREVIOUS MARKER command, the branch will occur if the marker is NOT FOUND. Used before a special macro CONFIRM (Y/N) command <CTRL+C>, the macro will be branched to if the user responds NO. Used before a <CTRL+A> Macro Ask for Input String, the branch will occur if the subsequent input string is EMPTY. See the <CTRL+Z> command for more conditional branching commands.

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- <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.
- <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 menu. This message will be printed, then the program will run the macro attached to the next key pressed.
- <CTRL+K> Get key. Simply waits for a key, then continues the macro.
- <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.
- <CTRL+V> Print message. Follow with text terminated by <RETURN>. LW will print the message, which will clear on the next keystroke.
- <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.
- <CTRL+Z> Set toggles and test flags. Follow with one of the characters below:
- | | |
|---|----------------------------------|
| U | Put the keyboard into uppercase. |
| L | Put keyboard into lowercase. |
| I | Set insert mode. |

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O	Set overtype mode.
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 called.
H	Hide the screen display.
U	Turn the screen on again.

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

As well as setting flags, the <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.

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

7.3.1 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 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.

7.3.2 SPECIAL CHARACTERS

<SPACE> or <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+B>uffer When pressed in ANY input dialogue (unless preceded by <CTRL+ESCAPE>), <CTRL+B> 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

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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.

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.

7.3.3 ENTERING OTHER COMMANDS FROM MACROS

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

7.3.4 THE SPECIAL MACRO FONT

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

<SHIFT+CTRL+N> New font, responding "O" for other, then typing MACRO <RETURN>. This font defines all the control keys as outline characters instead of international characters in order to make editing macros a little easier.

7.3.5 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> allows you to enter control codes into the editor or into an input dialogue, as <ESCAPE> on its own normally does in BASIC, etc. To get the escape code itself (which appears in LW as a curved downward pointing arrow) in the text, press <CTRL+ESCAPE> then <ESCAPE>.
- <CTRL+ESCAPE> pressed when text is marked will unmark the text, as will <BREAK> or any text typed.

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- The <ESCAPE> symbol in a macro duplicates <CTRL+ESCAPE> typed at the keyboard. To make a macro put the <ESCAPE> symbol into the editor, include two consecutive <ESCAPE> symbols in the macro.
- <ESCAPE> pressed at the keyboard runs macros from the editor.
- <ESCAPE> pressed outside the editor aborts the current operation.
- In macros, special macro commands and <SHIFT+CTRL> commands are entered as INVERSE <CTRL+KEY> COMMANDS.

Sorry if this seems complicated, but it seems the best solution to having macros which need to describe <SHIFT+CTRL> keys. The best way to clarify matters is with a couple of examples. Studying the macros supplied on the distribution disk will also help you to understand the LW macro language.

7.4 EXAMPLE MACROS

<CTRL+S> in LW brings up the save dialogue. The current filename is already there: all you have to do is press <RETURN>. Say you want to save your file at regular intervals under the same name during an editing session. You can automate this with a macro.

Make sure the editor is empty (press <CTRL+CLEAR>, then "y"), and load the macro editing font with <SHIFT+CTRL+N>, <o> for "Other", then MACRO <RETURN>.

We'll put this macro on the "s" key, so that to run it you'll just type <ESCAPE> then the <s> key.

Type <s>, then <SELECT> and the equals sign - <=> - together. That means the following text is attached to the <s> key. You should have a lower case "s" and an inverse equate on the screen. Now press <CTRL+ESCAPE>, then <CTRL+S>. This should put an outlined "S" on the screen. We want to automate the <RETURN> key stroke in the save dialogue, so we just press <RETURN> to complete the save command. If the save operation is successful, it would be nice to have a message saying the file has been saved. Type <CTRL+ESCAPE>, then <SELECT+CTRL+V>. You should have an outlined "V" on the second screen line. Now type (WITHOUT THE QUOTES), "Document Saved", and press <RETURN>. That's the macro finished. Save it under the name "TEST.MAC" for now, clear the editor, and load the macro into the macro buffer with the <SHIFT+CTRL+M> load macros command. Now if you load a text file, whenever you press <ESCAPE> then <s>, the file will be automatically saved back to disk and "Document Saved" will appear on the message line.

Note that LW distinguishes between upper and lower case when running macros, so if you want a macro to run regardless of what case the keyboard is in, you need to add another definition. In this case, if you wanted uppercase <S> to run the same macro, you would add to the macro <S>, <SELECT+EQUALS SIGN>, <CTRL+ESCAPE>, <SELECT+CTRL+X>, then a lowercase <s>. This simply makes the uppercase <S> run the lowercase <s> macro.

ANOTHER EXAMPLE

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The above example was pretty simple: let's try something a little more complex.

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 <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.

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.

8 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.

8.1 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+B>	Toggle false spaces
<CTRL+T>	Toggle visible returns
<CTRL+W>	Toggle word-wrap
<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+W>	Set number of screen columns (5-240)
<SHIFT+CTRL+INS>	Toggle Insert/Over-type modes
<CAPS>	Toggle Upper/Lower case

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 #

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

<CTRL+Q>	Load config
<SHIFT+CTRL+Q>	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 work disk.

8.2 USING THE CONFIGURATION PROGRAM

The LW configuration program (LWCONFIG.COM) should be loaded with internal BASIC disabled and no cartridges present. This program allows you to set extra options, such as screen colours, the location of the HELP files, and the default file extender (if any) to use for your documents when loading and saving files in LW.

LWCONFIG.COM is very similar to the printer driver editor, and has an identical form of presentation. SpartaDOS users can type:

```
LWCONFIG <filename>
```

at the command line to load the program with a configuration file (any file with a ".CFG" extender - you needn't type the extender) to edit.

Once the program has loaded, a menu appears offering the whole range of LW settings for alteration. The highlight bar is moved with the cursor keys (with or without <CTRL>), and an option selected with <RETURN>. The current setting for the chosen option will be displayed and can then be altered. To leave a setting unchanged, just type <ESCAPE> when it appears.

Some options are toggles - use the space bar to highlight "ON" or "OFF" and press return. Other options require numeric arguments - type the number, and press <RETURN>. A few options - HELP PATH, DIRECTORY MASK, EXTENDER - require string inputs.

"Extender" should be left blank if you don't want a default extender added to your document filenames. If you do type in an extender, DO NOT TYPE THE DOT - just the extender itself, of NO MORE THAN 3 CHARACTERS.

"Help Path" allows SpartaDOS/MyDOS/DOS XE users to specify the drive and path on which the HELP FILES (*.HLP) will be kept. DOS 2.5 users can use this option if they want to keep help files on a drive other than drive #1. SpartaDOS X users can use this function or put the help files in a directory included in the DOS PATH variable. See section 9: DOS Packages and LW.

When setting up the default margins, etc., take care not to input impossible values - the program makes no checks on the sense or otherwise of what you type in. If the print formatter outputs rubbish, chances are there are illogical values in the configuration. Always make the top margin a lower number than the bottom margin, the left lower than the right, etc. Note that you can set the "Wildcard" character for the search and replace functions. Change it from "?" to something else if you think you'll want to include a question mark as a "literal" character in a search/replace string.

8.2.1 SETTING UP MULTIPLE TEXT BUFFERS

Another of LW's most powerful features is its ability to use up to 9Æ16K banks of expanded RAM for multiple text buffers. The program puts no restrictions on what kind of memory expansion can be used: you're free to set up the bank switching values for whatever memory you have.

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The obvious application of this is for a standard 130XE with 4 additional edit buffers of 15871 bytes each (LW uses 512 bytes from each bank for special storage purposes), giving a total text capacity of 79355 bytes including the main (standard RAM) bank. The files are always kept separate (unlike AtariWriter Plus), but may be linked together when printed by using include bank commands. You can have upwards of 10,000 words of text instantly available in memory, and by having "include bank #" 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. However, it goes without saying (or should), that unless you save your files regularly, a mishap with all this text on board could be disastrous.

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

(or inverse <CTRL+Z>).

By default (loaded "clean" with no config file), LW uses no expanded RAM - it assumes you have a stock, unmodified 800XL or 65XE. The default configuration file, "LW.CFG" on the distribution disk, also doesn't use expanded RAM, but does include the bank values for a 130XE set up. "RAM Bank Masks" on the configuration program menu lets you type a comma separated list (up to 9 DECIMAL numbers) of the values which will switch in the various banks you want to use. LW ignores bits 0,1 and 7 of these numbers. The 130XE uses bits 2, 3, 4 and 5 for bank selection. The main bank is ALWAYS selected with decimal 48, which is bits 4 and 5 set. The 130XE banked list is, in order, 0, 4, 8 and 12. These refer to the following banked regions:

0 = \$0000 - \$3FFF

4 = \$4000 - \$7FFF

8 = \$8000 - \$BFFF

12 = \$C000 - \$FFFF

If the banked list is 0,4,8,12 and you type in 4 for # EXT Banks, that config file will set LW up for all 4 extended banks. If you type 1 in # EXT Banks, just the \$0000-Æ-Æ\$3FFF bank will be available, on <SHIFT+CTRL+2>. You can arrange the banks in any order you like - 12 first in the list will put \$C000 - \$FFFF on <SHIFT+CTRL+2> - but the assignments always start on this key and work right along the numbers.

You'll need to enter all values in decimal (sorry!). If you have a 130XE, just use the XE130.CFG file and modify it to use as many or as few banks as you want. If you have some other set up, consult the documentation for your RAM upgrade to see what values are required. I've left bit 6 available for alteration, but not bit 7 (the self-test bit). Hopefully this should cope with most memory set-ups.

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See section 9: DOS Packages and LW for a discussion of how to set up LW for expanded RAM on systems with RAM disks.

8.3 CUSTOM FONTS

Several alternative character sets (all with the extender ".FNT") are supplied on the distribution disk, which can be loaded at any time with:<SHIFT+CTRL+N>.The MACRO.FNT font is most suited to editing macros, since the control characters are outlined letters. The other fonts are cosmetic variations on the standard set, and all include full international characters.

9 DOS PACKAGES AND LW

LW works with and configures itself for all the most popular DOS packages for Atari Computers. This includes:

- Atari DOS 2.0/2.5
- Atari DOS XE
- MyDOS 4.5
- Disk based SpartaDOS
- SpartaDOS X

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.

9.1 MEMORY REQUIREMENTS

Whichever DOS you use, you must ensure that it has a MEMLO setting (\$2E7,\$2E8) well below \$2400. Although LW actually loads at \$2800, it uses the 1K block between \$2400 and \$27FF for its redefined character set. All memory from MEMLO up to \$23FF is used for the paste buffer, so you can see that the lower your DOS's MEMLO, the better. LW will not run at all if MEMLO is above \$2300.

Using DOS 2.5 with normal buffers you can expect a paste buffer of about 1.5K. Other DOSes are different, but few are more memory hungry than DOS 2.5. You can see that LW is very tightly squeezed into RAM, but that's a necessary price to pay for keeping the whole program in conventional memory, rather than using program overlays or space under the OS ROM. This is why LW works with so many different DOSes. The reason LW won't run on Atari 800 is that it requires the XL's keyboard tables and the international font.

LW also requires the cartridge memory, from \$A000-\$BFFF, and will switch out internal BASIC unless the DOS used has its own system for doing so from the command line. You must also remove any external cartridges, unless you use SpartaDOS X, which lets you switch cartridges on and off (with this DOS, you must load LW with the "X" command).

9.2 ATARI DOS 2.0/2.5

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. Any other unrecognized DOS packages will be treated by LW just as if they were DOS 2.0/2.5. If you have MEM.SAV set up, you can exit to DOS, then re-run at \$2800 and be back in the same file at the same point you left it.

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9.3 ATARI DOS XE

I have no idea how widely used this DOS is, although apart from the lack of technical information in the DOS XE manual and the irksome user interface, I have found it to be a quite useable system on the occasions I have tried it. LW will configure itself for this DOS, and will allow traversal of the subdirectory tree, the creation and deletion of subdirectories. Re-run after an exit to DOS works particularly well here, since, as with SpartaDOS, main memory is not corrupted by DOS (you should run at address \$2800). LW disables internal BASIC automatically with this DOS.

9.4 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. If you have MEM.SAV, exit to DOS and re-run works in exactly the same way as with DOS 2.5. Internal BASIC is disabled on loading.

I have never used MyDOS versions prior to 4.5, so I'm unsure whether LW will work correctly with them. See the SpartaDOS section for details of how to make LW load its configuration files from a drive/directory other than D1.

9.5 DISK-BASED SPARTADOS

SpartaDOS is easily the best DOS for use with LW, and probably with any compatible application. SpartaDOS offers the lowest possible MEMLO settings, leaving you with more space for the paste buffer and any resident handlers. LW can have a paste buffer of around 4K with the smallest versions of this DOS.

SpartaDOS switches internal BASIC in and out from the command line, so LW REQUIRES that you do a

`BASIC OFF`

command before loading. Any other external cartridges must also be removed.

You can specify a file to edit on the command line after the program name, and LW will attempt to load the file when it initializes. From the disk menu you can traverse the directory tree with ease without having to type any names and you can create and delete subdirectories at will. You can set up multiple memory banks to share with the RAM disk driver. You can exit to DOS, then re-run LW by simply typing "RUN" with no address, and be back in the editor, in the same bank and the exact same position in the file that you were in before you went to DOS. LW is fully compatible with the SpartaDOS Time/Date line and keyboard buffer.

The configuration program offers you the chance to alter the help path, so you can keep your help files on any drive/directory in the system.

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All the subdirectory DOSes, including SpartaDOS, let you put all your LW files in a subdirectory, then, when you want to run LW, you can make the directory the default, then run the program. This also means you can change LW's set-up by running it from within different subdirectories.

But what if you want to run LW from anywhere in the system, without worrying about which directory you're in? Or if you want LW to look on a different drive altogether? If you want to do either of these things, you need to run the LWPATH.COM utility, which allows you to actually change the LW.COM file itself so that LW looks for its configuration files on whichever drive and in whatever directory you choose. You need to tell the program where to find LW.COM, then you'll be offered the chance to change the config path. You **MUST** enter the drive specifier, optional path, and "LW" (no quotes).

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

LW [files] [/M[c]] [/Ppath] [/Q] [/X]

- M : Disable autorun macro or run macro "c"
- P : Set Search Path
- Q : Disable Splash Screen
- X : Load "Clean" (without any config, font, printer drivers or macros)

9.6 SPARTADOS X

LW was developed under SpartaDOS X, and takes advantage of many of its advanced features. That includes all the facilities of disk-based SpartaDOS versions, with the exception of re-run after an exit to DOS (memory is corrupted by SpartaDOS X). However, LW has most of the disk management functions you could possibly need right inside the program, so an exit to DOS in the middle of an editing session shouldn't be necessary.

9.6.1 THE SPARTADOS X PATH

An important feature only present in SpartaDOS X is the search path. This is the environment variable called PATH, and contains a list of all the drives/directories which should be searched when an executable file is called up by the command processor. The PATH can also be searched by applications, however, and LW searches the path when loading fonts, macros, printer drivers and configurations (unless you explicitly supply paths for these files), as well as its help screens.

If you use SpartaDOS X, format a disk and create a subdirectory called "LW". Copy all the LW files you want – macros, help files, etc – into this directory. Now create a CONFIG.SYS file which includes the path of the LW directory in the PATH environment variable, such as:

```
PATH=CAR:;A:>LW;
```

Now, not only can you load LW from any working directory on the system, LW will also be able to find its configuration files. This powerful feature makes the creation of interactive macros easy, since LW will always search the path when loading macro files.

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You may also want to set the help path using LWCONFIG.COM so that it points to your LW directory by entering:

```
D1:>LW>LW.HP1
```

This will allow LW to look for help files without even having to search the path and will speed up the system.

9.6.2 SPARTADOS X MEMORY CONFIGURATIONS

If you have a 130XE or other expanded RAM machine, you can achieve the largest possible paste bugger with LW by including in your CONFIG.SYS file the line:

```
USE BANKED
```

This will tell SpartaDOS X to use the uppermost expanded RAM bank for itself and will free up main memory for LW. This configuration can yield a paste buffer of upwards of 4K in size, even with the SpartaDOS keyboard buffer installed.

SpartaDOS X lets you specify how many banks to use for your RAM disks. These banks are used from the top bank down, so it's possible to set up a DOS bank, a RAM disk, and up to 2 extended text buffers for LW, all sharing the extra 64K of RAM in a 130XE. Of course, with RAMBO or similar expanded machines, many more configurations are possible. Just calculate how many banks SpartaDOS X is using, and you have the LOWEST banks left to configure for use as LW's text buffers.

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

```
X LW [files] [/M[c]] [/Ppath] [/Q] [/X]
```

- M : Disable autorun macro or run macro "c"
- P : Set Search Path
- Q : Disable Splash Screen
- X : Load "Clean" (without any config, font, printer drivers or macros)

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10 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.

10.1 EDITOR COMMANDS

COMMAND	FUNCTION	MACRO EQUIVALENT
CTRL A	Start of Line	
CTRL B	False Spaces Toggle	
CTRL C	Cut 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	Goto Place Marker	INVERSE CTRL G
CTRL H	Home/Start of Text	
SHIFT+CTRL H	Set Disk Menu file mask	INVERSE CTRL H
CTRL I	Merge File	
SHIFT+CTRL I	Write Block to Disk	INVERSE CTRL I
CTRL J	View File	
CTRL K	Kill Paste Buffer	
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	Install/Load Font	INVERSE CTRL N
CTRL O	Copy Marked Text	
SHIFT+CTRL O	Spool File	INVERSE CTRL O
CTRL P	Paste Text Block	
SHIFT+CTRL P	Print File	INVERSE CTRL P
CTRL Q	Load Configuration	
SHIFT+CTRL Q	Save Configuration	INVERSE CTRL Q
CTRL R	Replace Found String	

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SHIFT+CTRL R	Select Replace String	INVERSE CTRL R
CTRL S	Save File	
SHIFT+CTRL S	Set Place Marker	INVERSE CTRL S
CTRL T	Add-In #1	
SHIFT+CTRL T	Add-In #2	INVERSE CTRL T
CTRL U	Find String Upwards	
SHIFT+CTRL U	Set Search & Replace Options	INVERSE CTRL U
CTRL V	Preview Text	
CTRL W	Word Wrap Toggle	
SHIFT+CTRL W	Set Screen Width	INVERSE CTRL W
CTRL X	Exit to DOS	
CTRL Y	Char/Block Lowercase	
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 +	Sentence Left	
SHIFT *	Sentence Right	
SHIFT+CTRL -	Screen Up	[NONE]
SHIFT+CTRL =	Screen Down	[NONE]
CTRL [Word Left	
CTRL]	Word 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	[NONE]
ESCAPE	Run a Macro	[SEE MACRO GOSUB]
CTRL ESCAPE	Enter Control Character	[ESCAPE]
CTRL ?	Display Print Position	[NONE]
SHIFT+CTRL ?	Display Program Version #	[SEE "SET" COMMAND]
CTRL ;	Display Cursor Position	
CTRL <	Erase All Text	
SHIFT <	Erase All Text	
SHIFT+CTRL <	Toggle Visible Returns	[NONE]
CTRL >	Insert a 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	

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CAPS	Toggle Upper/Lower Case	[SEE "SET" COMMAND]
CTRL CAPS	Control Lock	
SHIFT CAPS	Uppercase 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]
SHIFT+CTRL 1	Select Main Text Bank	[SEE "SET" COMMAND]
SHIFT+CTRL 2-0	Select Extended RAM Bank	[SEE "SET" COMMAND]
START	Run # Macro	
SELECT+CHAR	Enter Inverse Character	
OPTION	Run Macro	
HELP	Help System	

10.2 SPECIAL KEYS

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

KEY	FUNCTION
SPACE or 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.
DELETE	If the first key pressed during input, will clear the input line and just leave the default device specifier.
ESCAPE or BREAK	Abandons input.
CTRL ESCAPE	Allows entry of control characters on the input line.

10.3 MACRO COMMANDS

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

COMMAND	FUNCTION
INV CTRL B	Branch Macro <macro key>. Selects a macro to run after negative confirm, a macro load, negative find string/next/goto marker.
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>.

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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:	
	U	Uppercase
	L	Lowercase
	R	Inverse
	N	Normal
	I	Insert Mode
	O	Over-Type Mode
	!	Case Sensitive
	?	Case Insensitive
	H	Hide screen updates
	U	Unhide screen updates
	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 (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)

10.4 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

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R<n>	Right Margin	70
S<n>	Print Style	
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	
LEFT ARROW	Add-in #3	
RIGHT ARROW	Add-in #4	
*	Add-in #5	
%	Add-in #6	

11 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. Don't expect masses of indigestible information. This section isn't only for programmers. 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.

11.1 ASSEMBLY LANGUAGE ADD-INS

Version 2.1 of LW presents assembly language programmers with the interesting opportunity of writing their own machine code routines to extend the functionality of the software. These small binary routines must adhere to strict guidelines, and are loaded into the macro buffer, patching into hooks in the main program. There are two unused editor commands and four print formatting directives which can be hooked into user-written modules.

A toolkit for writing add-ins will be available separately from the program author, and will include a full equate list for the program, example add-ins, and guidelines for writing your own modules.

11.2 MEMORY USAGE

The main LW.COM program is only 20K long, and nearly 2K of this code is the loading screen/initialization segment, which is abandoned once the program has loaded. 2K of the remaining code is taken up with font data and messages. The program loads at \$2800 and extends up to \$3FFF, skips \$4000-\$7FFF, then occupies \$8000-\$ABC2. The remaining RAM region \$BF00-\$BFFF is used for the macro buffer and the screen display. The \$4000-\$7FFF area is avoided since this is where the 130XE switches in the extra RAM banks, and LW's text buffer resides here no matter what computer you have.

LW also uses several other regions for data storage, including the entire upper half of page zero (\$80-\$FF). ALL memory from \$3FD to \$6FF is used by LW for buffers. This area includes the OS cassette buffer, which you're (hopefully) unlikely to need. It doesn't matter if DOS corrupts this memory if you do an exit to DOS: LW doesn't rely on the buffers being intact if you re-run the program from DOS (at \$2800). You SHOULD ensure, however, that no resident handlers use these RAM regions, otherwise conflicts with LW will certainly occur. For example, a type-ahead keyboard buffer which resides in Page 6 (\$600-\$6FF) would NOT be useable with LW.

LW uses no memory under the Operating System (hence its compatibility with most DOSes), and yet still allows 1K for the screen display, a further 2K for the print preview screen, 1K for the macro buffer, and over 15K for each text buffer.

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 that unlike 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

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screen output: it uses its own custom 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.

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.

11.3 PROGRAM DESIGN

LW handles the text in memory in a special way in order to achieve its speed. While many word processors hold text as a contiguous 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 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. No 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.

Of course, there's always a trade-off between speed and structure. In time critical sections, the quick and dirty approach often has to be used. But LW was easier to develop than it might have otherwise been, because the philosophy of structure and compactness was observed right from the first line of code, despite the fact that the program contains some extremely tight machine code.

LW is the culmination of my 10 years of experimentation with Atari programming, starting with BASIC, then on to C, and finally to Assembler. I haven't tried the Quick language from Germany or Action by OSS, but I honestly think that machine code is the best language to use if you need compactness and speed. After many years flailing about with the Atari Macro Assembler, I finally wrote my own

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Assembler because I wanted one which was worked with SpartaDOS X. The result was a Macro Assembler called MA65 and writing it was the best thing I ever did for my programming productivity. MA65 was used to compile THE LAST WORD (more times than I care to remember), and it can assemble the entire 130K of source code in about 8 minutes with a floppy drive and a RAM disk.

11.4 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.

The fonts for LW were designed with the GLYPH font editor by Jack Prevost.

The source code was written with another of my programs, XEDIT, which is a text editor available in the Public Domain. Its chief asset is its ability to handle files of up to 23K.

11.5 WHY LW CAME INTO BEING

For many years, the excellent word processor TextPro, in all its many incarnations, took care of all my word processing needs. I bought AtariWriter Plus but I only ever used it to proofread TextPro documents. I tried Mini Office 2, but the only thing I liked about it was the print preview facility. For ease of use and versatility, I still felt that TextPro was streets ahead of them both. I'd also read about The First XLEnt Word Processor, which offered icons and a print preview facility. I knew nothing about the reputedly superb but unavailable Paperclip, and had only read a review of Superscript, which I felt sure wouldn't run well with my system. What I really wished for was a program which had the facilities and programmability of TextPro, the efficiency of AtariWriter Plus, and the presentation and print preview of The First XLEnt WP. I also wanted an easy way to include international characters in my documents.

You now have a copy of the resultant program. It's been a successful project from my point of view, since I now have the word processor I always wanted on the Atari. All it lacks is a spell checker. I'll leave it up to those users lucky enough to own Paperclip and First XLEnt to decide how well LW compares with it.

I've tried to make LW a writer's word processor: I spend a lot of time writing short stories. Once LW is set up, you shouldn't have to worry about the technicalities of the program or waste time working around its limitations. If you've edited long files with other word processors, you will welcome the speed with which LW deals with large amounts of text.

I don't make any claims that this is the perfect WP for the Atari. What it is, however, is an amalgamation of all the best and most innovative features found on other Atari WPs, both PD and commercial. It may be the last word processor ever written for the Atari Classic: I'm pretty certain another of its size and complexity will not be seen. There are many commercial WPs available that were written years ago, and TextPro - without doubt the most popular WP for the Classic these days -

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is a superb program. I didn't write LW because I wanted to give the Atari world another WP: I wrote it primarily for myself. But now that it's complete, I'm keen to share it. It is – I believe – a commercial quality program, with the advantage of being Freeware and Open-Source.

11.6 DEVELOPMENT

There are many things about The Last Word which could be improved. Some things on the drawing board include:

- The ability to auto-detect RAM upgrades and configure text buffers accordingly
- The ability to read larger files or split files across text banks
- A special SpartaDOS X version of the program which uses RAM under the Operating System, providing a 24K main text buffer

Whether any of these features see the light of day remains to be seen. Only with the advent of fast PC based emulation and through the medium of Internet-based communities has The Last Word finally seen the light of day. It's still fun to see what can be done with the Atari 8, though!

11.7 CORRESPONDENCE

Any enquiries, bug reports, etc, should be addressed to me, Jonathan Halliday at haljazz@hotmail.com.

