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**DO IT YOUR WAY:
If You Don't Like WordStar's Commands, Change Them!**

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WordStar unfriendly? It seems that way when you start out. Sure, marking a block with ^KB and ^KK has a weird logic to it, since B is the beginning letter of the word "block" and K is the ending letter. And jumping to the right margin with ^QD follows, sort of, from ^D being the command for move right one character. But ^OG for temporary indent? Even loyal WordStar users like me have trouble with that one.

Fortunately, you don't have to let WordStar bully you into doing things its way. For instance, I mark a block by enclosing it in square brackets. I go to the right edge with <ESC><RIGHT ARROW>. And temporary indents are a breeze with <ESC><TAB>. What's more, everything can still be done the old way, too. My wife only uses WordStar occasionally, so that keeps her happy.

If you've got a keyboard macro program like SmartKey or ProKey, fine. But you don't need one to get these extra commands. All it takes is some simple changes to WordStar's built-in keyboard tables.

Each command is represented in one of these tables by a string of four bytes. The first byte is the ASCII hexadecimal equivalent of first keystroke. If the command is one keystroke long, the second byte is zero. If it's a two-keystroke command, the second byte is the hex equivalent of the second keystroke.

The third and fourth bytes cause WordStar to jump to the part of its code that knows how to perform whatever function the keystrokes represent.

I minored in psychology, so forgive me for thinking of these bytes in terms borrowed from B. F. Skinner. The first two are the stimulus: the keystrokes you give to WordStar. The second two are the response: what those keystrokes cause WordStar to do.

WordStar has three keyboard tables. First is the No-File Table (Listing 1). It contains stimulus-response pairs for the Opening Menu commands, including D ("Open a Document") and R ("Run a Program").

Second is the Editing Table (Listing 2). It contains stimulus-response pairs for commands used within a document, such as ^F (jump right one word) and ^OT (hide ruler line).

Finally, there's the Extra Table (Listing 3). In factory-fresh WordStar, the Extra Table is empty. It's there so you can play matchmaker, pairing up your own stimuli with any responses WordStar is capable of.

EDITING THE TABLES

You can edit the tables using the installation program that comes with WordStar. MicroPro made it easy by giving each internal address a name, or label.

No-File Table labels are in the form NOFTAB+n, where n (the numeric offset) is the hexadecimal count of how many bytes the address is into the table. The first byte of the No-File Table is NOFTAB+0, or simply NOFTAB. The second byte is NOFTAB+1, and so on. Editing Table bytes have labels in the form VTAB+n. And Extra Table labels are in the form XTAB+n.

If you have WordStar 3.3, the installation program is WINSTALL.COM. If you have an earlier version, it's INSTALL.COM. (By the way, keyboard tables for Perfect Writer Version 1 can be

modified, too. See the appendix on "Changing the Command Keys" in the Perfect Writer/Perfect Speller manual).

Old hands who prefer to patch using DDT.COM (CP/M) or DEBUG.COM (MS-DOS) will need the following absolute hex address information to get started. In CP/M WordStar 3.0 and MS-DOS WordStar 3.3, NOFTAB begins at 0430; VTAB at 0481; and XTAB at 0649. In CP/M WordStar 3.3, NOFTAB begins at 043C; VTAB at 0489; and XTAB at 0655. By adding the offsets given in the listings to these base figures, you can determine the absolute hex addresses for each of WordStar's stimulus-response pairs.

If you haven't customized WordStar for your printer or set the program's defaults, see Ted Silveira's excellent tutorial "WordStar Deluxe" in the July/August 1985 Profiles.

Place a copy of WS.COM and either INSTALL.COM or WINSTALL.COM and its companion WS.INS on a working disk in drive A. Type WINSTALL or INSTALL and follow the on-screen prompts.

To change WordStar's keyboard tables you have to access the label patcher. MicroPro chose to hide it in most copies of WordStar 3.3. Once you reach the INSTALLATION MENU, type a plus sign (+). It's not listed as an option, but WordStar understands it anyway. The screen will fill with step-by-step instructions on how to use the label patcher, then take you to the patcher itself.

Getting to the label patcher is different in WordStar 3.0. The program will ask you a series of questions about printer types, communications protocols, and so on. Simply type "U" for no change at each of these menus and "Y" for yes when the program asks you to confirm your choice. After a few such exchanges, you'll be asked "Are the modifications to WordStar now complete?" Type "N" for no and the program will present the label patcher.

CHANGING THE OPENING MENU

MailMerge is a much more versatile printing utility than

WordStar's P command. It can print multiple copies, double space hardcopy (use ".PF ON" and ".LS 2" at the top of your file) and insert your letterhead automatically (use ".FI <file name>").

I need the combined WordStar/MailMerge printing options all the time, but didn't want to retrain myself to hit "M" instead of "P" to print. So I changed one byte in the No-File Table.

The No-File Table is 64 bytes long, four bytes for each of the 16 opening menu commands. From Listing 1, you can see that NOFTAB+14 is the first of the four bytes that control how to summon MailMerge.

In the Installation program, ask to see NOFTAB+14. You'll have to add a colon to the label. In version 3.3, the colon precedes the label, so you type:

```
:NOFTAB+14
```

In version 3.0, the colon follows the label but precedes the numeric offset:

```
NOFTAB:+14
```

You'll see that the value for that byte is 0D, which is hexadecimal for ^M (there's a hex conversion chart in your Kaypro User's Guide).

Why ^M instead of M? Most WordStar commands can be typed three ways: as capital letters (such as M for run MailMerge or ^KS for save a file); as lower-case letters, (m or ^Ks); or as control keys (^M or ^K^S). The keyboard tables only contain one of these forms. Which form it is varies from command to command.

If you like, you can look at the next four bytes. NOFTAB+15 contains 00. It's empty because this is a single keystroke command (the control key isn't included when counting strokes). The next two bytes, NOFTAB+16 and NOFTAB+17, are the response: they cause WordStar to invoke MailMerge.

To make P be the stimulus that summons full-featured printing, change NOFTAB+14 from 0D to 10, which is hexadecimal for ^P. Now, whether you type P or M from the Opening Menu, you'll always get all WordStar's printing capabilities.

If you still want the anemic print abilities of the P command, you can change NOFTAB+10 to 0D. Then P will give you

Power printing (with MailMerge) and M will give you Mild printing using WordStar alone.

You'll also notice in Listing 1 that V is a main menu option. It doesn't do anything, though. I don't know what feature MicroPro was thinking of putting in there, but my guess is a View option which would let you examine a document without being able to change it (particularly useful on multi-user systems).

MODIFYING EDITING COMMANDS

Sometimes it's helpful to have multiple ways of accomplishing the same thing; that is, having two or more stimuli that give the same response.

WordStar has some examples of this built in. Backspace can be generated by both ^S and ^H. Delete can be accomplished by hitting the key (which sends 7F hexadecimal) and by ^_ (1F hex). And since there are two ways to delete, there are two ways to delete-to-beginning-of-line, ^Q and ^Q^_. MicroPro provided an alternative delete because some computers, such as the Osborne 1, don't have keys.

If you always use for delete, then ^_ is being wasted. There's no point carrying around code that isn't doing any work. I changed my ^_ to do the same thing as ^QP, which is WordStar's default way of saying move to the previous cursor position. Since ^QP is often necessary after ^KS (save a document) or ^B (reformat a paragraph), having a shorter way to get the same response is a real timesaver.

^QP begins at VTAB+48. The first byte you'll see there is 11, which is hexadecimal for ^Q. The second byte is 50, hex for P. Take note of the next two bytes (the response part), which vary from version to version.

Now go to ^_. It starts at VTAB+AC in CP/M WS 3.0 and

MS-DOS WS 3.3 and at VTAB+BC in CP/M WS 3.3.

The first byte there is 1F, hex for `^_`. The second is 00, because this is a single keystroke command. The next two bytes vary from version to version. Whatever they happen to be doesn't matter. Replace them with the values you found for the response bytes for the `^QP` command. Now the stimulus `^QP` and the stimulus `^_` will both give the same response: jump to previous cursor position.

FLASH MENUS

The first four stimulus-response pairs in the Editing Command Table represent what I've called deactivated flash menus (Listing 2). There's no way to use these commands as they exist now, because the second keystroke for each has been set to FF, which doesn't correspond to any key. If you want to see what they do, change VTAB+1, VTAB+5, VTAB+9, and VTAB+D from FF to 5C.

When you boot your new WordStar, open a file and type `^Q^\
\\` (control-Q control-backslash). Regardless of what help level you use, you'll see a menu of `^Q` commands come up on your screen, then disappear a moment later of its own accord. Likewise, `^K^\
\\`, `^O^\
\\`, and `^J^\
\\` will each flash the appropriate menu. If you can read them fast enough, you might find them useful for checking such things as whether column-mode or soft-hyphen-entry are on or off.

Be warned, though: activating these menus disables WordStar's built-in help function. Once you've seen what they do, you'll probably want to put them back the way they were.

ADDING YOUR OWN PERSONAL COMMANDS

The Extra Table is set aside for your own keystroke

combinations. You can patch in up to nine sets of four bytes, matching up any one or two keystroke stimulus that WordStar doesn't already use with any response the program is capable of.

Listing 4 contains the patches for my seven favorite new WordStar commands, some of which I mentioned at the beginning of the article. When patching values into the Extra Table, always begin with XTAB+0 and work your way toward the end. WordStar will think the rest of the table is empty if the first of any group of four bytes is 00.

The first set of patches is my favorite: super arrow keys for large cursor movements. To use these keys, tap the <ESC> key, release it, then tap the appropriate arrow. You'll fly around your file with the greatest of ease.

(Note to users of The Word Finder thesaurus program from Writing Consultants: with the super arrow keys installed, the thesaurus can't recognize words in certain screen positions unless you put the cursor on the first character. The fix: change the summon-thesaurus command from <ESC><ESC> to ^\^\ (control-backslash control-backslash). You'll have to dig into the thesaurus installation program ADDSF.COM to do this. For the CP/M version, change the bytes at addresses 537D and 5384 from 1B to 1C.)

The next group of patches lets you mark the beginning of a block with the [key and the end with the] key.

What if you want to type the square brackets in your file? Simply precede them with a ^P and they will appear.

Part of my work involves script writing, so I use WordStar's temporary indent ability a lot. MicroPro calls this the "paragraph tab" command and has provided ^OG as the way to invoke it. ^OG is an awkward series of keystrokes that doesn't seem to stand for anything. So I made the final patch in Listing 4, adding <ESC> followed by <TAB> as another way to do the same.

Now if you type <ESC>, release it, then hit the <TAB> key, your left margin will be temporarily reset to the first tab stop in your ruler line. Type <ESC><TAB> again, and it'll be set to the second tab. When you type <RTN>, the left margin will go

back to its default value.

There are still two places left in the Extra Table for commands of your own. What if you need more? Well, unless you use SpellStar (a program I loathe), you can replace the Find-SpellStar-Flag command, ^QL, with whatever you want. It's found at VTAB+88. And if you don't use WordStar's help menus, you can rewrite the code for the deactivated flash menus (beginning at VTAB+0, +4, +8, and +C). You can also rewrite all the ^J commands, starting at VTAB+1A0 in CP/M WS 3.0 and at VTAB+1A4 for all versions of WS 3.3. WordStar 3.3 also has an unused ^KZ command (who knows what new block function MicroPro never got around to finishing?). It's at VTAB+128. Finally, CP/M WS 3.3 has an unused help command, ^JA, at VTAB+1C8.

WORDSTAR AND DISABLED TYPISTS

Last summer my right hand got mangled up pretty bad. I discovered that WordStar was unforgiving of one-handed typists because of its heavy use of the control key. With your pinky on <CTRL>, it's a long reach to I, O, P, K, L, and M. Fortunately, changing the keyboard tables provides a solution for that, too.

There's no need to ever hit ^I, since the <TAB> key does the same thing. And ^M is the same as <RTN>.

But typing ^P with one hand is almost impossible. Try this: change VTAB+E0 from 10, which is ^P to 5C, which is \. This will allow you to toggle underling with \s (type a backslash, release it, then type an S). To get bold, type \b. And so on. The letter part of the commands can be either upper or lower case.

^L is another keyboard-spanning command. Try replacing it with an equals sign (=). Call up VTAB+8C (CP/M WS 3.0 and MS-DOS WS 3.3) or VTAB+A4 (CP/M WS 3.3) and change 0C to 3D. Then, when you want to repeat the last Find or Find-and-Replace operation, hit the equals key.

The last two are trickier because they're the first keys of

two-key editing commands. Change all the commands that begin with ^K to begin with /. Starting at VTAB+E4, change each occurrence of 0B (hex for ^K) to 2F (hex for /). From then on, you'll mark blocks with /b and /k, move them with /v, and hide them with /h.

Finally, ^O commands can be changed to ' commands. They begin at VTAB+15C in CP/M WS 3.0 and MS-DOS WS 3.3 and at VTAB+160 in CP/M WS 3.3. The hex equivalent of ' is 60. This will let 'r change the right margin, 't hide the ruler line, and so on.

To get an equals sign in your document, type \=. Likewise, any of the other keys you've redefined can be entered into your text simply by preceding them with a backslash.

If your handspan is smaller than mine, you might also have trouble reaching ^J for help. That's no problem on CP/M Kaypros: the <LINE FEED> key does the same thing.

If you use WordStar at help level 3 or 2, you can still get the help menus to appear by changing the first byte of the ^K and ^O deactivated flash menus (VTAB+4 and VTAB+8) from 0B and 0F to 2F and 60. Make sure the second byte in each stimulus pair is set to FF. No patch is needed to make \ summon the Print Menu.

OTHER APPLICATIONS

There are lots of other useful changes that can be made to WordStar's keyboard tables. If you're having trouble remembering WordStar's arcane commands, try coming up with your own mnemonic keystroke combinations. If you're a Perfect Writer user, you could modify WordStar's commands to resemble that program's. If you use SmartKey or a similar program to redefine your keyboard to the Dvorak layout, you might modify the Editing Command Table so that WordStar's cursor keys still form the same convenient diamond shape near the control key.

Happy patching.

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LISTING 1

NOFTAB: THE OPENING MENU COMMAND TABLE

OFFSET OF 1ST BYTE	KEY STROKES	HEX EQUIVALENTS	COMMAND DESCRIPTION
0	D	04 00	open a Document file
4	N	0E 00	open a Non-document file
8	H	08 00	set Help level
C	X	18 00	eXit to system
10	P	10 00	Print a file
14	M	0D 00	run MailMerge
18	Y	19 00	delete a file
1C	F	06 00	File directory on/off
20	Z	1A 00	scroll file directory up
24	W	17 00	scroll file directory down
28	L	0C 00	change Logged disk drive
2C	R	12 00	run a program
30	O	0F 05	cOpy a file
34	E	05 00	rEname a file
38	V	16 00	UNUSED COMMAND!
3C	S	13 00	run SpellStar

Beginning at label NOFTAB are 64 bytes of code defining the commands accessible from WordStar's Opening Menu. With simple patches, the command letters can be changed to whatever you want.

LISTING 2

VTAB: THE EDITING COMMAND TABLE

OFFSET OF 1ST BYTE	KEY STROKES	HEX EQUIVALENTS	COMMAND DESCRIPTION
CPM 3.0	CPM 3.3		
0	0	^Q*	deactivated ^Q flash menu
4	4	^K*	deactivated ^K flash menu
8	8	^O*	deactivated ^O flash menu
C	C	^J*	deactivated ^J flash menu
10	10	^JH	set help level
14	14	^S	non-destructive backspace
18	18	^H	non-destructive backsapce
1C	1C	^D	move one character right
20	20	^A	move one word left
24	24	^F	move one word right
28	28	^X	move one line down
2C	2C	^E	move one line up
30	30	^QS	move to column 1
34	34	^QD	move to right margin
38	38	^QX	move to screen bottom
3C	3C	^QE	move to screen top
40	40	^QB	move to beginning of block
44	44	^QK	move to end of block
48	48	^QP	move to previous position
4C	4C	^QV	move to source
50	50	^Q0	move to place marker 0
54	54	^Q1	move to place marker 1
58	58	^Q2	move to place marker 2
5C	5C	^Q3	move to place marker 3
60	60	^Q4	move to place marker 4
64	64	^Q5	move to place marker 5
68	68	^Q6	move to place marker 6
6C	6C	^Q7	move to place marker 7
70	70	^Q8	move to place marker 8
74	74	^Q9	move to place marker 9
78	78	^QR	move to beginning of file
7C	7C	^QC	move to end of file
80	80	^QF	find
84	84	^QA	find and replace
88	88	^QL	find SpellStar flag
8C	A4	^L	repeat last find
90	8C	^QW	continuous scroll up
94	90	^QZ	continuous scroll down
98	A8	^Z	window down one line
9C	AC	^W	window up one line
A0	B0	^R	window up one screen
A4	B4	^C	window down one screen

A8	B8		7F 00	destructive backspace
AC	BC	^	1F 00	destructive backspace
B0	C0	^G	07 00	delete character
B4	C4	^Y	19 00	delete line
B8	94	^Q	11 7F	delete to beginning of line
BC	98	^Q^	11 1F	delete to beginning of line
CO	9C	^QY-	11 19	delete to end of line
C4	C8	^T	14 00	delete word right
C8	CC	^V	16 00	insert on/off
CC	D0	^B	02 00	reformat
DO	A0	^QQ	11 11	repeat next command
D4	D4	^N	0E 00	insert line
D8	D8	^I	09 00	tab
DC	DC	^M	0D 00	carriage return
E0	E0	^P	10 00	send a print control (e.g. ^PS)
E4	E4	^KH	0B 08	hide block on/off
E8	E8	^KB	0B 42	begin block
EC	EC	^KK	0B 4B	end block
F0	F0	^K0	0B 30	set place marker 0
F4	F4	^K1	0B 31	set place marker 1
F8	F8	^K2	0B 32	set place marker 2
FC	FC	^K3	0B 33	set place marker 3
100	100	^K4	0B 34	set place marker 4
104	104	^K5	0B 35	set place marker 5
108	108	^K6	0B 36	set place marker 6
10C	10C	^K7	0B 37	set place marker 7
110	110	^K8	0B 38	set place marker 8
114	114	^K9	0B 39	set place marker 9
118	118	^KV	0B 16	move block
11C	11C	^KC	0B 03	copy block
120	120	^KY	0B 19	delete block
124	124	^KN	0B 0E	column mode on/off
n/a	128	^KZ	0B 1A	UNUSED COMMAND! (3.3 only)
128	12C	^U	15 00	interrupt
12C	130	^KX	0B 18	save and exit
130	134	^KD	0B 04	save and close
134	138	^KS	0B 13	save and continue
138	13C	^KQ	0B 11	abandon file
13C	140	^KR	0B 12	read from a file
140	144	^KW	0B 17	write to a file
144	148	^KJ	0B 0A	delete file
148	14C	^KF	0B 06	file directory on/off
14C	150	^KP	0B 10	print a file
150	154	^KL	0B 0C	log disk drive
154	158	^KO	0B 0F	copy a file
158	15C	^KE	0B 05	rename a file
15C	160	^OL	0F 0C	set left margin
160	164	^OR	0F 12	set right margin
164	168	^OI	0F 09	set tab
168	16C	^ON	0F 0E	clear tab
16C	170	^OF	0F 06	read ruler from document
170	174	^OW	0F 17	word-wrap on/off
174	178	^OJ	0F 0A	justification on/off
178	17C	^OV	0F 16	variable tab on/off
17C	180	^OD	0F 04	print control display on/off

180	184	^OT	0F 14	ruler line on/off
184	188	^OP	0F 10	page break on/off
188	18C	^OE	0F 05	soft hyphen on/off
18C	190	^OH	0F 08	hyphen help on/off
190	194	^OG	0F 07	paragraph tab
194	198	^OX	0F 18	margin release on/off
198	19C	^OC	0F 03	center line
19C	1A0	^OS	0F 13	set line spacing
1A0	1A4	^JD	0A 04	help with print directives
1A4	1A8	^JS	0A 13	help with status line
1A8	1AC	^JF	0A 06	help with flag characters
1AC	1B0	^JP	0A 10	help with place markers
1B0	1B4	^JB	0A 02	help with paragraph reform
1B4	1B8	^JM	0A 0D	help with margins, spacing, tabs
1B8	1BC	^JI	0A 09	help index, entering text
1BC	1C0	^JV	0A 16	help with moving a block of text
1C0	1C4	^JR	0A 12	help with ruler line
n/a	1C8	^JA	0A 01	UNUSED COMMAND! (CP/M 3.3 only)

Beginning at VTAB is the code defining WordStar's editing command stimulus-response pairs. If you've got CP/M, use the offsets in the left column for WordStar version 3.0 and the right column for version 3.3. If you've got MS-DOS, use the offsets listed in **boldface**.

LISTING 3

XTAB: THE EXTRA COMMAND TABLE

OFFSET OF 1ST BYTE	KEY STROKES	COMMAND DESCRIPTION
0	00 00	user-definable stimulus-response pair 1
4	00 00	user-definable stimulus-response pair 2
8	00 00	user-definable stimulus-response pair 3
C	00 00	user-definable stimulus-response pair 4
10	00 00	user-definable stimulus-response pair 5
14	00 00	user-definable stimulus-response pair 6
18	00 00	user-definable stimulus-response pair 7
1C	00 00	user-definable stimulus-response pair 8
20	00 00	user-definable stimulus-response pair 9

Starting at XTAB are 36 empty bytes of code to accomodate up to nine new keystroke commands such as <ESC> + <UP ARROW> = go to top of file.

LISTING 4

SUGGESTED PATCHES

ADDRESS	CP/M WS 3.0	CP/M WS 3.3	MS-DOS WS 3.3
---------	-------------	-------------	---------------

S U P E R A R R O W K E Y S

<ESC> followed by <LEFT ARROW> To column 1 (same as ^QS)

XTAB+0	1B	1B	1B
XTAB+1	13	13	08
XTAB+2	F1	67	BA
XTAB+3	63	64	7E

<ESC> followed by <RIGHT ARROW> To right margin (same as ^QD)

XTAB+4	1B	1B	1B
XTAB+5	04	04	04
XTAB+6	D3	49	95
XTAB+7	63	64	7E

<ESC> followed by <UP ARROW> To beginning of file (same as ^QR)

XTAB+8	1B	1B	1B
XTAB+9	05	05	05
XTAB+A	18	98	D1
XTAB+B	6B	6B	87

<ESC> followed by <DOWN ARROW> To end of file (same as ^QC)

XTAB+C	1B	1B	1B
XTAB+D	18	18	18
XTAB+E	1E	9E	D7
XTAB+F	6B	6B	87

S Q U A R E B R A C K E T B L O C K D E L I M I T E R S

[Begin block (same as ^KB)

XTAB+10	5B	5B	5B
XTAB+11	00	00	00
XTAB+12	1C	9C	8C
XTAB+13	6A	6A	86

] End block (same as ^KK)

XTAB+14	5D	5D	5D
XTAB+15	00	00	00
XTAB+16	1D	9D	8D
XTAB+17	6A	6A	86

E A S Y T E M P O R A R Y I N D E N T

<ESC> followed by <TAB> Paragraph tab (same as ^OG)

XTAB+18	1B	1B	1B
XTAB+19	09	09	09
XTAB+1A	48	48	48
XTAB+1B	02	02	02

These patches to WordStar's Extra Command Table will speed up your editing. All of the original ways of performing these functions will still be available, too.