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Woods Hole FORTH

by

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Technical Report

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Abstract

Woods Hole FORTH, called WFORTH, is a real time language for the RCA 1806 microprocessor. It follows the fig-FORTH standard, and is used by Alvin for data acquisition and display tasks, plus playback and processing tasks at sea and ashore. WFORTH is optimized for simple networking with RS-232 uarts. Programs can be installed in Eprom for use in unattended systems and can be configured to run a specific task when power is applied. The error handling can be customized to permit continued operation when errors are encountered. Extensive utilities and development tools are included such as full screen editor; the fig line editor; a single pass assembler; floating point support; disk file access; communication utilities for uploading or downloading files or blocks of memory; and documentation utilities. The complete sources and a glossary for WFORTH are included in this publication. Versions are supplied which include compiled development, floating point, and assembler utilities.

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Woods Hole FORTH

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Introduction

Woods Hole FORTH is a version of fig-FORTH, written for the RCA CDP 1806A microprocessor, used by the ALVIN Group and the Deep Submergence Laboratory at the Woods Hole Oceanographic Institution (WHOI) to perform numerous real-time data acquisition, display, and control functions. Woods Hole FORTH, hereafter called WFORH, is an extension of the language FORTH optimized for serial communications (RS-232), and program development for systems that will ultimately be placed in Prom or Eprom. WFORH is fully compatible with the RCA disk operating system, MDOS 1.0. An extremely powerful decompiler is included to help in debugging new words, or merely understand existing words. Floating point support is included as a series of screens and a file called FLOAT.CM. A version of WFORH which includes floating point support has been provided as a file named FFORTH.CM. In addition, a version containing a single pass Assembler is included for writing FORTH words in machine code. This is the file AFORTH.CM. WFORH conforms closely to the fig-FORTH model. With the exception of code words and I/O words, WFORH words are fully transportable to other fig-FORTH systems.

A complete Woods Hole FORTH system occupies three disks. The first, called the ALVIN OPERATING SYSTEM, normally occupies drive zero. It contains many copyrighted programs from RCA MICROSOS 1.0. The user should copy those files not found in the disk directory for the ALVIN Operating System in Chapter 11, from MDOS 1.0. This disk also contains backup copies of FORTH and WFORH, several SUBMIT files, and many files and programs used in acquiring and playing back data on the submersible Alvin.

The second disk, WOODS HOLE FORTH SCREEN FILE, contains all of the source screens which have been used to create WFORH.CM, FFORTH.CM, and AFORTH.CM from the file FORTH.CM plus numerous utility screens and 6 files: FORTH.CM, WFORH.CM, FFORTH.CM, AFORTH.CM, ASM4TH.CM, and FLOAT.CM. FORTH.CM, based upon the fig-FORTH model, has been generated from the source file WFORH.SRC. FLOAT.CM and ASM4TH.CM are files which are loaded by FFORTH.CM and AFORTH.CM respectively, and are not intended to be called by the user directly. This disk should also include the files COPY.CM and SYSGEN.CM, which the user must copy from the RCA MDOS disk. Chapter 11 provides a directory for this disk and also shows the cluster allocation table (CAT), which has been marked to reserve the sectors which correspond to FORTH screens 65 through 249. These are the screens normally used in WFORH and at

present, there are still about 60(d) sectors available on the disk. 1 sector equals 512(d) bytes. This is enough space to store 2 or more additional application versions of FORTH.

The following explanation demonstrates the relationships between the major files.

WFORTH.CM has been created from FORTH.CM by the sequence:

```
>FORTH:1 (cr) (load and run fig-FORTH generated by the assembler)
```

OK

```
66 LOAD 65 LOAD SAVE WFORTH.CM:1 (cr) (compile new words and save  
as the file WFORTH.CM:1)
```

FFORTH.CM has been created from WFORTH.CM by the sequence:

```
>WFORTH:1 (cr) (load and run WFORTH.CM)
```

OK

```
FLOATING NEW-FENCE SAVE FFORTH.CM:1 (cr) (compile floating point  
words and save as the file FORTH.CM:1)
```

AFORTH.CM has been created from WFORTH.CM by the sequence:

```
>WFORTH:1 (cr) (load and run WFORTH.CM)
```

OK

```
77 LOAD (cr) (load assembler master load screen)
```

```
>MEM (cr)
```

MEMORY SAVE PROGRAM

```
FIRST ADDR? C600 (cr)
```

```
LAST ADDR? CFFF (cr)
```

```
WRITE? ASM4TH.MEM:1 (cr)
```

```
>CDSBIN ASM4TH.MEM:1 ASM4TH.CM:1;9005 (cr)
```

The third disk, WOODS HOLE FORTH SOURCE AND LIST, contains the source file WFORTH.SRC; the output of the Assembler which is a list file called WFORTH.LST; and the file FORTH.CM. FORTH.CM is the binary loadable version of WFORTH.LST. Many SUBMIT files are also included to facilitate recursive development of the source, and ultimately, FORTH.CM.

FORTH.CM has been created from WFORTH.SRC by the sequence:

>SUBMIT ASMB:1 (cr) (calls all programs required to convert the source file to a binary loadable .CM file.)

These three disks are all that are required to completely maintain FORTH. If it becomes desirable to change FORTH, begin by editing the file WFORTH.SRC, then assemble to create the files WFORTH.LST and FORTH.CM. Finally, switch to the high level environment of FORTH, compile screens and save the resulting program, either with MEM.CM and CDSBIN.CM in the operating system, or SAVE from within WFORTH.

NOTATION

The following is a summary of the notation used in this document.

<u>Examples</u>	<u>Meaning</u>
FORTH BEEP	Any word which is capitalized represents a FORTH word.
MEM.CM	Capitalized words which end with the string .CM are programs created or used by the operating system MDOS 1.0.
Filespec	Filespec is used to indicate any file or program running under MDOS 1.0, using RCA's notation. For instance: AFORTH.CM:1, identifies the version of FORTH which has the assembler precompiled, which is located on drive 1.
ANY.WORD ANY.NAME	These indicate that any FORTH word can be used.
	There are eight general notations used for numbers, with some obvious variations. For instance, STRING.ADDRESS indicates a number, interpreted as an address, which points to a string. BLOCK.NUMBER indicates a number which specifies a block.

NUMBER These represent signed 16 bit numbers.

N1

N

U U represents an unsigned 16 bit number.

DOUBLE These represent signed 32 bit numbers (double precision).

D2

D

UD UD represents an unsigned 32 bit double number.

F F represents a 32 bit signed floating point number.

CHARACTER These represent a 16 bit number which is interpreted as

CHAR as an 8 bit character. The least significant 8 bits are used.

ADDRESS These represent 16 bit numbers which are interpreted as memory

ADDR addresses.

FLAG These represent 16 bit numbers which are interpreted as

f logical flags. The flag is true if the number is non-zero.

 The flag is false if the number is equal to zero.

< ... > This notation is used to represent the relative contents of

 the computation stack before and after a word is executed.

 The notation < N1 N2 N3 ... N4 N5 > is explained as follows.

 Before the word is executed, the stack has three numbers of

 interest, N1, N2, and N3, with N3 being the top number.

 After the word is executed, there is one less number on the

 stack. N5 is the top number, and N4 is below N5.

(cr) (cr) indicates that a carriage return is required to terminate

 the command line and cause execution of that line.

Getting started; system configuration and special hardware

First, working copies should be made of the three disks supplied. Format three disks by installing the SYSTEM disk in drive 0, and a blank diskette in drive 1, and typing: `FORMAT (cr)`. After formatting three disks, type `>SYSGEN ;E (cr)` to copy the system disk. Without leaving SYSGEN, replace the SYSTEM disk in drive 0 with the SCREEN FILE disk. Replace the copy of the SYSTEM in drive 1 with another formatted disk. Type `C (cr)` to copy the second disk. Replace the SCREEN FILE disk in drive 0 with the SOURCE disk and the SCREEN FILE copy in drive 1 with the final formatted disk and type `C (cr)`. After this is done, type `Q (cr)` to return to the operating system. Then copy all MDOS files onto the three disks. Use the directory in chapter 11 as a guide. Replace the SOURCE in drive 0 with the SYSTEM disk copy. Type `WFORTH:1` to start FORTH. You are now running WFORTH. Type:

65 LIST (cr)

to see the master load screen.

The minimum required hardware is one RCA MS 2000 development system with a CDP 1806A installed, and a terminal. It is preferable, at least for editing, to use a terminal at 9600 or 19.2K BAUD which does not require handshaking, such as a Televideo 910+. The communication utilities require either a CDP 18S641A uart card or a CDP 18S653 modem card. Both are supported simultaneously. The Woods Hole uart switcher card is required if it is desirable to communicate with more than 1 other system (up to 8) with a single uart. The schematic of this card is included. The Woods Hole video card is required for memory mapped video and the schematic is included. Graphics requires the Woods Hole graphics ram, schematic included. A parallel printer requires the RCA CDP 18S646 card. A serial printer requires the CDP 18S641 uart or CDP 18S653 modem. The CDP 18S402 or 18S602 card is required to burn EPROMS, using the operating system program PROM25. No special hardware is required for floating point support.

The RCA 2 level group number I/O convention is utilized and fully supported. This convention is a simple method of extending the number of I/O ports available for the 1806 processor. Port 1 is reserved for the group number. All I/O hardware must latch the value sent to port 1, and respond to I/O requests only if the value in port 1 (the group number) corresponds to the designated port number for that particular I/O device. There are some

restrictions on actually assigning group numbers. For a complete discussion, refer to RCA MPM 201C; the documentation for the 1800 series microprocessors.

The group numbers in use are shown in the following list.

<u>Group Number</u>	<u>Card Name</u>	<u>FORTH pointer</u>
1(h)	CDP 18S605 Terminal uart and CDP 18S646 parallel printer	TERM.GRP
4(h)	CDP 18S640 Prom programmer	
8(h)	CDP 18S651 Floppy disk controller	
10(h)	WHOI Video ram and Graphics ram cards	
EO(h)	CDP 18S641A Communication uart and WHOI uart switcher	COMM.GRP
FO(h)	CDP 18S653 MODEM	MODEM.GRP

FORTH EDITOR AND GLOSSARY

Woods Hole FORTH contains two editors, residing in the vocabulary EDITOR. The first is the fig-Editor, by Bill Ragsdale, described in the fig-FORTH installation manual. The second is the full screen function EDIT, similar to that supplied with Laboratory Microsystems PC FORTH. This editor is modified to work with a Televideo 910+ terminal.

The fig-Editor, which is essentially a line editor, has three types of commands; screen commands, line commands, and string commands. The screen commands LIST, L, CLEAR, COPY, and FLUSH deal with entire screens. 100 LIST (cr) will list screen 100 for editing. 200 CLEAR (cr) will clear screen 200. 100 150 COPY (cr) will copy screen 100 to 150. L (cr) will list the screen most recently selected by LIST. FLUSH (cr) will write all screens which have been modified to disk. The line editing commands H (hold), D (delete), T (type), R (replace), I (insert), E (erase), and S (spread) all operate on complete lines. A line is 64 (d) characters long. 10 H (cr) will hold line 10 in the PAD buffer. 11 D (cr) will delete line 11, but hold it in PAD. Lines 12 thru 15 are moved to lines 11 thru 14 and line 15 becomes blank. 5 T (cr) will list line 5 and hold it in PAD. 6 R (cr) will replace line 6 with the line held in PAD. 9 I (cr) will insert the line in PAD at line 9 after moving lines 9 thru 14 to 10 thru 15. Line 15 is lost. 14 E (cr) will fill line 14 with blanks. 4 S (cr) will move lines 4 thru 14 to lines 5 thru 15. Line 15 is lost and line 4 is left blank.

The cursor control and string editing words TOP, M (move), F (find), B (backup), N (next string occurrence), X (delete text), C (insert text), and TILL are used to position the editing cursor on the screen being edited. TOP

(cr) will move the cursor to the top of the screen. 1 T (cr) will move the cursor to the beginning of the first line. -25 M (cr) will move the cursor back 25 characters. F Hello (cr) will position the cursor after Hello, if it is found between the present cursor position and the end of the screen. If Hello is not found, message 0 is issued, and TOP is executed. B (cr) will move the cursor to the beginning of the string most recently found by F. N (cr) will find the next occurrence of the text found by F. X BAD.WORD (cr) will find and delete the string BAD.WORD. C NEW.TEXT (cr) will insert NEW.TEXT at the present cursor position. If characters are shifted past the

end of the current line, they are lost. TILL TEXT (cr) will delete from the present cursor position to the end of the string TEXT. C(cr) will cause a fig-Editor bug. A NULL character is inserted at the present cursor position. The NULL will prematurely terminate loading. To remove the NULL, type: TOP X(cr).

There are many other words in the Editor vocabulary; they are generally used to define the above words, rather than being executed by the user.

EDIT, the full screen editor is a variation of "EDIT" supplied with Laboratory Microsystems PC FORTH. It has been modified to work with a Televideo 910+ terminal, and may require changes for other terminals. The source screens for EDIT are screens 121 and 122. In particular, the three words GOTOXY, SETEDIT, and NOEDIT may require change. After changing these words, execute the following sequence:

65 LOAD SAVE WFORTH.CM:1 (cr).

This will rewrite the file WFORTH.CM to preserve the new version of EDIT. If you are using the assembler or floating point versions of WFORTH, it will also be necessary to regenerate AFORTH.CM and FFORTH.CM, as shown in chapter 1.

To use EDIT, type: SCREEN.NUMBER EDIT (cr) or: EDITL (cr). EDITL will select the screen most recently accessed by LIST. When in EDIT, eight keys have special significance. (ESC) terminates full screen editing. The cursor movement keys control cursor position. Control-I (^I) causes a horizontal tab. Control-E (^E) clears the entire screen and (cr) moves the cursor to the beginning of the next line. The delete key (del) only functions as a non-destructive backspace.

LINE EDITOR GLOSSARY

#LAG < ... CURSOR.ADDRESS COUNT.AFTER.CURSOR.TILL.EOL >

Number Lag

#LAG is a primitive used by the EDITOR.

#LEAD < ... LINE.ADDRESS OFFSET.TO.CURSOR >

Number Lead

#LEAD is a primitive used by the EDITOR.

#LOCATE < ... N1 N2 >

Number Locate

From the cursor position, determine the line number, N1 and the offset into the line, N2.

-MOVE < ADDRESS.LINE.NO ... >

Dash Move

Move a line of text from ADDRESS to the line no. of the current screen.

lline < ... FLAG >

l Line

Scan the cursor line for a match to PAD text. Return flag and update the cursor R# to the end of matching text, or to the start of the next line if no match is found.

B < ... >

Backup

Backup cursor by the text in PAD.

C < ... >

Insert

Characters

Spread at the cursor and copy the following text into the cursor line.

CLEAR < N ... >

Clear

Clear screen N. CLEAR can be used to select screen N for editing.

COPY	< N1 N2 ... >	Copy
	Copy screen N1 to screen N2.	
D	< N ... >	Delete
	Delete line N, but hold it in PAD. Line 15 is blank.	
DELETE	< N ... >	Delete
	Delete N characters prior to the cursor.	
E	< N ... >	Erase
	Erase line N with blanks.	
F	< ... >	Find
	Input the following text to PAD and search for a match from the cursor position till the end of the screen.	
FIND	< ... >	Find
	Search for a match to the string at PAD, from the cursor position till the end of screen. If no match is found, issue error message 0 and reposition the cursor to the top of the screen.	
FLUSH	< ... >	Flush
	Write all updated buffers to disk.	
H	< N ... >	Hold
	Hold line N in PAD.	
I	< N ... >	Insert Line
	Spread at line N and insert the text from PAD.	
L	< ... >	List
	List the current screen.	

LINE	< N ... ADDRESS >	Line
	Leave ADDRESS of line N of current screen. The address will be in the disk buffer area.	
M	< N ... >	Move
	Move cursor by the signed amount N, and print the cursor line.	
MATCH	< CURSOR.ADDR BYTES.LEFT.TILL.EOL STR.ADDR STR.COUNT ... FLAG MOVEMENT >	Match
	Match the string at STR.ADDR with all strings on the cursor line forward from the cursor. The arguments left allow the cursor R# to be updated either to the end of the matching text or to the start of the line text.	
N	< ... >	Next
	Find the next occurrence of the text in PAD.	
P	< N ... >	Put
	Put the following text on line N.	
R	< N ... >	Replace
	Replace line N with the line in PAD.	
R#	< ... ADDRESS >	R Number
	R# is a USER variable which contains the offset of the editing cursor from the start of the screen.	
S	< N ... >	Spread
	Spread lines starting at line N. Lines N through 14 move down 1 line. Line N becomes blank, and line 15 is lost.	
T	< N ... >	Type
	Type line N and save it in PAD.	

TEXT

< CHARACTER ... >

Text

Accept the following text to pad. CHARACTER is the text
delimiter.

TILL

< ... >

Till

Delete on the cursor line, from the cursor to the end of the
following text.

TOP

< ... >

Top

Position the editing cursor at the top of the screen.

WHERE

< N1 N2 ... >

Where

N2 is the block number, N1 is the offset into the block. If
an error is found in the source when loading from disk, the
word ERROR leaves these values on the stack to help the user
locate the error. WHERE uses these to print the screen and
line numbers where the error occurred.

X

< >

Delete Text

Delete the next occurrence of the text following X.

FORTH DISK OPERATING SYSTEM

Woods Hole FORTH includes a group of words used to access files created by the operating system MDOS 1.0. This group of words is collectively referred to as FORTH DOS. WFORTH accesses the disk via the routines Seek, Dread, and Dwrite in UT71, the RCA ROM utility program. WFORTH is fully compatible with all functions of RCA's MDOS, but some guidelines must be followed. WFORTH protects screens 65 thru 249 from the operating system by the word CAT-UPDATE, located on screen 226. This word marks the cluster allocation table of the disk in the selected drive (DR0 or DR1) to show that clusters 130 thru 499 are utilized. Once this has been done, MDOS will not write any files over those sectors. The screens are not named as a file, and MDOS is unable to find the screens; to MDOS they look like occupied sectors. The operating system sequence:

SYSGEN ;E (cr)

will correctly copy a disk with screens. If you are not required to store files on a disk, the full range of screens 0 thru 314 is available on each disk. It is always possible for FORTH to write over files, because FORTH DOS does not examine the cluster allocation table. To prevent this, use only screens 65 through 249. The word .CAT, also on screen 226, will show the cluster allocation table for the selected disk. Refer to RCA MPM 241 Pl, Appendix E, the document for MDOS, for a complete discussion of the cluster allocation table.

WFORTH has several user words which manipulate MDOS files. The word DIR will print the disk directory, and starting sector number for each file for the selected disk. The word OPEN, followed by a file name will make a file available for reading or modifying. After OPEN is executed, the word GETSEC will read the next sequential sector of the file into buffer memory, and return the address of the start of that sector, or it will return 0 if the end of file is reached. A sector is 200(h) bytes long. The word NEWLSN (new logical sector number) allows random access to the open file. NEWLSN works like GETSEC and returns the buffer address of the new sector. Once NEWLSN is executed (preceded by the new sector number), calls to GETSEC will return the address of the next sector. The word FILEID will print the name of the opened file. The word DISKID will print the disk ID field specified when the disk was created by SYSGEN.CM (an operating system program, not a FORTH

word). The word GETSEC stores the sector in FORTH's screen buffer area. Therefore, if there is any chance that the buffers may be disturbed by words such as FLUSH, or by reading many more new sectors or screens, then the sector should be copied from the disk buffer space to an unused area of ram (C000h - FFFFh is a good place).

The word DOWNLOAD is used to send a file on disk to a target computer which is connected to the uart at COMM.GRP. It requires that the target system be running a utility program that supports the I (insert) command (UT62, UT70, or UT71). See the glossary entry for DOWNLOAD for more details.

The word FILELOAD is used to load a file directly into memory, using the address contained in the file. This word does not sense the actual end of file but simply loads the number of complete sectors contained in the file. In most cases, this is not a problem, but problems can arise when loading files within a block of memory that is used for other purposes. The word ASSEMBLER is an example of a word which uses FILELOAD.

The word SAVE is used to save the present version of the program FORTH as a file. The file must already exist on the disk; it is merely updated to reflect the present environment. The sequence:

```
65 LOAD SAVE WFORTH.CM:1 (cr)
```

will load screen 65, the master load screen, and save the compiled result as the file WFORTH.CM:1. SAVE is the easiest way to preserve a special application version of FORTH, and is much faster than the operating system sequence:

```
MEM 0 - 3FFF WFORTH.MEM (cr)
```

```
CDSBIN WFORTH.MEM. (cr)
```

FORTH DOS is intended only to be a FORTH accessible subset of the RCA MDOS 1.0 operating system. It is still necessary to open files, format disks, copy disks, get directories with full attributes, and so on using MDOS. FORTH DOS is not a substitute for the operating system. Rather, it is intended to provide some functions, such as disk directory display and file updating without leaving FORTH. This extends the usefulness of both systems.

THE FORTH ASSEMBLER

Woods Hole FORTH includes a single pass assembler based upon the assembler by Jim McDaniels, supplied with RCA's Microboard FORTH. Labels LAB1: thru LAB4: are supported. The label must be defined first by a sequence such as: LAB4: 5 SEP , and then utilized by: LBR LAB4 or BR LAB4, as examples. If it is necessary to refer to a label before it is defined, the address must be computed by trial and error. The sequence HEX HERE 44 + LBR will assemble to a forward long branch 44(h) bytes higher. The assembler is useful when it is necessary for FORTH words to be written in machine code due to timing considerations.

In order to write code words, it is necessary to understand the register utilization of the 1806 microprocessor by WFORTH. Register 3 is used as the program counter for code words. Register 4 is the X register and the computation stack pointer. In Woods Hole FORTH, the stack pointer always points to the high byte of the top item on the stack. Successive bytes are retrieved by increasing the stack pointer. When a code word is finished, it should return to the FORTH word NEXT, by changing the program counter to register 5. Registers A, B, C, D, and F are available for general use. In addition, the other registers may be useful for interaction with FORTH. See the source listing for a complete description of register utilization.

The assembler is merely a high level interface to the FORTH word CREATE, and a lookup table for mnemonics. With this in mind, it is useful to first examine the structure of a no operation word that has been defined by CREATE.

CREATE NO-OP HERE DUP 2- ! D5 C, SMUDGE (cr)

The above sequence will create a word in the FORTH vocabulary which does nothing. When it is defined, it is named NO-OP. The sequence HERE DUP 2- ! makes it a CODE definition by storing the parameter field address of the word NO-OP in the code field of the word NO-OP. The sequence D5 C, stores the 1806 opcode D5 in the parameter field. When the word NO-OP is executed, this single machine instruction will be executed resulting in a return to the FORTH word NEXT by setting the program counter to register 5. The word SMUDGE makes the word NO-OP visible to dictionary searches. Although this is a trivial example, it shows the essential structure of CODE words, and the mechanism for building them.

As a second example, examine the definition of SETQ (set the Q line true).

```
HEX CREATE SETQ HERE DUP 2- ! 7BD5 , SMUDGE (cr)
```

This definition is on screen 91. Refer also to the assembler example load screen, screen 241. Using the assembler, the identical run time code can be created by the sequence:

```
CODE SETQ SEQ 5 SEP ENDCODE (cr)
```

These simple examples show the basic utilization of the assembler. Screen 220 contains a non-trivial example of assembler utilization.

There are a few additional assembler directive words. C; and ENDCODE are pseudonyms for END-CODE. A.O takes a 16 bit number from the stack and stores the low byte in the dictionary. A.l takes a 16 bit number from the stack and stores the high byte in the dictionary. PAGE moves the dictionary pointer to the next page boundary (XX00h). PAGEADJUST takes a number N from the stack and ensures that the following N bytes are on the same page. Additional assembler directives are located on screen 242. All RCA 1806 mnemonics are supported except four: B1, B2, B3, and B4. They are not supported because if they were, it would be impossible to define the hex numbers B1 thru B4. Instead, these branch on flag instructions have the modified mnemonics SB1, SB2, SB3, and SB4. Five FORTH words are redefined in the assembler: RO, OUT, OR, AND, and XOR. These are all 1806 mnemonics and in order to use the corresponding FORTH words it is necessary to execute FORTH first; for example: FORTH 6 OUT ASSEMBLER will place 2 numbers on the stack, the address of the USER variable OUT, and the number 6, and then return to the ASSEMBLER vocabulary (rather than assemble the op code for OUT 6).

COMMUNICATION UTILITIES

The FORTH communication utilities are intended to facilitate terminal emulation including full telephone dialing capabilities, handle downloading of MDOS files and uploading or downloading of blocks of memory in other RCA systems, facilitate the transfer of screens with another FORTH system, handle simple RS-232 tree networking at 1200 baud without handshaking or software protocol, and send MDOS files as formatted strings of ASCII-hex characters to any other computer.

The simplest communication word, UART initiates 2 way conversation between a device connected to the uart at TERM.GRP and a device connected to the uart at COMM.GRP. Usually this means that an operators' terminal is connected to a uart at Group 1 and a uart communicating with another computer is connected at group E0h.

With all communication words, the escape key (esc) is used to terminate the operation. If it is desirable to send an escape character to the target system, the following sequence will work:

(esc) ESC' U (cr) for a uart; and

(esc) ESC' RE-ENTER (cr) for a modem.

The sequence DIAL (PHONE.NUMBER) ORIGINATE (cr) will dial the phone number and set the modem for originate mode. The word DIAL will only dial dual-tone numbers, but the modem is capable of dialing pulse numbers. Refer to the documentation for the 18S653 modem and screens 103 and 104 for more details.

The word ANSWER is included, although the behavior of this word is presently somewhat primitive. ANSWER will set the modem to answer mode, answer after two rings, and then give full control of the FORTH system to the calling system. This is a convenient way to run the system remotely. The successful implementation of ANSWER depends upon the following programming convention. Any word which uses group select I/O must use the word TERM to restore the terminal group after I/O, instead of the sequence 1 1 OUTPUT. This is because Woods Hole FORTH does not assume that the terminal is assigned to Group 1; the actual terminal group number is contained in the USER variable TERM.GRP. If this convention is followed, then full remote operation via the modem is possible.

The words SEND-SCREEN and GET-SCREEN allow transfer of screens between FORTH systems. The sequence:

N1 GET-SCREEN (cr)

typed at the receiving system will set up the system to receive screen N1. Then:

N2 SEND-SCREEN (cr)

typed at the transmitting system will send screen N2. These words include no handshaking or error checking. Note that screen N2 is sent and stored as screen N1 in the receiving system, overwriting the existing screen N1. Both systems must have uarts assigned to the COMM.GRP, which are connected together, to transfer the data.

XMIT and V are two words used to pass blocks of data resident in memory between RCA systems only. The target system must be running an RCA utility program which supports the D (dump) and I (insert) commands (UT62, UT63, UT70, and UT71). The sequence:

SOURCE.ADDR LENGTH DESTINATION.ADDR XMIT (cr)

will send a block of data from SOURCE.ADDR in the local computer to DESTINATION.ADDR in the target computer for LENGTH bytes. The sequence:

SOURCE.ADDR LENGTH DESTINATION.ADDR V (cr)

will receive LENGTH bytes from SOURCE.ADDR in the target computer and store it at DESTINATION.ADDR in the local computer. In the case of XMIT and V, the local computer connects via the uart at COMM.GRP to the terminal input of the target computer.

The word DOWNLOAD will move a file from the disk to a target computer that is running an RCA utility program. The usage is:

TARGET.ADDR DOWNLOAD FILESPEC (cr)

This will move the file named in FILESPEC, to TARGET.ADDR in the target computer. The length of the transfer is determined by the file itself. The initial values of TERM.GRP, COMM.GRP, and MODEM.GRP are set by items 36, 38, and 40 in the parameter table and be changed by changing these items. See chapter 7, page 26 for a description of this procedure.

MEMORY MAP AND PARAMETER TABLE

<u>ADDRESS</u>	<u>NAME</u>	<u>POINTER</u>	<u>SIGNIFICANCE</u>
0000	COLD		This is the entry point for FORTH. Location 0000 contains a long branch to location 0005. This long branch may be patched to vector to another location after a system reset. This is useful in Eprom systems if something other than FORTH is desired after a system reset. FORTH may be entered externally by branching to location 0005. COLD initializes the USER variables 10(h) through 1E(h) (8 numbers) from the initial values in the parameter table and then executes WARM.
0003	WARM		This is the warm re-entry point for FORTH. Warm initializes registers 2, 4, 5, 6, 7, and 8. It also initializes USER variables 0 through 0E (8 numbers). All initial values are taken from the parameter table.
1841(h)	PARAMETER TABLE	+ORIGIN	The parameter table holds all the values that are used to initialize registers, USER variables (considered system variables) and CONSTANTS when WARM and COLD are executed. By manipulating values contained in the parameter table, it is possible to customize the behavior of the FORTH system, even to the extent of defining the initial task that FORTH will execute. Refer to the follow section of this chapter for complete details of the parameter table.
varies	Fence	FENCE	The fence is a marker, below which the system will not FORGET words. The value of FENCE is initialized by COLD and WARM from a value in the parameter table. The word NEW-FENCE will set the

initial value of FENCE in the parameter table to include (protect) all words currently defined. This is done by making the value of FENCE equal to the value of the dictionary pointer (DP).

varies Dictionary DP The dictionary pointer is a USER variable which points to the first available byte in the dictionary. For Eprom applications, DP must be changed to point to Ram if the application will involve defining new words or generate formatted output using words such as TYPE . The word ROMIT does this.

DP+48(h) PAD PAD PAD is the USER variable which points to the dynamically assigned scratch pad buffer located 48(h) bytes past the dictionary pointer. PAD is used in two ways. The area below PAD is used to construct output number strings by the words < # # and # >. This area must, therefore, be in Ram if an Eprom application program is to print numbers. The area above PAD is used by the EDITOR as a temporary string buffer. PAD's location is always 48 bytes above DP, so it is merely necessary to move DP to point to Ram for PAD to work properly in Eprom applications.

55FE(h) Computation S0 The computation stack, pointed to by S0, is the primary stack in FORTH. It grows downward in memory to meet PAD. Message 2 is issued by CREATE if there is any danger of the stack and the scratch pad colliding.

5600(h) Terminal TIB The terminal input buffer is 80(h) bytes long. It is used to store the input command line from the terminal. It grows upward in memory towards the return stack.

56FE(h) Return R0 The return stack is used by the FORTH interpreter to store the addresses of calling words. The return stack can also be used to store numbers in a fashion similar to the computation stack, with the words >R and R>, but only within the definition of a word. If the use of >R and R> is not balanced within a definition, the system will crash. The return stack grows downward toward the terminal input buffer.

5700(h) User Variable Area (register 7) The USER variable area is the area where the actual values of USER variables are stored. It is D4(h) bytes long so D4(h)/2 (106d) USER variables are available. The USER variable area must start on a page boundary. The allocation of USER variables is most easily handled by NEXTU (Refer to the glossary). The use of USER variables is mandatory in Eprom applications because the values are stored in the RAM USER variable area, not in the PROM dictionary, as VARIABLES are. See the glossary entry for USER for an explanation.

57D9(h) Start of Screen Buffers FIRST The screen buffer is used to store screens while being accessed by FORTH. In addition, the screen buffers are used by FORTH's Dos when reading files. Each screen buffer is 404(h) bytes long. The first two bytes are the block number. The most significant bit of the first byte is the UPDATE bit. If it is 1, then the screen will be updated (written to disk) by FLUSH, or when the buffer is needed for other screens. The next 400 bytes are the screen itself. The last 2 bytes are unused. When reassigning the screen buffer area by changing the constants FIRST and LIMIT, make sure that the area is an integral multiple of 404(h) bytes long.

THE PARAMETER TABLE:

The parameter table is used by FORTH to initialize the FORTH system at COLD or WARM startup. By manipulating values in the parameter table, FORTH can be configured for special applications. It is possible to specify the first word to be executed when FORTH starts up. As an example, the sequence:
N1 N2 +ORIGIN ! (cr)

where N1 is the Value, and N2 is the Item#, will update Item# with the new Value in the parameter table. The new Values are installed by executing the words COLD or WARM. The following 6 Values are used to initialize registers at COLD or WARM start:

<u>ADDR</u> <u>Value</u>	<u>Item#</u> (d)	<u>Register</u>	<u>Name</u>
1841 56FE:	0	2	Return stack position
1843 55FE:	2	4	Computation stack
1845 0098:	4	5	Inner interpreter
1847 0016:	6	6	Cold start vector
1849 5700:	8	7	User area
184B 11EB:	10	8	Initial task

The next 8 values are placed in USER variables 0 thru OE at COLD or WARM start:

<u>ADDR</u> <u>Value</u>	<u>Item#</u> (d)	<u>USER #</u> (h) <u>VARIABLE</u>	<u>Name</u>
184D 18FE:	12	0	Last name field addr
184F 007F:	14	2	Backspace character
1851 5700:	16	4	User area
1853 55FE:	18	6	Computation stack
1855 56FE:	20	8	Return stack
1857 5600:	22	A	Terminal input buffer
1859 001F:	24	C	Name field width
185B 0000:	26	E	Warning

The following 8 values are inserted in USER variables
10 thru 1E at COLD start only:

<u>ADDR</u> <u>Value</u>	<u>Item#</u> <u>(d)</u>	<u>USER #</u> <u>(h)</u>	<u>Name</u>
		<u>VARIABLE</u>	
185D 192A:	28	10	Fence
185F 192A:	30	12	Dictionary pointer
1861 183F:	32	14	VOC-LINK in FORTH
1863 013B:	34	16	Screens per disk
1865 00F0:	36	18	Modem group
1867 0001:	38	1A	Terminal group
1869 00E0:	40	1C	Comm uart group
186B 0050:	42	1E	Next user variable

The sequence:

DECIMAL ' ANY.WORD 10 +ORIGIN ! (cr)

will force FORTH to execute ANY.WORD initially. The word ANY.WORD must end with the word QUIT, however, to enter the FORTH interpretive loop when ANY.WORD has completed execution. The word NEW-FENCE will update items 12, 28, 30, 32, and 42 in the parameter table to insure that all words and USER variables presently defined are protected in the dictionary. This is required when saving FORTH as a disk file. See the chapter describing Eprom applications programming for more details on changing the parameter table.

DEVELOPING EPROM APPLICATION PROGRAMS

Woods Hole FORTH lends itself to Eprom, Prom, or Rom applications. The files FORTH.CM or WORTH.CM can be placed into Eprom with no changes, but the resulting version will have several problems because many FORTH pointers are stored within the dictionary and will be frozen in Eprom. The terminal input buffer is located just beyond the end of the dictionary; therefore, unless this is in Ram, it will contain garbage. Also, the word FORTH contains a pointer to the most recent word of the FORTH vocabulary, and no new words can be defined unless this pointer can be changed. In order to solve these problems, the word ROMIT is supplied. ROMIT assumes that a combination of 2716 Eproms and 6116 Rams will be used for memory. ROMIT moves all pointers associated with the end of the dictionary to the next 800(h) byte boundary beyond the dictionary pointer, and prints the memory limits for the dictionary.

The memory map for the Eprom system is:

0 to HERE-1	Eproms, Proms, or Rams
HERE to HERE+800(h) (terminal input buffer and PAD)	1 6116 Ram
Computation stack to end of USER variables	1 6116 Ram
End of USER variables to 7FFF(h) (FIRST to LIMIT) (only if screen buffers are required)	6116 Rams
7000(h) to 7FFF(h) (only if floating point is required)	Eproms, Proms, or Rams

In practical terms, this means that a 32K memory board (18S626 or 18S628) may conveniently contain an entire application system. The beginning is comprised of 2716 Eproms, and the remainder is composed of 6116 Rams. The word ROMIT must be executed after all application words are defined, to realign the pointers for an Eprom system.

If memory resources are severely limited and the memory map must be changed, the following list is useful in understanding the affected areas.

1. FIRST and LIMIT point to the start and end of the screen buffer area. If screens will be used, for instance to debug in-situ application systems, then the constants FIRST and LIMIT may be changed. The number of bytes between FIRST and LIMIT must be an integral number of 404(h) bytes. If screens are not to be used, then FIRST and LIMIT can be ignored. Note, however, that EMPTY-BUFFERS, called in ABORT, fills memory between FIRST and LIMIT with zeroes. This would destroy any user data between FIRST and LIMIT.
2. Computation stack. The location of the computation stack can be changed by changing items 2 and 18(d) in the parameter table. Remember that the stack grows downward.
3. Return stack. The location of the return stack can be changed by changing items 0 and 20(d) in the parameter table.
4. USER variable area. The location of the USER variable area can be changed by changing items 8 and 16(d) in the parameter table. The USER area must be 100(h) bytes long and start on a page boundary.
5. Terminal input buffer. The location of the terminal input buffer can be changed by changing item 22(d) in the parameter table. The terminal input buffer must be 80(h) bytes long. This buffer is only required if input from a terminal will be used.

If it is desirable to have FORTH immediately begin execution of a word, then the following sequence should be executed:

```
DECIMAL ' ANY.WORD 10 +ORIGIN ! (cr)
```

The definition of ANY.WORD must include QUIT as the last item of the definition if you want to enter the normal interpretive loop after ANY.WORD is executed.

In an Eprom version of fig-FORTH, it is not possible to define new words into existing vocabularies because the pointer to the last word is frozen in the vocabulary defining word (ie FORTH, EDITOR, ASSEMBLER, etc.) located within the dictionary and therefore within Prom. However, it is possible to start a new vocabulary and define words into it with the following sequence:

VOCABULARY ANY.VOCAB IMMEDIATE HERE 4 - DUP CURRENT ! CONTEXT ! (cr)

At this point it is possible to define new words into the vocabulary ANY.VOCAB, which is linked to the FORTH vocabulary. Sufficient ram must exist above the dictionary pointer to contain the new entries. This technique is very valuable for debugging Prom systems.

However, note that FIRST and LIMIT can be ignored. Empty-POSTERS, called in REPORT, fills memory between FIRST and LIMIT with zeroes. This would destroy any user data between FIRST and LIMIT.

2. Computation stack. The location of the computation stack can be changed by changing items 2 and 16(1) in the parameter table. Remember that the stack grows downwards.

3. Return stack. The location of the return stack can be changed by changing items 9 and 30(5) in the parameter table.

4. USER variable area. The location of the USER variable area can be changed by changing items 8 and 14(4) in the parameter table. The USER area must be 1024 bytes long and start on a page boundary.

5. Terminal input buffer. The location of the terminal input buffer can be changed by changing item 23(1) in the parameter table. The terminal input buffer must be 8000 bytes long. This buffer is only required if input from a terminal will be used.

It is desirable to have FORTH immediately begin execution of a word. Then the following sequence should be executed:

DECIMAL ! ANY.WORD 10 <CR> 1 (cr)

The definition of ANY.WORD must include QUIT as the last item of the definition if you want to enter the normal interpretive loop after ANY.WORD is executed.

In an ignore version of FORTH, it is not possible to define new words into existing vocabularies because the pointer to the last word is fixed in the vocabulary defining words (FORTH, EDITOR, ASSEMBLER, etc.) located within the dictionary and therefore within Prom. However, it is possible to start a new vocabulary and define words into it with the following sequence:

FLOATING POINT

Woods Hole FORTH has optional floating point functions. They are based on a software package from RCA (see RCA documentaiton MPM-207) which was adapted to be callable from FORTH. The file is called FLOAT.CM (Floating Point Arithmetic Subroutines) and is loaded separately in high memory by the word FLOATING. The file FFORTH.CM has floating point already compiled.

The internal representaton of the floating point numbers is 32 bits; 1 byte exponent and 3 byte mantissa stored in 2's complement notation. The exponent and the mantissa must have a leading decimal point. Since floating point numbers are 32 bits long, the same as FORTH double precision numbers, words such as 2DUP and 2ROT may be used to manipulate them.

A functional description of the Floating Point words is given below. Wherever possible, words correspond to Laboratory Microsystems PC FORTH for the IBM PC, and secondly to Laboratory Microsystems Z80 FORTH for CP/M systems.

The following symbols are used when describing stack behavior:

F = signed floating point number (32 bits)

D = signed double precision fixed point number (32 bits)

N = signed single precision fixed point number (16 bits)

f = flag; false = 0, true = non-zero (16 bits)

FLOAT < ... F > Float

Usage: FLOAT -.xxxxxx -yy. FLOAT converts a six digit mantissa and two digit exponent (base 10). All digits and decimal points must be present. Negative signs are optional. The floating point number, F, is left on the stack.

D->F < D ... F > Convert Double Precision to Floating Point

D->F converts a signed double precision fixed point number to a floating point number. D must be between 7FFFFFF and -7FFFFFF(h) and is interpreted as an integer without decimal point.

F. < F ... > Floating Point

Print

F. prints the floating point number in the format

-.xxxxxx -yy. All digits are printed.

FQUAD < F1 F2 F3 ... F4 F5 > Floating Point
Quadratic
solution

FQUAD solves the equations $F1(x^2) + F2(x) + F3 = 0$ and
returns the roots F4 and F5.

F@ < ADDR ... F > Floating Point
Fetch

Fetch the floating point number F from ADDR.

F! < F ADDR ... > Floating Point
Store

Store floating point number F at ADDR.

F+ < F1 F2 ... F3 > Floating Point
Add

F+ adds F1 and F2 to yield F3.

F- < F1 F2 ... F3 > Floating Point
Subtract

F- subtracts F2 from F1 to yield F3.

F* < F1 F2 ... F3 > Floating Point
Mutiply

F* multiplies F1 and F2 to yield F3.

F/ < F1 F2 ... F3 > Floating point
Divide

F/ divides F1 by F2 to yield F3.

FABS	< F1 ... F2 >	Floating Point Absolute Value
F2 is equal to the absolute value of F1.		
FMINUS	< F1 ... F2 >	Floating Point Minus
F2 is equal to the negative of F1.		
FSQRT	< F1 ... F2 >	Floating Point Square Root
F2 is equal to the square root of F1. F1 must be positive.		
FO>	< F ... flag >	Floating Point Zero greater than
FO> leaves a flag on the stack. The flag is true if F is greater than or equal to zero.		
FO=	< F ... flag >	Floating Point Zero equal
FO= leaves a flag on the stack. The flag is true if F is equal to zero.		
FSIN	< F1 ... F2 >	Floating Point Sine
F2 is equal to sin(F1). $-1 < F2 < 1$. F1 is in degrees.		
FCOS	< F1 ... F2 >	Floating Point Cosine
F2 is equal to the cosine of F1. F1 is in degrees.		
FARCTAN	< F1 ... F2 >	Floating Point Arctangent
F2 is equal to the arctangent of F1. F2 is in degrees.		

FEXP	< F1 ... F2 >	Floating Point Exponential
------	---------------	-------------------------------

FLN	< F1 ... F2 >	Floating point
		Natural Log

F**	< F1 F2 ... F3 >	Floating Point Exponentiation
-----	------------------	----------------------------------

```

FPI          < ... Fl >          Floating Point Pi
          Fl is equal to Pi, .31460 01

```

In addition to the Floating Point words, the double precision words 2ROT, 2SWAP, 2DUP, 2OVER, and 2DROP are useful in manipulating floating point numbers. They work just like their single precision counterparts.

Message	90	LN
Message	91	EXP
Message	92	D->F
Message	93	FSQRT
Message	94	F/
Message	95	F*
Message	96	F-
Message	97	F+
Message	98	FLOAT
Message	99	F.

If the user wishes to trap errors, the word (ABORT) can be patched to run a user trap routine.

Screen 223 is a floating point example screen. The sequence:

223 LOAD (cr)

will generate the examples.

The file FLOAT.CM must exist on the default drive for floating point to function, except when using FFORTH.CM, which has the file already incorporated.

DOCUMENTATION UTILITIES

Woods Hole FORTH includes many screens utilized in documenting a particular application of FORTH. There are two load screens which, by themselves, document the current FORTH environment. Screen 73 will provide complete printed documentation, while screen 74 will provide a brief document. Chapters 11 thru 22 of this manual were printed on a Diablo 620 printer connected to a uart at group E0h with the sequence:

SERPRINTER DIABLO 73 LOAD (cr).

Screens 233 thru 236 contain additional documentation words. A particularly useful word, MEMORY-MAP is contained on screen 235. This word displays the current memory map. An example is given in chapter 20.

The FORTH decompiler, inspired by Ray Duncan of Laboratory Microsystems is compiled into WFORTH.CM because it is extremely useful and simple to use. The sequence:

DECOMPILE ANY.WORD (cr)

will show the construction of any word defined by a colon definition, along with memory addresses for every entry in the word. The Decompiler is invaluable when debugging new FORTH words.

WFORTH provides support for a parallel (Centronics type) printer with the RCA 18S646 card, and a serial printer, using the uart at COMM.GRP. As supplied, WFORTH supports the parallel printer; to use a serial printer, merely invoke the word SERPRINTER. If permanent serial support is desirable, simply execute :

SERPRINTER NOPRINT SAVE WFORTH.CM:l (cr) .

The code for printer support is located on screen 80. Screen 243 contains code to support a serial printer attached to a Televideo 910+ terminal. If this is desired, exchange screens 80 and 243 and then execute the sequence:

65 LOAD SAVE WFORTH.CM:l. (cr)

This will recompile WFORTH and save it. Obviously, any type of printer support can be written to screen 80 and recompiled into WFORTH.CM.

Screen 75 is the master example load screen. The sequence:

PRINTER 75 LOAD PAGE TEAR (cr)

will generate the examples listed in Chapter 20. Studying these examples is an excellent way to become familiar with FORTH.

Disk directories and Cluster Allocation Tables

The disk directories are provided for the two disks which normally occupy drive 0 and drive 1. The distribution disks do not contain any of the files associated with MDOS 1.0. Users must copy these programs from their operating system disk. The cluster allocation tables show how much of the disks are still available; one bit corresponds to one sector. The first disk, ALVIN OPERATING SYSTEM VERSION 1.800, occupies drive 0. The second disk, WOODS HOLE FORTH SCREEN FILE, occupies drive one. The cluster allocation table for this disk has been marked (with the word CAT-UPDATE) to show that the sectors corresponding to screens 65 through 249 are occupied. Many of these screens are in fact blank; consult the next chapter for a list of utilized screens. The screens do not show in the disk directory since they are not MDOS files. The operating system program SYSGEN.CM provides the best method for copying screen file disks. The sequence:

```
>SYSGEN ;E (cr)
```

will make an exact copy of a screen file disk. Note that this must be done when running MDOS, rather than when running WFORTH.

Drive 1 is used as the screen file disk so that a complete application or group of application versions of FORTH can be contained on one disk, both as source screens and as .CM files ready to be placed in Eprom or downloaded to a target system, while retaining the operating system on drive 0. Note that the operating system is not present on the screen file disk, but the MDOS programs SYSGEN.CM and COPY.CM are. The next chapter contains more information on the general subject of screen file organization.

Disk directories

Disk ID: ALVIN OPERATING SYSTEM VERSION 1.801

11 30 84

Directory Start

DIR .CM	36	MEM .CM	50	NEWDSK.SUB	53	GPH .CM	55
DOT .CM	65	VDL .SUB	68	REPLAY.SUB	70	FONT .CM	72
ASM8 .CM	78	RENAME.CM	103	ALVIN .DOC	109	GRAPH .BAS	118
DUMP .SUB	127	ADT .CM	129	SUBVDL.CM	132	SYSGEN.CM	138
FREE .CM	156	FORMAT.CM	159	SER .CM	163	ASM4TH.CM	165
FFORTH.CM	172	EXAM .CM	238	MEMTST.CM	249	WFORTH.CM	251
Z .TMP	289	FSP2 .CM	316	SERIAL.SUB	325	COPY .CM	327
CDSBIN.CM	331	DELETE.CM	335	UVX4TH.CM	337	DUMP .BAS	367
BRP .CM	370	FORTH .CM	375	SUBMIT.CM	389	DEL .CM	402
U .CM	406	DIAG .CM	408	BASIC2.CM	412	GRAPH .SUB	439
ORD .CM	441	VDR1 .CM	444	FTAB .CM	454	AFORTH.CM	457
OP .SYS	10	VERIFY.CM	495	PRINT .CM	501	XREF .CM	505
EDIT .CM	517	PROM25.CM	530	WAIT .CM	536	SCIVDL.CM	539
NAV4TH.CM	545	DIVE .DOC	587	DIVE .BAK	589	VDL .CM	592
FTABL .CM	602						

Cluster allocation table

071F1	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF	
07201	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF	
07211	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF	
07221	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF	
07231	FF FF FF FF FF FF FF FF FF FF FC 00 00 01 00 00	

Disk ID: WOODS HOLE FORTH SCREEN FILE VER 1.801

11 30 84

Directory Start

FLOAT .CM	121	ASM4TH.CM	48	FFORTH.CM	55	SYSGEN.CM	558
WFORTH.CM	502	FORTH .CM	540	COPY .CM	554	AFORTH.CM	10

Cluster allocation table

061E1	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF	1F	
061F1	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF		
06201	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF		
06211	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF	1F	
06221	FF FF FF FF FF FF FF 80 00 00 00 00 00 01 00 00		

Screen Index

This section contains the index to the sources for all FORTH words which are appended to FORTH.CM. The easiest way to find the source for any of these words is to scan the index until the desired word is found, and then consult the corresponding screen. The index has been generated by the FORTH word INDEX , which prints the first line (line 0) of each screen. This is effective because the following convention has been followed. The first line of each screen is considered the index line. The index line contains the names of all words defined on that screen, as well as any other relevant information, such as the name of the author or the general type of words defined. No actual code is contained on line zero. INDEX uses the word ?INDEX to determine whether line 0 is a valid index line and only valid index lines are printed.

There is a general system of screen organization, as listed below.

<u>Range</u>	<u>Type</u>	<u>Comments</u>
65 - 79	Load screens	All of the load screens are contained here.
80 - 99	FORTH words	Miscellaneous useful forth words
100 - 111	Comm words	All of the communication words are defined here, as well as SERPRINTER, which is considered a Comm word.
112 - 115	Decompiler	The decompiler is defined.
116 - 122	Editor	The fig-Editor and the full screen editor EDIT are defined.
123 - 130	FORTH Dos	The FORTH disk operating system is defined.
131 - 142	Assembler	The FORTH Assembler is defined.
143 - 163	Floating	FORTH floating point is defined.
165 - 218	Applications	This group of 54 screens is available to the user for writing application words and programs.
219 - 224	Examples	This group of screens contains the sources for the examples in chapter 20.
225 - 233	Documentation	This group of screens contains the sources for FORTH self-documentation words.
234 - 249	Reference	This group of screens is included for reference. These include additional printer support words, assembler and editor extensions, teaching words, and a few screens from the fig-FORTH publication FORTH DIMENSIONS.


```

65 ( Master recursive load screen) ( FLOATING) ( Akens WHOI)
66 ( Load screen used after raw ASM8 output, then 65 LOAD, Akens)
67 ( Communications utilities load screen) ( Akens, WHOI)
68 ( Decompiler load screen QUIT.FLAG WORD.PTR; R Duncan, J Akens)
69 ( fig-FORTH portable editor load screen) ( William F. Ragsdale)
70 ( FORTH-DOS Disk utilities load screen) ( Akens, WHOI)
71 ( ASSEMBLER load screen) ( CODE END-CODE) ( Akens, McDaniels)
72 ( Floating point load screen) ( Stetten, Akens)
73 ( Load screen for complete printed documentation, Akens WHOI)
74 ( Load screen for brief printed documentation, Akens WHOI)
75 ( EXAMPLES load screen) ( Akens, WHOI)
76 ( ASM4TH load screen)
77 ( AFORTH load screen)
79 ( parptr serptry) ( Parallel and serial printer support)
80 ( PRINTER PARPRINTER NOPRINT)
81 ( U.R LOAD LOADTHRU ASMBR) ( incorporated after ASM8 output)
83 ( OVERLAYS) ( Patch version number in ABORT)
84 ( 2DROP 2DUP 2SWAP ZEROES D.RLZ U.RLZ HEX. DEC.)
85 ( NODISK BELL BEEP CMOVE> COPY NOT >IN WORD-79)
86 ( NEXTUSER ALLOTUSER QUOTE BYE CHAPTER) ( USER var utilities)
87 ( ESC ID SEC MSEC CLS NEW-FENCE .VHDR .FOOT ROMIT) ( Akens WHOI)
88 ( N. ?Y/N Y? VLIST)
89 ( Match MATCH)
90 ( .ASCII DUMP)
91 ( ?EF1-?EF4 W1-W4 WN1-WN4 SETQ RETQ ) ( EF, Q Utilities)
92 ( CASE OF ENDOF ENDCASE ) ( Charles Eaker, FORTH DIM. II/3)
93 ( DOS ASSEMBLER) ( Akens WHOI)
94 ( DEPTH .S DUMP-TERM SCREEN-DUMP VOCAB?)
95 ( VMOVE VCOPY VSHADOW) ( Vram utilities)
96 ( ?SPACE ?ASCII ?INDEX ?SCREEN INDEX)
97 ( SPREADSCREEN) ( Akens WHOI)
98 ( PARPTR PAGE TEAR DISKLIST) ( Akens WHOI)
99 ( )
100 ( COMM.CTL TERM.CTL STATUS CTL=> MODEM COMM TERM CONS ESC')
101 ( COMMUNIT RCVBRK RCVC RCVCHAR? RSTBRK SENDBRK) ( Comm utils 2)
102 ( EMIT' TRC SENDC SENDCHAR? UART U) ( Comm utils 3)
103 ( ONHOOK OFFHOOK DIALINIT DIALTONE ?CARRIER TS) ( Comm utils 4)
104 ( TS TONE) ( Comm utils 5)
105 ( RE-ENTER DIAL ORIGINATE) ( Comm utils 6)
106 ( Ansinit ANSWER) ( Comm utilities 7)
107 ( SEND-SCREEN GET-SCREEN) ( Screen transfer utils 8 )
108 ( CS CRS 2**N CHANNEL-SELECT CHANNEL-RESET ?KEY ?MONITOR)
109 ( Xmit XMIT) ( Comm utils 10)
110 ( CR' U.. ?HEXCHAR CLEAR-KEY SERPRINTER) ( Comm utils 11)
111 ( AH->B v V) ( Comm utils 12)
112 ( PDOTQ.DSP WORD.DSP BRANCH.DSP CV.DSP CONST.DSP) ( Decompiler)
113 ( USRV.DSP VAR.DSP DOES>.DSP) ( Decompiler 2)
114 ( DECOMPILE) ( Decompiler 3)
115 ( DECOMPILE, CONTINUED) ( Decompiler 4)
116 ( TEXT LINE EDITOR WHERE #LOCATE #LEAD) ( EDITOR 1)
117 ( #LAG -MOVE H E S D M T L) ( EDITOR 2)
118 ( R P I TOP CLEAR) ( EDITOR 3)
119 ( lLINE FIND DELETE N F) ( EDITOR 4)
120 ( B X TILL C T L ) ( EDITOR 5)
121 ( GOTOXY SETEDIT .CUR !CUR +CUR +.CUR +LIN HOM !BLK S.ERASE)

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Screen index for:

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122 ( EDIT EDITL) ( end EDITOR 8)
123 ( EOF IOCB SECTOR NEWSDW) ( FORTH-DOS 1)
124 ( GETSEC Open DISKID) ( FORTH-DOS 2)
125 ( .DIRSEC DIR NEWLSN) ( FORTH DOS 3)
126 ( FNAME FILEID) ( FORTH DOS 5)
127 ( OPEN) ( FORTH DOS 6)
128 ( .AH .BYTE .AHL .AHP) ( Ascii-hex dump words, FORTH DOS 7)
129 ( F-LEN SAVE SEND) ( FORTH DOS 8)
130 ( DOWNLOAD FILELOAD) ( end FORTH DOS)
131 ( R0 R1 R2 R3 R4 R5 R6 R7 R8 R9 RA RB RC RD RE RF) ( Registers)
132 ( END-CODE C; ENDCODE) ( 1806 ASSEMBLER 2)
133 ( IS ?SBERROR) ( 1806 ASSEMBLER 3)
134 ( T5 T4 T3 T2 T1 NX IP UP SP PC RP IV DMAV) ( Register Equates)
135 ( CRN LDN LDA INP PLO ETC) ( 1806 ASSEMBLER 5)
136 ( 1BFI 1BSB ETC ) ( 1806 ASSEMBLER 6)
137 ( 2BFI LBR LBQ LBZ LBDF LBNQ LBNZ LBNF) ( 1806 ASSEMBLER 7)
138 ( 1BOP IDLE IRX ETC) ( 1 byte op codes, 1806 ASSEMBLER 8)
139 ( 2BOP 1BF2BOP 2BF2BOP CR2BOP etc) ( 1806 ASSEMBLER 9 )
140 ( LBL1 LBL2 LBL3 LBL4 LAB1: LAB2: LAB3: LAB4: LAB1 LAB2 LAB3)
141 ( A.0 A.1 PAGE) ( 1806 ASSEMBLER 11)
142 ( ?NEXTPAGE ?PAGESPACE PAGEJUMP PAGEADJUST 1806 ASSEMBLER 12)
143 ( F0> F0=) ( Floating 0)
144 ( FLOAT.CM linkage) ( Floating 1)
145 ( BUFF FSPW) ( Floating USER variables) ( Floating 2)
146 ( [F.] ) ( Floating 3)
147 ( F. ) ( Floating 4)
148 ( [FLOAT] ) ( Floating 5)
149 ( [F+] F+ ) ( Floating 6)
150 ( [F-] F- FMINUS FABS) ( Floating 7)
151 ( [F*] F* ) ( Floating 8)
152 ( [F/] F/ ) ( Floating 9)
153 ( [FSQRT] FSQRT) ( Floating 10)
154 ( 2OVER 2ROT) ( Floating 11)
155 ( FQUAD) ( Quadratic solution) ( Floating 12)
156 ( F@ F!) ( Floating 13)
157 ( FSIN) ( Floating 14)
158 ( FCOS) ( Floating 15)
159 ( FARCTAN) ( Floating 16)
160 ( [FEXP] FEXP) ( Floating 17)
161 ( [FLN] FLN) ( Floating 18)
162 ( F** FPI) ( Floating 19)
163 ( FLOAT D->F) ( Floating 20)
164 ( SCOPY)
219 ( Load screen for file listings) ( Akens WHOI)
220 ( ASSEMBLER Examples 2) ( Akens WHOI)
221 ( Decompiler example screen) ( Akens, WHOI)
223 ( Floating point examples) ( Akens, WHOI)
224 ( FORTH DOS examples) ( Akens, WHOI)
225 ( .VHDR3 VLIST3)
226 ( CAT-UPDATE .CAT VLIST2) ( Cluster allocation table utilities)
227 ( .INDEX DIR' DIRECTORIES INDEX2 DUMP2) ( DOCUMENT words)
228 ( SHOW.VAR SHOW.USER) ( Decompiler 5)
229 ( SHOW.CONST SHOW.VOCAB) ( Decompiler 6)
230 ( ZFLAG ZZDICT ZHERE ZZEND ZNAME ZINSERT ZPRINT, Alphabetical )
231 ( ZSORT ZLIST ZZEDLIST) ( Vocabulary list)

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Screen index for:

Disk ID: WOODS HOLE FORTH SCREEN FILE VER 1.801

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232 ( FILEID CR? .File .FILSEC) ( Akens WHOI)
233 ( .FILE LISTFILES) ( Akens WHOI)
234 ( SET80 SET60 DIABLO) ( line printer words) ( Akens WHOI)
235 ( .BLOCKHDR .BUFSTAT MEMORY-MAP)
236 ( IOCB-SHOW) ( FORTH DOS teaching word)
237 ( ALVIN PLOTTER ALNAV PC1 PC2 ALVIN-RESET) ( Top lab comm utils)
238 ( COMM TERM BREAKC RCVC BREAKT TRC RCVT U ) ( Fast Uart at E0)
239 ( fig-FORTH portable editor extensions, by Kim Harris; untested)
240 ( SEARCH ) ( OVER RANGE OF SCREENS ) ( WFR, FORTH DIM III P 9 )
241 ( ASSEMBLER Examples ) ( Akens WHOI)
242 ( 0= Q=0 DF=1 ENDIF THEN IF ELSE BEGIN UNTIL AGAIN WHILE REPEAT)
243 ( NOPRINT PRINTER ) ( Load scn for serial printer from TV 910+)
244 ( VOC-LINK XX VV FIX-VOC-LINKS) ( JOHN C. CLARK)
245 ( BEGIN.MOD END.MOD) ( JOE BARNHART)
246 ( FORGET.MOD) ( JOE BARNHART)
247 ( CASE-EXAMPLE ) ( Ray Duncan, Laboratory Microsystems)
249 ( TEST SCREEN ) ( 5038 )
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Vocabulary List

This chapter is a list of all words in the FORTH VOCABULARY. The words are listed in the order in which they were defined, most recently defined word first. The name field address (NFA) is also listed. This provides an index to the memory dump if you wish to examine the complete dictionary entry for the word. The complete explanation for each word is given in the Glossary, chapter 25. A diagram explaining the dictionary entry format is shown below. The diagram includes some of the FORTH words which access fields within dictionary entries.

There are 6 pre-defined types of dictionary entries. These are Code definitions, Colon definitions, CONSTANTS, VARIABLES, USER variables and VOCABULARY definitions. Other types, such as string constants and string variables may be defined by the user for specific applications. Refer to the FORTH ENCYCLOPEDIA for complete details.

The lengths of the name field and the parameter field are variable. The link field and the code field are always two bytes long. The link field address points to the name field of the word previously defined in the present VOCABULARY. The code field address points to the code which is actually executed when the word is invoked. The code field of a code word points to the parameter field which contains machine code. For all other types of words, the code field points to code which interprets the entries in the parameter field. The dictionary is composed of a number of dictionary entries threaded together via the link field addresses. The end of the dictionary is signified by a link field address of 0000. Each word which defines a VOCABULARY entry contains a pointer to the most recently defined word in that particular VOCABULARY (ie FORTH EDITOR ASSEMBLER).

418B DOCUMENT	4180 TASK	416B FLOATING	4156 DOCUMENT
410F DISKLIST	4100 TEAR	40E3 PAGE	40BC PARPTR
3E2E DECOMPILE	3E06 VOCAB.DSP	3DDE DOES>.DSP	3DB6 VAR.DSP
3D77 USERV.DSP	3D4D CONST.DSP	3D2F CV.DSP	3D01 BRANCH.DSP
3CB6 WORD.DSP	3C8A PDOTQ.DSP	3C7B WORD.PTR	3C6B QUIT.FLAG
3C20 FILELOAD	3BC9 DOWNLOAD	3B78 SEND	3B35 SAVE
3B01 F-LEN	3ADC .AHP	3AB7 .AHL	3A99 .BYTE
3A6F .AH	38B2 OPEN	388F FILEID	3851 FNAME
37B6 NEWLSN	3775 DIR	36DF .DIRSEC	369E DISKID
366D Open	35EC GETSEC	359B NEWSDW	3552 SECTOR
3547 IOCB	353D EOF	34CC SPREADSCREEN	3494 INDEX
344A ?SCREEN	3401 ?INDEX	33E0 ?ASCII	33CD ?SPACE
3385 VSHADOW	3343 VCOPY	332B VMOVE	32D1 VOCAB?
32B7 SCREEN-DUMP	325B DUMP-TERM	3228 .S	320E DEPTH
31F8 ASSEMBLER	31D1 DOS	318C V	30FA v
30D2 AH->B	30A9 SERPRINTER	308F CLEAR-KEY	304A ?HEXCHAR
303A U..	302A CR'	2FF7 XMIT	2FBE Xmit
2F87 ?MONITOR	2F66 MONABORT	2F55 ?KEY	2F3B CHANNEL-RESET
2F20 CHANNEL-SELECT	2F00 CRS	2EED CS	2EC4 2**N
2E67 GET-SCREEN	2E2F SEND-SCREEN	2DF8 ANSWER	2DD6 Ansinit
2D85 ORIGINATE	2D54 DIAL	2CFA RE-ENTER	2BA1 TONE
2B54 TS	2B0F ?CARRIER	2A9D DIALTONE	2A78 DIALINIT
2A5E OFFHOOK	2A45 ONHOOK	2A3B U	29F3 UART
29D1 SENDCHAR?	29B3 SENDC	298F TRC	2981 EMIT'
2945 SENDBRK	2926 RSTBRK	2905 RCVCHAR?	28E2 RCV C
28BB RCVBRK	28A6 COMMINT	2891 ESC'	2882 CONS
2871 TERM	2860 COMM	284E MODEM	283E CTL=>
282D STATUS	281E TERM.CTL	280F COMM.CTL	27EF CLEAR
27DD EDITL	26AE EDIT	256D CUR	255F L
2553 T	2261 WHERE	224E EDITOR	222D LINE
220E TEXT	21DC ENDCASE	21B6 ENDOF	218D OF
2176 CASE	216B RETQ	2160 SETQ	2158 WN4
2150 WN3	2148 WN2	2140 WN1	2139 W4
2132 W3	212B W2	2124 W1	211B ?EF4
2112 ?EF3	2109 ?EF2	2100 ?EF1	2093 DUMP
202C .ASCII	1FDC MATCH	1F9E Match	1EFE VLIST
1ED0 Y?	1E9D ?Y/N	1E6C N.	1E2E ROMIT
1DC7 .FOOT	1D93 .VHDR	1D47 NEW-FENCE	1D37 CLS
1D1E MSEC	1CFA SEC	1CD1 ID	1CC7 ESC
1CB9 CHAPTER	1CAB BYE	1C97 QUOTE	1C86 ALLOTU
1C57 NEXTUSER	1C45 WORD-79	1C39 >IN	1C2D NOT
1BF8 COPY	1BBD CMOVE>	1BB0 BEEP	1B9F BELL
1B80 NODISK	1B67 DEC.	1B4E HEX.	1B3C U.RLZ
1B16 D.RLZ	1AF1 ZEROES	1ADD 2SWAP	1ACE 2DUP
1ABE 2DROP	1AB2 ASM BR	1A95 LOADTHRU	1A26 LOAD
1A16 U.R	19E8 NOPRINT	19C5 PARPRINTER	1969 PRINTER
194A serptr	192A parptr	18FE FLUSH	18B3 LIST
18A4 OK	1892 (DOS)	1883 MON	186D DR1
182F FORTH	181F DR0	17FD -->	17CA LOAD
17B4 GROUP	179D CDER	178C Cder	1736 R/W
16D6 BLOCK	168D BUFFER	166F EMPTY-BUFFERS	1650 UPDATE
1625 +BUF	1613 .LINE	15EC (LINE)	15D7 S->D
15AF MESSAGE	15A2 U.	1596 ?	158A .
157B D.	156A .R	1546 D.R	152F #S
1505 #	14EC SIGN	14D5 #>	14C6 <#

Nfa	Name	Vocabulary list					
14A5	SPACES	1495	WHILE	1474	ELSE	145F	IF
1442	REPEAT	142C	AGAIN	1420	END	140A	UNTIL
13F4	+LOOP	13DF	LOOP	13CE	DO	13C1	THEN
13A9	ENDIF	1397	BEGIN	138A	BACK	137B	*/
1367	*/MOD	1359	MOD	134B	/	1338	/MOD
1311	M/	12D2	FORGET	12BE	'	12B0	(
1298	IMMEDIATE	127A	[COMPILE]	124B	."	1239	;
11DE	ABORT	11B3	QUIT	1199	DEFINITIONS	1164	VOCABULARY
1114	INTERPRET	10E9	?STACK	10CC	DLITERAL	10B0	LITERAL
108D	DOES>	107B	<BUILDS	106A	USER	1055	VARIABLE
1040	CONSTANT	1026	!CODE	1002	:	0F9D	CREATE
0F69	ID.	0F51	MIN	0F20	ERROR	0F10	(ABORT)
0EE6	-FIND	0E8D	NUMBER	0E40	(NUMBER)	0DF3	WORD
0DB9		0D9D	QUERY	0D2C	EXPECT	0D16	;CODE
0CFE	(;CODE)	0CE8	DECIMAL	0CD6	HEX	0CC1	SMUDGE
0CB1	]	0CA3	[	0C87	COMPILE	0C6C	?LOADING
0C53	?CSP	0C3E	?PAIRS	0C28	?EXEC	0C10	?COMP
0BF5	?ERROR	0BE1	PFA	0BCB	NFA	0BB8	LATEST
0B91	TRAVERSE	0B82	D+-	0B74	+-	0B57	PAD
0B3A	(. ")	0B10	-TRAILING	0AFB	COUNT	0AE7	!CSP
0ADF	CFA	0AD3	LFA	0AC8	2-	0AB7	1-
0A9F	C,	0A80	,	0A64	ALLOT	0A4C	HERE
09FF	M/MOD	09CD	BLOCK-WRITE	09A5	BLOCK-READ	095B	SPACE
092C	TYPE	0904	CR	08F5	EMIT	08DE	?TERMINAL
08C9	KEY	08AA	HOLD	088F	BLANKS	087E	ERASE
0861	FILL	0835	INPUT	0810	OUTPUT	0804	Nextu
07F5	COMM.GRP	07E6	TERM.GRP	07D6	MODEM.GRP	07CC	GRP
07C1	OUTL	07B3	SCR/DSK	07A3	USER-IOCB	0798	PREV
078E	USE	0784	HLD	077B	R#	0771	CSP
0767	FLD	075D	DPL	0752	BASE	0746	STATE
0738	CURRENT	072A	CONTEXT	071D	OFFSET	0713	SCR
0709	OUT	0700	IN	06F6	BLK	06E7	VOC-LINK
06DE	DP	06D2	FENCE	06C4	WARNING	06B8	WIDTH
06AE	TIB	06A5	R0	069C	S0	067E	+ORIGIN
0671	ORIGIN	0665	B/SCR	0659	B/BUF	064D	LIMIT
0641	FIRST	0637	L/P	062D	C/L	0624	BL
061C	3	0614	2	060C	1	0604	0
0571	M*	0563	*	0541	MAX	0532	DABS
0524	ABS	050F	-DUP	04F8	ROT	04EB	C!
04DC	!	04CC	C@	04BB	@	04A7	TOGGLE
0496	DUP	0482	SWAP	0476	DROP	0460	OVER
0444	DMINUS	042A	MINUS	0411	D+	0401	-
03ED	+	03E2	2+	03D0	1+	03C0	+
03AA	>	038C	<	036F	=	0362	0<
034D	0=	0342	I	0331	R>	0323	>R
0313	LEAVE	02F4	CMOVE	02CB	DIGIT	02BB	;S
02A5	RP!	0291	SP!	0280	SP@	026E	XOR
025D	OR	024B	AND	0235	U*	01FF	U/
01ED	EXECUTE	018C	ENCLOSE	0178	0BRANCH	0169	BRANCH
0154	(DO)	0143	LIT	00EC	(FIND)	00C9	(+LOOP)
00A5	(LOOP)	0055	EF	002D	WARM	000D	COLD

Alphabetical Vocabulary List

This chapter contains an alphabetically sorted list of the FORTH VOCABULARY. The first name in the list is the FORTH word NULL, which is a nonprinting character.

A diagram explaining the dictionary entry format is shown below. The diagram includes some of the FORTH words which access fields within the dictionary entry.

There are 6 pre-defined types of dictionary entries. These are Code definitions, Colon definitions, CONSTANTS, VARIABLES, USER variables and VOCABULARY definitions. Other types, such as string constants and string variables may be defined by the user for specific applications. Refer to the FORTH ENCYCLOPEDIA for complete details.

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0DB9	04DC !	1026 !CODE	0AE7 !CSP
1505 #	14D5 #>	152F #S	12BE '
12B0 (	00C9 (+LOOP)	0B3A (.")	0CFE (;CODE)
0F10 (ABORT)	0154 (DO)	1892 (DOS)	00EC (FIND)
15EC (LINE)	00A5 (LOOP)	0E40 (NUMBER)	0563 *
137B */	1367 */MOD	03C0 +	03ED +!
0B74 +-	1625 +BUF	13F4 +LOOP	067E +ORIGIN
0A80 ,	0401 -	17FD -->	050F -DUP
0EE6 -FIND	0B10 -TRAILING	158A .	124B ."
3A6F .AH	3AB7 .AHL	3ADC .AHP	202C .ASCII
3A99 .BYTE	36DF .DIRSEC	1DC7 .FOOT	1613 .LINE
156A .R	3228 .S	1D93 .VHDR	134B /
1338 /MOD	0604 0	0362 0<	034D 0=
0178 0BRANCH	060C 1	03D0 1+	0AB7 1-
0614 2	2EC4 2**N	03E2 2+	0AC8 2-
1ABE 2DROP	1ACE 2DUP	1ADD 2SWAP	061C 3
1002 :	1239 ;	0D16 ;CODE	02BB ;S
038C <	14C6 <#	107B <BUILDS	036F =
03AA >	1C39 >IN	0323 >R	1596 ?
33E0 ?ASCII	2B0F ?CARRIER	0C10 ?COMP	0C53 ?CSP
2100 ?EF1	2109 ?EF2	2112 ?EF3	211B ?EF4
0BF5 ?ERROR	0C28 ?EXEC	304A ?HEXCHAR	3401 ?INDEX
2F55 ?KEY	0C6C ?LOADING	2F87 ?MONITOR	0C3E ?PAIRS
344A ?SCREEN	33CD ?SPACE	10E9 ?STACK	08DE ?TERMINAL
1E9D ?Y/N	04BB @	11DE ABORT	0524 ABS
142C AGAIN	30D2 AH->B	0A64 ALLOT	1C86 ALLOTU
024B AND	2DF8 ANSWER	1AB2 ASMBR	31F8 ASSEMBLER
2DD6 Ansinit	0659 B/BUF	0665 B/SCR	138A BACK
0752 BASE	1BB0 BEEP	1397 BEGIN	1B9F BELL
0624 BL	088F BLANKS	06F6 BLK	16D6 BLOCK
09A5 BLOCK-READ	09CD BLOCK-WRITE	0169 BRANCH	3D01 BRANCH.DSP
168D BUFFER	1CAB BYE	04EB C!	0A9F C,
062D C/L	04CC C@	2176 CASE	179D CDER
0ADF CFA	2F3B CHANNEL-RESET	2F20 CHANNEL-SELECT	1CB9 CHAPTER
27EF CLEAR	308F CLEAR-KEY	1D37 CLS	02F4 CMOVE
1BB0 CMOVE>	000D COLD	2860 COMM	280F COMM.CTL
07F5 COMM.GRP	28A6 COMMINIT	0C87 COMPILE	2882 CONS
3D4D CONST.DSP	1040 CONSTANT	072A CONTEXT	1BF8 COPY
0AFB COUNT	0904 CR	302A CR'	0F9D CREATE
2F00 CRS	2EED CS	0771 CSP	283E CTL=>
256D CUR	0738 CURRENT	3D2F CV.DSP	178C Cder
0411 D+	0B82 D+-	157B D.	1546 D.R
1B16 D.RLZ	0532 DABS	1B67 DEC.	0CE8 DECIMAL
3E2E DECOMPILE	1199 DEFINITIONS	320E DEPTH	2D54 DIAL
2A78 DIALINIT	2A9D DIALTONE	02CB DIGIT	3775 DIR
369E DISKID	410F DISKLIST	10CC DLITERAL	0444 DMINUS
13CE DO	418B DOCUMENT	4156 DOCUMENT	108D DOES>
3DDE DOES>.DSP	31D1 DOS	3BC9 DOWNLOAD	06DE DP
075D DPL	181F DR0	186D DR1	0476 DROP
2093 DUMP	325B DUMP-TERM	0496 DUP	26AE EDIT
27DD EDITL	224E EDITOR	0055 EF	1474 ELSE
08F5 EMIT	2981 EMIT'	166F EMPTY-BUFFERS	018C ENCLOSE
1420 END	21DC ENDCASE	13A9 ENDIF	21B6 ENDOF
353D EOF	087E ERASE	0F20 ERROR	1CC7 ESC

2891 ESC'	0D2C EXPECT	3B01 F-LEN	06D2 FENCE
01ED EXECUTE	3C20 FILELOAD	0861 FILL	0641 FIRST
388F FILEID	416B FLOATING	18FE FLUSH	3851 FNAME
0767 FLD	182F FORTH	2E67 GET-SCREEN	35EC GETSEC
12D2 FORGET	07CC GRP	0A4C HERE	0CD6 HEX
17B4 GROUP	0784 HLD	08AA HOLD	0342 I
1B4E HEX.	0F69 ID.	145F IF	1298 IMMEDIATE
1CD1 ID	3494 INDEX	0835 INPUT	1114 INTERPRET
0700 IN	08C9 KEY	255F L	0637 L/P
3547 IOCB	0313 LEAVE	0AD3 LFA	064D LIMIT
0BB8 LATEST	18B3 LIST	0143 LIT	10B0 LITERAL
222D LINE	17CA LOAD	1A95 LOADTHRU	13DF LOOP
1A26 LOAD	1311 M/	09FF M/MOD	1FDC MATCH
0571 M*	15AF MESSAGE	0F51 MIN	042A MINUS
0541 MAX	284E MODEM	07D6 MODEM.GRP	1883 MON
1359 MOD	1D1E MSEC	1F9E Match	1E6C N.
2F66 MONABORT	37B6 NEWLSN	359B NEWSDW	1C57 NEXTUSER
1D47 NEW-FENCE	1B80 NODISK	19E8 NOPRINT	1C2D NOT
0BCB NFA	0804 Nextu	218D OF	2A5E OFFHOOK
0E8D NUMBER	18A4 OK	2A45 ONHOOK	38B2 OPEN
071D OFFSET	0671 ORIGIN	2D85 ORIGINATE	0709 OUT
025D OR	0810 OUTPUT	0460 OVER	366D Open
07C1 OUTL	40E3 PAGE	19C5 PARPRINTER	40BC PARPTR
0B57 PAD	0BE1 PFA	0798 PREV	1969 PRINTER
3C8A PDOTQ.DSP	11B3 QUIT	3C6B QUIT.FLAG	1C97 QUOTE
0D9D QUERY	1736 R/W	06A5 R0	0331 R>
077B R#	28E2 RCVC	2905 RCVCHAR?	2CFA RE-ENTER
28BB RCVBRK	216B RETQ	1E2E ROMIT	04F8 ROT
1442 REPEAT	2926 RSTBRK	15D7 S->D	069C S0
02A5 RP!	0713 SCR	07B3 SCR/DSK	32B7 SCREEN-DUMP
3B35 SAVE	3552 SECTOR	3B78 SEND	2E2F SEND-SCREEN
1CFA SEC	29B3 SENDC	29D1 SENDCHAR?	30A9 SERPRINTER
2945 SENDBRK	14EC SIGN	0CC1 SMUDGE	0291 SP!
2160 SETQ	095B SPACE	14A5 SPACES	34CC SPREADSCREEN
0280 SP@	282D STATUS	0482 SWAP	2553 T
0746 STATE	4100 TEAR	2871 TERM	281E TERM.CTL
4180 TASK	220E TEXT	13C1 THEN	06AE TIB
07E6 TERM.GRP	2BA1 TONE	0B91 TRAVERSE	298F TRC
04A7 TOGGLE	092C TYPE	2A3B U	0235 U*
2B54 TS	303A U..	1A16 U.R	1B3C U.RLZ
15A2 U.	29F3 UART	140A UNTIL	1650 UPDATE
01FF U/	106A USER	07A3 USER-IOCB	3D77 USERV.DSP
078E USE	3DB6 VAR.DSP	1055 VARIABLE	3343 VCOPY
318C V	332B VMOVE	06E7 VOC-LINK	3E06 VOCAB.DSP
1EFE VLIST	1164 VOCABULARY	3385 VSHADOW	2124 W1
32D1 VOCAB?	2132 W3	2139 W4	002D WARM
212B W2	2261 WHERE	1495 WHILE	06B8 WIDTH
06C4 WARNING	2148 WN2	2150 WN3	2158 WN4
2140 WN1	1C45 WORD-79	3CB6 WORD.DSP	3C7B WORD.PTR
0DF3 WORD	026E XOR	2FBF Xmit	1ED0 Y?
2FF7 XMIT	0CA3 [	127A [COMPILE]	0CB1]
1AF1 ZEROES	194A serptr	30FA v	
192A parptr			

USER Variables

This chapter contains a list of all USER variables, including some used for documentation. The offset added to the beginning of the USER variable area (normally 5700h) gives the location where the value of the variable is actually stored. This table was generated by the word SHOW.USER, located on screen 228. Because the compiled code for this word is fairly long, it is not included in WFORTH.CM, however, it is an extremely useful word when developing programs. Therefore the user may find it helpful to compile this word during program development and discard it when the application is working properly.

NAME	TYPE	OFFSET	VALUE
NO	USER	5700h	0
NO	USER	5701h	0
YES	USER	5702h	0
YES	USER	5703h	0
YES	USER	5704h	0
YES	USER	5705h	0
YES	USER	5706h	0
YES	USER	5707h	0
YES	USER	5708h	0
YES	USER	5709h	0
YES	USER	570Ah	0
YES	USER	570Bh	0
YES	USER	570Ch	0
YES	USER	570Dh	0
YES	USER	570Eh	0
YES	USER	570Fh	0
YES	USER	5710h	0
YES	USER	5711h	0
YES	USER	5712h	0
YES	USER	5713h	0
YES	USER	5714h	0
YES	USER	5715h	0
YES	USER	5716h	0
YES	USER	5717h	0
YES	USER	5718h	0
YES	USER	5719h	0
YES	USER	571Ah	0
YES	USER	571Bh	0
YES	USER	571Ch	0
YES	USER	571Dh	0
YES	USER	571Eh	0
YES	USER	571Fh	0
YES	USER	5720h	0
YES	USER	5721h	0
YES	USER	5722h	0
YES	USER	5723h	0
YES	USER	5724h	0
YES	USER	5725h	0
YES	USER	5726h	0
YES	USER	5727h	0
YES	USER	5728h	0
YES	USER	5729h	0
YES	USER	572Ah	0
YES	USER	572Bh	0
YES	USER	572Ch	0
YES	USER	572Dh	0
YES	USER	572Eh	0
YES	USER	572Fh	0
YES	USER	5730h	0
YES	USER	5731h	0
YES	USER	5732h	0
YES	USER	5733h	0
YES	USER	5734h	0
YES	USER	5735h	0
YES	USER	5736h	0
YES	USER	5737h	0
YES	USER	5738h	0
YES	USER	5739h	0
YES	USER	573Ah	0
YES	USER	573Bh	0
YES	USER	573Ch	0
YES	USER	573Dh	0
YES	USER	573Eh	0
YES	USER	573Fh	0
YES	USER	5740h	0
YES	USER	5741h	0
YES	USER	5742h	0
YES	USER	5743h	0
YES	USER	5744h	0
YES	USER	5745h	0
YES	USER	5746h	0
YES	USER	5747h	0
YES	USER	5748h	0
YES	USER	5749h	0
YES	USER	574Ah	0
YES	USER	574Bh	0
YES	USER	574Ch	0
YES	USER	574Dh	0
YES	USER	574Eh	0
YES	USER	574Fh	0
YES	USER	5750h	0
YES	USER	5751h	0
YES	USER	5752h	0
YES	USER	5753h	0
YES	USER	5754h	0
YES	USER	5755h	0
YES	USER	5756h	0
YES	USER	5757h	0
YES	USER	5758h	0
YES	USER	5759h	0
YES	USER	575Ah	0
YES	USER	575Bh	0
YES	USER	575Ch	0
YES	USER	575Dh	0
YES	USER	575Eh	0
YES	USER	575Fh	0
YES	USER	5760h	0
YES	USER	5761h	0
YES	USER	5762h	0
YES	USER	5763h	0
YES	USER	5764h	0
YES	USER	5765h	0
YES	USER	5766h	0
YES	USER	5767h	0
YES	USER	5768h	0
YES	USER	5769h	0
YES	USER	576Ah	0
YES	USER	576Bh	0
YES	USER	576Ch	0
YES	USER	576Dh	0
YES	USER	576Eh	0
YES	USER	576Fh	0
YES	USER	5770h	0
YES	USER	5771h	0
YES	USER	5772h	0
YES	USER	5773h	0
YES	USER	5774h	0
YES	USER	5775h	0
YES	USER	5776h	0
YES	USER	5777h	0
YES	USER	5778h	0
YES	USER	5779h	0
YES	USER	577Ah	0
YES	USER	577Bh	0
YES	USER	577Ch	0
YES	USER	577Dh	0
YES	USER	577Eh	0
YES	USER	577Fh	0
YES	USER	5780h	0
YES	USER	5781h	0
YES	USER	5782h	0
YES	USER	5783h	0
YES	USER	5784h	0
YES	USER	5785h	0
YES	USER	5786h	0
YES	USER	5787h	0
YES	USER	5788h	0
YES	USER	5789h	0
YES	USER	578Ah	0
YES	USER	578Bh	0
YES	USER	578Ch	0
YES	USER	578Dh	0
YES	USER	578Eh	0
YES	USER	578Fh	0
YES	USER	5790h	0
YES	USER	5791h	0
YES	USER	5792h	0
YES	USER	5793h	0
YES	USER	5794h	0
YES	USER	5795h	0
YES	USER	5796h	0
YES	USER	5797h	0
YES	USER	5798h	0
YES	USER	5799h	0
YES	USER	57A0h	0
YES	USER	57A1h	0
YES	USER	57A2h	0
YES	USER	57A3h	0
YES	USER	57A4h	0
YES	USER	57A5h	0
YES	USER	57A6h	0
YES	USER	57A7h	0
YES	USER	57A8h	0
YES	USER	57A9h	0
YES	USER	57AAh	0
YES	USER	57ABh	0
YES	USER	57ACh	0
YES	USER	57ADh	0
YES	USER	57AEh	0
YES	USER	57AFh	0
YES	USER	57B0h	0
YES	USER	57B1h	0
YES	USER	57B2h	0
YES	USER	57B3h	0
YES	USER	57B4h	0
YES	USER	57B5h	0
YES	USER	57B6h	0
YES	USER	57B7h	0
YES	USER	57B8h	0
YES	USER	57B9h	0
YES	USER	57BAh	0
YES	USER	57Bbh	0
YES	USER	57BCh	0
YES	USER	57BDh	0
YES	USER	57BEh	0
YES	USER	57BFh	0
YES	USER	57C0h	0
YES	USER	57C1h	0
YES	USER	57C2h	0
YES	USER	57C3h	0
YES	USER	57C4h	0
YES	USER	57C5h	0
YES	USER	57C6h	0
YES	USER	57C7h	0
YES	USER	57C8h	0
YES	USER	57C9h	0
YES	USER	57CAh	0
YES	USER	57CBh	0
YES	USER	57CCh	0
YES	USER	57CDh	0
YES	USER	57CEh	0
YES	USER	57CFh	0
YES	USER	57D0h	0
YES	USER	57D1h	0
YES	USER	57D2h	0
YES	USER	57D3h	0
YES	USER	57D4h	0
YES	USER	57D5h	0
YES	USER	57D6h	0
YES	USER	57D7h	0
YES	USER	57D8h	0
YES	USER	57D9h	0
YES	USER	57DAh	0
YES	USER	57DBh	0
YES	USER	57DCh	0
YES	USER	57DDh	0
YES	USER	57DEh	0
YES	USER	57DFh	0
YES	USER	57E0h	0
YES	USER	57E1h	0
YES	USER	57E2h	0
YES	USER	57E3h	0
YES	USER	57E4h	0
YES	USER	57E5h	0
YES	USER	57E6h	0
YES	USER	57E7h	0
YES	USER	57E8h	0
YES	USER	57E9h	0
YES	USER	57EAh	0
YES	USER	57EBh	0
YES	USER	57ECh	0
YES	USER	57EDh	0
YES	USER	57EEh	0
YES	USER	57EFh	0
YES	USER	57F0h	0
YES	USER	57F1h	0
YES	USER	57F2h	0
YES	USER	57F3h	0
YES	USER	57F4h	0
YES	USER	57F5h	0
YES	USER	57F6h	0
YES	USER	57F7h	0
YES	USER	57F8h	0
YES	USER	57F9h	0
YES	USER	57FAh	0
YES	USER	57FBh	0
YES	USER	57FCh	0
YES	USER	57FDh	0
YES	USER	57FEh	0
YES	USER	57FFh	0

USER variables

Name	Type	Offset	Value
WORD.PTR	USER	96 (0060h),	Currently = 15494 (3C86h)
QUIT.FLAG	USER	94 (005Eh),	Currently = 1 (0001h)
IOCB	USER	84 (0054h),	Currently = 502 (01F6h)
CUR	USER	82 (0052h),	Currently = 255 (00FFh)
CHAPTER	USER	80 (0050h),	Currently = 15 (000Fh)
Nextu	USER	30 (001Eh),	Currently = 106 (006Ah)
COMM.GRP	USER	28 (001Ch),	Currently = 224 (00E0h)
TERM.GRP	USER	26 (001Ah),	Currently = 1 (0001h)
MODEM.GRP	USER	24 (0018h),	Currently = 240 (00F0h)
GRP	USER	68 (0044h),	Currently = 1 (0001h)
OUTL	USER	66 (0042h),	Currently = 15 (000Fh)
SCR/DSK	USER	22 (0016h),	Currently = 315 (013Bh)
USER-IOCB	USER	54 (0036h),	Currently = 256 (0100h)
PREV	USER	52 (0034h),	Currently = 23515 (5BDBh)
USE	USER	50 (0032h),	Currently = 24543 (5FDFh)
HLD	USER	48 (0030h),	Currently = 19498 (4C2Ah)
R#	USER	46 (002Eh),	Currently = 0 (0000h)
CSP	USER	44 (002Ch),	Currently = 22008 (55F8h)
FLD	USER	42 (002Ah),	Currently = 50 (0032h)
DPL	USER	40 (0028h),	Currently = -1 (FFFFh)
BASE	USER	38 (0026h),	Currently = 16 (0010h)
STATE	USER	36 (0024h),	Currently = 0 (0000h)
CURRENT	USER	34 (0022h),	Currently = 6205 (183Dh)
CONTEXT	USER	32 (0020h),	Currently = 16796 (419Ch)
OFFSET	USER	78 (004Eh),	Currently = 315 (013Bh)
SCR	USER	76 (004Ch),	Currently = 247 (00F7h)
OUT	USER	74 (004Ah),	Currently = 45 (002Dh)
IN	USER	72 (0048h),	Currently = 658 (0292h)
BLK	USER	64 (0040h),	Currently = 73 (0049h)
VOC-LINK	USER	20 (0014h),	Currently = 16798 (419Eh)
DP	USER	18 (0012h),	Currently = 19432 (4BE8h)
FENCE	USER	16 (0010h),	Currently = 16779 (418Bh)
WARNING	USER	14 (000Eh),	Currently = 0 (0000h)
WIDTH	USER	12 (000Ch),	Currently = 31 (001Fh)
TIB	USER	10 (000Ah),	Currently = 22016 (5600h)
R0	USER	8 (0008h),	Currently = 22270 (56FEh)
S0	USER	6 (0006h),	Currently = 22014 (55FEh)

CONSTANTS, VARIABLES, and VOCABULARIES

This chapter contains a list of the CONSTANTS, VARIABLES, and VOCABULARIES. These lists were generated by the words SHOW.CONST , SHOW.VAR , and SHOW.VOCAB respectively. Because the compiled code for these words is quite lengthy, they are not compiled into WFORTH, but the sources for these words are located on screens 228 and 229. Note that very few VARIABLES are used in WFORTH. This is because VARIABLES will not work in an Eprom system, a primary application of Woods Hole FORTH.

VARIABLES

Name	Type	Value
TEMP.CTR	VARIABLE	25 (0010h)
CONF.CTR	VARIABLE	25 (0010h)

VOCABULARIES

VOCABULARY EDITOR
VOCABULARY FORTH
VOCABULARY EXTERNAL

CONSTANTS

Name	Type	Value
EOF	CONSTANT , Currently =	19 (0013h)
ESC	CONSTANT , Currently =	27 (001Bh)
ORIGIN	CONSTANT , Currently =	6209 (1841h)
B/SCR	CONSTANT , Currently =	1 (0001h)
B/BUF	CONSTANT , Currently =	1024 (0400h)
LIMIT	CONSTANT , Currently =	32767 (7FFFh)
FIRST	CONSTANT , Currently =	22487 (57D7h)
L/P	CONSTANT , Currently =	60 (003Ch)
C/L	CONSTANT , Currently =	64 (0040h)
BL	CONSTANT , Currently =	32 (0020h)
3	CONSTANT , Currently =	3 (0003h)
2	CONSTANT , Currently =	2 (0002h)
1	CONSTANT , Currently =	1 (0001h)
0	CONSTANT , Currently =	0 (0000h)
EF	CONSTANT , Currently =	94 (005Eh)

VARIABLES

Name	Type	Value
TERM.CTL	VARIABLE , Currently =	29 (001Dh)
COMM.CTL	VARIABLE , Currently =	29 (001Dh)

VOCABULARIES

VOCABULARY DOCUMENT
 VOCABULARY EDITOR
 VOCABULARY FORTH

Screen Listings

This chapter contains listings for all screens used in creating WFORTH.CM, FFORTH.CM, and AFORTH.CM. It is sometimes helpful to examine the source for a word when trying to understand its behavior. In addition, the screens frequently contain comments which provide a better explanation of the word than that in the Glossary.

This chapter was generated by the sequence:

DECIMAL PRINTER 65 249 DISKLIST PAGE TEAR (cr)

SCREEN 65

```

0 ( Master recursive load screen) ( FLOATING) ( Akens WHOI)
1  BASE @ DECIMAL      0 FENCE ! FORTH FORGET ASMBR
2                      80 Nextu ! 80 42 +ORIGIN !
3 : ASMBR ; ( marks the end of the ASM8 output)
4 83 92 LOADTHRU ( Load miscellaneous words)
5 69 LOAD ( Load the fig-EDITOR and EDIT)
6 67 LOAD ( Load the communications utilities)
7 93 97 LOADTHRU ( Load miscellaneous words)
8 70 LOAD ( Load Forth-DOS)
9 68 LOAD ( Load the Decompiler)
10 98 LOAD ( Load more printer words)
11 : FLOATING 72 LOAD ; ( Define floating point load word)
12
13 : TASK ; ( Mark the end of this load sequence)
14 NEW-FENCE ( Protect all newly compiled words)
15 CR BASE ! ;S

```

SCREEN 66

```

0 ( Load screen used after raw ASM8 output, then 65 LOAD, Akens)
1
2 BASE @ DECIMAL
3
4
5 80 LOAD ( Load printer words)
6 81 LOAD ( Mark the end of ASM8 output)
7
8 BASE ! ;S
9
10 By the sequence:
11 66 LOAD PRINTER 65 LOAD NOPRINT SAVE WFORTH.CM:1 (cr)
12 it is possible to document the process of compiling
13 WFORTH.CM:1 . Once screen 66 has been compiled to FORTH.CM,
14 it is possible to recursively develop application programs
15 by the sequence: 65 LOAD SAVE Filespec .

```

SCREEN 67

```

0 ( Communications utilities load screen) ( Akens, WHOI)
1  BASE @ DECIMAL
2
3 100 111 LOADTHRU
4
5
6  BASE ! ;S
7
8 These words will run at 1200 baud. There are two important
9 concepts, TERM, and COMM. TERM, or terminal,
10 selects the proper uart GROUP number for communications
11 normally directed to the operator, usually GROUP 1 in the
12 1804 environment. COMM or communications selects the
13 proper uart GROUP number for communications normally
14 directed to an external device, usually GROUP E0(Hex).
15

```

SCREEN 68

```
0 ( Decompiler load screen QUIT.FLAG WORD.PTR; R Duncan, J Akens)
1   BASE @ DECIMAL
2
3 NEXTUSER    QUIT.FLAG
4 NEXTUSER    WORD.PTR
5
6 112 114 LOADTHRU
7
8 BASE ! ;S
9
10
11   ( Screens 228 and 229 have more SHOW words)
12
13
14
15
```

SCREEN 69

```
0 ( fig-FORTH portable editor load screen) ( William F. Ragsdale)
1 BASE @ DECIMAL
2
3 116 122 LOADTHRU
4
5
6 : CLEAR SCR ! 16 0 DO FORTH I EDITOR E LOOP ; ( SCR# ... )
7
8 BASE ! ;S
9
10
11
12
13
14
15
```

SCREEN 70

```
0 ( FORTH-DOS Disk utilities load screen) ( Akens, WHOI)
1 BASE @ DECIMAL
2
3 123 130 LOADTHRU
4
5 BASE ! ;S
6
7 IOCB is the input output control block
8 SDW is the segment description word
9
10
11
12
13
14
15
```


SCREEN 71

```

0 ( ASSEMBLER load screen) ( CODE END-CODE) ( Akens, McDaniels)
1 BASE @ HEX
2 CR
3 VOCABULARY ASSEMBLER IMMEDIATE
4 : CODE ?EXEC CREATE [COMPILE] ASSEMBLER
5 [COMPILE] HEX !CSP ; IMMEDIATE
6
7 ASSEMBLER DEFINITIONS
8 DP @ C700 DP ! ( Load ASSEMBLER at C700H, save DP on stack)
9 DECIMAL
10
11 131 142 LOADTHRU CR HEX ." Assembler ends at " HERE U. CR
12
13 DP ! ( Restore dictionary pointer [DP] )
14 FORTH DEFINITIONS
15 ASSEMBLER BASE ! ;S

```

SCREEN 72

```

0 ( Floating point load screen) ( Stetten, Akens)
1 BASE @ HEX
2
3 FLUSH 6FEF ' LIMIT ! ( Reserve 6FEF - 7FFF for FLOATING)
4 HERE 7000 DP ! ( Save DP, move DP to 7000)
5 FILELOAD FLOAT.CM ( Load FLOAT.CM)
6 6FFF ' CREATE 6 + ! ( Patch CREATE to compile above stack)
7 DECIMAL
8 143 163 LOADTHRU ( Load floating point screens)
9 HEX A0 ' CREATE 6 + ! ( Restore CREATE)
10 DP ! ( Restore DP)
11 : FLOATING CR ." Floating point is loaded" CR ;
12 FLOATING
13 ' > 2 - ' SAVE E + ! ( Patch SAVE to work for WFORTH.CM)
14 BASE ! ;S
15

```

SCREEN 73

```

0 ( Load screen for complete printed documentation, Akens WHOI)
1 DECIMAL
2 VOCABULARY DOCUMENT IMMEDIATE DOCUMENT DEFINITIONS
3 225 233 LOADTHRU
4 FORTH DEFINITIONS PRINTER DOCUMENT
5 37 FLD ! ( Reset the page counter, FLD)
6 1 OUTL ! ( Reset the line counter, OUTL)
7 PAGE DIRECTORIES
8 PAGE DECIMAL 65 249 INDEX2
9 PAGE VLIST2 1 FLD +! 1 CHAPTER +! PAGE ZLIST 1 FLD +! 1 CHAPTER
10 +! PAGE SHOW.USER .FOOT 1 FLD +! 1 CHAPTER +!
11 PAGE SHOW.CONST SHOW.VAR SHOW.VOCAB .FOOT DECIMAL 1 CHAPTER +!
12 1 FLD +! PAGE 65 249 DISKLIST 1 FLD +! 1 CHAPTER +!
13 PAGE VLIST3 1 FLD +! 1 CHAPTER +!
14 PAGE 0 HERE DUMP2 1 FLD +! 1 CHAPTER +!
15 PAGE DECIMAL 75 LOAD DOCUMENT LISTFILES PAGE TEAR COLD

```

SCREEN 74

```

0 ( Load screen for brief printed documentation, Akens WHOI)
1  DECIMAL
2
3  VOCABULARY DOCUMENT IMMEDIATE DOCUMENT DEFINITIONS
4
5  225 231 LOADTHRU
6  FORTH DEFINITIONS    PRINTER DOCUMENT
7  0 FLD ! ( Reset the page counter, FLD)
8  1 OUTL ! ( Reset the line counter, OUTL) 1 CHAPTER !
9  PAGE DIRECTORIES    1 CHAPTER +!
10 PAGE DECIMAL 65 249 INDEX2    1 CHAPTER +!
11 PAGE VLIST2 1 CHAPTER +!    PAGE ZLIST 1 CHAPTER +!
12 PAGE SHOW.USER .FOOT    1 CHAPTER +!
13 PAGE SHOW.CONST SHOW.VAR SHOW.VOCAB .FOOT DECIMAL 1 CHAPTER +!
14 PAGE DECIMAL 175 218 DISKLIST
15 PAGE TEAR    COLD

```

SCREEN 75

```

0 ( EXAMPLES load screen) ( Akens, WHOI)
1  BASE @ DECIMAL
2
3  ( This screen generates chapter 20)
4
5  CR
6  75 LIST
7  221 LOAD ( run decompiler examples)
8  224 LOAD ( run FORTH DOS examples)
9  247 LOAD ( run CASE examples) .FOOT PAGE
10 241 LOAD ( run assembler examples) FLUSH
11 223 LOAD ( run floating point examples) .FOOT PAGE
12
13
14 BASE ! ;S
15

```

SCREEN 76

```

0 ( ASM4TH load screen)
1
2  DECIMAL
3
4  FILELOAD ASM4TH.CM
5
6  ' ABORT 10 +ORIGIN !
7
8  COLD
9
10
11
12
13
14
15

```


SCREEN 77

```

0 ( AFORTH load screen)
1 BASE @ DECIMAL
2
3 ASSEMBLER DECIMAL NEW-FENCE
4
5 : ASMLOAD 76 LOAD ;
6
7 ' ASMLOAD 10 +ORIGIN !
8
9 SAVE AFORTH.CM:1
10
11 ." MEM from C600 to CFFF as ASM4TH.MEM:1" CR
12 ." CDSBIN ASM4TH.MEM:1 ASM4TH.CM:1:" CR
13
14 DOS
15

```

SCREEN 79

```

0 ( parptr serptr)      ( Parallel and serial printer support)
1 BASE @ HEX           ( This only works if EMIT is in RAM)
2 CREATE parptr      HERE DUP 2- ! D5 C, ( Parallel printer code)
3     E361 , 01E4 ,   ( Group 1 select)
4     HERE 34 C, C,
5     24F0 ,   ( This word does nothing in FORTH, but)
6     FA7F ,   ( holds the code that is executed when)
7     FBFF ,   ( the printer is enabled, and the word)
8     5466 , E3 C, 6101 ,   ( EMIT is used.)
9     E2 C, 6896 , SMUDGE
10 CREATE serptr  HERE DUP 2- ! D5 C, ( Serial printer code)
11     E361 , E0E4 , 2424 , HERE 6B C, FA80 , 32 C, C, 1462 ,
12     E3 C, 6101 , E2 C, 6896 , SMUDGE   ( Uses uart at COMM.GRP)
13
14 BASE ! ;S
15

```

SCREEN 80

```

0 ( PRINTER PARPRINTER NOPRINT)
1 BASE @ DECIMAL      ( This only works if EMIT is in RAM)
2 79 LOAD HEX
3 : PRINTER ( ... ) ( Turn printer on by patching EMIT)
4 C0 ' BLOCK-READ 12 - C! ' parptr 1+ ' BLOCK-READ 11 - !
5 TERM.GRP @ DUP ' parptr 11 + C! ' serptr 10 + C!
6 COMM.GRP @ ' serptr 3 + C! ;
7
8 : PARPRINTER   ( This word selects the parallel printer)
9 ' parptr      ' PRINTER 12 + ! PRINTER ;
10
11 : NOPRINT ( ... ) ( Turn printer off by removing patch)
12     E2 ' BLOCK-READ 12 - C! 6896 ' BLOCK-READ 11 - ! ;
13
14 BASE ! ;S
15

```

SCREEN 81

```

0 ( U.R LOAD LOADTHRU ASMBR) ( incorporated after ASM8 output)
1 BASE @ DECIMAL
2
3 : U.R 0 SWAP D.R ;      ( U R... )
4
5 : LOAD DECIMAL CR      ( SCN#... )
6 ." Load" DUP 4 U.R DUP 0 SWAP SPACE ." , " BASE @ HERE HEX 4
7   U.R BASE ! SPACE .LINE SPACE BLK @ >R IN @ >R 0 IN ! BLK !
8   INTERPRET R> IN ! R> BLK ! ?TERMINAL IF QUIT THEN ;
9
10 : LOADTHRU 1+ SWAP DO I LOAD LOOP ; ( START.SCN END.SCN ... )
11
12 : ASMBR ; ( This is the word used as a fence when recompiling)
13
14 BASE ! ;S
15

```

SCREEN 83

```

0 ( OVERLAYS)              ( Patch version number in ABORT)
1
2   BASE @ HEX
3   38 ' ABORT 2C + C!
4   3030 ' ABORT 2D + ! ( VERSION NUMBER)
5
6   BASE ! ;S
7
8 ' 0= 2- ' ABORT 47 + ! ( Defeat disk initialization for
9                        systems without disks)
10
11 ' DR0 2- ' ABORT 43 + ! ( Change default drive to drive 0)
12
13
14
15

```

SCREEN 84

```

0 ( 2DROP 2DUP 2SWAP ZEROES D.RLZ U.RLZ HEX. DEC.)
1 BASE @ HEX
2
3 : 2DROP DROP DROP ; ( N1 N2 ... )
4 : 2DUP OVER OVER ; ( N1 N2 ...N1 N2 N1 N2)
5 : 2SWAP ROT >R ROT R> ; ( N1 N2 N3 N4...N3 N4 N1 N2)
6
7 : ZEROES ( < #.OF.ZEROES ... > Print zeroes, used like SPACES)
8   0 MAX -DUP IF 0 DO 30 EMIT LOOP THEN ;
9 : D.RLZ ( < D #.LEADING.ZEROES ... > Print D with leading 0's)
10   >R SWAP OVER DABS <# #S SIGN #> R> OVER - ZEROES TYPE ;
11 : U.RLZ 0 SWAP D.RLZ ; ( U #.LEADING.ZEROES ... )
12
13 : HEX. BASE @ HEX SWAP . BASE ! ; ( Number ... )
14 : DEC. BASE @ DECIMAL SWAP . BASE ! ; ( Number ... )
15 BASE ! ;S

```


SCREEN 85

```

0 ( NODISK BELL BEEP CMOVE> COPY NOT >IN WORD-79)
1 BASE @ HEX
2 : NODISK ' 0= 2- ' ABORT 47 + ! ; ( ... )
3
4
5 : BELL 7 EMIT ; : BEEP BELL ; ( Pseudonym for BELL)
6
7 : CMOVE> ( CMOVE UP < SRC.ADDR DEST.ADDR LEN ... >)
8 DUP ROT + ROT ROT DUP ROT + SWAP 1+ 1 DO 2DUP
9 I - C@ SWAP I - C! LOOP 2DROP ;
10
11 : COPY OFFSET @ + SWAP 1 OVER + SWAP DO ( SOURCE# DEST# ... )
12 DUP I BLOCK 2 - ! 1+ UPDATE LOOP DROP FLUSH ; ( COPY SCRN)
13
14 : NOT 0= ; : >IN IN ; : WORD-79 WORD HERE ;
15 BASE ! ;S

```

SCREEN 86

```

0 ( NEXTUSER ALLOTUSER QUOTE BYE CHAPTER) ( USER var utilities)
1 BASE @ HEX
2
3
4 : NEXTUSER Nextu @ 2 Nextu +! ( ... )
5 DUP D4 > IF 19 MESSAGE QUIT
6 THEN USER ; ( Usage: NEXTUSER NAME)
7
8 : ALLOTU Nextu +! ; ( N ... )
9
10 : QUOTE 22 EMIT SPACE ;
11
12 : BYE FLUSH MON ; ( ... )
13 NEXTUSER CHAPTER ( Chapter number)
14
15 BASE ! ;S

```

SCREEN 87

```

0 ( ESC ID SEC MSEC CLS NEW-FENCE .VHDR .FOOT ROMIT) ( Akens WHOI)
1 BASE @ DECIMAL
2 27 CONSTANT ESC ( ESCAPE)
3 : ID ' ABORT DUP 13 + 16 TYPE SPACE 34 + 13 TYPE ;
4 : SEC 256 * 1 DO 20 1 DO LOOP LOOP ; ( SECONDS ... )
5 : MSEC 5 * 0 DO LOOP ; ( MILLISECONDS ... )
6 : CLS 26 EMIT ; ( CLEARSCREEN)
7 : NEW-FENCE LATEST 12 +ORIGIN ! HERE 28 +ORIGIN ! ( ... )
8 HERE 30 +ORIGIN ! HERE FENCE ! VOC-LINK @ 32 +ORIGIN !
9 Nextu @ 42 +ORIGIN ! ;
10 : .VHDR ." Nfa Name" 16 SPACES ." Vocabulary list" CR CR ;
11 : .FOOT OUTL @ L/P 1- - DUP 0< IF MINUS L/P MIN
12 0 DO CR LOOP ELSE DROP THEN 0 OUTL ! ID 5 SPACES ( ... )
13 ." Chapter " CHAPTER @ DEC. 15 SPACES ." page " FLD @ DEC. ;
14 HEX : ROMIT HERE 800 / 1+ 800 * DUP DP ! 1- ( ... )
15 ." ROM it from 0 to " HEX. NODISK NEW-FENCE ; BASE ! ;S

```

SCREEN 88

```

0 ( N. ?Y/N Y? VLIST)
1   BASE @ HEX
2 : N. BASE @ >R DECIMAL DUP 5 .R ." (" HEX 4 U.RLZ ." h)" R>
3   BASE ! ;
4 : ?Y/N KEY DUP 59 = SWAP 79 = OR DUP IF ." Y" ELSE ." N" THEN
5   ( ... F) ( If Y F = 1; If <> Y or y F = 0 print Y or N) ;
6 : Y? ( ... ) ( Check KEY, If <> Y QUIT, otherwise continue)
7   CR ." Type Y to continue" ?Y/N IF ELSE OK QUIT THEN ;
8 : VLIST   BASE @ HEX   ( ... ) .VHDR
9   0 OUT ! CONTEXT @ @ BEGIN DUP DUP OUT @ 3C > IF CR 0 OUT !
10  THEN      0 <# # # # #> TYPE DUP 1+ C@ 80 -
11  IF SPACE ID. ELSE DROP THEN
12  14 OUT @ OVER MOD DUP IF ELSE DROP 14 THEN - SPACES
13  PFA LFA @ DUP 0= ?TERMINAL OR UNTIL DROP CR ID BASE ! ;
14  BASE ! ;S
15

```

SCREEN 89

```

0 ( Match MATCH)
1 BASE @ DECIMAL
2
3 : Match
4   -DUP IF OVER + SWAP
5   DO DUP C@ FORTH I C@ -
6   IF 0= LEAVE ELSE 1+ THEN LOOP   ELSE DROP 0= THEN ;
7
8 : MATCH ( CUR.ADDR #BYTES STRING.ADDR STRING.CNT ... F CUR.MOV)
9   >R >R 2DUP R> R> 2SWAP OVER + SWAP
10  DO 2DUP FORTH I SWAP Match
11  IF >R 2DROP R> - FORTH I SWAP - 0 SWAP 0 0 LEAVE
12  THEN LOOP 2DROP   SWAP 0= SWAP ;
13
14 BASE ! ;S
15

```

SCREEN 90

```

0 ( .ASCII DUMP)
1   BASE @ HEX
2
3 : .ASCII ( ADDR ... ) ( Print char at ADDR if ascii)
4   C@ DUP FE > IF DROP 2E THEN
5   DUP DUP 7F > SWAP A0 < AND IF DROP 2E THEN
6   DUP 7E - 0= IF DROP 2E THEN
7   DUP 20 < IF DROP 2E ENDIF EMIT ;
8
9 : DUMP ( START.ADDR LENGTH ... )
10  BASE @ ROT ROT HEX OVER + SWAP DO I DUP DUP CR 5 U.RLZ SPACE
11  10 + SWAP OVER OVER DO I C@ SPACE 2 U.RLZ LOOP 2 SPACES
12  DO I .ASCII LOOP ?TERMINAL IF LEAVE THEN 10 +LOOP
13  BASE ! CR ;
14
15  BASE ! ;S

```


SCREEN 91

```

0 ( ?EF1-?EF4 W1-W4 WN1-WN4 SETQ RETQ ) ( EF, Q Utilities)
1   BASE @ DECIMAL
2   EF      CREATE ?EF1 HERE 2- ! SMUDGE ( ... FLAG)
3   EF 4 + CREATE ?EF2 HERE 2- ! SMUDGE ( Get external flag)
4   EF 8 + CREATE ?EF3 HERE 2- ! SMUDGE
5   EF 12 + CREATE ?EF4 HERE 2- ! SMUDGE
6   EF 26 + CREATE W1 HERE 2- ! SMUDGE ( ... )
7   EF 29 + CREATE W2 HERE 2- ! SMUDGE ( Wait till EF true)
8   EF 32 + CREATE W3 HERE 2- ! SMUDGE
9   EF 35 + CREATE W4 HERE 2- ! SMUDGE
10  EF 38 + CREATE WN1 HERE 2- ! SMUDGE ( ... )
11  EF 41 + CREATE WN2 HERE 2- ! SMUDGE ( Wait till EF false)
12  EF 44 + CREATE WN3 HERE 2- ! SMUDGE
13  EF 47 + CREATE WN4 HERE 2- ! SMUDGE
14  HEX CREATE SETQ HERE DUP 2- ! 7BD5 , SMUDGE ( ... ) ( Set Q)
15      CREATE RETQ HERE DUP 2- ! 7AD5 , SMUDGE      BASE ! ;S

```

SCREEN 92

```

0 ( CASE OF ENDOF ENDCASE ) ( Charles Eaker, FORTH DIM. II/3)
1
2 : CASE ?COMP CSP @ !CSP 4 ; IMMEDIATE
3
4 : OF 4 ?PAIRS COMPILE OVER COMPILE = COMPILE 0BRANCH
5   HERE 0 , COMPILE DROP 5 ; IMMEDIATE
6
7 : ENDOF 5 ?PAIRS COMPILE BRANCH      HERE 0 ,
8   SWAP 2 [COMPILE] ENDIF 4 ; IMMEDIATE
9
10 : ENDCASE 4 ?PAIRS COMPILE DROP BEGIN SP@
11   CSP @ = 0= WHILE 2 [COMPILE]
12   ENDIF REPEAT CSP ! ; IMMEDIATE ( Load scn 247 for example)
13
14 ;S
15

```

SCREEN 93

```

0 ( DOS ASSEMBLER) ( Akens WHOI)
1   BASE @ HEX
2
3 : DOS      FLUSH
4   NEW-FENCE CR ." The DP is " HERE HEX . DECIMAL
5           (DOS);
6
7 DECIMAL
8
9 : ASSEMBLER 71 LOAD ;      IMMEDIATE
10
11 BASE ! ;S
12
13
14
15

```

SCREEN 94

```

0 ( DEPTH .S DUMP-TERM SCREEN-DUMP VOCAB?)
1  BASE @ HEX
2
3 : DEPTH SP@ S0 @ SWAP - 2 / ; ( ... DEPTH.OF.STACK)
4 : .S ( ... ) ( NONDESTRUCTIVE STACK PRINT)
5     DEPTH IF SP@ 2- S0 @ 2- DO I ? -2 +LOOP
6     ELSE ." Empty" THEN ; ( TOS ON RIGHT )
7 : DUMP-TERM ( ADDR LENGTH ... ) ( Dump to terminal)
8     BEGIN 100 - DUP 0 > IF OVER 100 ELSE OVER OVER 100 + THEN
9     DUMP DUP 0 > IF SWAP 100 + SWAP Y? 0 ELSE DROP DROP 1 THEN
10    UNTIL ;
11 : SCREEN-DUMP BLOCK 400 DUMP-TERM ; ( SCREEN.NUMBER ... )
12 : VOCAB? ( ... ) ( Explain vocabularies)
13     CONTEXT @ 4 - NFA ID. ." is the context, "
14     CURRENT @ 4 - NFA ID. ." is the current vocabulary" ;
15    BASE ! ;S

```

SCREEN 95

```

0 ( VMOVE VCOPY VSHADOW) ( Vram utilities)
1  BASE @ HEX ( Requires WHOI video RAM)
2
3 : VMOVE 10 GROUP 2 OUTPUT TERM ; ( PAGE ... )
4
5 : VCOPY ( PAGE ... )
6     DUP D0 VMOVE D000 USE @ 400 CMOVE
7     100 * D000 400 CMOVE VMOVE
8     USE @ D000 400 CMOVE ;
9
10 : VSHADOW ( PAGE ... )
11     DUP 90 VMOVE D000 USE @ 400 CMOVE
12     D000 400 20 FILL F0 VMOVE
13     USE @ D000 400 CMOVE VMOVE ; BASE ! ;S
14     The video ram is a 64 character by 16 line video display with
15     genlock input for sync timing. It is addressed as ram at PAGE.

```

SCREEN 96

```

0 ( ?SPACE ?ASCII ?INDEX ?SCREEN INDEX)
1
2  BASE @ DECIMAL
3
4 : ?SPACE 32 = ; ( CHARACTER ... FLAG) ( See if space [20H])
5 : ?ASCII DUP 32 < SWAP 126 > OR 0= ; ( CHAR...F) ( Printable ?)
6 : ?INDEX ( SCN#...F) ( See if scn has a valid INDEX line)
7     0 SWAP BLOCK DUP 64 + SWAP DO I C@ ?SPACE IF ELSE
8     DROP 1 THEN I C@ ?ASCII IF ELSE DROP 0 LEAVE THEN LOOP ;
9 : ?SCREEN ( SCRN# ... FLAG) ( SEE IF SCN IS ALL PRINTABLE CHAR)
10    0 SWAP BLOCK DUP 1024 + SWAP DO I C@ ?SPACE IF ELSE
11    DROP 1 THEN I C@ ?ASCII IF ELSE DROP 0 LEAVE THEN LOOP ;
12
13 : INDEX 1+ SWAP DO I ?INDEX IF CR I 3 .R SPACE 0 I .LINE THEN
14 ?TERMINAL IF LEAVE THEN LOOP CR ; ( FIRST.SCN LAST.SCN ... )
15    BASE ! ;S

```


SCREEN 97

```

0 ( SPREADSCREEN) ( Akens WHOI)
1 BASE @ DECIMAL
2
3 : SPREADSCREEN DUP DUP 0 SWAP ( SCN# ... )
4 1+ 250 SWAP DO I ?SCREEN IF ( Make blank scn at SCN#)
5 ELSE DROP I LEAVE THEN LOOP ( Search upward for blank scn)
6 DUP 0= IF ." No blank screen" QUIT ( Move all scns up)
7 ELSE DO I 1- I COPY -1 +LOOP THEN CLEAR FLUSH ;
8
9 BASE ! ;S
10
11
12
13
14
15

```

SCREEN 98

```

0 ( PARPTR PAGE TEAR DISKLIST) ( Akens WHOI)
1 BASE @ HEX
2
3 : PARPTR ( <CHAR ... > send CHAR to parallel port printer)
4 GRP @ SWAP 1 GROUP FF XOR WN1 6 OUTPUT GROUP ;
5 : PAGE 0D EMIT
6 8C EMIT 1 FLD +! ; ( < ... > New page, printer status same)
7
8 : TEAR PAGE NOPRINT ; ( ... ) ( New page, printer off)
9
10 : DISKLIST DISKID
11 ( STARTSCN# ENDSCN# ... ) ( Print scns)
12 0 ROT ROT 1+ SWAP DO I ?SCREEN IF I LIST 1+ THEN
13 DUP 2 > IF DROP 0 .FOOT PAGE DISKID THEN LOOP DROP .FOOT ;
14 DECIMAL : DOCUMENT 72 LOAD ;
15 BASE ! ;S

```

SCREEN 99

```

0 ( )
1 ;S
2
3
4
5
6
7
8
9
10
11
12
13
14
15

```

SCREEN 100

```

0 ( COMM.CTL TERM.CTL STATUS CTL=> MODEM COMM TERM CONS ESC' )
1   BASE @ HEX
2
3   1D VARIABLE COMM.CTL
4   1D VARIABLE TERM.CTL
5
6 : STATUS      3 INPUT      ; ( ... STATUS )
7 : CTL=>      3 OUTPUT      ; ( CONTROL.BYTE ... )
8
9 : MODEM      MODEM.GRP @ GROUP ; ( ... ) ( Select modem)
10 : COMM      COMM.GRP @ GROUP ; ( ... ) ( Sel uart at COMM.GRP)
11 : TERM      TERM.GRP @ GROUP ; ( ... ) ( Sel uart at TERM.GRP)
12 : CONS      1 GROUP      ; ( ... ) ( Sel uart at group 1)
13 : ESC' COMM 1B EMIT TERM ;
14
15   BASE ! ;S

```

SCREEN 101

```

0 ( COMMIT RCVBRK RCVC RCVCHAR? RSTBRK SENDBRK ) ( Comm utils 2)
1   BASE @ HEX
2 : COMMIT ( ... ) ( Initialize uart at comm group)
3   COMM.CTL @ CTL=> ;
4
5 : RCVBRK 2 INPUT DROP TERM ." Break received" ;
6 : RCVC 8 AND IF RCVBRK ELSE 2 INPUT TERM EMIT THEN ;
7 : RCVCHAR? DUP 1 AND IF RCVC ELSE DROP THEN ;
8 : RSTBRK STATUS 8 AND IF 2 INPUT DROP THEN ;
9 : SENDBRK 2 INPUT DROP
10   BEGIN 0
11   COMM 5D CTL=> STATUS RCVCHAR?
12   TERM ?EF4 IF COMM COMMIT 0 2 OUTPUT DROP 1
13   THEN UNTIL ;
14
15   BASE ! ;S

```

SCREEN 102

```

0 ( EMIT' TRC SENDC SENDCHAR? UART U ) ( Comm utils 3)
1   BASE @ HEX
2   CREATE EMIT' HERE DUP 2- ! E460 , 62D5 , SMUDGE
3
4 : TRC KEY DUP ESC = IF DROP DROP 1 ELSE COMM EMIT THEN ;
5 : SENDC 8 AND IF SENDBRK ELSE TRC THEN ;
6 : SENDCHAR? DUP 1 AND IF SENDC ELSE DROP THEN ;
7
8 : UART ( ... ) ( General word to talk to uart at comm group)
9   ( To change group, change variable COMM.GRP.)
10   ." Uart at group " BASE @ HEX COMM.GRP @ . CR BASE !
11   COMM COMMIT RSTBRK BEGIN 0
12   COMM STATUS RCVCHAR? TERM STATUS SENDCHAR?
13   UNTIL CR ;
14 : U UART ; ( Pseudonym for UART)
15   BASE ! ;S

```


SCREEN 103

```

0 ( ONHOOK OFFHOOK DIALINIT DIALTONE ?CARRIER TS) ( Comm utils 4)
1   BASE @ HEX
2
3 : ONHOOK  MODEM 0 7 OUTPUT TERM ; ( ... )
4 : OFFHOOK MODEM 1 7 OUTPUT TERM ; ( ... )
5 : DIALINIT MODEM 1 6 OUTPUT 23 7 OUTPUT TERM ; ( ... )
6 : DIALTONE DIALINIT 1 SEC MODEM 0A 6 OUTPUT 1 SEC ( ... )
7   0 400 0 DO
8     5 INPUT 1 AND IF ELSE 1 6 OUTPUT DROP 1 LEAVE THEN LOOP
9     IF ELSE ONHOOK ." No dial tone" CR QUIT THEN TERM ;
10 : ?CARRIER 0 100 0 DO MODEM 5 INPUT 2 AND IF DROP 1 TERM
11   LEAVE THEN 50 MSEC TERM ?TERMINAL IF LEAVE THEN LOOP ;
12 : TS ( TONESEND ) MODEM 23 7 OUTPUT FF 4 OUTPUT
13   1 6 OUTPUT 4 OUTPUT
14   40 MSEC FF 4 OUTPUT 3 7 OUTPUT 40 MSEC TERM ;
15   BASE ! ;S

```

SCREEN 104

```

0 ( TS TONE) ( Comm utils 5)
1 BASE @ HEX : TONE CASE ( TONE.SYMBOL ... )
2 2A OF E7 TS ENDOF ( *)
3 23 OF B7 TS ENDOF ( #)
4 30 OF D7 TS ENDOF ( 0)
5 31 OF EE TS ENDOF ( 1)
6 32 OF DE TS ENDOF ( 2)
7 33 OF BE TS ENDOF ( 3)
8 34 OF ED TS ENDOF ( 4)
9 35 OF DD TS ENDOF ( 5)
10 36 OF BD TS ENDOF ( 6)
11 37 OF EB TS ENDOF ( 7)
12 38 OF DB TS ENDOF ( 8)
13 39 OF BB TS ENDOF ( 9)
14 2C OF 250 MSEC ENDOF ( ,)
15 3B OF DIALTONE ENDOF ( ; ) ENDCASE ; BASE ! ;S

```

SCREEN 105

```

0 ( RE-ENTER DIAL ORIGINATE) ( Comm utils 6)
1 BASE @ HEX
2
3 : RE-ENTER MODEM.GRP @ COMM.GRP ! UART ." RE-ENTER ? "
4 ?Y/N IF ." Type RE-ENTER when ready" CR ELSE ONHOOK
5 E0 COMM.GRP ! THEN ;
6
7 : DIAL ONHOOK 1 SEC
8   DIALTONE 20 WORD HERE C@ 1+ 1 DO HERE I + C@ TONE LOOP ;
9
10 : ORIGINATE MODEM 7F 4 OUTPUT 1 6 OUTPUT 1 7 OUTPUT
11   5 SEC ?CARRIER TERM
12   IF ELSE ONHOOK ." No carrier" QUIT THEN RE-ENTER ;
13
14   BASE ! ;S
15

```

SCREEN 106

```

0 ( Ansinit ANSWER)                      ( Comm utilities 7)
1   BASE @ HEX
2
3 : Ansinit ' ASMBR DUP ' (ABORT) ! 0A +ORIGIN ! ;
4
5 : ANSWER Ansinit ONHOOK 1 SEC MODEM 0 6 OUTPUT 94 7 OUTPUT
6   COMMIT MODEM.GRP @ TERM.GRP ! TERM QUIT ;
7
8 ' ANSWER ' Ansinit 2+ !
9
10
11 BASE ! ;S
12
13
14
15

```

SCREEN 107

```

0 ( SEND-SCREEN GET-SCREEN)              ( Screen transfer utils 8 )
1   BASE @ HEX
2
3 : SEND-SCREEN DUP CR ." Sending Screen " . ( Screen# ... )
4   COMM CR BLOCK 400 TYPE TERM ;
5
6 : GET-SCREEN ." Getting Screen " DUP DUP . CR COMM
7   BLOCK 400 0 DO DUP I + COMM KEY      ( Screen# ... )
8   TERM ?TERMINAL IF LEAVE THEN
9   SWAP C! LOOP DROP UPDATE FLUSH TERM LIST ;
10
11 BASE ! ;S
12 SEND-SCREEN and GET-SCREEN are utilities to transfer screens
13 between FORTH systems, using a UART assigned to COMM.GRP.
14 To use: N GET-SCREEN at receiver,
15 then M SEND-SCREEN at transmitter. No handshaking, be careful.

```

SCREEN 108

```

0 ( CS CRS 2**N CHANNEL-SELECT CHANNEL-RESET ?KEY ?MONITOR)
1   BASE @ HEX      ( These words require WHOI Uart switcher card)
2
3 : 2**N ( N ... 2**N)
4   DUP 0= IF 1 ELSE 1 SWAP 0 DO 2 * LOOP THEN ;
5 : CS COMMIT 2**N 6 OUTPUT ;      ( CHANNEL.NUMBER ... )
6 : CRS 2**N 7 OUTPUT 10 MSEC 0 7 OUTPUT ; ( CHANNEL.NUMBER ... )
7 : CHANNEL-SELECT      ( CHANNEL.NUMBER ... )
8   COMM CS TERM ;
9 : CHANNEL-RESET      ( CHANNEL.NUMBER ... )
10  COMM CRS TERM ;
11 : ?KEY STATUS 1 AND ;      ( ... FLAG) ( 1 if KEY available)
12 : MONABORT TERM ." No monitor" QUIT ;
13 : ?MONITOR ." @" 200 MSEC ?KEY IF KEY 2A = IF ELSE
14   MONABORT THEN ELSE MONABORT THEN ;
15 BASE ! ;S

```


SCREEN 109

```

0 ( Xmit XMIT) ( Comm utils 10)
1 BASE @ HEX
2
3 : Xmit ( Assumes communication established with target MON)
4 ( USAGE: SOURCE LENGTH DEST Xmit < SOURCE LENGTH DEST ... >)
5   COMMUNIT ?MONITOR
6   ." I" U. SWAP DUP ROT + SWAP
7   DO I C@ 2 U.RLZ LOOP 0D EMIT 120 MSEC ;
8
9 : XMIT ( Assumes communication established with target MONITOR)
10 ( USAGE: SOURCE LENGTH DEST XMIT < SOURCE LENGTH DEST ... >)
11   BASE @ 10 = IF ELSE ." Declare HEX" QUIT THEN
12   COMM Xmit TERM ;
13
14
15 BASE ! ;S

```

SCREEN 110

```

0 ( CR' U.. ?HEXCHAR CLEAR-KEY SERPRINTER) ( Comm utils 11)
1 BASE @ HEX
2
3 : CR' 0D EMIT ; ( ... )
4
5 : U.. 0 0 D.R ; ( U. with no trailing space)
6
7 : ?HEXCHAR DUP 30 < SWAP DUP 46 > ROT OR IF DROP 0 ELSE
8   DUP 39 > SWAP 41 < AND 0= THEN ; ( < CHAR ... FLAG> 1 if hex)
9
10 : CLEAR-KEY ?KEY IF KEY DROP THEN ; ( ... )
11
12 : SERPRINTER ( This word selects the serial printer)
13   COMM COMMUNIT TERM ' serptry ' PRINTER 12 + ! PRINTER ;
14
15 BASE ! ;S

```

SCREEN 111

```

0 ( AH->B v V) ( Comm utils 12)
1 BASE @ HEX
2 : AH->B ( < AH ... BINARY> Ascii-hex to binary conversion)
3   DUP 39 > IF 37 - ELSE 30 - THEN ;
4 : v ( Assumes communication established with source MONITOR)
5 ( Usage: SOURCE LENGTH DEST v < SOURCE LENGTH DEST ... >)
6 ?MONITOR HERE SWAP DP ! ." D" ROT U. SWAP U.. CR'
7 BEGIN BEGIN CLEAR-KEY KEY 20 = UNTIL ( Find first space)
8   KEY 20 = IF ELSE DP ! TERM ABORT THEN ( Find second space)
9   BEGIN KEY DUP ?HEXCHAR IF KEY AH->B SWAP AH->B 10 * + C, 0
10   ELSE DUP 20 = IF DROP 0 ELSE 1 THEN THEN UNTIL 3B = 0=
11   UNTIL DP ! ;
12 : V ( SOURCE LENGTH DEST ... )
13   BASE @ 10 = IF ELSE ." Declare HEX" QUIT THEN
14   COMM v TERM ." Reception complete" ;
15 BASE ! ;S

```

SCREEN 112

```

0 ( PDOTQ.DSP WORD.DSP BRANCH.DSP CV.DSP CONST.DSP) ( Decompiler)
1   BASE @ DECIMAL
2 : PDOTQ.DSP WORD.PTR @ 2+ DUP >R DUP C@ + 1- WORD.PTR !
3   R> COUNT TYPE ;
4
5 : WORD.DSP 3 - -1 TRAVERSE DUP 1+ C@ 59 = IF 1 QUIT.FLAG
6   ! THEN DUP C@ 160 AND 128 = IF ID. ELSE
7   DROP THEN ;
8
9 : BRANCH.DSP ." TO " WORD.PTR @ 2+ DUP WORD.PTR
10    ! @ 0 HEX D. DECIMAL ;
11 : CV.DSP ." , Currently = " ;
12
13 : CONST.DSP ' CONSTANT NFA ID. CV.DSP      WORD.PTR @
14    2+ @ N. 1 QUIT.FLAG ! ;
15 BASE ! ;S

```

SCREEN 113

```

0 ( USERV.DSP VAR.DSP DOES>.DSP) ( Decompiler 2)
1 BASE @ DECIMAL
2
3 : USERV.DSP ." USER"      WORD.PTR @ 2+ @ N.
4   CV.DSP      WORD.PTR @ 2+ @ 16 +ORIGIN
5   @ + @ N. 1 QUIT.FLAG ! ;
6
7 : VAR.DSP ' VARIABLE NFA ID. CV.DSP
8   WORD.PTR @ 2+ @ N. 1 QUIT.FLAG ! ;
9
10 : DOES>.DSP
11    ." DOES>" WORD.PTR @ 2 + @ 2- WORD.PTR ! ;
12
13 : VOCAB.DSP ." VOCABULARY " WORD.PTR @ NFA ID. SPACE ;
14
15 BASE ! ;S

```

SCREEN 114

```

0 ( DECOMPILE) ( Decompiler 3)
1 : DECOMPILE -FIND 0= IF 3 SPACES ." ? Not in Glossary" CR
2   ELSE DROP DUP DUP 2- @ = IF 3 SPACES ." Code word" CR
3   ELSE 0 QUIT.FLAG ! DUP 2- WORD.PTR ! CR
4   ." Decompiling " NFA ID. CR
5   ." CFA (CFA)" CR BEGIN
6   WORD.PTR @ DUP 0 HEX D. SPACE DUP @ 6 U.R
7   5 SPACES DECIMAL @ CASE
8 ' LIT 2- OF WORD.PTR @ 2+ DUP WORD.PTR ! @ N.  ENDOF
9 ' (;CODE) 2- OF WORD.PTR @ @ WORD.DSP 1 QUIT.FLAG !  ENDOF
10 ' 0BRANCH 2- OF ." BZ" BRANCH.DSP  ENDOF
11 ' BRANCH 2- OF ." BR" BRANCH.DSP  ENDOF
12 ' (DO) 2- OF ." DO "  ENDOF
13 ' FORTH 2- @ OF WORD.PTR @ 2+ @ ' FORTH @ = IF
14   VOCAB.DSP THEN DOES>.DSP  ENDOF
15 -->

```


SCREEN 115

```

0 ( DECOMPILE, CONTINUED) ( Decompiler 4)
1
2 ' (LOOP) 2- OF ." LOOP " BRANCH.DSP ENDOF
3 ' (+LOOP) 2- OF ." +LOOP " BRANCH.DSP ENDOF
4 ' (." ) 2- OF ." ." QUOTE PDOTQ.DSP QUOTE ENDOF
5 ' BASE 2- @ OF USRV.DSP ENDOF
6 ' VARIABLE 2+ @ OF VAR.DSP ENDOF
7 ' 1 2- @ OF CONST.DSP ENDOF
8 ' : 2- @ OF ." : " WORD.PTR @ 2 + NFA ID. ENDOF
9 ' COMPILE 2- OF ." COMPILE " WORD.PTR @ 2+ DUP
10 WORD.PTR ! @ WORD.DSP ENDOF
11 DUP WORD.DSP
12 ENDCASE
13 CR 2 WORD.PTR +! QUIT.FLAG @ ?TERMINAL OR
14 UNTIL THEN THEN CR ;
15 ;S

```

SCREEN 116

```

0 ( TEXT LINE EDITOR WHERE #LOCATE #LEAD) ( EDITOR 1)
1 BASE @ HEX
2 FORTH DEFINITIONS
3 : TEXT HERE C/L 1+ BLANKS WORD HERE PAD C/L 1+ CMOVE ;
4 : LINE DUP FFF0 AND 17 ?ERROR SCR @ (LINE) DROP ;
5
6 VOCABULARY EDITOR IMMEDIATE HEX
7 : WHERE ( print screen # and image of error )
8 DUP B/SCR / DUP SCR ! ." Screen # " DECIMAL .
9 SWAP C/L /MOD C/L * ROT BLOCK + CR C/L TYPE
10 CR HERE C@ - SPACES 5E EMIT
11 [COMPILE] EDITOR QUIT ;
12 EDITOR DEFINITIONS
13 : #LOCATE R# @ C/L /MOD ;
14 : #LEAD #LOCATE LINE SWAP ;
15 BASE ! ;S

```

SCREEN 117

```

0 ( #LAG -MOVE H E S D M T L) ( EDITOR 2)
1 BASE @ HEX
2
3 : #LAG #LEAD DUP >R + C/L R> - ;
4 : -MOVE LINE C/L CMOVE UPDATE ;
5
6 : H LINE PAD 1+ C/L DUP PAD C! CMOVE ;
7 : E LINE C/L BLANKS UPDATE ;
8 : S DUP 1 - 0E DO I LINE I 1+ -MOVE -1 +LOOP E ;
9 : D DUP H 0F DUP ROT DO I 1+ LINE I -MOVE LOOP E ;
10 : M R# +! CR SPACE #LEAD TYPE 5F EMIT
11 #LAG TYPE #LOCATE . DROP ;
12 : T DUP C/L * R# ! H 0 M ;
13 : L SCR @ LIST 0 M ;
14
15 BASE ! ;S

```

SCREEN 118

```

0 ( R P I TOP CLEAR)      ( EDITOR 3)
1   BASE @ HEX
2
3
4 : R      PAD 1+ SWAP -MOVE ;
5 : P      1 TEXT R L ;
6 : I      DUP S R ;
7
8 : TOP      0 R# ! ;
9
10 : CLEAR      SCR ! 10 0 DO FORTH I EDITOR E LOOP ;
11
12   BASE ! ;S
13
14
15

```

SCREEN 119

```

0 ( 1LINE FIND DELETE N F)      ( EDITOR 4)
1   BASE @ HEX      EDITOR DEFINITIONS
2 : 1LINE      ( scan line with cursor for match to PAD text )
3      ( update cursor, return boolean )
4      #LAG PAD COUNT MATCH R# +! ;
5 : FIND      ( string at PAD over full screen, else error )
6      BEGIN 3FF R# @ < IF TOP PAD HERE C/L 1+
7      CMOVE 0 ERROR ENDIF 1LINE UNTIL ;
8 : DELETE      ( backwards at cursor by count-1 )
9      >R #LAG + FORTH I -      ( save blank fill loc)
10     #LAG FORTH I MINUS R# +!      ( backup cursor )
11     #LEAD + SWAP CMOVE R> BLANKS UPDATE ;
12 : N      ( find next occurrence of previous text )
13     FIND 0 M ;
14 : F      ( find occurrence of text )
15     1 TEXT N ;      BASE ! ;S

```

SCREEN 120

```

0 ( B X TILL C T L )      ( EDITOR 5)
1 : B      ( back up cursor by text in PAD )
2      PAD C@ MINUS M ;
3 : X      ( delete following text )
4      1 TEXT FIND PAD C@ DELETE 0 M ;
5 : TILL      ( delete from cursor to text end on this line )
6      #LEAD + 1 TEXT 1LINE 0= 0 ?ERROR
7      #LEAD + SWAP - DELETE 0 M ;
8 : C      ( spread at cursor and copy in following text )
9      1 TEXT PAD COUNT #LAG ROT OVER
10     MIN >R FORTH I R# +!
11     FORTH I - >R DUP HERE R> DUP >R CMOVE HERE
12     #LEAD + R> CMOVE R> CMOVE UPDATE 0 M ;
13 FORTH DEFINITIONS DECIMAL      : T EDITOR [COMPILE] EDITOR T ;
14 : L EDITOR [COMPILE] EDITOR TOP L ;
15     ;S

```


SCREEN 121

```

0 ( GOTOXY SETEDIT .CUR !CUR +CUR +.CUR +LIN HOM !BLK S.ERASE)
1  BASE @ HEX          ( Full screen editor 1)
2  NEXTUSER    CUR
3  EDITOR DEFINITIONS
4  : GOTOXY 1B EMIT 3D EMIT 20 + EMIT 20 + EMIT ; ( TV 910+ )
5  : SETEDIT 1B EMIT 6C EMIT ; ( Set TeleVideo 910+ for EDIT)
6  : NOEDIT 1B EMIT 6B EMIT ;
7  : .CUR          CUR @ 40 /MOD 2 + SWAP 4 + SWAP GOTOXY ;
8  : !CUR          0 MAX 3FF MIN CUR ! ;
9  : +CUR          CUR @ + !CUR ;
10 : +.CUR         +CUR .CUR ;
11 : +LIN          CUR @ 40 / + 40 * !CUR ;
12 : HOM           0 CUR ! .CUR ;
13 : !BLK          SCR @ BLOCK CUR @ + C! UPDATE 1 +.CUR ;
14 : S.ERASE       HOM 400 0 DO 20 DUP EMIT !BLK LOOP HOM .CUR ;
15 FORTH DEFINITIONS EDITOR  BASE ! ;S

```

SCREEN 122

```

0 ( EDIT EDITL) ( end EDITOR 8)
1 BASE @ HEX
2 : EDIT [COMPILE] EDITOR EDITOR SETEDIT CLS
3 LIST HOM .CUR BEGIN 0 ( FLAG) KEY CASE
4 05 OF S.ERASE ENDOF ( ERASE )
5 ESC OF 0 11 GOTOXY NOEDIT CR CR DROP 1 ENDOF
6 0A OF 40 +.CUR ENDOF ( DOWN 1 LINE)
7 7F OF -1 +.CUR ENDOF ( DELETE)
8 08 OF -1 +.CUR ENDOF ( LEFT 1 CHARACTER)
9 0D OF 1 +LIN .CUR ENDOF ( NEW LINE)
10 0B OF -40 +.CUR ENDOF ( UP 1 LINE)
11 0C OF 1 +.CUR ENDOF ( RIGHT 1 CHARACTER)
12 09 OF CUR @ 8 / 8 * 8 + !CUR .CUR ENDOF ( TAB)
13 DUP 20 < IF 7 EMIT ELSE DUP DUP EMIT !BLK ENDIF
14 ENDCASE UNTIL ;
15 : EDITL SCR @ EDIT ; FORTH BASE ! ;S

```

SCREEN 123

```

0 ( EOF IOCB SECTOR NEWSDW) ( FORTH-DOS 1)
1 BASE @ HEX
2
3 13 CONSTANT EOF ( End of file)
4 NEXTUSER IOCB 8 ALLOTU
5 : SECTOR ( SECTOR-NUMBER...BUFFER-ADDRESS)
6 DUP 275 > IF ." PSN too large" QUIT
7 THEN 0 2 M/ BLOCK SWAP 200 * + DUP IOCB 7 + ! ;
8
9 : NEWSDW ( < ... FLAG > 1 = EOF; New.segment.descriptor.word)
10 ( THIS WORD IS USED BY GETSEC)
11 0 IOCB 4 + C! IOCB @ SECTOR IOCB 2 + C@ + DUP
12 C@ DUP 7F > ROT ROT
13 1+ IOCB 3 + C! 1+ @ IOCB 5 + ! ;
14
15 BASE ! ;S

```

SCREEN 124

```

0 ( GETSEC Open DISKID) ( FORTH-DOS 2)
1 BASE @ HEX
2
3 : GETSEC ( ... BUFFER-ADDRESS OR 0.IF.END-OF-FILE)
4 BEGIN IOCB 3 + C@ IOCB 4 + C@ >
5 IF IOCB 5 + @ IOCB 4 + C@ + SECTOR IOCB 4 + C@ 1+ IOCB 4 +
6 C! 1 ELSE IOCB 2 + C@ 3 + IOCB 2 + C! NEWSDW IF 0 1 ELSE
7 0 THEN THEN UNTIL ;
8
9 : Open ( STARTING.SECTOR.NUMBER ... ) ( RUN TIME OPEN)
10 IOCB ! 0 IOCB 2+ C! NEWSDW IF ." End of file"
11 QUIT THEN
12 GETSEC DROP ;
13 : DISKID CR ." Disk ID: " 0 SECTOR C + DUP 8 + 2C TYPE
14 5 SPACES 8 TYPE CR ;
15 BASE ! ;S

```

SCREEN 125

```

0 ( .DIRSEC DIR NEWLSN) ( FORTH DOS 3)
1 BASE @ HEX
2
3 : .DIRSEC 200 0 DO ?TERMINAL IF LEAVE ELSE ( SECTOR.BUFF... )
4 DUP I + DUP C@ ?ASCII IF DUP DUP 6 TYPE ." ."
5 6 + 3 TYPE 3 SPACES A + @ .
6 OUT @ DUP 3C > IF DROP 0 OUT ! CR ELSE 14 MOD
7 14 SWAP - SPACES THEN ELSE DROP THEN THEN 10 +LOOP DROP ;
8 : DIR DISKID ." Directory Start" CR CR ( ... )
9 0 OUT ! CR A 1 DO I SECTOR .DIRSEC LOOP CR FLUSH ;
10 : NEWLSN IOCB @ DUP Open SECTOR BEGIN ( NEWLSN ... BUF.ADDR)
11 2DUP C@ DUP 79 > IF ." End of file" QUIT
12 THEN 1+ < IF DROP IOCB 4 + C! GETSEC 1
13 ELSE DUP C@ ROT SWAP - SWAP 3 + DUP C@ 1+ IOCB 3 + C!
14 DUP 1+ @ IOCB 5 + ! IOCB 2 + C@ 3 + IOCB 2 + C! 0 THEN UNTIL ;
15 BASE ! ;S

```

SCREEN 126

```

0 ( FNAME FILEID) ( FORTH DOS 5)
1 BASE @ HEX
2
3 : FNAME DUP DUP HERE 1 + + PAD 3 CMOVE PAD HERE 7 + 3 CMOVE
4 HERE + 7 ROT - 20 FILL ;
5
6 : FILEID ." File ID: " ;
7
8
9 BASE ! ;S
10
11
12
13
14
15

```


SCREEN 127

```

0 ( OPEN) ( FORTH DOS 6)
1 BASE @ HEX
2 : OPEN ( ... Use as in: OPEN OP.SYS) FLUSH 20 WORD HERE 1+
3 HERE C@ ' (FIND) 13 + 1 EDITOR MATCH FORTH SWAP IF HERE + DUP
4 1+ C@ 3 AND SCR/DSK @ * OFFSET ! 2020 SWAP ! ELSE DROP
5 THEN HERE C + HERE DUP C@ 1+ + DO 20 I C! LOOP
6 HERE 1+ HERE C@ ' ." NFA 1+ 1 EDITOR MATCH
7 FORTH SWAP IF CASE ( DEAL WITH .)
8 2 OF 2 FNAME ENDOF 3 OF 3 FNAME ENDOF
9 4 OF 4 FNAME ENDOF 5 OF 5 FNAME ENDOF 6 OF 20 HERE 6 + C! ENDOF
10 7 OF HERE 8 + PAD 3 CMOVE PAD HERE 7 + 3 CMOVE ENDOF
11 ENDCASE ELSE DROP THEN HERE 1+ ' FILEID C + 2DUP 6 CMOVE SWAP 6
12 + SWAP 7 + 3 CMOVE 1 A 1 DO I SECTOR 200 HERE 1+ 9 EDITOR MATCH
13 SWAP IF FORTH I SECTOR + 1+ @ SWAP DROP 0 LEAVE ELSE DROP THEN
14 LOOP FORTH IF CR FILEID ." Not found" QUIT THEN Open ;
15 BASE ! ;S

```

SCREEN 128

```

0 ( .AH .BYTE .AHL .AHP) ( Ascii-hex dump words, FORTH DOS 7)
1 BASE @ HEX
2
3 : .AH ( PRINT ASCII-HEX NIBBLE <NIBBLE... >)
4 DUP 9 > IF 37 + EMIT ELSE 30 + EMIT THEN ;
5
6 : .BYTE DUP 10 / .AH F AND .AH ; ( NN... )
7
8 : .AHL ( PRINT ASCII-HEX LINE <ADDR... >)
9 20 0 DO DUP I + C@ .BYTE LOOP DROP CR ;
10
11 : .AHP ( PRINT ASCII-HEX PAGE <ADDR... >)
12 CR DUP 200 + SWAP DO I .AHL 20 +LOOP ;
13
14
15 BASE ! ;S

```

SCREEN 129

```

0 ( F-LEN SAVE SEND) ( FORTH DOS 8)
1 BASE @ HEX
2
3 : F-LEN ( < ... FILE-LENGTH > Get length of open file)
4 0 ( SUM) 0 NEWLSN BEGIN DUP C@ DUP 80 <
5 WHILE ROT + SWAP 3 + REPEAT DROP DROP ;
6 : SAVE ( < ... > Usage: SAVE FILESPEC eg:SAVE WFORTH.CM:0)
7 OPEN F-LEN DUP 200 * HERE < IF 1A MESSAGE QUIT THEN
8 0 DO I 200 * GETSEC 200 CMOVE
9 UPDATE LOOP FLUSH ;
10 : SEND OPEN ( SEND FILESPEC < ... >)
11 BEGIN GETSEC DUP 0= IF DROP 1 ELSE
12 BEGIN DUP COMM .AHP ?TERMINAL IF TERM 12 MESSAGE QUIT THEN
13 ?Y/N IF DROP 1 ELSE 0 THEN TERM UNTIL 0 THEN
14 UNTIL ;
15 BASE ! ;S

```

SCREEN 130

```

0 ( DOWNLOAD FILELOAD)                                ( end FORTH DOS)
1 BASE @ HEX
2
3 : DOWNLOAD ( Assumes that communications have been established)
4   ( with the target monitor via the uart at COMM.GRP, normally)
5   ( E0H.      Usage:      HEX TARGET.ADDR DOWNLOAD FILESPEC)
6   ( Stack behavior :      < TARGET.ADDRESS ... > )
7   OPEN      ( file specified in FILESP.ATR:DR      )
8   BEGIN DUP GETSEC DUP 0= IF DROP ." Downloading is complete"
9   CR 1 ELSE 200 ROT XMIT 200 + ?TERMINAL THEN UNTIL DROP ;
10
11 : FILELOAD OPEN 0 NEWLSN 1F8 + @ ( ... )
12   BEGIN 0 GETSEC DUP IF ROT 2DUP 200 CMOVE
13   SWAP DROP 200 + SWAP      ( Usage: FILELOAD FLOAT.CM)
14   ELSE 2DROP DROP 1 THEN UNTIL ;
15   BASE ! ;S

```

SCREEN 131

```

0 ( R0 R1 R2 R3 R4 R5 R6 R7 R8 R9 RA RB RC RD RE RF) ( Registers)
1 BASE @ HEX
2 CR
3 00 CONSTANT R0      01 CONSTANT R1      02 CONSTANT R2
4 03 CONSTANT R3      04 CONSTANT R4      05 CONSTANT R5
5 06 CONSTANT R6      07 CONSTANT R7      08 CONSTANT R8
6 09 CONSTANT R9      0A CONSTANT RA      0B CONSTANT RB
7 0C CONSTANT RC      0D CONSTANT RD      0E CONSTANT RE
8 0F CONSTANT RF
9
10 BASE ! ;S
11
12
13
14
15

```

SCREEN 132

```

0 ( END-CODE C; ENDCODE)                                ( 1806 ASSEMBLER 2)
1
2
3 ASSEMBLER DEFINITIONS
4
5 : END-CODE ( ... )
6   CURRENT @ CONTEXT !
7   ?EXEC
8   ?CSP
9   SMUDGE ;
10
11 : C; END-CODE ;      ( Pseudonyms for END-CODE)
12
13 : ENDCODE END-CODE ;
14
15 ;S

```


SCREEN 133

```

0 ( IS ?SBERROR) ( 1806 ASSEMBLER 3)
1  BASE @ HEX
2
3 : IS  CONSTANT ;
4
5 : ?SBERROR
6  OVER FF00 FORTH AND HERE 1+ FF00 AND ASSEMBLER
7  = 0=  IF
8  CR HERE COUNT TYPE
9  ." On Screen " BLK @ . ." , line " IN @ C/L / .
10 CR ." caused a short branch off-page" THEN ;
11
12  BASE ! ;S
13
14
15

```

SCREEN 134

```

0 ( T5 T4 T3 T2 T1 NX IP UP SP PC RP IV DMAV) ( Register Equates)
1  CR  BASE @ HEX 0F CONSTANT T5 ( Temporary register)
2  0D CONSTANT T4 ( Temporary register)
3  0C CONSTANT T3 ( Temporary register)
4  0B CONSTANT T2 ( Temporary register)
5  0A CONSTANT T1 ( Temporary register)
6  09 CONSTANT NXP ( NEXT pointer)
7  08 CONSTANT IP ( FORTH program counter)
8  06 CONSTANT RS0 ( Bottom of return stack)
9  07 CONSTANT UP ( USER area pointer )
10 05 CONSTANT NXPC ( Program counter for NEXT)
11 04 CONSTANT SP ( FORTH computation stack pointer)
12 03 CONSTANT PC ( Program counter for code words)
13 02 CONSTANT RP ( FORTH return stack pointer)
14 01 CONSTANT IV ( The interrupt vector)
15 00 CONSTANT DMAV ( The DMA vector ) BASE ! ;S

```

SCREEN 135

```

0 ( CRN LDN LDA INP PLO ETC) ( 1806 ASSEMBLER 5)
1  BASE @ HEX
2  CR
3 : CRN      ( Compute register number )
4  <BUILDS C, DOES> C@ + C, ;
5
6  00 CRN LDN      10 CRN INC      20 CRN DEC
7  40 CRN LDA      50 CRN STR      60 CRN OUT
8  68 CRN INP      80 CRN GLO      90 CRN GHI
9  A0 CRN PLO      B0 CRN PHI      D0 CRN SEP
10 E0 CRN SEX
11
12  BASE ! ;S
13
14
15

```

SCREEN 136

```

0 ( 1BFI 1BSB ETC ) ( 1806 ASSEMBLER 6)
1 BASE @ HEX
2 : 1BFI ( 1 byte follows immediately after op code)
3 <BUILDS C, DOES> C@ C, C, ;
4 F8 1BFI LDI F9 1BFI ORI FA 1BFI ANI
5 FB 1BFI XRI FC 1BFI ADI FD 1BFI SDI
6 FF 1BFI SMI 7D 1BFI SDBI 7C 1BFI ADCI
7 7F 1BFI SMBI
8
9 : 1BSB <BUILDS C, DOES> ?SBERROR C@ C, C, ; ( Short branch)
10 30 1BSB BR 31 1BSB BQ 32 1BSB BZ
11 33 1BSB BDF 34 1BSB SBI 35 1BSB SB2
12 36 1BSB SB3 37 1BSB SB4 39 1BSB BNQ
13 3A 1BSB BNZ 3B 1BSB BNF 3C 1BSB BN1
14 3D 1BSB BN2 3E 1BSB BN3 3F 1BSB BN4
15 BASE ! ;S

```

SCREEN 137

```

0 ( 2BFI LBR LBQ LBZ LBDF LBNQ LBNZ LBNF ) ( 1806 ASSEMBLER 7)
1 BASE @ HEX
2
3 : 2BFI ( 2 bytes follow immediately after op code)
4 <BUILDS C, DOES> C@ C, , ;
5
6 C0 2BFI LBR
7 C1 2BFI LBQ
8 C2 2BFI LBZ
9 C3 2BFI LBDF
10 C9 2BFI LBNQ
11 CA 2BFI LBNZ
12 CB 2BFI LBNF
13
14
15 BASE ! ;S

```

SCREEN 138

```

0 ( 1BOP IDLE IRX ETC ) ( 1 byte op codes, 1806 ASSEMBLER 8)
1 BASE @ HEX CR
2 : 1BOP <BUILDS C, DOES> C@ C, ;
3 00 1BOP IDLE 38 1BOP SKP 38 1BOP NBR
4 60 1BOP IRX 70 1BOP RET 71 1BOP DIS
5 72 1BOP LDXA 73 1BOP STXD 74 1BOP ADC
6 75 1BOP SDB 76 1BOP SHRC 77 1BOP SMB
7 78 1BOP SAV 79 1BOP MARK 7A 1BOP REQ
8 7B 1BOP SEQ 7E 1BOP SHLC C4 1BOP NOP
9 CC 1BOP LSIE CD 1BOP LSQ C5 1BOP LSNQ
10 C6 1BOP LSNZ C7 1BOP LSNF C8 1BOP LSKP
11 C8 1BOP NLBR CE 1BOP LSZ CF 1BOP LSDF
12 F0 1BOP LDX F1 1BOP OR F2 1BOP AND
13 F3 1BOP XOR F4 1BOP ADD F5 1BOP SD
14 F6 1BOP SHR F7 1BOP SM FE 1BOP SHL
15 BASE ! ;S

```


SCREEN 139

```

0 ( 2BOP 1BF2BOP 2BF2BOP CR2BOP etc)          ( 1806 ASSEMBLER 9 )
1  BASE @ HEX
2 : 2BOP <BUILDS , DOES> @ , ; ( 2 byte op codes )
3      6800 2BOP STPC          6805 2BOP SCM1      680A 2BOP XIE
4      6801 2BOP DTC          6806 2BOP LDC        680B 2BOP XID
5      6802 2BOP SPM2         6807 2BOP STM         680C 2BOP CIE
6      6803 2BOP SCM2         6808 2BOP GEC         680D 2BOP CID
7      6804 2BOP SPM1         6809 2BOP ETQ
8 : 1BF2BOP <BUILDS , DOES> ?SBERROR @ , C, ;
9      683E 1BF2BOP BCI       683F 1BF2BOP BXI
10 : 2BF2BOP <BUILDS , DOES> @ + , , ;
11      68C0 2BF2BOP RLDI     6880 2BF2BOP SCAL
12 : CR2BOP <BUILDS , DOES> @ + , ;
13      6860 CR2BOP RLXA      68A0 CR2BOP RSXD
14      68B0 CR2BOP RNX       6890 CR2BOP SRET
15  BASE ! ;S

```

SCREEN 140

```

0 ( LBL1 LBL2 LBL3 LBL4 LAB1: LAB2: LAB3: LAB4: LAB1 LAB2 LAB3)
1  BASE @ HEX          ( 1806 ASSEMBLER 10)
2
3 0 VARIABLE LBL1      0 VARIABLE LBL2
4 0 VARIABLE LBL3      0 VARIABLE LBL4
5
6 : LAB1: HERE LBL1 ! ;      : LAB2: HERE LBL2 ! ;
7 : LAB3: HERE LBL3 ! ;      : LAB4: HERE LBL4 ! ;
8
9 : LAB1 LBL1 @ ;           : LAB2 LBL2 @ ;
10 : LAB3 LBL3 @ ;          : LAB4 LBL4 @ ;
11
12 BASE ! ;S
13 USAGE:      LAB1: 5 SEP          LAB1 LBR
14
15

```

SCREEN 141

```

0 ( A.0 A.1 PAGE)          ( 1806 ASSEMBLER 11)
1  BASE @ HEX
2 CR
3 : A.0   SP@ 1+ C@ SWAP DROP ;
4
5 : A.1   SP@ C@ SWAP DROP ;
6
7 : PAGE  HERE FF00 FORTH AND ASSEMBLER 0100 + DP ! ;
8  ( Moves dictionary pointer to next page boundary)
9
10  BASE ! ;S
11
12
13
14
15

```

SCREEN 142

```
0 ( ?NEXTPAGE ?PAGESPACE PAGEJUMP PAGEADJUST 1806 ASSEMBLER 12)
1   BASE @ HEX
2
3 : ?NEXTPAGE FORTH HERE FF00 AND 0100 + ASSEMBLER ;
4
5 : ?PAGESPACE ?NEXTPAGE HERE - ;
6
7 : PAGEJUMP ?PAGESPACE FORTH DUP 2 >
8   IF DROP C0 ( LBR ) C,
9   HERE ASSEMBLER PAGE FORTH HERE SWAP !
10  ELSE ( #BYTES ) 0 DO C4 ( NOP ) C, LOOP ENDIF ASSEMBLER ;
11
12 : PAGEADJUST ?PAGESPACE > FORTH IF PAGEJUMP ENDIF ASSEMBLER ;
13
14 BASE ! ;S
15
```

SCREEN 143

```
0 ( F0> F0=) ( Floating 0)
1   BASE @ HEX
2
3 : F0> ( F ... FLAG) SWAP DROP 80 AND NOT ;
4
5 : F0= ( F ... FLAG) FFFF AND SWAP FF AND OR NOT ;
6
7   BASE ! ;S
8
9
10
11
12
13
14
15
```

SCREEN 144

```
0 ( FLOAT.CM linkage) ( Floating 1)
1   BASE @ HEX
2 ( These are subroutines in FLOAT.CM)
3 : (FADD) 7935 ;
4 : (FSUB) 7938 ; ( The names are the same as in FLOAT.CM)
5 : (FMPY) 7BE2 ;
6 : (FDIV) 7D7D ;
7 : (SQRT) 7D59 ;
8 : (FCBD) 7E16 ;
9 : (FCDB) 7F31 ;
10 : (FSIN) 7C5C ;
11 : (FCOS) 7C74 ;
12 : (ATAN) 7CF8 ;
13 : (EXP) 7A89 ;
14 : (LN) 7B13 ;
15 BASE ! ;S
```


SCREEN 145

```

0 ( BUFF FSPW) ( Floating USER variables)      ( Floating 2)
1   BASE @ HEX
2
3
4 NEXTUSER BUFF 8 ALLOTU ( 10 bytes for BCD conversion)
5
6 NEXTUSER FPSW ( Floating point status word, 0 is ok)
7
8
9
10
11 BASE ! ;S
12
13
14
15

```

SCREEN 146

```

0 ( [F.])                                     ( Floating 3)
1   BASE @ HEX
2
3   CREATE (F.)                               ( < F ... ADDR.OF.BUFF > )
4   HERE DUP 2- !
5   686D , 686F ,                             ( F =>RE&RF  RD temporary)
6   24 C, 68AE , 14 C,                         ( RE to stack ) 8DAE , 9DBE ,
7   E2 C, 6886 , (FCBD) , ( FLOAT.CM subroutine)
8   BUFF , 0602 , E4 C, ( 6 Digit mantissa, 2 digit exponent)
9   68CC , FPSW , F800 , 765C , ( Errors to FPSW, msb )
10  686E , ( RE from stack )
11  24 C, 68AD , 14 C, ( BUFF to stack)
12  D5 C, SMUDGE
13
14
15 BASE ! ;S

```

SCREEN 147

```

0 ( F.)                                     ( Floating 4)
1   BASE @ HEX
2
3 : F. ( < F ... > Print floating point)
4   2DUP F0= ( 0 ?)
5   IF BUFF DUP 0B SWAP C! 6 0 DO 1+ DUP 00 SWAP C! LOOP
6     1+ DUP 0B SWAP C! 2 0 DO 1+ DUP 00 SWAP C! LOOP
7   DROP 2DROP BUFF ELSE (F.) FPSW C@ 63 ?ERROR THEN
8     DUP C@ 0D XOR IF SPACE ELSE ." -" THEN ." ."
9     DUP 7 + DUP 6 - DO ( Print mantissa)
10    I C@ 30 + EMIT LOOP SPACE
11    DUP 7 + C@ 0D XOR IF SPACE ELSE ." -" THEN
12    0A + DUP 2 - DO ( Print exponent)
13    I C@ 30 + EMIT LOOP SPACE ;
14
15 BASE ! ;S

```

SCREEN 148

```

0 ( [FLOAT]) ( Floating 5)
1 BASE @ HEX
2
3 CREATE (FLOAT) ( ... F )
4 HERE DUP 2- !
5 24 C, 68AE , 14 C, ( RE to stack )
6 E2 C, 6886 , (FCDB) , ( FLOAT.CM subroutine)
7 BUFF , 0602 , E4 C, ( 6 Digit mantissa, 2 digit exponent)
8 68CC , FPSW , F800 , 765C , ( Errors to FPSW, msb )
9 686D , ( RE from stack, RD temporary )
10 24 C, 68AF , 68AE , 14 C, ( F to stack )
11 8DAE , 9DBE ,
12 D5 C, SMUDGE
13
14
15 BASE ! ;S

```

SCREEN 149

```

0 ( [F+] F+) ( Floating 6)
1 BASE @ HEX
2
3 CREATE (F+) ( < F1 F2...F3 > F3=F1+F2)
4 HERE DUP 2- !
5 8EAB , 9EBB , ( Store RE=> RB)
6 686E , 686F , ( F1=>RE&RF)
7 84AD , 94BD , ( RD->F2)
8 E2 C, 6886 , (FADD) , E4 C, ( call FADD)
9 68CC , FPSW , F800 , 765C , ( Errors to FPSW, msb)
10 1414 , 1468 , AF68 , AE14 , ( F3 => Stack)
11 8BAE , 9BBE , ( Restore RE)
12 D5 C, SMUDGE
13
14 : F+ ( <F1 F2 .. F3> F3=F1+F2 ) (F+) FPSW C@ 61 ?ERROR ;
15 BASE ! ;S

```

SCREEN 150

```

0 ( [F-] F- FMINUS FABS) ( Floating 7)
1 BASE @ HEX
2
3 CREATE (F-) ( <F1 F2...F3> F3=F1-F2 )
4 HERE DUP 2- ! 8EAB , 9EBB , ( Store RE=> RB )
5 686E , 686F , ( F1=>RE&RF )
6 84AD , 94BD , ( RD->F2 )
7 E2 C, 6886 , (FSUB) , E4 C, ( call FSUB)
8 68CC , FPSW , F800 , 765C , ( Errors to FPSW, msb)
9 1414 , 1468 , AF68 , AE14 , ( F3 => stack)
10 8BAE , 9BBE , ( Restore RE)
11 D5 C, SMUDGE
12 : F- 2SWAP (F-) FPSW C@ 60 ?ERROR ; ( <F1 F2 .. F3> F3=F1-F2 )
13 : FMINUS 0. 2SWAP F- ; ( F ... -F )
14 : FABS 2DUP F0> IF ELSE FMINUS THEN ; ( F1 ... ABS.F1)
15 BASE ! ;S

```


SCREEN 151

```

0 ( [F*] F* ) ( Floating 8)
1 BASE @ HEX
2
3 CREATE (F*) ( <F1 F2...F3> F3=F1*F2 )
4 HERE DUP 2- !
5 8EAC , 9EBC , ( Store RE=> RC)
6 686E , 686F , ( F1=>RE&RF)
7 84AD , 94BD , ( RD->F2)
8 E2 C, 6886 , (FMPY) , E4 C, ( call FMPY)
9 68CB , FPSW , F800 , 765B , ( Errors to FPSW, msb)
10 1414 , 1468 , AF68 , AE14 , ( F3 => stack)
11 8CAE , 9CBE , ( Restore RE)
12 D5 C, SMUDGE
13
14 : F* ( <F1 F2 ... F3> F3=F1+F2 ) (F*) FPSW C@ 5F ?ERROR ;
15 BASE ! ;S

```

SCREEN 152

```

0 ( [F/] F/) ( Floating 9)
1 BASE @ HEX
2
3 CREATE (F/) ( <F2 F1...F3> F3=F1/F2)
4 HERE DUP 2- !
5 8EAC , 9EBC , ( Store RE=> RC)
6 686E , 686F , ( F1=>RE&RF)
7 84AD , 94BD , ( RD->F2)
8 E2 C, 6886 , (FDIV) , E4 C, ( Call FDIV)
9 68CB , FPSW , F800 , 765B , ( Errors to FPSW, msb)
10 1414 , 1468 , AF68 , AE14 , ( F3 => stack)
11 8CAE , 9CBE , ( Restore RE)
12 D5 C, SMUDGE
13
14 : F/ 2SWAP (F/) FPSW C@ 5E ?ERROR ; ( <F1 F2 ... F3> F3=F1/F2)
15 BASE ! ;S

```

SCREEN 153

```

0 ( [FSQRT] FSQRT) ( Floating 10)
1 BASE @ HEX
2
3 CREATE (FSQRT) ( < F1 ... F2 > F2=SQRT<F1>)
4 HERE DUP 2- !
5 8EAB , 9EBB , ( Store RE=> RB)
6 686E , 686F , ( F1=>RE&RF)
7 E2 C, 6886 , (SQRT) , E4 C, ( Call SQRT)
8 68CC , FPSW , F800 , 765C , ( Errors to FPSW, msb)
9 2468 , AF68 , AE14 , ( F2 => Stack)
10 8BAE , 9BBE , ( Restore RE)
11 D5 C, SMUDGE
12
13 : FSQRT ( <F1...F2> F2=SQRT<F1>) (FSQRT) FPSW C@ 5D ?ERROR ;
14
15 BASE ! ;S

```

SCREEN 154

```

0 ( 2OVER 2ROT) ( Floating 11)
1 BASE @ HEX
2
3 CREATE 2OVER ( D1 D2 ... D1 D2 D1 )
4 HERE DUP 2- ! 6060 , 6060 ,
5 686C , 686D , 2424 , 2424 ,
6 2424 , 2424 , 24 C,
7 68AD , 68AC , 60D5 ,
8 SMUDGE
9
10 : 2ROT ( < D1 D2 D3 ... D2 D3 D1 > )
11 >R >R 2SWAP R> R> 2SWAP ;
12
13 BASE ! ;S
14
15

```

SCREEN 155

```

0 ( FQUAD) ( Quadratic solution) ( Floating 12)
1 BASE @ HEX
2
3 : FQUAD ( F1 F2 F3 ... F4 F5)
4 ( F1=A F2=B F3=C F4,F5=ROOTS )
5 2ROT 2ROT 2OVER 2OVER 2SWAP 2DUP ( -B/2A)
6 F+ F/ FMINUS >R >R
7 2DUP F* >R >R 2DUP 2ROT F* 3400000.
8 F* R> R> 2SWAP F- FSQRT
9 2SWAP 2DUP F+ F/ ( ROOT OF B^2 - 4AC / 2A)
10 R> R> 2OVER 2OVER 2SWAP F- 2ROT 2ROT F+ ;
11
12
13 BASE ! ;S
14
15

```

SCREEN 156

```

0 ( F@ F!) ( Floating 13)
1 BASE @ HEX
2
3 : F@ ( < N...F > Fetch F at N ) DUP @ >R 2 + @ R> ;
4
5 : F! ( <F N ...> Store F at N ) DUP >R ! R> 2 + ! ;
6
7
8 BASE ! ;S
9
10
11
12
13
14
15

```


SCREEN 157

```

0 ( FSIN)                                     ( Floating 14)
1 BASE @ HEX
2
3 CREATE FSIN                                ( < F1 ... F2 > F2=SIN<F1>)
4 HERE DUP 2- !
5 8EAB , 9EBB ,                               ( Store RE=> RB)
6 686E , 686F ,                               ( F1=>RE&RF)
7 E2 C, 6886 , (FSIN) , E4 C,                 ( Call FSIN)
8 2468 , AF68 , AE14 ,                       ( F2 => Stack)
9 8BAE , 9BBE ,                               ( Restore RE)
10 D5 C, SMUDGE
11
12 BASE ! ;S
13
14
15

```

SCREEN 158

```

0 ( FCOS)                                     ( Floating 15)
1 BASE @ HEX
2
3 CREATE FCOS                                ( < F1 ... F2 > F2= cos<F1> )
4 HERE DUP 2- !
5 8EAB , 9EBB ,                               ( Store RE=> RB )
6 686E , 686F ,                               ( F1=>RE&RF )
7 E2 C, 6886 , (FCOS) , E4 C,                 ( Call FCOS )
8 2468 , AF68 , AE14 ,                       ( F2 => Stack)
9 8BAE , 9BBE ,                               ( Restore RE)
10 D5 C, SMUDGE
11
12 BASE ! ;S
13
14
15

```

SCREEN 159

```

0 ( FARCTAN)                                ( Floating 16)
1 BASE @ HEX
2
3 CREATE FACRTAN                            ( < F1 .. F2 > F2=ATAN<F1>)
4 HERE DUP 2- !
5 8EAB , 9EBB ,                               ( Store RE=> RB)
6 686E , 686F ,                               ( F1=>RE&RF)
7 E2 C, 6886 , (ATAN) , E4 C,                 ( Call ATAN)
8 2468 , AF68 , AE14 ,                       ( F2 => Stack)
9 8BAE , 9BBE ,                               ( Restore RE)
10 D5 C, SMUDGE
11
12 BASE ! ;S
13
14
15

```

SCREEN 160

```

0 ( [FEXP] FEXP) ( Floating 17)
1 BASE @ HEX
2
3 CREATE (FEXP) ( < F1 ... F2 > F2=EXP<F1>)
4 HERE DUP 2- !
5 8EAB , 9EBB , ( Store RE=> RB)
6 686E , 686F , ( F1=>RE&RF)
7 E2 C, 6886 , (EXP) , E4 C, ( Call EXP)
8 68CC , FPSW , F800 , 765C , ( Errors to FPSW, msb)
9 2468 , AF68 , AE14 , ( F2 => Stack)
10 8BAE , 9BBE , ( Restore RE)
11 D5 C, SMUDGE
12
13 : FEXP ( <F1...F2> F2=EXP<F1>) (FEXP) FPSW C@ 58 ?ERROR ;
14
15 BASE ! ;S

```

SCREEN 161

```

0 ( [FLN] FLN) ( Floating 18)
1 BASE @ HEX
2
3 CREATE (FLN) ( < F1 ... F2 > F2=LN<F1>)
4 HERE DUP 2- !
5 8EAB , 9EBB , ( Store RE=> RB)
6 686E , 686F , ( F1=>RE&RF)
7 E2 C, 6886 , (LN) , E4 C, ( Call LN)
8 68CC , FPSW , F800 , 765C , ( Errors to FPSW, msb)
9 2468 , AF68 , AE14 , ( F2 => Stack)
10 8BAE , 9BBE , ( Restore RE)
11 D5 C, SMUDGE
12
13 : FLN ( <F1...F2> F2=LN<F1> ) (FLN) FPSW C@ 57 ?ERROR ;
14
15 BASE ! ;S

```

SCREEN 162

```

0 ( F** FPI) ( Floating 19)
1 BASE @ HEX
2
3 : F** ( < F1 F2 ... F3 > F3 = F1 Raised to the F2 power)
4 2SWAP FLN F* FEXP ;
5
6 : FPI ( ... PI ) -77F9 264 ;
7
8
9 BASE ! ;S
10
11
12
13
14
15

```


SCREEN 163

```

0 ( FLOAT D->F) ( Floating 20)
1 BASE @ HEX
2 : FLOAT ( < ... F > FLOAT -.xxxxxx -yy)
3 20 WORD ( READ MANTISSA ) HERE 1+
4 DUP C@ 2D XOR IF 0B BUFF C! ELSE 1+ 0D BUFF C! THEN ( +- )
5 1+ 7 1 DO DUP C@ 30 - BUFF I + C! 1+ LOOP DROP ( .xxxxxx)
6 20 WORD ( READ EXPONENT) HERE 1+
7 DUP C@ 2D XOR IF 0B BUFF 7 + C! ELSE 1+ 0D BUFF 7 + C! ( +- )
8 THEN A 8 DO DUP C@ 30 - BUFF I + C! 1+ LOOP DROP ( .yy)
9 (FLOAT) FPSW C@ 62 ?ERROR ;
10
11 : D->F ( < D ... F > Fixed DOUBLE, 0-FFFFFF to floating point)
12 DUP 8000 AND >R DABS DUP FF80 AND 5C ?ERROR
13 R> D+- FF AND 1700 OR 0. F+ ;
14 CR
15 BASE ! ;S

```

SCREEN 164

```

0 ( SCOPY)
1 BASE @ DECIMAL
2
3 : SCOPY ( DR0.SCN DR1.SCN LENGTH ... )
4 OFFSET @ >R 0 OFFSET ! >R ( DR0.SCN DR1.SCN)
5 2DUP 315 + - MINUS SWAP DROP ( DR0.SCN BLOCK.DIFFERENCE)
6 SWAP DUP ( BLOCK.DIFFERENCE DR0.SCN DR0.SCN)
7 R> + SWAP DO DUP I + I SWAP COPY LOOP DROP
8 R> OFFSET ! ;
9
10 BASE ! ;S
11
12 This utility word is used to copy a block of screens from
13 drive zero to drive one. It doesn't matter which drive is
14 selected, and the selected drive is unchanged after SCOPY
15 is executed.

```

SCREEN 219

```

0 ( Load screen for file listings) ( Akens WHOI)
1 BASE @ DECIMAL
2 NOPRINT
3 CR ." Place source disk in drive 0, then any key" KEY DROP
4 CR -2 OUTL +!
5 PRINTER
6 1 CHAPTER +!
7 1 FLD +! .FILE WFORTH.LST .FOOT PAGE 1 CHAPTER +!
8 1 FLD +! .FILE XREF .FOOT PAGE 1 CHAPTER +!
9 NOPRINT CR
10 ." Place system disk in drive 0, then any key" KEY DROP
11
12 BASE ! ;S
13
14
15

```

SCREEN 220

```

0 ( ASSEMBLER Examples 2)                                ( Akens WHOI)
1 DECIMAL CR 220 LIST CR  HEX
2 CODE Pemit      (      Number ...      )
3                  ( Name the word Pemit [printer emit])
4  R4 SEX  R4 INC  ( Point to the low byte of the top number)
5  LDX          ( Get the low byte)
6  OFF XRI       ( Invert the byte for the 646 board)
7  07F ANI       ( Mask off the high bit for the 646 board)
8  STXD IRX      ( Store masked byte and adjust stack)
9  HERE SBI      ( Wait until EFL, BUSY, is false)
10 6  OUT        ( Send the byte to the printer)
11 5  SEP        ( Return to NEXT)
12 END-CODE      ( End the definition)
13 CR CR ." This is the dictionary entry for Pemit" CR
14 ' Pemit' NFA 20 DUMP ASSEMBLER DECOMPILE CODE DECOMPILE END-CODE
15 FORTH DECIMAL .FOOT PAGE ;S

```

SCREEN 221

```

0 ( Decompiler example screen)                            ( Akens, WHOI)
1 DECIMAL 221 LIST DECOMPILE ID .FOOT PAGE
2 DECOMPILE ABORT DECOMPILE ROMIT .FOOT PAGE
3 DECOMPILE MESSAGE
4 DECOMPILE ERROR
5 DECOMPILE >IN
6 DECOMPILE NOT
7 DECOMPILE WORD-79 .FOOT PAGE
8 DECOMPILE INDEX
9 DECOMPILE CMOVE>
10 DECOMPILE GRP .FOOT PAGE
11 DECOMPILE UART DECOMPILE TERM DECOMPILE TERM.GRP
12 DECOMPILE COMM DECOMPILE COMM.GRP .FOOT PAGE
13 DECOMPILE NEW-FENCE DECOMPILE NODISK .FOOT PAGE
14 DECOMPILE .FOOT DECOMPILE PAGE .FOOT PAGE
15 DECIMAL ;S

```

SCREEN 223

```

0 ( Floating point examples)                              ( Akens, WHOI)
1 DECIMAL CR 223 LIST FLUSH
2 FLOATING      ( Load the floating point screens and FLOAT.CM:1)
3 CR CR CR
4 ." PI is equal to " FPI F. CR CR
5 ." The square root of 3 is " 3. D->F FSQRT F. CR CR
6 ." The roots of: X**2 - 5X + 6 = 0 are: "
7 FLOAT .100000 01 FLOAT -.500000 01 FLOAT .600000 01
8 FQUAD
9 ." X = " F. ." , and X = " F. CR CR
10 ." The roots of: Y**2 + Y -20 = 0 are: "
11 1 S->D D->F 2DUP -20 S->D D->F FQUAD
12 ." Y = " F. ." , and Y = " F. CR
13
14 DECIMAL
15 ;S

```


SCREEN 224

```

0 ( FORTH DOS examples) ( Akens, WHOI)
1 DECIMAL CR 224 LIST HEX
2
3 CR ." Opening WFORTH.CM:1" CR
4 OPEN WFORTH.CM:1 CR
5 ." This is the beginning of WFORTH.CM:1, at location 0000" CR
6 GETSEC 40 DUMP CR
7 ." This is sector 8 of WFORTH.CM:1 at location 0E00 h" CR
8 8 NEWLSN 40 DUMP CR
9 ." This is logical sector 0 of WFORTH.CM:1, the segment descript
10 ion word" CR 0 NEWLSN 10 DUMP CR
11 CR DECIMAL DIR .FOOT PAGE
12 235 LOAD MEMORY-MAP CR CR
13 236 LOAD CR IOCB-SHOW .FOOT PAGE
14
15 DECIMAL ;S

```

SCREEN 225

```

0 ( .VHDR3 VLIST3)
1 BASE @ HEX
2
3 : .VHDR3 CR ( ... ) ( Print VLIST3 header)
4 10 SPACES ." Vocabulary list" CR
5 ." NFA Name" 0C SPACES ." @LFA CFA @CFA @PFA" CR ;
6 : VLIST3 BASE @ HEX CURRENT @ @ .VHDR3 ( ... )
7 BEGIN CR 0 OUT ! DUP DUP ( NFA)
8 5 U.RLZ SPACE ID. OUT @ 16 SWAP - SPACES
9 PFA DUP DUP DUP DUP
10 LFA @ 4 U.RLZ 2 SPACES CFA DUP 5 U.RLZ @ 5 U.R
11 2 SPACES @ 4 U.RLZ CFA DUP @ 2 - = IF ." Code" THEN NFA C@
12 40 AND IF ." Immediate" THEN OUTL @ L/P 3 - < IF
13 ELSE CR .FOOT PAGE .VHDR3 THEN LFA @
14 DUP 0= ?TERMINAL OR UNTIL DROP BASE ! CR .FOOT ;
15 BASE ! ;S

```

SCREEN 226

```

0 ( CAT-UPDATE .CAT VLIST2) ( Cluster allocation table utilities)
1 BASE @ HEX ( Cluster allocation table for scrns 65-249 )
2
3 : CAT-UPDATE 4 BLOCK 20F + DUP DUP C@ 1F OR SWAP C! ( ... )
4 1+ DUP 2D + SWAP DO FF I C! LOOP 4 BLOCK 23D + DUP
5 SWAP C! UPDATE FLUSH ; ( CLUSTER ALLOCATION TABLE)
6
7 : .CAT 4 BLOCK 200 + 50 DUMP ; ( Print cluster allocation tbl)
8 : VLIST2 BASE @ HEX ( ... ) .VHDR 3 OUTL !
9 0 OUT ! CURRENT @ @ BEGIN DUP DUP OUT @ 3C > IF CR 0 OUT !
10 OUTL @ 39 > IF .FOOT PAGE .VHDR 3 OUTL ! 0 OUT ! THEN
11 THEN 0 <# # # # # > TYPE DUP 1+ C@ 80 -
12 IF SPACE ID. ELSE DROP THEN
13 14 OUT @ OVER MOD DUP IF ELSE DROP 14 THEN - SPACES
14 PFA LFA @ DUP 0= ?TERMINAL OR UNTIL DROP CR .FOOT BASE ! ;
15 BASE ! ;S

```


SCREEN 227

```

0 ( .INDEX DIR' DIRECTORIES INDEX2 DUMP2)      ( DOCUMENT words)
1 : .INDEX ." Screen index for:" DISKID ;   BASE @ HEX
2 : DIR' DIR CR ." Cluster allocation table" CR .CAT CR ;
3 : DIRECTORIES ." Disk directories" FLUSH CR CR
4   DR0 DIR' CR CR DR1 DIR' .FOOT ;
5 : INDEX2 .INDEX                               ( FIR.ST.SCN LAST.SCN... )
6   1+ SWAP DO I ?INDEX IF CR I 3 .R SPACE 0 I .LINE THEN
7   ?TERMINAL IF LEAVE THEN OUTL @ 38 > IF CR .FOOT PAGE
8   .INDEX THEN LOOP CR .FOOT ;
9 : VCHDR ." Name" A SPACES ." Type" 14 SPACES ." Value" CR CR ;
10 : DUMP2 ( START.ADDR LENGTH ... ) ." Memory dump" CR CR
11   BASE @ >R HEX OVER + SWAP DO I DUP 5 U.RLZ DUP SPACE
12   10 + SWAP OVER OVER DO I C@ SPACE 2 U.RLZ LOOP 2 SPACES
13   DO I .ASCII LOOP ?TERMINAL IF LEAVE THEN
14   OUTL @ 38 > IF CR .FOOT PAGE ." Memory dump" CR
15   THEN CR 10 +LOOP R> BASE ! CR .FOOT ; BASE ! ;S

```

SCREEN 228

```

0 ( SHOW.VAR SHOW.USER)                        ( Decompiler 5)
1 : SHOW.VAR BASE @ HEX CR 20 SPACES          ( ... )
2   ." VARIABLES" CR CR VCHDR CURRENT @ @ PFA
3   BEGIN DUP CFA DUP @ ' VARIABLE 2+ @ =
4   IF DUP WORD.PTR ! 0 OUT ! WORD.DSP
5   OUT @ 14 MOD 14 SWAP - SPACES VAR.DSP CR
6   ELSE DROP THEN LFA @ DUP 0= IF DROP 1 ELSE PFA 0 THEN
7   ?TERMINAL OR UNTIL BASE ! CR ;
8 : SHOW.USER BASE @ HEX CR 20 SPACES          ( ... )
9   ." USER variables" CR CR CURRENT @ @ PFA
10  ." Name      Type      Offset      Value" CR CR
11  BEGIN DUP CFA DUP @ ' BASE 2- @ =
12  IF DUP WORD.PTR ! 0 OUT ! WORD.DSP
13  OUT @ 14 MOD 14 SWAP - SPACES USERV.DSP CR
14  ELSE DROP THEN LFA @ DUP 0= IF DROP 1 ELSE PFA 0 THEN
15  ?TERMINAL OR UNTIL BASE ! CR ; ;S

```

SCREEN 229

```

0 ( SHOW.CONST SHOW.VOCAB)                     ( Decompiler 6)
1 : SHOW.CONST BASE @ HEX CR 20 SPACES          ( ... )
2   ." CONSTANTS" CR CR VCHDR CURRENT @ @ PFA
3   BEGIN DUP CFA DUP @ ' 2      2- @ =
4   IF DUP WORD.PTR ! 0 OUT ! WORD.DSP
5   OUT @ 14 MOD 14 SWAP - SPACES CONST.DSP CR
6   ELSE DROP THEN LFA @ DUP 0= IF DROP 1 ELSE PFA 0 THEN
7   ?TERMINAL OR UNTIL BASE ! CR ;
8 : SHOW.VOCAB BASE @ HEX CR 20 SPACES          ( ... )
9   ." VOCABULARIES" CR CR CURRENT @ @ PFA
10  BEGIN DUP CFA DUP @ ' FORTH 2- @ =
11  IF DUP WORD.PTR ! VOCAB.DSP CR 2 +
12  ELSE DROP THEN LFA @ DUP 0= IF DROP DROP DROP 1
13  ELSE PFA 0 THEN ?TERMINAL OR UNTIL BASE ! CR ;
14 ;S
15

```


SCREEN 230

```

0 ( ZFLAG ZZDICT ZHERE ZZEND ZNAME ZINSERT ZPRINT, Alphabetical )
1 BASE @ HEX NEXTUSER ZFLAG NEXTUSER ZZDICT
2 NEXTUSER ZHERE NEXTUSER ZZEND
3 : ZNAME ( COMPARE NAMES < NFA1 NFA2 ... FLAG> 1 IF 1 < 2)
4 0 ZFLAG ! 2DUP C@ 1F AND SWAP C@ 1F AND MIN 1+ 1 DO
5 2DUP I + C@ 7F AND SWAP I + C@ 7F AND 2DUP
6 > IF 1 ZFLAG ! LEAVE THEN < IF -1 ZFLAG ! LEAVE THEN LOOP
7 ZFLAG @ 0= IF C@ 1F AND SWAP C@ 1F AND > ELSE 2DROP ZFLAG @
8 0 > THEN ;
9 : ZINSERT ZHERE @ DUP 2 + ZZEND @ ZHERE @ - CMOVE>
10 2 ZZEND +! ZZDICT @ ZHERE @ ! ;
11 : ZPRINT BASE @ HEX .VHDR ( ... )
12 ZZEND @ C000 DO OUT @ 3C > IF CR 0 OUT ! OUTL @ 38 > IF
13 .FOOT PAGE .VHDR THEN THEN I @ DUP 4 U.RLZ SPACE
14 ID. 14 OUT @ OVER MOD DUP IF ELSE DROP 14 THEN - SPACES
15 2 +LOOP BASE ! .FOOT ; BASE ! ;S

```

SCREEN 231

```

0 ( ZSORT ZLIST ZZEDLIST) ( Vocabulary list)
1 BASE @ HEX
2 : ZSORT C000 ZHERE !
3 BEGIN ZHERE @ ZZEND @ = IF ZINSERT 1
4 ELSE ZZDICT @ ZHERE @ @ ZNAME
5 IF ZINSERT 1 ELSE 2 ZHERE +! 0 THEN THEN UNTIL ;
6
7 : ZLIST C000 700 0 FILL CURRENT @ @ DUP ZZDICT ! C000 DUP DUP
8 ZHERE ! 2 + ZZEND ! ! BEGIN ZZDICT @ PFA LFA @ DUP 0= IF DROP 1
9 ELSE ZZDICT ! ZSORT 0 THEN ?TERMINAL OR UNTIL ZPRINT ;
10
11 : ZZEDLIST EDITOR ' #LOCATE FORTH LFA DUP DUP @ SWAP
12 ROT 0 SWAP ! [COMPILE] EDITOR ZLIST ! [COMPILE] FORTH ;
13
14 BASE ! ;S
15

```

SCREEN 232

```

0 ( FILEID CR? .File .FILSEC) ( Akens WHOI)
1 BASE @ HEX
2
3 : FILEID FILEID DISKID CR ;
4
5 : CR? CR OUTL @ 4 + L/P > IF .FOOT PAGE FILEID THEN ;
6
7 : .File ( flag character ... flag) DUP 0C = IF DROP ELSE
8 DUP 0A = IF DROP ELSE DUP 13 = IF DROP DROP 1 ELSE
9 DUP 0D = IF CR? DROP ELSE EMIT THEN THEN THEN ;
10
11 : .FILESEC ( flag addr.sector ... flag; 1 if EOF or done)
12 DUP 200 + SWAP DO I C@ DUP EOF = ?TERMINAL OR
13 IF DROP 1 LEAVE ELSE .File THEN LOOP ;
14
15 BASE ! ;S

```

SCREEN 233

```

0 ( .FILE LISTFILES) ( Akens WHOI)
1 BASE @ DECIMAL
2
3 : .FILE ( USAGE .FILE FILESPEC < ... >)
4   OPEN FILEID BEGIN 0 GETSEC DUP IF .FILESEC ELSE DROP THEN
5     UNTIL ;
6
7 : LISTFILES DR0 534 LOAD DR1 ;
8
9 BASE ! ;S
10
11
12
13
14
15

```

SCREEN 234

```

0 ( SET80 SET60 DIABLO) ( line printer words) ( Akens WHOI)
1 ( These words refer to an EPSON printer with GRAFTRAX+.)
2
3   BASE @ HEX
4
5 : SET80 F PARPTR ESC PARPTR 30 PARPTR
6   ' L/P 50 ! ; ( < ... > Set printer for 80 lines/page )
7
8 : SET60 12 PARPTR ESC PARPTR 32 PARPTR
9   ' L/P 3C ! ; ( < ... > Set printer for 60 lines/page )
10
11 : DIABLO COMM COMMUNIT 1B EMIT 1F EMIT 0C EMIT
12   0D EMIT 8 SPACES 1B EMIT 39 EMIT TERM ;
13 BASE ! ;S
14
15

```

SCREEN 235

```

0 ( .BLOCKHDR .BUFSTAT MEMORY-MAP)
1 BASE @ HEX 0 USER UP
2 : .BLOCKHDR DUP C@ S0 AND SWAP DUP @ DUP + 2 /
3   SWAP HEX . 5 SPACES DECIMAL . IF 5 SPACES ." Yes" THEN ;
4 : .BUFSTAT CR ." Address block update" BASE @ HEX ( ... )
5   LIMIT 404 - BEGIN DUP CR .BLOCKHDR 404 - DUP FIRST < UNTIL
6   DROP BASE ! ;
7 : MEMORY-MAP BASE @ HEX CR ( ... )
8   .BUFSTAT CR
9   UP . 5 SPACES ." User area starts here" CR
10  R0 ? 5 SPACES ." Return stack starts down from here" CR
11  TIB ? 5 SPACES ." Terminal input buffer" CR
12  S0 ? 5 SPACES ." Computation stack starts down here" CR
13  HERE . 5 SPACES ." Dictionary pointer" CR
14  FENCE ? 5 SPACES ." FENCE" CR
15  BASE ! ; BASE ! ;S

```


SCREEN 236

```

0 ( IOCB-SHOW) ( FORTH DOS teaching word)
1 BASE @ HEX
2
3 : IOCB-SHOW ( < ... > DISPLAYS THE IOCB VARIABLES)
4 CR ." The starting sector number is " IOCB @ . CR
5 ." The segment descriptor word offset is "
6 IOCB 2+ C@ . ." bytes" CR
7 ." There are " IOCB 3 + C@ .
8 ." contiguous clusters for this SDW" CR
9 IOCB 4 + C@ . ." clusters have been read via this SDW" CR
10 ." The starting sector number for this SDW is "
11 IOCB 5 + @ . CR
12 ." The buffer address is " BASE @ HEX IOCB 7 + @ U.
13 BASE ! CR ;
14
15 BASE ! ;S

```

SCREEN 237

```

0 ( ALVIN PLOTTER ALNAV PC1 PC2 ALVIN-RESET) ( Top lab comm utils)
1
2 : ALVIN 0 CHANNEL-SELECT U ; ( ... )
3 : PLOTTER 1 CHANNEL-SELECT U ;
4 : ALNAV 2 CHANNEL-SELECT U ;
5 : PC1 3 CHANNEL-SELECT U ;
6 : PC2 4 CHANNEL-SELECT U ;
7 : ALVIN-RESET 0 CHANNEL-RESET ALVIN ;
8 : ID ." Top Lab" ;
9
10 ;S
11
12
13
14
15

```

SCREEN 238

```

0 ( COMM TERM BREAKC RCVC BREAKT TRC RCVT U ) ( Fast Uart at E0)
1 BASE @ HEX
2 : COMM E0 1 => 1D 3 => ;
3 : TERM 1 1 => 1D 3 => ;
4 : BREAKC 2 <= DROP 1 1 => 0D EMIT ." Break received " ;
5 : RCVC 8 AND IF BREAKC ELSE 2 <= 1 1 => 2 => THEN ;
6 : BREAKT 2 <= DROP 0D EMIT ." Break sent "
7 BEGIN 0 E0 1 => 5D 3 => 3 <= DUP 1 AND IF RCVC ELSE DROP THEN
8 1 1 => ?EF4 IF CR ." BREAK RESET "
9 E0 1 => 1D 3 => 0 2 => DROP 1 THEN UNTIL ;
10 : TRC 2 <= DUP 1B XOR 0= IF DROP DROP 1 ELSE E0 1 => 2 => THEN ;
11 : RCVT 8 AND IF BREAKT ELSE TRC THEN ;
12 : U ." Uart E0 " CR COMM COMMUNIT BEGIN 0
13 E0 1 => 3 <= DUP 1 AND IF RCVC ELSE DROP THEN
14 1 1 => 3 <= DUP 1 AND IF RCVT ELSE DROP THEN UNTIL ;
15 BASE ! ;S

```

SCREEN 239

```

0 ( fig-FORTH portable editor extensions, by Kim Harris; untested)
1 ( from FORTH Dimensions Vol II No 6 page 161 )
2 EDITOR DEFINITIONS DECIMAL
3
4 : ENTER? ( start-line# current-line# ... f ) OVER = ;
5 : ENTER ( ... ) QUERY 1 TEXT ;
6 : NULL? ( ... f ) TIB @ C@ 0= ;
7 : .BS ( ... ) 8 EMIT ;
8
9 : NEW ( start-line# ... ) FORTH 16 0 DO CR I 3 .R SPACE
10 I ENTER? IF ENTER NULL? IF .BS I SCR @ .LINE ELSE
11 I EDITOR R FORTH 1+ THEN ELSE I SCR @ .LINE THEN LOOP DROP ;
12 : UNDER ( start-line# ... ) FORTH 1+ 16 0 DO CR I 3 .R SPACE
13 I ENTER? IF ENTER NULL? IF .BS I SCR @ .LINE ELSE
14 I EDITOR I FORTH 1+ THEN ELSE I SCR @ .LINE THEN LOOP DROP ;
15 FORTH DEFINITIONS ;S

```

SCREEN 240

```

0 ( SEARCH ) ( OVER RANGE OF SCREENS ) ( WFR, FORTH DIM III P 9 )
1 BASE @ DECIMAL
2 00 VARIABLE COUNTER
3 : BUMP ( THE LINE NUMBER AND HANDLE PAGING )
4 1 COUNTER +! COUNTER @
5 56 > IF 0 COUNTER !
6 CR CR 15 MESSAGE 12 EMIT THEN ;
7 : SEARCH ( FROM TO --- TARGET SCREEN )
8 12 EMIT 01 TEXT 0 COUNTER !
9 1+ SWAP DO FORTH I SCR !
10 EDITOR TOP
11 BEGIN 1LINE IF 0 M SCR ? BUMP THEN
12 1023 R# @ < UNTIL
13 LOOP ;
14 BASE ! ;S
15

```

SCREEN 241

```

0 ( ASSEMBLER Examples ) ( Akens WHOI)
1 BASE @ DECIMAL CR 241 LIST HEX
2 ASSEMBLER ( Load the ASSEMBLER)
3
4 CODE NO-OP ( Start the code definition, CALL it NO-OP)
5 5 SEP ( return to NEXT) ( This word does nothing)
6 ( 5 SEP must terminate all code definitions)
7 END-CODE ( End the code definition)
8 CR ." This is the dictionary entry for NO-OP" CR
9 ' NO-OP NFA 10 DUMP ( Show structure of the new word)
10
11 CODE SEEQ SEQ 5 SEP END-CODE CR CR
12 ." These are the dictionary entries for SETQ AND SEEQ" CR
13 ' SETQ NFA 10 DUMP ' SEEQ NFA 10 DUMP
14 FORTH DEFINITIONS CR
15 DECIMAL .FOOT PAGE 220 LOAD ;S

```


SCREEN 242

```

0 ( 0= Q=0 DF=1 ENDIF THEN IF ELSE BEGIN UNTIL AGAIN WHILE REPEAT)
1  BASE @ HEX ( ASSEMBLER 14, not yet debugged)
2  CA ( LBNZ ) IS 0= C2 ( LBZ ) IS 0<> C9 ( LBNQ ) IS Q=0
3  C1 ( LBQ ) IS Q<>0 CB ( LBNF ) IS DF=1 C3 ( LBDF ) IS DF=0
4  ( USE ONE OF THE ABOVE CONDITIONALS BEFORE IF, UNTIL OR WHILE )
5
6  : ENDIF 2 ?PAIRS HERE SWAP ! ;
7  : THEN [COMPILE] ENDIF ;
8  : IF C, HERE 0 , 2 ;
9  : ELSE 2 ?PAIRS C0 IF ROT SWAP ENDIF 2 ;
10 : BEGIN HERE 1 ;
11 : UNTIL SWAP 1 ?PAIRS C, , ;
12 : AGAIN 1 ?PAIRS C0 C, , ;
13 : WHILE IF 2+ ;
14 : REPEAT >R >R AGAIN R> R> 2 - ENDIF ;
15  BASE ! ;S

```

SCREEN 243

```

0 ( NOPRINT PRINTER ) ( Load scn for serial printer from TV 910+)
1
2  BASE @ HEX
3
4  : NOPRINT CR 1B EMIT 61 EMIT 1 WAIT ;
5
6  : PRINTER NOPRINT ." SCREEN OFF "
7  1B EMIT 60 EMIT 1 WAIT ;
8
9  DECIMAL 124 LOAD
10  BASE ! ;S
11
12  The escape sequences in PRINT and NOPRINT must be
13  changed to suit your terminal. These are the words
14  to turn on and off the printer attached to the terminal.)
15

```

SCREEN 244

```

0 ( VOC-LINK XX VV FIX-VOC-LINKS) ( JOHN C. CLARK)
1  BASE @ DECIMAL
2  FORTH DEFINITIONS
3
4  0 VARIABLE XX
5  0 VARIABLE VV
6
7  : FIX-VOC-LINKS VOC-LINK XX ! VOC-LINK @ VV !
8  BEGIN VV @
9  WHILE VV @ HERE U<
10  IF VV @ XX @ ! VV @ XX ! XX @ @ VV !
11  ELSE VV @ @ VV ! THEN
12  REPEAT ;
13
14  BASE ! ;S
15

```

SCREEN 245

```

0 ( BEGIN.MOD END.MOD)                ( JOE BARNHART)
1 ( Contributed by Joe Barnhart, Santa Rosa, CA)
2 BASE @ DECIMAL
3
4 0 VARIABLE LINKS 2 ALLOT              ( storage for DP and NFA)
5
6 : BEGIN.MOD                          ( nnnn --- )
7     HERE LINKS !                      ( save the old DP)
8     LATEST LINKS 2+ !                 ( and NFA of latest word)
9     S0 @ SWAP 168 + - DP !           ( space for PAD and STACK)
10    ;
11
12 : END.MOD                            ( restore the old DP)
13     LINKS @ DP ! ;
14
15     BASE ! ;S

```

SCREEN 246

```

0 ( FORGET.MOD)                        ( JOE BARNHART)
1 : FORGET.MOD
2     LINKS 2+ @                        ( NFA of "old" latest word)
3     LINKS @ PFA LFA !                ( LFA of most recent word)
4     FIX-VOC-LINKS ;
5 ;S
6     To use these words do the following:
7 1. Type nnnn BEGIN.MOD to reserve nnnn bytes for the
8    transient module (such as the 1806 assembler)
9 2. Load the module. If you get a "stack space" error
10    you didn't reserve enough space.
11 3. Type END.MOD to finish the transient module.
12 4. Use the module until you're through (defining CODE words
13    for example).
14 5. Type FORGET.MOD to reclaim the space used by the transient
15    module. Your new definitions are retained.

```

SCREEN 247

```

0 ( CASE-EXAMPLE )                    ( Ray Duncan, Laboratory Microsystems)
1 BASE @ DECIMAL CR 247 LIST CR CR
2 : CASE-EXAMPLE ( Define a word called CASE-EXAMPLE)
3     ." The number is " ( NUMBER ... )
4     CASE ( Start the CASE statement)
5         1 OF ." one."      ENDOF ( If NUMBER = 1, print One)
6         2 OF ." two."      ENDOF ( If NUMBER = 2, print Two)
7         3 OF ." three."    ENDOF ( If NUMBER = 3, print Three)
8         ." less than one or greater than three." ( If NUMBER is less
9           than 1 or greater than 3, print the message: Less than etc)
10    ENDCASE CR CR ; ( End the CASE statement and definition)
11
12    1 CASE-EXAMPLE ( NUMBER = 1)
13    0 CASE-EXAMPLE ( NUMBER = 0)
14    100 CASE-EXAMPLE ( NUMBER = 100)
15 FORGET CASE-EXAMPLE BASE ! ;S

```


SCREEN 249

```
0 ( TEST SCREEN ) ( 5038 )
1   For program exchange, the medium of hard copy is cheap,
2   convenient, and machine-independent. Its primary disadvantages
3   are the time required for hand-typing the source code and the
4   possibility of human error in the process. Even if the screens
5   LOAD without error messages, some errors may pass undetected
6   until run-time, when the system crashes mysteriously.
7
8
9
10
11
12
13
14
15
```

Vocabulary List with Full Attributes

This chapter lists all FORTH words in the order in which they were defined, most recently defined first. Each entry includes the name field address (NFA), the name of the word, the contents of the link field (@LFA), the code field address (CFA), the contents of the code field (@CFA), and the contents of the first byte of the parameter field. In addition, CODE words and IMMEDIATE words are flagged. The order in which each entry is printed corresponds exactly to the actual dictionary entry for each word. The drawing below illustrates the dictionary entry format.

There are 6 pre-defined types of dictionary entries. These are Code definitions, Colon definitions, CONSTANTS, VARIABLES, USER variables and VOCABULARY definitions. Other types, such as string constants and string variables may be defined by the user for specific applications. Refer to the FORTH ENCYCLOPEDIA for complete details.

The lengths of the name field and the parameter field are variable. The link field and the code field are always two bytes long. The link field address points to the name field of the word previously defined in the present VOCABULARY. The code field address points to the code which is actually executed when the word is invoked. The code field of a code word points to the parameter field which contains machine code. For all other types of words, the code field points to code which interprets the entries in the parameter field. The dictionary is composed of a number of dictionary entries threaded together via the link field addresses. The end of the dictionary is signified by a link field address of 0000. Each word which defines a VOCABULARY entry contains a pointer to the most recently defined word in that particular VOCABULARY (ie FORTH EDITOR ASSEMBLER).

This chapter was generated by the following sequence:

```
PRINTER VLIST2 NOPRINT (cr)
```


		Vocabulary list			
NFA	Name	@LFA	CFA	@CFA	@PFA
0418B	DOCUMENT	4180	04196	10A1	1191 Immediate
04180	TASK	416B	04187	857	02C0
0416B	FLOATING	4156	04176	857	0149
04156	DOCUMENT	410F	04161	857	0149
0410F	DISKLIST	4100	0411A	857	36A7
04100	TEAR	40E3	04107	857	40EA
040E3	PAGE	40BC	040EA	857	0149
040BC	PARPTR	3E2E	040C5	857	07D2
03E2E	DECOMPILE	3E06	03E3A	857	0EEE
03E06	VOCAB.DSP	3DDE	03E12	857	0B41
03DDE	DOES>.DSP	3DB6	03DEA	857	0B41
03DB6	VAR.DSP	3D77	03DC0	857	0149
03D77	USERV.DSP	3D4D	03D83	857	0B41
03D4D	CONST.DSP	3D2F	03D59	857	0149
03D2F	CV.DSP	3D01	03D38	857	0B41
03D01	BRANCH.DSP	3CB6	03D0E	857	0B41
03CB6	WORD.DSP	3C8A	03CC1	857	0620
03C8A	PDOTQ.DSP	3C7B	03C96	857	3C86
03C7B	WORD.PTR	3C6B	03C86	690	0060
03C6B	QUIT.FLAG	3C20	03C77	690	005E
03C20	FILELOAD	3BC9	03C2B	857	38B9
03BC9	DOWNLOAD	3B78	03BD4	857	38B9
03B78	SEND	3B35	03B7F	857	38B9
03B35	SAVE	3B01	03B3C	857	38B9
03B01	F-LEN	3ADC	03B09	857	0608
03ADC	.AHP	3AB7	03AE3	857	0909
03AB7	.AHL	3A99	03ABE	857	0149
03A99	.BYTE	3A6F	03AA1	857	049C
03A6F	.AH	38B2	03A75	857	049C
038B2	OPEN	388F	038B9	857	1906
0388F	FILEID	3851	03898	857	0B41
03851	FNAME	37B6	03859	857	049C
037B6	NEWLSN	3775	037BF	857	354E
03775	DIR	36DF	0377B	857	36A7
036DF	.DIRSEC	369E	036E9	857	0149
0369E	DISKID	366D	036A7	857	0909
0366D	Open	35EC	03674	857	354E
035EC	GETSEC	359B	035F5	857	354E
0359B	NEWSDW	3552	035A4	857	0608
03552	SECTOR	3547	0355B	857	049C
03547	IOCB	353D	0354E	690	0054
0353D	EOF	34CC	03543	5FB	0013
034CC	SPREADSCREEN	3494	034DB	857	049C
03494	INDEX	344A	0349C	857	03D5
0344A	?SCREEN	3401	03454	857	0608
03401	?INDEX	33E0	0340A	857	0608
033E0	?ASCII	33CD	033E9	857	049C
033CD	?SPACE	3385	033D6	857	0149
03385	VSHADOW	3343	0338F	857	049C
03343	VCOPY	332B	0334B	857	049C
0332B	VMOVE	32D1	03333	857	0149
032D1	VOCAB?	32B7	032DA	857	0734
032B7	SCREEN-DUMP	325B	032C5	857	16DE
0325B	DUMP-TERM	3228	03267	857	0149

		Vocabulary list			
NFA	Name	@LFA	CFA	@CFA	@PFA
03228	.S	320E	0322D	857	3216
0320E	DEPTH	31F8	03216	857	0286
031F8	ASSEMBLER	31D1	03204	857	0149 Immediate
031D1	DOS	318C	031D7	857	1906
0318C	V	30FA	03190	857	0759
030FA	v	30D2	030FE	857	2F92
030D2	AH->B	30A9	030DA	857	049C
030A9	SERPRINTER	308F	030B6	857	2867
0308F	CLEAR-KEY	304A	0309B	857	2F5C
0304A	?HEXCHAR	303A	03055	857	049C
0303A	U..	302A	03040	857	0608
0302A	CR'	2FF7	03030	857	0149
02FF7	XMIT	2FBE	02FFE	857	0759
02FBE	Xmit	2F87	02FC5	857	28B1
02F87	?MONITOR	2F66	02F92	857	0B41
02F66	MONABORT	2F55	02F71	857	2878
02F55	?KEY	2F3B	02F5C	857	2836
02F3B	CHANNEL-RESET	2F20	02F4B	857	2867
02F20	CHANNEL-SELECT	2F00	02F31	857	2867
02F00	CRS	2EED	02F06	857	2ECB
02EED	CS	2EC4	02EF2	857	28B1
02EC4	2**N	2E67	02ECB	857	049C
02E67	GET-SCREEN	2E2F	02E74	857	0B41
02E2F	SEND-SCREEN	2DF8	02E3D	857	049C
02DF8	ANSWER	2DD6	02E01	857	2DE0
02DD6	Ansinit	2D85	02DE0	857	0149
02D85	ORIGINATE	2D54	02D91	857	2856
02D54	DIAL	2CFA	02D5B	857	2A4E
02CFA	RE-ENTER	2BA1	02D05	857	07E2
02BA1	TS	2B54	02BA8	857	0149
02B54	TS	2B0F	02B59	857	2856
02B0F	?CARRIER	2A9D	02B1A	857	0608
02A9D	DIALTONE	2A78	02AA8	857	2A83
02A78	DIALINIT	2A5E	02A83	857	2856
02A5E	OFFHOOK	2A45	02A68	857	2856
02A45	ONHOOK	2A3B	02A4E	857	2856
02A3B	U	29F3	02A3F	857	29FA
029F3	UART	29D1	029FA	857	0B41
029D1	SENDCHAR?	29B3	029DD	857	049C
029B3	SENDC	298F	029BB	857	0149
0298F	TRC	2981	02995	857	08CF
02981	EMIT'	2945	02989	298B	E460 Code
02945	SENDBRK	2926	0294F	857	0618
02926	RSTBRK	2905	0292F	857	2836
02905	RCVCHAR?	28E2	02910	857	049C
028E2	RCVC	28BB	028E9	857	0149
028BB	RCVBRK	28A6	028C4	857	0618
028A6	COMMINIT	2891	028B1	857	281A
02891	ESC'	2882	02898	857	2867
02882	CONS	2871	02889	857	0610
02871	TERM	2860	02878	857	07F1
02860	COMM	284E	02867	857	0800
0284E	MODEM	283E	02856	857	07E2
0283E	CTL=>	282D	02846	857	0620

		Vocabulary list			
NFA	Name	@LFA	CFA	@CFA	@PFA
0282D	STATUS	281E	02836	857	0620
0281E	TERM.CTL	280F	02829	5FE	001D
0280F	COMM.CTL	27EF	0281A	5FE	001D
027EF	CLEAR	27DD	027F7	857	0719
027DD	EDITL	26AE	027E5	857	0719
026AE	EDIT	256D	026B5	857	2257
0256D	CUR	255F	02573	690	0052
0255F	L	2553	02563	857	2257
02553	T	2261	02557	857	2257
02261	WHERE	224E	02269	857	049C
0224E	EDITOR	222D	02257	10A1	1191 Immediate
0222D	LINE	220E	02234	857	049C
0220E	TEXT	21DC	02215	857	0A53
021DC	ENDCASE	21B6	021E6	857	0149 Immediate
021B6	ENDOF	218D	021BE	857	0149 Immediate
0218D	OF	2176	02192	857	0149 Immediate
02176	CASE	216B	0217D	857	0C18 Immediate
0216B	RETQ	2160	02172	2174	7AD5 Code
02160	SETQ	2158	02167	2169	7BD5 Code
02158	WN4	2150	0215E	8D	8453
02150	WN3	2148	02156	8A	8357
02148	WN2	2140	0214E	87	8357
02140	WN1	2139	02146	84	8357
02139	W4	2132	0213E	81	8357
02132	W3	212B	02137	7E	8257
0212B	W2	2124	02130	7B	8257
02124	W1	211B	02129	78	8257
0211B	?EF4	2112	02122	6A	8257
02112	?EF3	2109	02119	66	843F
02109	?EF2	2100	02110	62	843F
02100	?EF1	2093	02107	5E	843F
02093	DUMP	202C	0209A	857	0759
0202C	.ASCII	1FDC	02035	857	04D1
01FDC	MATCH	1F9E	01FE4	857	0328
01F9E	Match	1EFE	01FA6	857	0516
01EFE	VLIST	1ED0	01F06	857	0759
01ED0	Y?	1E9D	01ED5	857	0909
01E9D	?Y/N	1E6C	01EA4	857	08CF
01E6C	N.	1E2E	01E71	857	0759
01E2E	ROMIT	1DC7	01E36	857	0A53
01DC7	.FOOT	1D93	01DCF	857	07C8
01D93	.VHDR	1D47	01D9B	857	0B41
01D47	NEW-FENCE	1D37	01D53	857	0BC1
01D37	CLS	1D1E	01D3D	857	0149
01D1E	MSEC	1CFA	01D25	857	0149
01CFA	SEC	1CD1	01D00	857	0149
01CD1	ID	1CC7	01CD6	857	0149
01CC7	ESC	1CB9	01CCD	5FB	001B
01CB9	CHAPTER	1CAB	01CC3	690	0050
01CAB	BYE	1C97	01CB1	857	1906
01C97	QUOTE	1C86	01C9F	857	0149
01C86	ALLOTU	1C57	01C8F	857	080C
01C57	NEXTUSER	1C45	01C62	857	080C
01C45	WORD-79	1C39	01C4F	857	0DFA

Vocabulary list

NFA Name	@LFA	CFA	@CFA	@PFA	
01C39 >IN	1C2D	01C3F	857	0705	
01C2D NOT	1BF8	01C33	857	0352	
01BF8 COPY	1BBD	01BFF	857	0726	
01BBD CMOVE>	1BB0	01BC6	857	049C	
01BB0 BEEP	1B9F	01BB7	857	1BA6	
01B9F BELL	1B80	01BA6	857	0149	
01B80 NODISK	1B67	01B89	857	0149	
01B67 DEC.	1B4E	01B6E	857	0759	
01B4E HEX.	1B3C	01B55	857	0759	
01B3C U.RLZ	1B16	01B44	857	0608	
01B16 D.RLZ	1AF1	01B1E	857	0328	
01AF1 ZEROES	1ADD	01AFA	857	0608	
01ADD 2SWAP	1ACE	01AE5	857	04FE	
01ACE 2DUP	1ABE	01AD5	857	0467	
01ABE 2DROP	1AB2	01AC6	857	047D	
01AB2 ASMBR	1A95	01ABA	857	02C0	
01A95 LOADTHRU	1A26	01AA0	857	03D5	
01A26 LOAD	1A16	01A2D	857	0CF2	
01A16 U.R	19E8	01A1C	857	0608	
019E8 NOPRINT	19C5	019F2	857	0149	
019C5 PARPRINTER	1969	019D2	857	0149	
01969 PRINTER	194A	01973	857	0149	
0194A serptr	192A	01953	1955	D5E3	Code
0192A parptr	18FE	01933	1935	D5E3	Code
018FE FLUSH	18B3	01906	857	0655	
018B3 LIST	18A4	018BA	857	0CF2	
018A4 OK	1892	018A9	857	0B41	
01892 (DOS)	1883	0189A	189C	F890	Code
01883 MON	186D	01889	188B	9EFA	Code
0186D DR1	182F	01873	857	066D	
0182F FORTH	181F	01837	10A1	1191	Immediate
0181F DR0	17FD	01825	857	0608	
017FD -->	17CA	01803	857	0C77	Immediate
017CA LOAD	17B4	017D1	857	06FC	
017B4 GROUP	179D	017BC	17BE	F845	Code
0179D CDER	178C	017A4	857	1793	
0178C Cder	1736	01793	1795	248D	Code
01736 R/W	16D6	0173C	857	0489	
016D6 BLOCK	168D	016DE	857	0726	
0168D BUFFER	166F	01696	857	0794	
0166F EMPTY-BUFFERS	1650	0167F	857	0649	
01650 UPDATE	1625	01659	857	079F	
01625 +BUF	1613	0162C	857	0661	
01613 .LINE	15EC	0161B	857	15F5	
015EC (LINE)	15D7	015F5	857	0328	
015D7 S->D	15AF	015DE	15E0	E404	Code
015AF MESSAGE	15A2	015B9	857	0B41	
015A2 U.	1596	015A7	857	0608	
01596 ?	158A	0159A	857	04BF	
0158A .	157B	0158E	857	15DE	
0157B D.	156A	01580	857	0608	
0156A .R	1546	0156F	857	0328	
01546 D.R	152F	0154C	857	0328	
0152F #S	1505	01534	857	1509	

		Vocabulary list			
NFA	Name	@LFA	CFA	@CFA	@PFA
01505	#	14EC	01509	857	0759
014EC	SIGN	14D5	014F3	857	04FE
014D5	#>	14C6	014DA	857	047D
014C6	<#	14A5	014CB	857	0B5D
014A5	SPACES	1495	014AE	857	0608
01495	WHILE	1474	0149D	857	1464 Immediate
01474	ELSE	145F	0147B	857	0618 Immediate
0145F	IF	1442	01464	857	0C91 Immediate
01442	REPEAT	142C	0144B	857	0328 Immediate
0142C	AGAIN	1420	01434	857	0610 Immediate
01420	END	140A	01426	857	1412 Immediate
0140A	UNTIL	13F4	01412	857	0610 Immediate
013F4	+LOOP	13DF	013FC	857	0620 Immediate
013DF	LOOP	13CE	013E6	857	0620 Immediate
013CE	DO	13C1	013D3	857	0C91 Immediate
013C1	THEN	13A9	013C8	857	13B1 Immediate
013A9	ENDIF	1397	013B1	857	0C18 Immediate
01397	BEGIN	138A	0139F	857	0C18 Immediate
0138A	BACK	137B	01391	857	0A84
0137B	*/	1367	01380	857	136F
01367	*/MOD	1359	0136F	857	0328
01359	MOD	134B	0135F	857	133F
0134B	/	1338	0134F	857	133F
01338	/MOD	1311	0133F	857	0328
01311	M/	12D2	01316	857	0467
012D2	FORGET	12BE	012DB	857	0742
012BE	'	12B0	012C2	857	0EEE Immediate
012B0	(	1298	012B4	857	0149 Immediate
01298	IMMEDIATE	127A	012A4	857	0BC1
0127A	[COMPILE]	124B	01286	857	0EEE Immediate
0124B	."	1239	01250	857	0149 Immediate
01239	;	11DE	0123D	857	0C5A Immediate
011DE	ABORT	11B3	011E6	857	0297
011B3	QUIT	1199	011BA	857	0608
01199	DEFINITIONS	1164	011A7	857	0734
01164	VOCABULARY	1114	01171	857	1085
01114	INTERPRET	10E9	01120	857	0EEE
010E9	?STACK	10CC	010F2	857	06A1
010CC	DLITERAL	10B0	010D7	857	074E Immediate
010B0	LITERAL	108D	010BA	857	074E Immediate
0108D	DOES>	107B	01095	857	0336
0107B	<BUILDS	106A	01085	857	0608
0106A	USER	1055	01071	857	0149
01055	VARIABLE	1040	01060	857	0149
01040	CONSTANT	1026	0104B	857	0149
01026	!CODE	1002	0102E	857	0FA6
01002	:	0F9D	01006	857	0C30 Immediate
00F9D	CREATE	0F69	00FA6	857	0286
00F69	ID.	0F51	00F6F	857	0B5D
00F51	MIN	0F20	00F57	857	0467
00F20	ERROR	0F10	00F28	857	06CE
00F10	(ABORT)	0EE6	00F1A	857	11E6
00EE6	-FIND	0E8D	00EEE	857	0629
00E8D	NUMBER	0E40	00E96	857	0608

NFA Name	Vocabulary list			
	@LFA	CFA	@CFA	@PFA
00E40 (NUMBER)	0DF3	00E4B	857	03D5
00DF3 WORD	0DB9	00DFA	857	06FC
00DB9	0D9D	00DBD	857	06FC Immediate
00D9D QUERY	0D2C	00DA5	857	06B4
00D2C EXPECT	0D16	00D35	857	0467
00D16 ;CODE	0CFE	00D1E	857	0C5A Immediate
00CFE (;CODE)	0CE8	00D08	857	0336
00CE8 DECIMAL	0CD6	00CF2	857	0149
00CD6 HEX	0CC1	00CDC	857	0149
00CC1 SMUDGE	0CB1	00CCA	857	0BC1
00CB1]	0CA3	00CB5	857	0149
00CA3 [	0C87	00CA7	857	0608 Immediate
00C87 COMPILE	0C6C	00C91	857	0C18
00C6C ?LOADING	0C53	00C77	857	06FC
00C53 ?CSP	0C3E	00C5A	857	0286
00C3E ?PAIRS	0C28	00C47	857	0405
00C28 ?EXEC	0C10	00C30	857	074E
00C10 ?COMP	0BF5	00C18	857	074E
00BF5 ?ERROR	0BE1	00BFE	857	0489
00BE1 PFA	0BCB	00BE7	857	0610
00BCB NFA	0BB8	00BD1	857	0149
00BB8 LATEST	0B91	00BC1	857	0742
00B91 TRAVERSE	0B82	00B9C	857	0489
00B82 D+-	0B74	00B88	B8A	4414 Code
00B74 +-	0B57	00B79	B7B	4414 Code
00B57 PAD	0B3A	00B5D	B5F	E2F8 Code
00B3A (.")	0B10	00B41	B43	4852 Code
00B10 -TRAILING	0AFB	00B1C	B1E	686B Code
00AFB COUNT	0AE7	00B03	B05	686B Code
00AE7 !CSP	0ADF	00AEE	AF0	E2F8 Code
00ADF CFA	0AD3	00AE5	ACF	8421
00AD3 LFA	0AC8	00AD9	ADB	F804 Code
00AC8 2-	0AB7	00ACD	ACF	F802 Code
00AB7 1-	0A9F	00ABC	ABE	F801 Code
00A9F C,	0A80	00AA4	AA6	E2F8 Code
00A80 ,	0A64	00A84	A86	E2F8 Code
00A64 ALLOT	0A4C	00A6C	A6E	E2F8 Code
00A4C HERE	09FF	00A53	A55	E2F8 Code
009FF M/MOD	09CD	00A07	A09	686F Code
009CD BLOCK-WRITE	09A5	009DB	9DD	686F Code
009A5 BLOCK-READ	095B	009B2	9B4	686F Code
0095B SPACE	092C	00963	965	24F8 Code
0092C TYPE	0904	00933	935	E2F8 Code
00904 CR	08F5	00909	90B	24F8 Code
008F5 EMIT	08DE	008FC	8FE	E268 Code
008DE ?TERMINAL	08C9	008EA	8EC	246B Code
008C9 KEY	08AA	008CF	8D1	246B Code
008AA HOLD	088F	008B1	8B3	E2F8 Code
0088F BLANKS	087E	00898	89A	F820 Code
0087E ERASE	0861	00886	888	F800 Code
00861 FILL	0835	00868	86A	686F Code
00835 INPUT	0810	0083D	83F	E222 Code
00810 OUTPUT	0804	00819	81B	1468 Code
00804 Nextu	07F5	0080C	690	001E

		Vocabulary list			
NFA	Name	@LFA	CFA	@CFA	@PFA
007F5	COMM.GRP	07E6	00800	690	001C
007E6	TERM.GRP	07D6	007F1	690	001A
007D6	MODEM.GRP	07CC	007E2	690	0018
007CC	GRP	07C1	007D2	690	0044
007C1	OUTL	07B3	007C8	690	0042
007B3	SCR/DSK	07A3	007BD	690	0016
007A3	USER-IOCB	0798	007AF	690	0036
00798	PREV	078E	0079F	690	0034
0078E	USE	0784	00794	690	0032
00784	HLD	077B	0078A	690	0030
0077B	R#	0771	00780	690	002E
00771	CSP	0767	00777	690	002C
00767	FLD	075D	0076D	690	002A
0075D	DPL	0752	00763	690	0028
00752	BASE	0746	00759	690	0026
00746	STATE	0738	0074E	690	0024
00738	CURRENT	072A	00742	690	0022
0072A	CONTEXT	071D	00734	690	0020
0071D	OFFSET	0713	00726	690	004E
00713	SCR	0709	00719	690	004C
00709	OUT	0700	0070F	690	004A
00700	IN	06F6	00705	690	0048
006F6	BLK	06E7	006FC	690	0040
006E7	VOC-LINK	06DE	006F2	690	0014
006DE	DP	06D2	006E3	690	0012
006D2	FENCE	06C4	006DA	690	0010
006C4	WARNING	06B8	006CE	690	000E
006B8	WIDTH	06AE	006C0	690	000C
006AE	TIB	06A5	006B4	690	000A
006A5	R0	069C	006AA	690	0008
0069C	S0	067E	006A1	690	0006
0067E	+ORIGIN	0671	00688	857	067A
00671	ORIGIN	0665	0067A	5FB	1841
00665	B/SCR	0659	0066D	5FB	0001
00659	B/BUF	064D	00661	5FB	0400
0064D	LIMIT	0641	00655	5FB	7FFF
00641	FIRST	0637	00649	5FB	57D7
00637	L/P	062D	0063D	5FB	003C
0062D	C/L	0624	00633	5FB	0040
00624	BL	061C	00629	5FB	0020
0061C	3	0614	00620	5FB	0003
00614	2	060C	00618	5FB	0002
0060C	1	0604	00610	5FB	0001
00604	0	0571	00608	5FB	0000
00571	M*	0563	00576	578	E268 Code
00563	*	0541	00567	569	E268 Code
00541	MAX	0532	00547	549	686A Code
00532	DABS	0524	00539	53B	04FE Code
00524	ABS	050F	0052A	52C	04FE Code
0050F	-DUP	04F8	00516	518	686A Code
004F8	ROT	04EB	004FE	500	686A Code
004EB	C!	04DC	004F0	4F2	686A Code
004DC	!	04CC	004E0	4E2	686A Code
004CC	C@	04BB	004D1	4D3	686A Code

Vocabulary list

NFA Name	@LFA	CFA	@CFA	@PFA
004BB @	04A7	004BF	4C1	686A Code
004A7 TOGGLE	0496	004B0	4B2	686A Code
00496 DUP	0482	0049C	49E	686A Code
00482 SWAP	0476	00489	48B	686A Code
00476 DROP	0460	0047D	47F	1414 Code
00460 OVER	0444	00467	469	EB68 Code
00444 DMINUS	042A	0044D	44F	1414 Code
0042A MINUS	0411	00432	434	14FF Code
00411 D+	0401	00416	418	686A Code
00401 -	03ED	00405	407	686A Code
003ED +!	03E2	003F2	3F4	686B Code
003E2 2+	03D0	003E7	3E9	F802 Code
003D0 1+	03C0	003D5	3D7	F801 Code
003C0 +	03AA	003C4	3C6	686A Code
003AA >	038C	003AE	3B0	686A Code
0038C <	036F	00390	392	686A Code
0036F =	0362	00373	375	686A Code
00362 0<	034D	00367	369	44FE Code
0034D 0=	0342	00352	354	44F1 Code
00342 I	0331	00346	348	2468 Code
00331 R>	0323	00336	338	2468 Code
00323 >R	0313	00328	32A	E268 Code
00313 LEAVE	02F4	0031B	31D	E212 Code
002F4 CMOVE	02CB	002FC	2FE	44FC Code
002CB DIGIT	02BB	002D3	2D5	686A Code
002BB ;S	02A5	002C0	2C2	E868 Code
002A5 RP!	0291	002AB	2AD	87FC Code
00291 SP!	0280	00297	299	87FC Code
00280 SP@	026E	00286	288	EA68 Code
0026E XOR	025D	00274	276	686A Code
0025D OR	024B	00262	264	686A Code
0024B AND	0235	00251	253	686A Code
00235 U*	01FF	0023A	23C	686A Code
001FF U/	01ED	00204	206	686F Code
001ED EXECUTE	018C	001F7	1F9	6869 Code
0018C ENCLOSE	0178	00196	198	1414 Code
00178 0BRANCH	0169	00182	184	44F1 Code
00169 BRANCH	0154	00172	174	E868 Code
00154 (DO)	0143	0015B	15D	E268 Code
00143 LIT	00EC	00149	14B	E868 Code
000EC (FIND)	00C9	000F5	F7	686A Code
000C9 (+LOOP)	00A5	000D3	D5	1486 Code
000A5 (LOOP)	0055	000AE	B0	16E2 Code
00055 EF	002D	0005A	5FB	005E
0002D WARM	000D	00034	36	F810 Code
0000D COLD	0000	00014	16	68CB Code

Memory Dump

This chapter consists of a memory dump of the program WFORTH.CM, including additional documentation words. It is generated by the following sequence:

```
PRINTER 0 HERE DUMP NOPRINT (cr)
```


Memory dump

```

00000 C0 00 05 30 36 71 00 61 01 63 1D 30 16 84 43 4F @..06q.a.c.0..CO
00010 4C C4 00 00 00 16 68 CB 18 3D 68 CA 18 4D 4A 5B LD....hK.=hJ.MJ[
00020 1B 4A 5B 1B F8 00 5B 1B 5B F8 20 30 38 84 57 41 .J[.x.[.x 08.WA
00030 52 CD 00 0D 00 36 F8 10 AF 68 CA 18 41 EA 68 62 RM...6x./hJ.Ajhb
00040 68 64 68 65 68 66 68 67 68 68 EB 68 B7 4A 5B 1B hdhehfghghkh7J[.
00050 2F 8F 3A 4D D5 82 45 C6 00 2D 05 FB 00 5E 3C 6F /.:MU.EF.-.{.^<o
00060 30 6C 3D 6F 30 6C 3E 6F 30 6C 3F 6F F8 01 C8 F8 0l=o0l>o0l?ox.Hx
00070 00 24 54 24 F8 00 54 D5 3C 78 D5 3D 7B D5 3E 7E .ST$x.TU<xU={U>.
00080 D5 3F 81 D5 34 84 D5 35 87 D5 36 8A D5 37 8D D5 U?.U4.U5.U6.U7.U
00090 E8 68 69 E9 68 63 E4 D3 30 90 E3 68 B6 E2 12 68 hhihcdS0.ch6b.h
000A0 66 22 D3 30 9A 86 28 4C 4F 4F 50 A9 00 55 00 B0 f"S0..(LOOP).U.0
000B0 16 E2 12 12 86 F7 22 96 77 FE 3B C1 22 E8 68 68 .b...w".w~;A"hhh
000C0 D5 18 18 12 12 68 66 22 D5 87 28 2B 4C 4F 4F 50 U....hf"U.(+LOOP
000D0 A9 00 A5 00 D5 14 86 F4 A6 24 96 74 B6 44 14 E2 ).%.U..t&$..t6D.b
000E0 FE 3B B2 12 12 86 F5 22 96 75 30 B9 86 28 46 49 ~;2...u".u09.(FI
000F0 4E 44 A9 00 C9 00 F7 68 6A 68 6B 24 EA 0A 52 4B ND).I.whjhk$J.RK
00100 F3 FA 3F CA 01 27 1A 4B F3 FE 3A 28 7E 32 06 4A sz?J.'.Ks~:(.2.J
00110 FA 80 32 0F E4 8A FC 04 73 9A 7C 00 73 02 73 F8 z.2.d.|.s|.s.sx
00120 00 73 F8 FF 73 54 D5 1A 4A FA 80 32 28 0A 3A 3B .sx.sTU.Jz.2(;;
00130 1A 0A 2A 3A 3B F8 00 E4 73 54 D5 EA 68 6A 24 E4 ..*;;x.dsTUjhj$d
00140 C0 00 F9 83 4C 49 D4 00 EC 01 4B E8 68 6A E4 24 @.y.LIT.1.Khhjd$
00150 68 AA 14 D5 84 28 44 4F A9 01 43 01 5D E2 68 A6 h*.U.(DO).C.]bh&
00160 E4 68 66 68 6B E2 68 AB D5 86 42 52 41 4E 43 C8 dhfhkbh+U.BRANCH
00170 01 54 01 74 E8 68 68 D5 87 30 42 52 41 4E 43 C8 .T.thhhU.0BRANCH
00180 01 69 01 84 44 F1 14 32 74 18 18 D5 87 45 4E 43 .i..Dq.2t..U.ENC
00190 4C 4F 53 C5 01 78 01 98 14 14 68 6B 24 24 24 04 LOSE.x....hk$$$$.
001A0 52 E2 F8 00 AA BA BC 0B F7 3A AF 1B 1A 30 A7 E4 Rbx.*:<.w:/..0'd
001B0 8A 73 AC 9A 73 BC F8 00 73 73 73 54 14 E2 0B 32 .s,.s<x.sssT.b.2
001C0 C8 F7 32 E3 1B 1A 30 BE 8A E4 73 9A 54 60 8C F7 Hw2c..0>.ds.T`.w
001D0 3A D9 24 9C F7 14 3A D9 1A 9A 14 54 14 8A 54 24 :Y$.w.:Y...T..T$
001E0 24 24 D5 1A 8A 54 24 9A 54 14 2A 30 D9 87 45 58 $$U..T$.T.*0Y.EX
001F0 45 43 55 54 C5 01 8C 01 F9 68 69 F8 93 A5 D5 82 ECUTE...yhix.*U.
00200 55 AF 01 ED 02 06 68 6F 68 6B 68 6A 24 68 AF 14 U/.m..hohkhj$h/.
00210 14 F8 11 AF FE 8A 7E AA 9A 7E BA 2F 8F 32 45 8B .x./~..*...:/..2E.
00220 7E AB 9B 7E BB 8B F7 BF 24 9B 77 14 CB 02 15 BB .+...;w?$.w.K...;
00230 9F AB C0 02 15 82 55 AA 01 FF 02 3C 68 6A 14 E2 .+@...U*...<hj.b
00240 68 86 05 CE E4 68 AB 68 AA 14 D5 83 41 4E C4 02 h..Ndh+h*.U.AND.
00250 35 02 53 68 6A 14 8A F2 73 9A F2 54 D5 82 4F D2 5.Shj..rs.rTU.OR
00260 02 4B 02 64 68 6A 14 8A F1 73 9A F1 54 D5 83 58 .K.dhj..qs.qTU.X
00270 4F D2 02 5D 02 76 68 6A 14 8A F3 73 9A F3 54 D5 OR.].vhj..ss.sTU
00280 83 53 50 C0 02 6E 02 88 EA 68 B4 E4 24 68 AA 14 .SP@.n...jh4d$h*.
00290 D5 83 53 50 A1 02 80 02 99 87 FC 06 AA 97 7C 00 U.SP!.....|.*.|.
002A0 BA EA 68 64 D5 83 52 50 A1 02 91 02 AD 87 FC 08 :jhdU.RP!....-.|.
002B0 AA 97 7C 00 BA EA 68 62 22 30 C6 82 3B D3 02 A5 *.|.:jhb"0F.;S.*
002C0 02 C2 E8 68 B6 12 42 B6 02 A6 D5 85 44 49 47 49 .Bhh6.B6.&U.DIGI
002D0 D4 02 BB 02 D5 68 6A 14 04 FF 30 CB 03 58 FF 11 T.;.Uhj...0K.X..
002E0 33 E7 FF F9 C3 03 58 FC 0A 73 24 F7 CB 03 5B 14 3g.yC.X|.s$wK.[.
002F0 14 C0 03 58 85 43 4D 4F 56 C5 02 CB 02 FE 44 FC .@.X.CMOVE.K.~D|
00300 01 BF 44 AF 2F 68 6A 68 6B 9F 32 12 4B 5A 1A 2F .?D//hjhk.2.KZ./
00310 30 09 D5 85 4C 45 41 56 C5 02 F4 03 1D E2 12 12 0.U.LEAVE.t..b..
00320 68 A6 D5 82 3E D2 03 13 03 2A E2 68 A6 E4 68 66 h&U.>R...*bh&dhf
00330 D5 82 52 BE 03 23 03 38 24 68 A6 14 12 42 B6 02 U.R>.#.8$h&..B6.
00340 A6 D5 81 C9 03 31 03 48 24 68 A6 14 D5 82 30 BD &U.I.1.H$h&..U.0=
00350 03 42 03 54 44 F1 32 5B F8 00 C8 F8 01 73 F8 00 .B.TDq2[x.Hx.sx.
00360 54 D5 82 30 BC 03 4D 03 69 44 FE 33 5B 30 58 81 TU.0<.M.iD~3[0X.
00370 BD 03 62 03 75 68 6A 9A F3 BA 14 8A F3 54 9A F1 =.b.uhj.s:...sT.q

```


Memory dump

```

00380 32 85 F8 00 C8 F8 01 73 F8 00 54 D5 81 BC 03 6F 2.x.Hx.sx.TU.<.o
00390 03 92 68 6A 14 8A F5 24 04 FB 80 54 9A FB 80 75 ..hj..u$.{.T.{.u
003A0 14 F8 00 7E FB 01 73 F6 54 D5 81 BE 03 8C 03 B0 .x..{.svTU.>...0
003B0 68 6A 14 8A F7 24 04 FB 80 54 9A FB 80 77 30 A0 hj..w$.{.T.{.w0
003C0 81 AB 03 AA 03 C6 68 6A 14 8A F4 73 9A 74 54 D5 .+.*.Fhj..ts.tTU
003D0 82 31 AB 03 C0 03 D7 F8 01 E4 14 F4 73 F8 00 74 .l+.@.Wx.d.tsx.t
003E0 54 D5 82 32 AB 03 D0 03 E9 F8 02 30 D9 82 2B A1 TU.2+.P.ix.0Y.+!
003F0 03 E2 03 F4 68 6B 1B 68 6A EB 8A F4 73 9A 74 73 .b.thk.hjk.ts.ts
00400 D5 81 AD 03 ED 04 07 68 6A 14 8A F5 73 9A 75 54 U.-.m..hj..us.uT
00410 D5 82 44 AB 04 01 04 18 68 6A 68 6B 14 14 14 8B U.D+....hjhk....
00420 F4 73 9B 74 73 8A 74 C0 03 CB 85 4D 49 4E 55 D3 ts.ts.t@.K.MINUS
00430 04 11 04 34 14 FF 00 04 FB FF 7C 00 73 04 FB FF ...4....{.|.s.{.
00440 7C 00 54 D5 86 44 4D 49 4E 55 D3 04 2A 04 4F 14 |.TU.DMINUS.*.O.
00450 14 14 04 FB FF FC 01 73 04 FB FF 7C 00 73 30 37 ...{.|.s.{.|.s07
00460 84 4F 56 45 D2 04 44 04 69 EB 68 B4 68 6A 68 6A .OVER.D.ikh4hjhj
00470 E4 24 68 AA 14 D5 84 44 52 4F D0 04 60 04 7F 14 d$h*.U.DROP.`..
00480 14 D5 84 53 57 41 D0 04 76 04 8B 68 6A 68 6B 24 .U.SWAP.v..hjhk$
00490 68 AA 68 AB 14 D5 83 44 55 D0 04 82 04 9E 68 6A h*h+.U.DUP....hj
004A0 24 24 24 68 AA 14 D5 86 54 4F 47 47 4C C5 04 96 $$h*.U.TOGGLE..
004B0 04 B2 68 6A 68 6B EB 8A F3 5B D5 81 C0 04 A7 04 .2hjhkk.s[U.@.'
004C0 C1 68 6A 24 EA 68 6A E4 68 AA 14 D5 82 43 C0 04 Ahj$jhjd*.U.C@.
004D0 BB 04 D3 68 6A 24 0A 73 F8 00 54 D5 81 A1 04 CC ;.Shj$.sx.TU.!.L
004E0 04 E2 68 6A 68 6B EA 1A 68 AB D5 82 43 A1 04 DC .bhjhkj.h+U.C!.\\
004F0 04 F2 68 6A 14 44 5A D5 83 52 4F D4 04 EB 05 00 .rhj.DZU.ROT.k..
00500 68 6A 68 6B 68 6C 24 68 AB 68 AA 68 AC 14 D5 84 hjkhk1$h+h*h,.U.
00510 2D 44 55 D0 04 F8 05 18 68 6A 24 9A F1 24 24 CE -DUP.x..hj$.q$$N
00520 68 AA 14 D5 83 41 42 D3 05 0F 05 2C 04 FE C3 04 h*.U.ABS....,~C.
00530 34 D5 84 44 41 42 D3 05 24 05 3B 04 FE C3 04 4F 4U.DABS.$.;.~C.O
00540 D5 83 4D 41 D8 05 32 05 49 68 6A 14 8A F5 24 04 U.MAX.2.Ihj..u$.
00550 FB 80 54 9A FB 80 BA 75 33 5E 14 68 AA 14 04 FB {.T.{.:u3^h*...{
00560 80 54 D5 81 AA 05 41 05 69 E2 68 86 05 7E 14 14 .TU.*.A.ibh.....
00570 D5 82 4D AA 05 63 05 78 E2 68 86 05 7E D5 E4 68 U.M*.c.xbh...Udh
00580 6A F8 00 AF 44 FE 3B 96 04 FB FF FC 01 73 04 FB jx./D~;..{.|.s.{
00590 FF 7C 00 54 14 1F 9A FE 3B A4 9A FB FF BA 8A FB .|.T...~;$.{.:..{
005A0 FF AA 1A 1F E2 68 86 05 CE E4 8F F6 3B C6 8B FB .*..bh..Nd.v;F.{
005B0 FF FC 01 AB 9B FB FF 7C 00 BB 8A FB FF 7C 00 AA .|.+.{|.|.|.|.
005C0 9A FB FF 7C 00 BA 68 AB 68 AA 14 E2 68 96 E4 F8 .{|.:h+h*.bh.dx
005D0 10 AC 68 CB 00 00 8B FE AB 9B 7E BB 8A 7E AA 9A .,hK...~+...;.*.
005E0 7E BA 3B F4 8B F4 AB 24 9B 74 BB 14 8A 7C 00 AA .:;t.t+$t;...|.
005F0 9A 7C 00 BA 2C 8C 3A D6 E2 68 96 E9 68 69 24 E4 .|.:,:Vbh.ihisd
00600 68 A9 14 D5 81 B0 05 71 05 FB 00 00 81 B1 06 04 h).U.0.q.{...1..
00610 05 FB 00 01 81 B2 06 0C 05 FB 00 02 81 B3 06 14 .{...2...{...3..
00620 05 FB 00 03 82 42 CC 06 1C 05 FB 00 20 83 43 2F .{...BL...{.C/
00630 CC 06 24 05 FB 00 40 83 4C 2F D0 06 2D 05 FB 00 L.$.{.@.L/P.-.{.
00640 3C 85 46 49 52 53 D4 06 37 05 FB 57 D7 85 4C 49 <.FIRST.7.{WW.LI
00650 4D 49 D4 06 41 05 FB 7F FF 85 42 2F 42 55 C6 06 MIT.A.{..B/BUF.
00660 4D 05 FB 04 00 85 42 2F 53 43 D2 06 59 05 FB 00 M.{...B/SCR.Y.{.
00670 01 86 4F 52 49 47 49 CE 06 65 05 FB 18 41 87 2B ..ORIGIN.e.{.A.+
00680 4F 52 49 47 49 CE 06 71 08 57 06 7A 03 C4 02 C0 ORIGIN.q.W.z.D.@
00690 24 E9 19 87 F4 54 24 29 97 74 54 D5 82 53 B0 06 $i..tT$).tTU.S0.
006A0 7E 06 90 00 06 82 52 B0 06 9C 06 90 00 08 83 54 .....R0.....T
006B0 49 C2 06 A5 06 90 00 0A 85 57 49 44 54 C8 06 AE IB.%.....WIDTH..
006C0 06 90 00 0C 87 57 41 52 4E 49 4E C7 06 B8 06 90 .....WARNING.8..
006D0 00 0E 85 46 45 4E 43 C5 06 C4 06 90 00 10 82 44 ...FENCE.D.....D
006E0 D0 06 D2 06 90 00 12 88 56 4F 43 2D 4C 49 4E CB P.R.....VOC-LINK
006F0 06 DE 06 90 00 14 83 42 4C CB 06 E7 06 90 00 40 .^.....BLK.g...@

```


Memory dump

```

00700 82 49 CE 06 F6 06 90 00 48 83 4F 55 D4 07 00 06 .IN.v...H.OUT...
00710 90 00 4A 83 53 43 D2 07 09 06 90 00 4C 86 4F 46 ..J.SCR.....L.OF
00720 46 53 45 D4 07 13 06 90 00 4E 87 43 4F 4E 54 45 FSET.....N.CONTE
00730 58 D4 07 1D 06 90 00 20 87 43 55 52 52 45 4E D4 XT.....CURRENT
00740 07 2A 06 90 00 22 85 53 54 41 54 C5 07 38 06 90 *...."STATE.8..
00750 00 24 84 42 41 53 C5 07 46 06 90 00 26 83 44 50 $.BASE.F...&.DP
00760 CC 07 52 06 90 00 28 83 46 4C C4 07 5D 06 90 00 L.R...(FLD.)...
00770 2A 83 43 53 D0 07 67 06 90 00 2C 82 52 A3 07 71 *.CSP.g...,R#.q
00780 06 90 00 2E 83 48 4C C4 07 7B 06 90 00 30 83 55 .....HLD.{...0.U
00790 53 C5 07 84 06 90 00 32 84 50 52 45 D6 07 8E 06 SE.....2.PREV...
007A0 90 00 34 89 55 53 45 52 2D 49 4F 43 C2 07 98 06 ..4.USER-IOCB...
007B0 90 00 36 87 53 43 52 2F 44 53 CB 07 A3 06 90 00 ..6.SCR/DSK.#...
007C0 16 84 4F 55 54 CC 07 B3 06 90 00 42 83 47 52 D0 ..OUTL.3...B.GRP
007D0 07 C1 06 90 00 44 89 4D 4F 44 45 4D 2E 47 52 D0 .A...D.MODEM.GRP
007E0 07 CC 06 90 00 18 88 54 45 52 4D 2E 47 52 D0 07 .L.....TERM.GRP.
007F0 D6 06 90 00 1A 88 43 4F 4D 4D 2E 47 52 D0 07 E6 V.....COMM.GRP.f
00800 06 90 00 1C 85 4E 65 78 74 F5 07 F5 06 90 00 1E .....Nextu.u....
00810 86 4F 55 54 50 55 D4 08 04 08 1B 14 68 6A 9A FA .OUTPUT.....hj.z
00820 07 FE FC 25 A3 14 D5 61 D5 62 D5 63 D5 64 D5 65 .~|%.UaUbUcUdUe
00830 D5 66 D5 67 D5 85 49 4E 50 55 D4 08 10 08 3F E2 UfUgU.INPUT...?b
00840 22 F8 D5 73 F8 24 73 E4 04 F3 54 14 04 FA 07 3A "xUsx$sd.sT..z.:
00850 53 24 D5 F9 68 52 D2 E2 68 A6 E6 68 B8 E8 68 B9 S$UyhRRbh&fh8hh9
00860 D5 84 46 49 4C CC 08 35 08 6A 68 6F 68 6B 68 6A U.FILL.5.jhohkhj
00870 E2 8B 52 9B F1 32 7D 8F 5A 1A 2B 30 71 D5 85 45 b.R.q2}.Z.+0qU.E
00880 52 41 53 C5 08 61 08 88 F8 00 24 73 C0 08 6A 86 RASE.a..x.$s@.j.
00890 42 4C 41 4E 4B D3 08 7E 08 9A F8 20 C0 08 8A 52 BLANKS....x @..R
008A0 87 F4 AB 97 7C 00 BB 1B 68 96 84 48 4F 4C C4 08 .t+.|.;.h..HOLD.
008B0 8F 08 B3 E2 F8 30 68 86 08 9F 0B FF 01 5B 2B AA ..3bx0h.....[+*
008C0 0B 7F 00 5B BA 14 44 5A D5 83 4B 45 D9 08 AA 08 ..[:.DZU.KEY.*.
008D0 D1 24 6B F6 3B D2 6A FA 7F 73 F8 00 54 D5 89 3F Q$kv;Rjzxsx.TU.?
008E0 54 45 52 4D 49 4E 41 CC 08 C9 08 EC 24 6B FA 08 TERMINAL.I.l$kHz.
008F0 73 6A F3 54 D5 84 45 4D 49 D4 08 DE 08 FE E2 68 sjsTU.EMIT.^~bh
00900 86 09 8C D5 82 43 D2 08 F5 09 0B 24 F8 0D 54 E2 ...U.CR.u..$x.Tb
00910 68 86 09 9C 24 F8 0A 54 68 86 09 9C F8 42 68 86 h...$x.Th...xBh.
00920 08 9F 0B FC 01 5B 2B 0B 7C 00 5B D5 84 54 59 50 ...|. [+|. [U.TYP
00930 C5 09 04 09 35 E2 F8 4A 68 86 08 9F E4 68 6A 68 E...5bxJh...dhjh
00940 6D EB 8A F4 73 9A 74 73 E2 8A 52 9A F1 C2 09 2B mk.ts.tsb.R.qB.+
00950 24 4D 54 68 86 09 9C 2A C0 09 49 85 53 50 41 43 $MTh...*@.I.SPAC
00960 C5 09 2C 09 65 24 F8 20 73 C0 08 FE 68 A4 68 C4 E.,.e$xs@.~h$hd
00970 09 77 15 15 68 96 D3 E2 68 A6 E6 68 B3 68 63 E2 .w..h.Sbh&fh3hcb
00980 30 76 12 68 64 22 68 C5 00 98 68 96 F8 4A 68 86 0v.hd"hE..h.xJh.
00990 08 9F 0B FC 01 5B 2B 0B 7C 00 5B 14 6B FE 3B 9C ...|. [+|. [k~;.
009A0 E4 62 C0 19 56 8A 42 4C 4F 43 4B 2D 52 45 41 C4 db@.V.BLOCK-READ
009B0 09 5B 09 B4 68 6F E2 68 86 09 6C 68 A8 68 A7 D4 .[.4hobh..lh(h'T
009C0 87 F6 D4 87 F9 D4 17 78 D4 87 F9 30 F4 8B 42 4C .vT.yT.xT.y0t.BL
009D0 4F 43 4B 2D 57 52 49 54 C5 09 A5 09 DD 68 6F E2 OCK-WRITE.%.]hob
009E0 68 86 09 6C 68 A8 68 A7 D4 87 F6 D4 87 FC D4 17 h..lh(h'T.vT.|T.
009F0 78 D4 87 FC 12 68 67 68 68 22 68 86 09 82 D5 85 xT.|.hghh"h...U.
00A00 4D 2F 4D 4F C4 09 CD 0A 09 68 6F 68 6B 68 6A 68 M/MOD.M..hohkhjh
00A10 CC 00 00 24 8F 73 9F 54 14 F8 21 AF FE 8A 7E AA L..$.s.T.x!/~...*
00A20 9A 7E BA 8B 7E AB 9B 7E BB 2F 8F C2 0A 44 8C 7E ...+...;/.B.D..
00A30 AC 9C 7E BC 8C F7 BF 24 9C 77 14 CB 0A 1D BC 9F ,...<.w?$s.w.K.<.
00A40 AC C0 0A 1D 68 AC 68 AA 68 AB 14 D5 84 48 45 52 ,@..h,h*h+.U.HER
00A50 C5 09 FF 0A 55 E2 F8 12 68 86 08 9F 24 0B 54 24 E...Ubx.h...$.T$
00A60 2B 0B 54 D5 85 41 4C 4C 4F D4 0A 4C 0A 6E E2 F8 +.TU.ALLOT.L.nbx
00A70 12 68 86 08 9F E4 68 6A EB 8A F4 73 9A 74 73 D5 .h...dhjk.ts.tsU

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Memory dump

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00A80 81 AC 0A 64 0A 86 E2 F8 11 68 86 08 9F EB 68 6F .,.d..bx.h...kho
00A90 2B 44 5F 1F F8 02 AA 44 5F F8 00 BA C0 0A 78 82 +D_.x.*D_x.:@.x.
00AA0 43 AC 0A 80 0A A6 E2 F8 11 68 86 08 9F EB 68 6F C,...&bx.h...kho
00AB0 2B 14 F8 01 C0 0A 96 82 31 AD 0A 9F 0A BE F8 01 +.x.@...l-...>x.
00AC0 14 F5 73 F8 00 75 54 D5 82 32 AD 0A B7 0A CF F8 .usx.uTU.2-.7.Ox
00AD0 02 30 C0 83 4C 46 C1 0A C8 0A DB F8 04 30 C0 83 .0@.LFA.H.[x.0@.
00AE0 43 46 C1 0A D3 0A CF 84 21 43 53 D0 0A DF 0A F0 CFA.S.O.!CSP..p
00AF0 E2 F8 2C 68 86 08 9F EB 68 A4 D5 85 43 4F 55 4E bx,h...kh$U.COUn
00B00 D4 0A E7 0B 05 68 6B 24 4B 68 AB 73 F8 00 54 D5 T.g..hk$Kh+sx.TU
00B10 89 2D 54 52 41 49 4C 49 4E C7 0A FB 0B 1E 68 6B .-TRAILING.{..hk
00B20 14 8B F4 AA 24 9B 74 BA 24 2A 0A FB 20 3A 36 2B ..t*$$.t:$*.{ :6+
00B30 8B 3A 29 9B 3A 29 68 AB 14 D5 84 28 2E 22 A9 0B .:).:.)h+.U.(").
00B40 10 0B 43 48 52 24 68 A8 73 F8 00 54 E2 88 F4 A8 ..CHR$h(sx.Tb.t(
00B50 98 7C 00 B8 C0 09 35 83 50 41 C4 0B 3A 0B 5F E2 .|.8@.5.PAD..._b
00B60 F8 11 68 86 08 9F EB 68 6F E4 24 8F FC 44 73 9F x.h...khod$.|Ds.
00B70 7C 00 54 D5 82 2B AD 0B 57 0B 7B 44 14 FE C3 04 |.TU.+-.W.{D.~C.
00B80 34 D5 83 44 2B AD 0B 74 0B 8A 44 14 FE C3 04 4F 4U.D+-..t..D.~C.O
00B90 D5 88 54 52 41 56 45 52 53 C5 0B 82 08 57 04 89 U.TRAVERSE...W..
00BA0 04 67 03 C4 01 49 00 7F 04 67 04 D1 03 90 01 82 .g.D.I..g.Q....
00BB0 0B A0 04 89 04 7D 02 C0 86 4C 41 54 45 53 D4 0B . ...}.@.LATEST.
00BC0 91 08 57 07 42 04 BF 04 BF 02 C0 83 4E 46 C1 0B ..W.B.?.?.@.NFA.
00BD0 B8 08 57 01 49 00 05 04 05 01 49 FF FF 0B 9C 02 8.W.I.....I.....
00BE0 C0 83 50 46 C1 0B CB 08 57 06 10 0B 9C 01 49 00 @.PFA.K.W.....I.
00BF0 05 03 C4 02 C0 86 3F 45 52 52 4F D2 0B E1 08 57 ..D.@.?ERROR.a.W
00C00 04 89 01 82 0C 0C 0F 28 01 72 0C 0E 04 7D 02 C0 .....(r...}.@
00C10 85 3F 43 4F 4D D0 0B F5 08 57 07 4E 04 BF 03 52 .?COMP.u.W.N.?.R
00C20 01 49 00 11 0B FE 02 C0 85 3F 45 58 45 C3 0C 10 .I...~.@.?EXEC..
00C30 08 57 07 4E 04 BF 01 49 00 12 0B FE 02 C0 86 3F .W.N.?.I...~.@.?
00C40 50 41 49 52 D3 0C 28 08 57 04 05 01 49 00 13 0B PAIRS.(.W...I...
00C50 FE 02 C0 84 3F 43 53 D0 0C 3E 08 57 02 86 07 77 ~.@.?CSP.>.W...w
00C60 04 BF 04 05 01 49 00 14 0B FE 02 C0 88 3F 4C 4F .?...I...~.@.?LO
00C70 41 44 49 4E C7 0C 53 08 57 06 FC 04 BF 03 52 01 ADING.S.W.|.?R.
00C80 49 00 16 0B FE 02 C0 87 43 4F 4D 50 49 4C C5 0C I...~.@.COMPILE.
00C90 6C 08 57 0C 18 03 36 04 9C 03 E7 03 28 04 BF 0A l.W...6...g.(.?.
00CA0 84 02 C0 C1 DB 0C 87 08 57 06 08 07 4E 04 E0 02 ..@A[...W...N.`.
00CB0 C0 81 DD 0C A3 08 57 01 49 00 C0 07 4E 04 E0 02 @.].#.W.I.@.N.`.
00CC0 C0 86 53 4D 55 44 47 C5 0C B1 08 57 0B C1 01 49 @.SMUDGE.l.W.A.I
00CD0 00 20 04 B0 02 C0 83 48 45 D8 0C C1 08 57 01 49 . .0.@.HEX.A.W.I
00CE0 00 10 07 59 04 E0 02 C0 87 44 45 43 49 4D 41 CC ...Y.`.@.DECIMAL
00CF0 0C D6 08 57 01 49 00 0A 07 59 04 E0 02 C0 87 28 .V.W.I...Y.`.@.(
00D00 3B 43 4F 44 45 A9 0C E8 08 57 03 36 0B C1 0B E7 ;CODE).h.W.6.A.g
00D10 0A E5 04 E0 02 C0 C5 3B 43 4F 44 C5 0C FE 08 57 .e.`.@E;CODE.~.W
00D20 0C 5A 0C 91 0D 08 0C A7 0C CA 02 C0 86 45 58 50 .Z.....'.J.@.EXP
00D30 45 43 D4 0D 16 08 57 04 67 03 C4 04 67 01 5B 08 ECT...W.g.D.g.[.
00D40 CF 04 9C 01 49 00 0E 06 88 04 BF 03 73 01 82 0D O...I.....?s...
00D50 6D 04 7D 01 49 00 08 04 67 03 46 03 73 04 9C 03 m.}.I...g.F.s...
00D60 36 0A CD 03 C4 03 28 04 05 01 72 0D 93 04 9C 01 6.M.D.(...r.....
00D70 49 00 0D 03 73 01 82 0D 85 03 1B 04 7D 06 29 06 I...s.....}.).
00D80 08 01 72 0D 87 04 9C 03 46 04 F0 06 08 03 46 03 .r.....F.p...F.
00D90 D5 04 E0 08 FC 00 AE 0D 3F 04 7D 02 C0 85 51 55 U.`|...?.}.@.QU
00DA0 45 52 D9 0D 2C 08 57 06 B4 04 BF 01 49 00 80 0D ERY.,.W.4.?.I...
00DB0 35 06 08 07 05 04 E0 02 C0 C1 80 0D 9D 08 57 06 5.....`.@A....W.
00DC0 FC 04 BF 01 82 0D ED 06 10 06 FC 03 F2 06 08 07 |.?.m...|.r...
00DD0 05 04 E0 06 FC 04 BF 01 49 00 07 02 51 03 52 01 ..`.|.?.I...Q.R.
00DE0 82 0D E9 0C 30 03 36 04 7D 01 72 0D F1 03 36 04 ..i.0.6.}.r.q.6.
00DF0 7D 02 C0 84 57 4F 52 C4 0D B9 08 57 06 FC 04 BF }.@.WORD.9.W.|.?

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Memory dump

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00E00 01 82 0E 0E 06 FC 04 BF 16 DE 01 72 0E 12 06 B4 .....|.?.^..r...4
00E10 04 BF 07 05 04 BF 03 C4 04 89 01 96 0A 53 01 49 .?...?.D.....S.I
00E20 00 22 08 98 07 05 03 F2 04 67 04 05 03 28 03 46 .".....r.g...(F
00E30 0A 53 04 F0 03 C4 0A 53 03 D5 03 36 02 FC 02 C0 .S.p.D.S.U.6.|.@
00E40 88 28 4E 55 4D 42 45 52 A9 0D F3 08 57 03 D5 04 .(NUMBER).s.W.U.
00E50 9C 03 28 04 D1 07 59 04 BF 02 D3 01 82 0E 89 04 ..(.Q.Y.?.S.....
00E60 89 07 59 04 BF 02 3A 04 7D 04 FE 07 59 04 BF 02 ..Y.?.:..}.~.Y.?.
00E70 3A 04 16 07 63 04 BF 03 D5 01 82 0E 83 06 10 07 :...c.?.U.....
00E80 63 03 F2 03 36 01 72 0E 4D 03 36 02 C0 86 4E 55 c.r.6.r.M.6.@.NU
00E90 4D 42 45 D2 0E 40 08 57 06 08 06 08 04 FE 04 9C MBER.@.W.....~..
00EA0 03 D5 04 D1 01 49 00 2D 03 73 04 9C 03 28 03 C4 .U.Q.I.-.s...(D
00EB0 01 49 FF FF 07 63 04 E0 0E 4B 04 9C 04 D1 06 29 .I...c.`.K...Q.)
00EC0 04 05 01 82 0E DA 04 9C 04 D1 01 49 00 2E 04 05 .....Z...Q.I....
00ED0 06 08 0B FE 06 08 01 72 0E B4 04 7D 03 36 01 82 ...~...r.4.}.6..
00EE0 0E E4 04 4D 02 C0 85 2D 46 49 4E C4 0E 8D 08 57 .d.M.@.-FIND...W
00EF0 06 29 0D FA 0A 53 07 34 04 BF 04 BF 00 F5 04 9C .).z.S.4.?.?.u..
00F00 03 52 01 82 0F 0E 04 7D 0A 53 0B C1 00 F5 02 C0 .R.....}.S.A.u.@
00F10 87 28 41 42 4F 52 54 A9 0E E6 08 57 11 E6 02 C0 .(ABORT).f.W.f.@
00F20 85 45 52 52 4F D2 0F 10 08 57 06 CE 04 BF 03 67 .ERROR...W.N.?.g
00F30 01 82 0F 36 0F 1A 0A 53 0B 03 09 33 0B 41 02 20 ...6...S...3.A.
00F40 3F 15 B9 02 97 07 05 04 BF 06 FC 04 BF 11 BA 02 ?.9.....?.|.?.:..
00F50 C0 83 4D 49 CE 0F 20 08 57 04 67 04 67 03 AE 01 @.MIN. .W.g.g...
00F60 82 0F 65 04 89 04 7D 02 C0 83 49 44 AE 0F 51 08 ..e...}.@.ID..Q.
00F70 57 0B 5D 01 49 00 20 01 49 00 5F 08 68 04 9C 0B W.].I. .I. .h...
00F80 E7 0A D9 04 67 04 05 0B 5D 04 89 02 FC 0B 5D 0B g.Y.g...]....|.].
00F90 03 01 49 00 1F 02 51 09 33 09 63 02 C0 86 43 52 ..I...Q.3.c.@.CR
00FA0 45 41 54 C5 0F 69 08 57 02 86 0A 53 01 49 00 A0 EATE.i.W...S.I.
00FB0 03 C4 03 90 06 18 0B FE 0E EE 01 82 0F CC 04 7D .D.....~.n...L.}
00FC0 0B D1 0F 6F 01 49 00 04 15 B9 09 63 0A 53 04 9C .Q.o.I...9.c.S..
00FD0 04 D1 06 C0 04 BF 0F 57 03 D5 0A 6C 04 9C 01 49 .Q.@.?.W.U.l...I
00FE0 00 A0 04 B0 0A 53 06 10 04 05 01 49 00 80 04 B0 . .0.S.....I...0
00FF0 0B C1 0A 84 07 42 04 BF 04 E0 0A 53 03 E7 0A 84 .A...B.?.`.S.g..
01000 02 C0 C1 BA 0F 9D 08 57 0C 30 0A EE 07 42 04 BF .@A:...W.0.n.B.?
01010 07 34 04 E0 0F A6 0C B5 01 49 FF FE 06 E3 03 F2 .4.`.&.5.I.~.c.r
01020 0C 91 08 57 02 C0 85 21 43 4F 44 C5 10 02 08 57 ...W.@.!CODE...W
01030 0F A6 0C CA 0B C1 0B E7 0A E5 04 E0 0A 84 02 C0 .&.J.A.g.e.`...@
01040 88 43 4F 4E 53 54 41 4E D4 10 26 08 57 01 49 05 .CONSTANT.&.W.I.
01050 FB 10 2E 02 C0 88 56 41 52 49 41 42 4C C5 10 40 {...@.VARIABLE.@
01060 08 57 01 49 05 FE 10 2E 02 C0 84 55 53 45 D2 10 .W.I.~...@.USER.
01070 55 08 57 01 49 06 90 10 2E 02 C0 87 3C 42 55 49 U.W.I.....@.<BUI
01080 4C 44 D3 10 6A 08 57 06 08 10 4B 02 C0 85 44 4F LDS.j.W...K.@.DO
01090 45 53 BE 10 7B 08 57 03 36 0B C1 0B E7 04 E0 0D ES>.{.W.6.A.g.`.
010A0 08 E2 68 A6 E6 68 B8 E9 68 68 24 E4 68 A9 14 D5 .bh&fh8ihh$dh).U
010B0 C7 4C 49 54 45 52 41 CC 10 8D 08 57 07 4E 04 BF GLITERAL...W.N.?
010C0 01 82 10 CA 0C 91 01 49 0A 84 02 C0 C8 44 4C 49 ...J...I...@HDLI
010D0 54 45 52 41 CC 10 B0 08 57 07 4E 04 BF 01 82 10 TERAL.0.W.N.?...
010E0 E7 04 89 10 BA 10 BA 02 C0 86 3F 53 54 41 43 CB g.....@.?.STACK
010F0 10 CC 08 57 06 A1 04 BF 04 9C 02 86 03 90 06 10 .L.W.!.?.....
01100 0B FE 01 49 01 00 04 05 02 86 03 AE 01 49 00 07 .~.I.....I..
01110 0B FE 02 C0 89 49 4E 54 45 52 50 52 45 D4 10 E9 .~.@.INTERPRET.i
01120 08 57 0E EE 01 82 11 44 07 4E 04 BF 03 90 01 82 .W.n...D.N.?....
01130 11 3A 0A E5 0A 84 01 72 11 3E 0A E5 01 F7 10 F2 .:e...r.>.e.w.r
01140 01 72 11 5E 0A 53 0E 96 07 63 04 BF 03 D5 01 82 .r.^..S...c.?.U..
01150 11 58 10 D7 01 72 11 5C 04 7D 10 BA 10 F2 01 72 .X.W.r.\.}.:r.r
01160 11 22 02 C0 8A 56 4F 43 41 42 55 4C 41 52 D9 11 .".@.VOCABULARY.
01170 14 08 57 10 85 01 49 81 A0 0A 84 07 42 04 BF 0A ..W...I. ...B.?.

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Memory dump

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01180 E5 0A 84 0A 53 06 F2 04 BF 0A 84 06 F2 04 E0 10 e...S.r.?...r.`.
01190 95 03 E7 07 34 04 E0 02 C0 8B 44 45 46 49 4E 49 ..g.4.`.@.DEFINI
011A0 54 49 4F 4E D3 11 64 08 57 07 34 04 BF 07 42 04 TIONS.d.W.4.?.B.
011B0 E0 02 C0 84 51 55 49 D4 11 99 08 57 06 08 06 FC `.@.QUIT...W...|
011C0 04 E0 0C A7 02 AB 09 09 0D A5 11 20 07 4E 04 BF `.'+...%.N.?
011D0 03 52 01 82 11 D8 18 A9 01 72 11 C4 02 C0 85 41 .R...X.)r.D.@.A
011E0 42 4F 52 D4 11 B3 08 57 02 97 0C F2 06 10 17 BC BORT.3.W....r...<
011F0 09 09 0B 41 10 57 6F 6F 64 73 20 48 6F 6C 65 20 ...A.Woods Hole
01200 46 4F 52 54 48 09 09 0B 41 0D 56 65 72 73 69 6F FORTH...A.Versio
01210 6E 20 31 2E 38 30 30 09 09 16 7F 06 49 04 9C 07 n 1.800....I...
01220 9F 04 E0 07 94 04 E0 18 37 11 A7 18 73 06 10 16 ..`....7.'s....
01230 DE 04 7D 18 A9 11 BA 02 C0 C1 BB 11 DE 08 57 0C ^.}.).:..@A;.^W.
01240 5A 0C 91 02 C0 0C CA 0C A7 02 C0 C2 2E A2 12 39 z...@.J.'@B".9
01250 08 57 01 49 00 22 07 4E 04 BF 01 82 12 70 0C 91 .W.I.".N.?...p..
01260 0B 41 0D FA 0A 53 04 D1 03 D5 0A 6C 01 72 12 78 .A.z.S.Q.U.l.r.x
01270 0D FA 0A 53 0B 03 09 33 02 C0 C9 5B 43 4F 4D 50 .z.S...3.@I[COMP
01280 49 4C 45 DD 12 4B 08 57 0E EE 03 52 06 08 0B FE ILE].K.W.n.R...~
01290 04 7D 0A E5 0A 84 02 C0 89 49 4D 4D 45 44 49 41 .}.e...@.IMMEDIA
012A0 54 C5 12 7A 08 57 0B C1 01 49 00 40 04 B0 02 C0 TE.z.W.A.I.@.0.@
012B0 C1 A8 12 98 08 57 01 49 00 29 0D FA 02 C0 C1 A7 A(...W.I.).z.@A'
012C0 12 B0 08 57 0E EE 03 52 06 08 0B FE 04 7D 10 BA .0.W.n.R...~.}.:
012D0 02 C0 86 46 4F 52 47 45 D4 12 BE 08 57 07 42 04 .@.FORGET.>.W.B.
012E0 BF 07 34 04 BF 04 05 01 49 00 18 0B FE 12 C2 04 ?.4.?....I...~.B.
012F0 9C 06 DA 04 BF 03 90 01 49 00 15 0B FE 04 9C 0B ..Z.?....I...~...
01300 D1 06 E3 04 E0 0A D9 04 BF 07 34 04 BF 04 E0 02 Q.c.`.Y.?.4.?.`.
01310 C0 82 4D AF 12 D2 08 57 04 67 03 28 03 28 05 39 @.M/.R.W.g.(.(.9
01320 03 46 05 2A 02 04 03 36 03 46 02 74 0B 79 04 89 .F.*...6.F.t.y..
01330 03 36 0B 79 04 89 02 C0 84 2F 4D 4F C4 13 11 08 .6.y...@./MOD...
01340 57 03 28 15 DE 03 36 13 16 02 C0 81 AF 13 38 08 W.(.^6...@./8.
01350 57 13 3F 04 89 04 7D 02 C0 83 4D 4F C4 13 4B 08 W.?....}.@.MOD.K.
01360 57 13 3F 04 7D 02 C0 85 2A 2F 4D 4F C4 13 59 08 W.?.}.@.*MOD.Y.
01370 57 03 28 05 76 03 36 13 16 02 C0 82 2A AF 13 67 W.(.v.6...@.*/.g
01380 08 57 13 6F 04 89 04 7D 02 C0 84 42 41 43 CB 13 .W.o...}.@.BACK.
01390 7B 08 57 0A 84 02 C0 C5 42 45 47 49 CE 13 8A 08 {.W...@EBEGIN...
013A0 57 0C 18 0A 53 06 10 02 C0 C5 45 4E 44 49 C6 13 W...S...@EENDIF.
013B0 97 08 57 0C 18 06 18 0C 47 0A 53 04 89 04 E0 02 ..W.....G.S....`.
013C0 C0 C4 54 48 45 CE 13 A9 08 57 13 B1 02 C0 C2 44 @DTHEN.)W.l.@BD
013D0 CF 13 C1 08 57 0C 91 01 5B 0A 53 06 20 02 C0 C4 O.A.W...[.S. @D
013E0 4C 4F 4F D0 13 CE 08 57 06 20 0C 47 0C 91 00 AE LOOP.N.W. .G....
013F0 13 91 02 C0 C5 2B 4C 4F 4F D0 13 DF 08 57 06 20 ...@E+LOOP._.W.
01400 0C 47 0C 91 00 D3 13 91 02 C0 C5 55 4E 54 49 CC .G...S...@EUNTIL
01410 13 F4 08 57 06 10 0C 47 0C 91 01 82 13 91 02 C0 .t.W...G.....@
01420 C3 45 4E C4 14 0A 08 57 14 12 02 C0 C5 41 47 41 CEND...W...@EAGA
01430 49 CE 14 20 08 57 06 10 0C 47 0C 91 01 72 13 91 IN. .W...G....r...
01440 02 C0 C6 52 45 50 45 41 D4 14 2C 08 57 03 28 03 .@FREPEAT.,.W.(.
01450 28 14 34 03 36 03 36 06 18 04 05 13 B1 02 C0 C2 (.4.6.6.....l.@B
01460 49 C6 14 42 08 57 0C 91 01 82 0A 53 06 08 0A 84 IF.B.W.....S....
01470 06 18 02 C0 C4 45 4C 53 C5 14 5F 08 57 06 18 0C ...@ELSE._.W...
01480 47 0C 91 01 72 0A 53 06 08 0A 84 04 89 06 18 13 G....r.S.....
01490 B1 06 18 02 C0 C5 57 48 49 4C C5 14 74 08 57 14 l...@EWHILE.t.W.
014A0 64 03 E7 02 C0 86 53 50 41 43 45 D3 14 95 08 57 d.g.@.SPACES...W
014B0 06 08 05 47 05 16 01 82 14 C4 06 08 01 5B 09 63 ...G.....D...[.c
014C0 00 AE 14 BE 02 C0 82 3C A3 14 A5 08 57 0B 5D 07 ...>.@.<#.%W.].
014D0 8A 04 E0 02 C0 82 23 BE 14 C6 08 57 04 7D 04 7D ..`.@.#>.F.W.}.}
014E0 07 8A 04 BF 0B 5D 04 67 04 05 02 C0 84 53 49 47 ...?..].g...@.SIG
014F0 CE 14 D5 08 57 04 FE 03 67 01 82 15 03 01 49 00 N.U.W.~.g.....I.

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Memory dump

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01500 2D 08 B1 02 C0 81 A3 14 EC 08 57 07 59 04 BF 0A -.1.@.#.1.W.Y.?.
01510 07 04 FE 01 49 00 09 04 67 03 90 01 82 15 25 01 ..~.I...g.....%.
01520 49 00 07 03 C4 01 49 00 30 03 C4 08 B1 02 C0 82 I...D.I.0.D.1.@.
01530 23 D3 15 05 08 57 15 09 04 67 04 67 02 62 03 52 #S...W...g.g.b.R
01540 01 82 15 36 02 C0 83 44 2E D2 15 2F 08 57 03 28 ...6.@.D.R./..W.(
01550 04 89 04 67 05 39 14 CB 15 34 14 F3 14 DA 03 36 ...g.9.K.4.s.Z.6
01560 04 67 04 05 14 AE 09 33 02 C0 82 2E D2 15 46 08 .g.....3.@..R.F.
01570 57 03 28 15 DE 03 36 15 4C 02 C0 82 44 AE 15 6A W.(.^6.L.@.D..j
01580 08 57 06 08 15 4C 09 63 02 C0 81 AE 15 7B 08 57 .W...L.c.@...{.W
01590 15 DE 15 80 02 C0 81 BF 15 8A 08 57 04 BF 15 8E .^...@.?...W?...
015A0 02 C0 82 55 AE 15 96 08 57 06 08 15 80 02 C0 87 .@.U....W.....@.
015B0 4D 45 53 53 41 47 C5 15 A2 08 57 0B 41 09 20 4D MESSAGE."W.A. M
015C0 65 73 73 61 67 65 20 07 59 04 BF 04 89 0C F2 15 essage .Y.?...r.
015D0 8E 07 59 04 E0 02 C0 84 53 2D 3E C4 15 AF 15 E0 ..Y.`.@.S->D./.`
015E0 E4 04 24 FE F8 00 C7 F8 FF 73 54 D5 86 28 4C 49 d.$~x.Gx.sTU.(LI
015F0 4E 45 A9 15 D7 08 57 03 28 01 49 00 40 06 61 13 NE).W.W.(.I.@.a.
01600 6F 03 36 06 6D 05 67 03 C4 16 DE 03 C4 01 49 00 o.6.m.g.D.^D.I.
01610 40 02 C0 85 2E 4C 49 4E C5 15 EC 08 57 15 F5 0B @.@..LINE.1.W.u.
01620 1C 09 33 02 C0 84 2B 42 55 C6 16 13 08 57 06 61 ..3.@.+BUF...W.a
01630 01 49 00 04 03 C4 03 C4 04 9C 06 55 03 73 01 82 .I...D.D...U.s..
01640 16 46 04 7D 06 49 04 9C 07 9F 04 BF 04 05 02 C0 .F.}.I.....?...@
01650 86 55 50 44 41 54 C5 16 25 08 57 07 9F 04 BF 04 .UPDATE.%W...?.
01660 BF 01 49 80 00 02 62 07 9F 04 BF 04 E0 02 C0 8D ?.I...b...?.`.@.
01670 45 4D 50 54 59 2D 42 55 46 46 45 52 D3 16 50 08 EMPTY-BUFFERS.P.
01680 57 06 49 06 55 04 67 04 05 08 86 02 C0 86 42 55 W.I.U.g.....@.BU
01690 46 46 45 D2 16 6F 08 57 07 94 04 BF 04 9C 03 28 FFER.o.W...?...(
016A0 16 2C 01 82 16 A0 07 94 04 E0 03 46 04 BF 03 67 .,....`F.?g
016B0 01 82 16 C6 03 46 03 E7 03 46 04 BF 01 49 7F FF ...F.F.g.F?.I.
016C0 02 51 06 08 17 3C 03 46 04 E0 03 46 07 9F 04 E0 .Q...<.F.`F...`
016D0 03 36 03 E7 02 C0 85 42 4C 4F 43 CB 16 8D 08 57 .6.g.@.BLOCK...W
016E0 07 26 04 BF 03 C4 03 28 07 9F 04 BF 04 9C 04 BF .&?.D.(...?...?
016F0 03 46 04 05 04 9C 03 C4 01 82 17 2E 16 2C 03 52 .F.....D.....,R
01700 01 82 17 16 04 7D 03 46 16 96 04 9C 03 46 06 10 .....}.F.....F..
01710 17 3C 06 18 04 05 04 9C 04 BF 03 46 04 05 04 9C .<.....?F....
01720 03 C4 03 52 01 82 16 FC 04 9C 07 9F 04 E0 03 36 .D.R...|.....`6
01730 04 7D 03 E7 02 C0 83 52 2F D7 16 D6 08 57 04 89 .}.g.@.R/W.V.W..
01740 07 BD 04 BF 13 3F 07 AF 04 F0 06 18 05 67 07 AF .=.???./.p...g./
01750 03 D5 04 E0 04 89 07 AF 06 20 03 C4 04 E0 07 AF .U.`.../.D.`./
01760 04 89 01 82 17 6C 09 B2 01 72 17 6E 09 DB 07 D2 .....1.2.r.n.[.R
01770 04 BF 17 BC 17 A4 02 C0 EF 1F 1F 1F 0F FC 02 73 .?<.$.@o.....|s
01780 0F FC 01 73 0F 7C 00 73 D4 87 F6 D5 84 43 64 65 .|.s|.sT.vU.Cde
01790 F2 17 36 17 95 24 8D 54 24 F8 00 54 D5 84 43 44 r.6..$.T$x.TU.CD
017A0 45 D2 17 8C 08 57 17 93 01 82 17 B2 01 49 00 08 ER...W.....2.I..
017B0 15 B9 02 C0 85 47 52 4F 55 D0 17 9D 17 BE F8 45 .9.@.GROUP...>xE
017C0 A7 14 04 57 F8 00 A7 E4 61 D5 84 4C 4F 41 C4 17 '.Wx.'daU.LOAD.
017D0 B4 08 57 06 FC 04 BF 03 28 07 05 04 BF 03 28 06 4.W.|.?.(...?.(
017E0 08 07 05 04 E0 06 6D 05 67 06 FC 04 E0 11 20 03 ....`.m.g.|.`.
017F0 36 07 05 04 E0 03 36 06 FC 04 E0 02 C0 C3 2D 2D 6...`.6.|.`.@C--
01800 BE 17 CA 08 57 0C 77 06 08 07 05 04 E0 06 6D 06 >.J.W.w.....`.m.
01810 FC 04 BF 04 67 13 5F 04 05 06 FC 03 F2 02 C0 83 |.?.g....|.r.@.
01820 44 52 B0 17 FD 08 57 06 08 07 26 04 E0 02 C0 C5 DR0.}.W...&`.@E
01830 46 4F 52 54 C8 18 1F 10 A1 11 91 81 A0 41 8B 00 FORTH...!...A..
01840 00 56 FE 55 FE 00 98 00 16 57 00 11 E8 41 80 00 .V~U~....W..hA..
01850 7F 57 00 55 FE 56 FE 56 00 00 1F 00 00 41 8B 41 W.U~V~V....A.A
01860 8B 22 5F 01 3B 00 F0 00 01 00 E0 00 62 83 44 52 .".;.p...`.b.DR
01870 B1 18 2F 08 57 06 6D 07 BD 04 BF 05 67 07 26 04 1./W.m.=.?g.&.

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Memory dump

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01880 E0 02 C0 83 4D 4F CE 18 6D 18 8B 9E FA 7F BE C0 `.@.MON.m...z>@
01890 87 F0 85 28 44 4F 53 A9 18 83 18 9C F8 90 B0 F8 .p.(DOS)....x.0x
018A0 05 A0 E0 D0 82 4F CB 18 92 08 57 0B 41 03 20 4F .`P.OK...W.A. O
018B0 4B 02 C0 84 4C 49 53 D4 18 A4 08 57 0C F2 09 09 K.@.LIST.$W.r..
018C0 04 9C 07 19 04 E0 0B 41 07 53 43 52 45 45 4E 20 .....`A.SCREEN
018D0 15 8E 01 49 00 10 06 08 01 5B 09 09 03 46 01 49 ...I.....[...F.I
018E0 00 03 15 6F 09 63 03 46 07 19 04 BF 16 1B 08 EA ...o.c.F...?....j
018F0 01 82 18 F6 03 1B 00 AE 18 DA 09 09 02 C0 85 46 ...v.....Z...@.F
01900 4C 55 53 C8 18 B3 08 57 06 55 06 49 04 05 06 61 LUSH.3.W.U.I...a
01910 01 49 00 04 03 C4 13 4F 06 08 01 5B 01 49 7F FF .I...D.O...[.I.
01920 16 96 04 7D 00 AE 19 1C 02 C0 86 70 61 72 70 74 ...}.....@.parpt
01930 F2 18 FE 19 35 D5 E3 61 01 E4 34 3A 24 F0 FA 7F r.~.5Uca.d4:$pz
01940 FB FF 54 66 E3 61 01 E2 68 96 86 73 65 72 70 74 {.Tfca.bh..serpt
01950 F2 19 2A 19 55 D5 E3 61 E0 E4 24 24 6B FA 80 32 r.*.UUca`d$$kz.2
01960 5C 14 62 E3 61 01 E2 68 96 87 50 52 49 4E 54 45 \.bca.bh..PRINTE
01970 D2 19 4A 08 57 01 49 00 C0 01 49 09 B4 01 49 00 R.J.W.I.@.I.4.I.
01980 12 04 05 04 F0 01 49 19 55 03 D5 01 49 09 B4 01 ....p.I.U.U.I.4.
01990 49 00 11 04 05 04 E0 07 F1 04 BF 04 9C 01 49 19 I.....`.q.?...I.
019A0 35 01 49 00 11 03 C4 04 F0 01 49 19 55 01 49 00 5.I...D.p.I.U.I.
019B0 10 03 C4 04 F0 08 00 04 BF 01 49 19 55 06 20 03 ..D.p...?.I.U. .
019C0 C4 04 F0 02 C0 8A 50 41 52 50 52 49 4E 54 45 D2 D.p.@.PARPRINTER
019D0 19 69 08 57 01 49 19 35 01 49 19 75 01 49 00 12 .i.W.I.5.I.u.I..
019E0 03 C4 04 E0 19 73 02 C0 87 4E 4F 50 52 49 4E D4 .D.`.s.@.NOPRINT
019F0 19 C5 08 57 01 49 00 E2 01 49 09 B4 01 49 00 12 .E.W.I.b.I.4.I..
01A00 04 05 04 F0 01 49 68 96 01 49 09 B4 01 49 00 11 ...p.Ih..I.4.I..
01A10 04 05 04 E0 02 C0 83 55 2E D2 19 E8 08 57 06 08 ...`.@.U.R.h.W..
01A20 04 89 15 4C 02 C0 84 4C 4F 41 C4 1A 16 08 57 0C ...L.@.LOAD...W.
01A30 F2 09 09 0B 41 04 4C 6F 61 64 04 9C 01 49 00 04 r...A.Load...I..
01A40 1A 1C 04 9C 06 08 04 89 09 63 0B 41 02 2C 20 07 .....c.A.,.
01A50 59 04 BF 0A 53 0C DC 01 49 00 04 1A 1C 07 59 04 Y.?.S.\.I.....Y.
01A60 E0 09 63 16 1B 09 63 06 FC 04 BF 03 28 07 05 04 `c....c.|.?.(...
01A70 BF 03 28 06 08 07 05 04 E0 06 FC 04 E0 11 20 03 ?.(...`.|.`. .
01A80 36 07 05 04 E0 03 36 06 FC 04 E0 08 EA 01 82 1A 6...`.6.|.`.j...
01A90 93 11 BA 02 C0 88 4C 4F 41 44 54 48 52 D5 1A 26 ....@.LOADTHRU.&
01AA0 08 57 03 D5 04 89 01 5B 03 46 1A 2D 00 AE 1A A8 .W.U...[.F.-... (
01AB0 02 C0 85 41 53 4D 42 D2 1A 95 08 57 02 C0 85 32 .@.ASMBR...W.@.2
01AC0 44 52 4F D0 1A B2 08 57 04 7D 04 7D 02 C0 84 32 DROP.2.W.}.}.@.2
01AD0 44 55 D0 1A BE 08 57 04 67 04 67 02 C0 85 32 53 DUP.>.W.g.g.@.2S
01AE0 57 41 D0 1A CE 08 57 04 FE 03 28 04 FE 03 36 02 WAP.N.W.~.(.~.6.
01AF0 C0 86 5A 45 52 4F 45 D3 1A DD 08 57 06 08 05 47 @.ZEROES.].W...G
01B00 05 16 01 82 1B 14 06 08 01 5B 01 49 00 30 08 FC .....[.I.0.|
01B10 00 AE 1B 0A 02 C0 85 44 2E 52 4C DA 1A F1 08 57 .....@.D.RLZ.q.W
01B20 03 28 04 89 04 67 05 39 14 CB 15 34 14 F3 14 DA .(...g.9.K.4.s.Z
01B30 03 36 04 67 04 05 1A FA 09 33 02 C0 85 55 2E 52 .6.g...z.3.@.U.R
01B40 4C DA 1B 16 08 57 06 08 04 89 1B 1E 02 C0 84 48 LZ...W.....@.H
01B50 45 58 AE 1B 3C 08 57 07 59 04 BF 0C DC 04 89 15 EX.<.W.Y.?.\...
01B60 8E 07 59 04 E0 02 C0 84 44 45 43 AE 1B 4E 08 57 ..Y.`.@.DEC..N.W
01B70 07 59 04 BF 0C F2 04 89 15 8E 07 59 04 E0 02 C0 .Y.?.r.....Y.`.@
01B80 86 4E 4F 44 49 53 CB 1B 67 08 57 01 49 03 54 0A .NODISK.g.W.I.T.
01B90 CD 01 49 11 E8 01 49 00 47 03 C4 04 E0 02 C0 84 M.I.h.I.G.D.`.@.
01BA0 42 45 4C CC 1B 80 08 57 01 49 00 07 08 FC 02 C0 BELL...W.I...|. @
01BB0 84 42 45 45 D0 1B 9F 08 57 1B A6 02 C0 86 43 4D .BEEP...W.&.@.CM
01BC0 4F 56 45 BE 1B B0 08 57 04 9C 04 FE 03 C4 04 FE OVE>.0.W...~.D.~
01BD0 04 FE 04 9C 04 FE 03 C4 04 89 03 D5 06 10 01 5B .~...~.D...U...[
01BE0 1A D5 03 46 04 05 04 D1 04 89 03 46 04 05 04 F0 .U.F...Q...F...p
01BF0 00 AE 1B E0 1A C6 02 C0 84 43 4F 50 D9 1B BD 08 ...`.F.@.COPY.=.

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Memory dump

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01C00 57 07 26 04 BF 03 C4 04 89 06 10 04 67 03 C4 04 W.&?.D.....g.D.
01C10 89 01 5B 04 9C 03 46 16 DE 06 18 04 05 04 E0 03 ..[...F.^.....`.
01C20 D5 16 59 00 AE 1C 13 04 7D 19 06 02 C0 83 4E 4F U.Y.....}...@.NO
01C30 D4 1B F8 08 57 03 52 02 C0 83 3E 49 CE 1C 2D 08 T.x.W.R.@.>IN.-.
01C40 57 07 05 02 C0 87 57 4F 52 44 2D 37 B9 1C 39 08 W...@.WORD-79.9.
01C50 57 0D FA 0A 53 02 C0 88 4E 45 58 54 55 53 45 D2 W.z.S.@.NEXTUSER
01C60 1C 45 08 57 08 0C 04 BF 06 18 08 0C 03 F2 04 9C .E.W...?.....r..
01C70 01 49 00 D4 03 AE 01 82 1C 82 01 49 00 19 15 B9 .I.T.....I...9
01C80 11 BA 10 71 02 C0 86 41 4C 4C 4F 54 D5 1C 57 08 ...q.@.ALLOTU.W.
01C90 57 08 0C 03 F2 02 C0 85 51 55 4F 54 C5 1C 86 08 W...r.@.QUOTE...
01CA0 57 01 49 00 22 08 FC 09 63 02 C0 83 42 59 C5 1C W.I."|.c.@.BYE.
01CB0 97 08 57 19 06 18 89 02 C0 87 43 48 41 50 54 45 ..W.....@.CHAPTE
01CC0 D2 1C AB 06 90 00 50 83 45 53 C3 1C B9 05 FB 00 R.+...P.ESC.9.{.
01CD0 1B 82 49 C4 1C C7 08 57 01 49 11 E8 04 9C 01 49 ..ID.G.W.I.h...I
01CE0 00 0D 03 C4 01 49 00 10 09 33 09 63 01 49 00 22 ...D.I...3.c.I."
01CF0 03 C4 01 49 00 0D 09 33 02 C0 83 53 45 C3 1C D1 .D.I...3.@.SEC.Q
01D00 08 57 01 49 01 00 05 67 06 10 01 5B 01 49 00 14 .W.I...g...[.I..
01D10 06 10 01 5B 00 AE 1D 14 00 AE 1D 0C 02 C0 84 4D ...[.....@.M
01D20 53 45 C3 1C FA 08 57 01 49 00 05 05 67 06 08 01 SEC.z.W.I...g...
01D30 5B 00 AE 1D 31 02 C0 83 43 4C D3 1D 1E 08 57 01 [...l.@.CLS...W.
01D40 49 00 1A 08 FC 02 C0 89 4E 45 57 2D 46 45 4E 43 I...|. @.NEW-FENC
01D50 C5 1D 37 08 57 0B C1 01 49 00 0C 06 88 04 E0 0A E.7.W.A.I.....`.
01D60 53 01 49 00 1C 06 88 04 E0 0A 53 01 49 00 1E 06 S.I.....`.S.I...
01D70 88 04 E0 0A 53 06 DA 04 E0 06 F2 04 BF 01 49 00 ..`.S.Z`.r?.I.
01D80 20 06 88 04 E0 08 0C 04 BF 01 49 00 2A 06 88 04 ....`...?.I.*...
01D90 E0 02 C0 85 2E 56 48 44 D2 1D 47 08 57 0B 41 09 `. @.VHDR.G.W.A.
01DA0 4E 66 61 20 20 4E 61 6D 65 01 49 00 10 14 AE 0B Nfa Name.I.....
01DB0 41 0F 56 6F 63 61 62 75 6C 61 72 79 20 6C 69 73 A.Vocabulary lis
01DC0 74 09 09 09 09 02 C0 85 2E 46 4F 4F D4 1D 93 08 t.....@..FOOT...
01DD0 57 07 C8 04 BF 06 3D 0A BC 04 05 04 9C 03 67 01 W.H.?.=.<.....g.
01DE0 82 1D F7 04 32 06 3D 0F 57 06 08 01 5B 09 09 00 ..w.2.=.W...[...
01DF0 AE 1D ED 01 72 1D F9 04 7D 06 08 07 C8 04 E0 1C ..m.r.y.}...H.`.
01E00 D6 01 49 00 05 14 AE 0B 41 08 43 68 61 70 74 65 V.I.....A.Chapte
01E10 72 20 1C C3 04 BF 1B 6E 01 49 00 0F 14 AE 0B 41 r .C?.n.I.....A
01E20 05 70 61 67 65 20 07 6D 04 BF 1B 6E 02 C0 85 52 .page .m?.n.@.R
01E30 4F 4D 49 D4 1D C7 08 57 0A 53 01 49 08 00 13 4F OMIT.G.W.S.I...O
01E40 03 D5 01 49 08 00 05 67 04 9C 06 E3 04 E0 0A BC .U.I...g....c.`.<
01E50 0B 41 11 52 4F 4D 20 69 74 20 66 72 6F 6D 20 30 .A.ROM it from 0
01E60 20 74 6F 20 1B 55 1B 89 1D 53 02 C0 82 4E AE 1E to .U...S.@.N..
01E70 2E 08 57 07 59 04 BF 03 28 0C F2 04 9C 01 49 00 ..W.Y?..(r...I.
01E80 05 15 6F 0B 41 02 20 28 0C DC 01 49 00 04 1B 44 ..o.A. (. \.I...D
01E90 0B 41 02 68 29 03 36 07 59 04 E0 02 C0 84 3F 59 .A.h).6.Y.`.@.?Y
01EA0 2F CE 1E 6C 08 57 08 CF 04 9C 01 49 00 59 03 73 /N.l.W.O...I.Y.s
01EB0 04 89 01 49 00 79 03 73 02 62 04 9C 01 82 1E C9 ...I.y.s.b.....I
01EC0 0B 41 02 20 59 01 72 1E CE 0B 41 02 20 4E 02 C0 .A. Y.r.N.A. N.@
01ED0 82 59 BF 1E 9D 08 57 09 09 0B 41 12 54 79 70 65 .Y?...W...A.Type
01EE0 20 59 20 74 6F 20 63 6F 6E 74 69 6E 75 65 1E A4 Y to continue.$
01EF0 01 82 1E F8 01 72 1E FC 18 A9 11 BA 02 C0 85 56 ...x.r.|.)...@.V
01F00 4C 49 53 D4 1E D0 08 57 07 59 04 BF 0C DC 1D 9B LIST.P.W.Y.?.\...
01F10 06 08 07 0F 04 E0 07 34 04 BF 04 BF 04 9C 04 9C .....`.4.?.?....
01F20 07 0F 04 BF 01 49 00 3C 03 AE 01 82 1F 36 09 09 ...?.I.<.....6..
01F30 06 08 07 0F 04 E0 06 08 14 CB 15 09 15 09 15 09 .....`...K.....
01F40 15 09 14 DA 09 33 04 9C 03 D5 04 D1 01 49 00 80 ...Z.3...U.Q.I..
01F50 04 05 01 82 1F 5E 09 63 0F 6F 01 72 1F 60 04 7D .....^c.o.r.`.}
01F60 01 49 00 14 07 0F 04 BF 04 67 13 5F 04 9C 01 82 .I.....?g._....
01F70 1F 76 01 72 1F 7C 04 7D 01 49 00 14 04 05 14 AE .v.r.|.}.I.....

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Memory dump

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01F80 0B E7 0A D9 04 BF 04 9C 03 52 08 EA 02 62 01 82 .g.Y.?...R.j.b..
01F90 1F 1C 04 7D 09 09 1C D6 07 59 04 E0 02 C0 85 4D ...}...V.Y.`.@.M
01FA0 61 74 63 E8 1E FE 08 57 05 16 01 82 1F D6 04 67 atch.~.W.....V.g
01FB0 03 C4 04 89 01 5B 04 9C 04 D1 03 46 04 D1 04 05 .D...[...Q.F.Q..
01FC0 01 82 1F CC 03 52 03 1B 01 72 1F CE 03 D5 00 AE ...L.R...r.N.U..
01FD0 1F B6 01 72 1F DA 04 7D 03 52 02 C0 85 4D 41 54 .6.r.Z.}.R.@.MAT
01FE0 43 C8 1F 9E 08 57 03 28 03 28 1A D5 03 36 03 36 CH...W.(.(U.6.6
01FF0 1A E5 04 67 03 C4 04 89 01 5B 1A D5 03 46 04 89 .e.g.D...[.U.F..
02000 1F A6 01 82 20 1E 03 28 1A C6 03 36 04 05 03 46 .&... ..(.F.6...F
02010 04 89 04 05 06 08 04 89 06 08 06 08 03 1B 00 AE .....
02020 1F FA 1A C6 04 89 03 52 04 89 02 C0 86 2E 41 53 .z.F...R...@..AS
02030 43 49 C9 1F DC 08 57 04 D1 04 9C 01 49 00 FE 03 CII.\.W.Q...I.~.
02040 AE 01 82 20 4B 04 7D 01 49 00 2E 04 9C 04 9C 01 ... K.}.I.....
02050 49 00 7F 03 AE 04 89 01 49 00 A0 03 90 02 51 01 I.....I. ...Q.
02060 82 20 69 04 7D 01 49 00 2E 04 9C 01 49 00 7E 04 . i.}.I.....I...
02070 05 03 52 01 82 20 7D 04 7D 01 49 00 2E 04 9C 01 ..R.. }.}.I.....
02080 49 00 20 03 90 01 82 20 8F 04 7D 01 49 00 2E 08 I. .... }.I...
02090 FC 02 C0 84 44 55 4D D0 20 2C 08 57 07 59 04 BF |.@.DUMP ,.W.Y.?
020A0 04 FE 04 FE 0C DC 04 67 03 C4 04 89 01 5B 03 46 .~.~.\.g.D...[.F
020B0 04 9C 04 9C 09 09 01 49 00 05 1B 44 09 63 01 49 .....I...D.c.I
020C0 00 10 03 C4 04 89 04 67 04 67 01 5B 03 46 04 D1 ...D...g.g.[.F.Q
020D0 09 63 06 18 1B 44 00 AE 20 CC 06 18 14 AE 01 5B .c...D.. L.....[
020E0 03 46 20 35 00 AE 20 E0 08 EA 01 82 20 F0 03 1B .F 5.. `j.. p..
020F0 01 49 00 10 00 D3 20 AE 07 59 04 E0 09 09 02 C0 .I...S `Y.`...@
02100 84 3F 45 46 B1 20 93 00 5E 84 3F 45 46 B2 21 00 .?EF1 ..^.?EF2!..
02110 00 62 84 3F 45 46 B3 21 09 00 66 84 3F 45 46 B4 .b.?EF3!..f.?EF4
02120 21 12 00 6A 82 57 B1 21 1B 00 78 82 57 B2 21 24 !..j.Wl!..x.W2!$
02130 00 7B 82 57 B3 21 2B 00 7E 82 57 B4 21 32 00 81 .{.W3!+...W4!2..
02140 83 57 4E B1 21 39 00 84 83 57 4E B2 21 40 00 87 .WN1!9...WN2!@..
02150 83 57 4E B3 21 48 00 8A 83 57 4E B4 21 50 00 8D .WN3!H...WN4!P..
02160 84 53 45 54 D1 21 58 21 69 7B D5 84 52 45 54 D1 .SETQ!X!i{U.RETQ
02170 21 60 21 74 7A D5 C4 43 41 53 C5 21 6B 08 57 0C !`!tzUDCASE!k.W.
02180 18 07 77 04 BF 0A EE 01 49 00 04 02 C0 C2 4F C6 ..w.?.n.I...@BOF
02190 21 76 08 57 01 49 00 04 0C 47 0C 91 04 67 0C 91 !v.W.I...G...g..
021A0 03 73 0C 91 01 82 0A 53 06 08 0A 84 0C 91 04 7D .s.....S.....}
021B0 01 49 00 05 02 C0 C5 45 4E 44 4F C6 21 8D 08 57 .I...@EENDOF!..W
021C0 01 49 00 05 0C 47 0C 91 01 72 0A 53 06 08 0A 84 .I...G...r.S....
021D0 04 89 06 18 13 B1 01 49 00 04 02 C0 C7 45 4E 44 .....l.I...@GEND
021E0 43 41 53 C5 21 B6 08 57 01 49 00 04 0C 47 0C 91 CASE!6.W.I...G..
021F0 04 7D 02 86 07 77 04 BF 03 73 03 52 01 82 22 08 .}...w.?.s.R..".
02200 06 18 13 B1 01 72 21 F2 07 77 04 E0 02 C0 84 54 ...l.r!r.w.`.@.T
02210 45 58 D4 21 DC 08 57 0A 53 06 33 03 D5 08 98 0D EXT!\.W.S.3.U...
02220 FA 0A 53 0B 5D 06 33 03 D5 02 FC 02 C0 84 4C 49 z.S.].3.U.|.@.LI
02230 4E C5 22 0E 08 57 04 9C 01 49 FF F0 02 51 01 49 NE".W...I.p.Q.I
02240 00 17 0B FE 07 19 04 BF 15 F5 04 7D 02 C0 C6 45 ...~...?..u.}.@FE
02250 44 49 54 4F D2 22 2D 10 A1 11 91 81 A0 26 84 18 DITOR"-.!... &..
02260 3F 85 57 48 45 52 C5 22 4E 08 57 04 9C 06 6D 13 ?.WHERE"N.W...m.
02270 4F 04 9C 07 19 04 E0 0B 41 09 53 63 72 65 65 6E O.....`A.Screen
02280 20 23 20 0C F2 15 8E 04 89 06 33 13 3F 06 33 05 # .r.....3.?3.
02290 67 04 FE 16 DE 03 C4 09 09 06 33 09 33 09 09 0A g.~.^..D...3.3...
022A0 53 04 D1 04 05 14 AE 01 49 00 5E 08 FC 22 57 11 S.Q.....I.^.|"W.
022B0 BA 02 C0 87 23 4C 4F 43 41 54 C5 18 3B 08 57 07 :.@.#LOCATE.;.W.
022C0 80 04 BF 06 33 13 3F 02 C0 85 23 4C 45 41 C4 22 ..?.3.?.@.#LEAD"
022D0 B3 08 57 22 BD 22 34 04 89 02 C0 84 23 4C 41 C7 3.W"="4...@.#LAG
022E0 22 C9 08 57 22 D1 04 9C 03 28 03 C4 06 33 03 36 "I.W"Q...(.D.3.6
022F0 04 05 02 C0 85 2D 4D 4F 56 C5 22 DB 08 57 22 34 ...@.-MOVE"[.W"4

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Memory dump

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02300 06 33 02 FC 16 59 02 C0 81 C8 22 F4 08 57 22 34 .3.|.Y.@.H"t.W"4
02310 0B 5D 03 D5 06 33 04 9C 0B 5D 04 F0 02 FC 02 C0 .|.U.3...|.p.|.@
02320 81 C5 23 08 08 57 22 34 06 33 08 98 16 59 02 C0 .E#..W"4.3...Y.@
02330 81 D3 23 20 08 57 04 9C 06 10 04 05 01 49 00 0E .S# .W.....I..
02340 01 5B 03 46 22 34 03 46 03 D5 22 FC 01 49 FF FF .[.F"4.F.U"|.I..
02350 00 D3 23 42 23 24 02 C0 81 C4 23 30 08 57 04 9C .S#B#$.@.D#0.W..
02360 23 0C 01 49 00 0F 04 9C 04 FE 01 5B 03 46 03 D5 #...I.....~.[.F.U
02370 22 34 03 46 22 FC 00 AE 23 6C 23 24 02 C0 81 CD "4.F"|...#1#$.@.M
02380 23 58 08 57 07 80 03 F2 09 09 09 63 22 D1 09 33 #X.W...r...c"Q.3
02390 01 49 00 5F 08 FC 22 E2 09 33 22 BD 15 8E 04 7D .I.._|"b.3"=...}
023A0 02 C0 81 D4 23 7E 08 57 04 9C 06 33 05 67 07 80 .@.T#..W...3.g..
023B0 04 E0 23 0C 06 08 23 82 02 C0 81 CC 23 A2 08 57 .`#...#...@.I#"W
023C0 07 19 04 BF 18 BA 06 08 23 82 02 C0 81 D2 23 BA ...?::...#...@.R#:
023D0 08 57 0B 5D 03 D5 04 89 22 FC 02 C0 81 D0 23 CC .W.].U.._|.@.P#L
023E0 08 57 06 10 22 15 23 D0 23 BE 02 C0 81 C9 23 DC .W..".#P#>.@.I#\
023F0 08 57 04 9C 23 34 23 D0 02 C0 83 54 4F D0 23 EC .W..#4#P.@.TOP#1
02400 08 57 06 08 07 80 04 E0 02 C0 85 43 4C 45 41 D2 .W.....\.@.CLEAR
02410 23 FA 08 57 07 19 04 E0 01 49 00 10 06 08 01 5B #z.W....\I.....[
02420 03 46 23 24 00 AE 24 20 02 C0 85 31 4C 49 4E C5 .F#$..$.@.llINE
02430 24 0A 08 57 22 E2 0B 5D 0B 03 1F E4 07 80 03 F2 $.W"b.]....d...r
02440 02 C0 84 46 49 4E C4 24 2A 08 57 01 49 03 FF 07 .@.FIND$*.W.I...
02450 80 04 BF 03 90 01 82 24 69 24 00 0B 5D 0A 53 06 ..?....$i$...].S.
02460 33 03 D5 02 FC 06 08 0F 28 24 32 01 82 24 4B 02 3.U.|...($2..$K.
02470 C0 86 44 45 4C 45 54 C5 24 42 08 57 03 28 22 E2 @.DELETE$B.W.("b
02480 03 C4 03 46 04 05 22 E2 03 46 04 32 07 80 03 F2 .D.F.."b.F.2...r
02490 22 D1 03 C4 04 89 02 FC 03 36 08 98 16 59 02 C0 "Q.D...|.6...Y.@
024A0 81 CE 24 71 08 57 24 49 06 08 23 82 02 C0 81 C6 .N$q.W$I...#...@.F
024B0 24 A0 08 57 06 10 22 15 24 A4 02 C0 81 C2 24 AE $ .W..".$$.@.B$.
024C0 08 57 0B 5D 04 D1 04 32 23 82 02 C0 81 D8 24 BC .W.].Q.2#...@.X$<
024D0 08 57 06 10 22 15 24 49 0B 5D 04 D1 24 7A 06 08 .W..".$I.].Q$z..
024E0 23 82 02 C0 84 54 49 4C CC 24 CC 08 57 22 D1 03 #...@.TILL$$.W"Q.
024F0 C4 06 10 22 15 24 32 03 52 06 08 0B FE 22 D1 03 D..".$2.R...~"Q.
02500 C4 04 89 04 05 24 7A 06 08 23 82 02 C0 81 C3 24 D....$z..#...@.C$
02510 E4 08 57 06 10 22 15 0B 5D 0B 03 22 E2 04 FE 04 d.W.."...].~"b.~.
02520 67 0F 57 03 28 03 46 07 80 03 F2 03 46 04 05 03 g.W.(.F...r.F...
02530 28 04 9C 0A 53 03 36 04 9C 03 28 02 FC 0A 53 22 (...S.6...(.|.S"
02540 D1 03 C4 03 36 02 FC 03 36 02 FC 16 59 06 08 23 Q.D.6.|.6.|.Y..#
02550 82 02 C0 81 D4 22 61 08 57 22 57 23 A6 02 C0 81 ..@.T"a.W"W#&.@.
02560 CC 25 53 08 57 22 57 24 00 23 BE 02 C0 83 43 55 L%S.W"W$.#>.@.CU
02570 D2 25 5F 06 90 00 52 86 47 4F 54 4F 58 D9 25 0D R% ...R.GOTOXY%.
02580 08 57 01 49 00 1B 08 FC 01 49 00 3D 08 FC 01 49 .W.I...|.I.=.|.I
02590 00 20 03 C4 08 FC 01 49 00 20 03 C4 08 FC 02 C0 . .D.|.I. .D.|.@
025A0 87 53 45 54 45 44 49 D4 25 77 08 57 01 49 00 1B .SETEDIT%w.W.I..
025B0 08 FC 01 49 00 6C 08 FC 02 C0 86 4E 4F 45 44 49 .|.I.l.|.@.NOEDI
025C0 D4 25 A0 08 57 01 49 00 1B 08 FC 01 49 00 6B 08 T% .W.I...|.I.k.
025D0 FC 02 C0 84 2E 43 55 D2 25 BA 08 57 25 73 04 BF |.@..CUR%:.W%s.?
025E0 01 49 00 40 13 3F 06 18 03 C4 04 89 01 49 00 04 .I.@.?...D...I..
025F0 03 C4 04 89 25 80 02 C0 84 21 43 55 D2 25 D3 08 .D..%...@.!CUR%S.
02600 57 06 08 05 47 01 49 03 FF 0F 57 25 73 04 E0 02 W...G.I...W%s.`.
02610 C0 84 2B 43 55 D2 25 F8 08 57 25 73 04 BF 03 C4 @.+CUR%x.W%s.?.D
02620 25 FF 02 C0 85 2B 2E 43 55 D2 26 11 08 57 26 18 %...@.+CUR&..W&.
02630 25 DA 02 C0 84 2B 4C 49 CE 26 24 08 57 25 73 04 %Z.@.+LIN&$$.W%s.
02640 BF 01 49 00 40 13 4F 03 C4 01 49 00 40 05 67 25 ? .I.@.O.D.I.@.g%
02650 FF 02 C0 83 48 4F CD 26 34 08 57 06 08 25 73 04 ..@.HOM&4.W...%s.
02660 E0 25 DA 02 C0 84 21 42 4C CB 26 53 08 57 07 19 `%Z.@.!BLK&S.W..
02670 04 BF 16 DE 25 73 04 BF 03 C4 04 F0 16 59 06 10 .?..^%s.?.D.p.Y..

```


Memory dump

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02680 26 2C 02 C0 87 53 2E 45 52 41 53 C5 26 65 08 57 &,.@.S.ERASE&e.W
02690 26 59 01 49 04 00 06 08 01 5B 01 49 00 20 04 9C &Y.I.....[.I. ..
026A0 08 FC 26 6C 00 AE 26 9A 26 59 25 DA 02 C0 84 45 .|&l..&.Y%Z.@.E
026B0 44 49 D4 25 6D 08 57 22 57 25 AA 1D 3D 18 BA 26 DIT%m.W"W%*.=:&
026C0 59 25 DA 06 08 08 CF 01 49 00 05 04 67 03 73 01 Y%Z...O.I...g.s.
026D0 82 26 DB 04 7D 26 8E 01 72 27 D7 1C CD 04 67 03 .&[.]&..r'W.M.g.
026E0 73 01 82 26 FD 04 7D 06 08 01 49 00 11 25 80 25 s..&[.]...I..%.%
026F0 C3 09 09 09 09 04 7D 06 10 01 72 27 D7 01 49 00 C.....}...r'W.I.
02700 0A 04 67 03 73 01 82 27 15 04 7D 01 49 00 40 26 ..g.s..'...}.I.@&
02710 2C 01 72 27 D7 01 49 00 7F 04 67 03 73 01 82 27 ,.r'W.I..g.s..'
02720 2D 04 7D 01 49 FF FF 26 2C 01 72 27 D7 01 49 00 -.}.I..&,.r'W.I.
02730 08 04 67 03 73 01 82 27 45 04 7D 01 49 FF FF 26 ..g.s..'E.}.I..&
02740 2C 01 72 27 D7 01 49 00 0D 04 67 03 73 01 82 27 ,.r'W.I..g.s..'
02750 5D 04 7D 06 10 26 3B 25 DA 01 72 27 D7 01 49 00 ].}..&%Z.r'W.I.
02760 0B 04 67 03 73 01 82 27 75 04 7D 01 49 FF C0 26 ..g.s..'u.}.I.@&
02770 2C 01 72 27 D7 01 49 00 0C 04 67 03 73 01 82 27 ,.r'W.I..g.s..'
02780 8B 04 7D 06 10 26 2C 01 72 27 D7 01 49 00 09 04 ..}.&,.r'W.I...
02790 67 03 73 01 82 27 B7 04 7D 25 73 04 BF 01 49 00 g.s..'7.}%s?.I.
027A0 08 13 4F 01 49 00 08 05 67 01 49 00 08 03 C4 25 ..O.I...g.I...D%
027B0 FF 25 DA 01 72 27 D7 04 9C 01 49 00 20 03 90 01 .%Z.r'W...I. ...
027C0 82 27 CD 01 49 00 07 08 FC 01 72 27 D5 04 9C 04 .M.I...|.r'U...
027D0 9C 08 FC 26 6C 04 7D 01 82 26 C3 02 C0 85 45 44 ..|&l.}.&C.@.ED
027E0 49 54 CC 26 AE 08 57 07 19 04 BF 26 B5 02 C0 85 ITL&..W...?&5.@.
027F0 43 4C 45 41 D2 27 DD 08 57 07 19 04 E0 01 49 00 CLEAR'].W...`.I.
02800 10 06 08 01 5B 03 46 23 24 00 AE 28 05 02 C0 88 ....[.F#$$(..@.
02810 43 4F 4D 4D 2E 43 54 CC 27 EF 05 FE 00 1D 88 54 COMM.CTL'o.~...T
02820 45 52 4D 2E 43 54 CC 28 0F 05 FE 00 1D 86 53 54 ERM.CTL(..~...ST
02830 41 54 55 D3 28 1E 08 57 06 20 08 3D 02 C0 85 43 ATUS(..W. .=.@.C
02840 54 4C 3D BE 28 2D 08 57 06 20 08 19 02 C0 85 4D TL=>(-.W. ...@.M
02850 4F 44 45 CD 28 3E 08 57 07 E2 04 BF 17 BC 02 C0 ODEM(>.W.b.?.<.@
02860 84 43 4F 4D CD 28 4E 08 57 08 00 04 BF 17 BC 02 .COMM(N.W...?.<.
02870 C0 84 54 45 52 CD 28 60 08 57 07 F1 04 BF 17 BC @.TERM(`.W.q.?.<
02880 02 C0 84 43 4F 4E D3 28 71 08 57 06 10 17 BC 02 .@.CONS(q.W...<.
02890 C0 84 45 53 43 A7 28 82 08 57 28 67 01 49 00 1B @.ESC'(..W(g.I..
028A0 08 FC 28 78 02 C0 88 43 4F 4D 4D 49 4E 49 D4 28 .|(x.@.COMMUNIT(
028B0 91 08 57 28 1A 04 BF 28 46 02 C0 86 52 43 56 42 ..W(..?(F.@.RCVB
028C0 52 CB 28 A6 08 57 06 18 08 3D 04 7D 28 78 0B 41 RK(&W...=.){x.A
028D0 0F 20 42 72 65 61 6B 20 72 65 63 65 69 76 65 64 . Break received
028E0 02 C0 84 52 43 56 C3 28 BB 08 57 01 49 00 08 02 .@.RCVC(;.W.I...
028F0 51 01 82 28 FB 28 C4 01 72 29 03 06 18 08 3D 28 Q..({(D.r)....=(
02900 78 08 FC 02 C0 88 52 43 56 43 48 41 52 BF 28 E2 x.|.@.RCVCHAR?(b
02910 08 57 04 9C 06 10 02 51 01 82 29 22 28 E9 01 72 .W.....Q..)"(i.r
02920 29 24 04 7D 02 C0 86 52 53 54 42 52 CB 29 05 08 )$.}.@.RSTBRK)..
02930 57 28 36 01 49 00 08 02 51 01 82 29 43 06 18 08 W(6.I...Q..)C...
02940 3D 04 7D 02 C0 87 53 45 4E 44 42 52 CB 29 26 08 =.}.@.SENDBRK)&.
02950 57 06 18 08 3D 04 7D 06 08 28 67 01 49 00 5D 28 W...=.}.(g.I.](
02960 46 28 36 29 10 28 78 21 22 01 82 29 7B 28 67 28 F(6).(x!"..){(g(
02970 B1 06 08 06 18 08 19 04 7D 06 10 01 82 29 57 02 1.....}{....)W.
02980 C0 85 45 4D 49 54 A7 29 45 29 8B E4 60 62 D5 83 @.EMIT')E).d`bU.
02990 54 52 C3 29 81 08 57 08 CF 04 9C 1C CD 03 73 01 TRC)..W.O...M.s.
029A0 82 29 AD 04 7D 04 7D 06 10 01 72 29 B1 28 67 08 .)-.}.}.r)l(g.
029B0 FC 02 C0 85 53 45 4E 44 C3 29 8F 08 57 01 49 00 |.@.SENDC)..W.I.
029C0 08 02 51 01 82 29 CD 29 4F 01 72 29 CF 29 95 02 ..Q..)M)O.r)O)..
029D0 C0 89 53 45 4E 44 43 48 41 52 BF 29 B3 08 57 04 @.SENDCHAR?)3.W.
029E0 9C 06 10 02 51 01 82 29 EF 29 BB 01 72 29 F1 04 ....Q..)o);.r)q.
029F0 7D 02 C0 84 55 41 52 D4 29 D1 08 57 0B 41 0E 55 }.@.UART)Q.W.A.U

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Memory dump

```

02A00 61 72 74 20 61 74 20 67 72 6F 75 70 20 07 59 04 art at group .Y.
02A10 BF 0C DC 08 00 04 BF 15 8E 09 09 07 59 04 E0 28 ?.\...?.....Y.`(
02A20 67 28 B1 29 2F 06 08 28 67 28 36 29 10 28 78 28 g(1)/..(g(6).(x(
02A30 36 29 DD 01 82 2A 25 09 09 02 C0 81 D5 29 F3 08 6)]...*%...@.U)s.
02A40 57 29 FA 02 C0 86 4F 4E 48 4F 4F CB 2A 3B 08 57 W)z.@.ONHOOK*;;W
02A50 28 56 06 08 01 49 00 07 08 19 28 78 02 C0 87 4F (V...I....(x.@.O
02A60 46 46 48 4F 4F CB 2A 45 08 57 28 56 06 10 01 49 FFHOOK*E.W(V...I
02A70 00 07 08 19 28 78 02 C0 88 44 49 41 4C 49 4E 49 ....(x.@.DIALINI
02A80 D4 2A 5E 08 57 28 56 06 10 01 49 00 06 08 19 01 T*^.W(V...I.....
02A90 49 00 23 01 49 00 07 08 19 28 78 02 C0 88 44 49 I.#.I....(x.@.DI
02AA0 41 4C 54 4F 4E C5 2A 78 08 57 2A 83 06 10 1D 00 ALTONE*x.W*.....
02AB0 28 56 01 49 00 0A 01 49 00 06 08 19 06 10 1D 00 (V.I...I.....
02AC0 06 08 01 49 04 00 06 08 01 5B 01 49 00 05 08 3D ...I.....[.I...=
02AD0 06 10 02 51 01 82 2A DC 01 72 2A EA 06 10 01 49 ...Q...*\r*j...I
02AE0 00 06 08 19 04 7D 06 10 03 1B 00 AE 2A CA 01 82 .....}*J..
02AF0 2A F6 01 72 2B 0B 2A 4E 0B 41 0C 4E 6F 20 64 69 *v.r+.*N.A.No di
02B00 61 6C 20 74 6F 6E 65 09 09 11 BA 28 78 02 C0 88 al tone....:(x.@.
02B10 3F 43 41 52 52 49 45 D2 2A 9D 08 57 06 08 01 49 ?CARRIER*..W...I
02B20 01 00 06 08 01 5B 28 56 01 49 00 05 08 3D 06 18 .....[(V.I...=..
02B30 02 51 01 82 2B 3E 04 7D 06 10 28 78 03 1B 01 49 .Q...>.)..(x...I
02B40 00 50 1D 25 28 78 08 EA 01 82 2B 4E 03 1B 00 AE .P.%(x.j..+N....
02B50 2B 26 02 C0 82 54 D3 2B 0F 08 57 28 56 01 49 00 +&.@.TS+..W(V.I.
02B60 23 01 49 00 07 08 19 01 49 00 FF 01 49 00 04 08 #.I.....I...I...
02B70 19 06 10 01 49 00 06 08 19 01 49 00 04 08 19 01 ....I.....I.....
02B80 49 00 40 1D 25 01 49 00 FF 01 49 00 04 08 19 06 I.@.%.I...I.....
02B90 20 01 49 00 07 08 19 01 49 00 40 1D 25 28 78 02 .I.....I.@.%(x.
02BA0 C0 84 54 4F 4E C5 2B 54 08 57 01 49 00 2A 04 67 @.TONE+T.W.I.*.g
02BB0 03 73 01 82 2B C2 04 7D 01 49 00 E7 2B 59 01 72 .s...+B.}.I.g+Y.r
02BC0 2C F8 01 49 00 23 04 67 03 73 01 82 2B DA 04 7D ,x.I.#.g.s...+Z.}
02BD0 01 49 00 B7 2B 59 01 72 2C F8 01 49 00 30 04 67 .I.7+Y.r,x.I.0.g
02BE0 03 73 01 82 2B F2 04 7D 01 49 00 D7 2B 59 01 72 .s...+r.}.I.W+Y.r
02BF0 2C F8 01 49 00 31 04 67 03 73 01 82 2C 0A 04 7D ,x.I.l.g.s...,.}
02C00 01 49 00 EE 2B 59 01 72 2C F8 01 49 00 32 04 67 .I.n+Y.r,x.I.2.g
02C10 03 73 01 82 2C 22 04 7D 01 49 00 DE 2B 59 01 72 .s...,".}.I.^+Y.r
02C20 2C F8 01 49 00 33 04 67 03 73 01 82 2C 3A 04 7D ,x.I.3.g.s...,:}
02C30 01 49 00 BE 2B 59 01 72 2C F8 01 49 00 34 04 67 .I.>+Y.r,x.I.4.g
02C40 03 73 01 82 2C 52 04 7D 01 49 00 ED 2B 59 01 72 .s...R.}.I.m+Y.r
02C50 2C F8 01 49 00 35 04 67 03 73 01 82 2C 6A 04 7D ,x.I.5.g.s...j.}
02C60 01 49 00 DD 2B 59 01 72 2C F8 01 49 00 36 04 67 .I.]+Y.r,x.I.6.g
02C70 03 73 01 82 2C 82 04 7D 01 49 00 BD 2B 59 01 72 .s...,.}.I.=+Y.r
02C80 2C F8 01 49 00 37 04 67 03 73 01 82 2C 9A 04 7D ,x.I.7.g.s...,.}
02C90 01 49 00 EB 2B 59 01 72 2C F8 01 49 00 38 04 67 .I.k+Y.r,x.I.8.g
02CA0 03 73 01 82 2C B2 04 7D 01 49 00 DB 2B 59 01 72 .s...2.}.I.[+Y.r
02CB0 2C F8 01 49 00 39 04 67 03 73 01 82 2C CA 04 7D ,x.I.9.g.s...J.}
02CC0 01 49 00 BB 2B 59 01 72 2C F8 01 49 00 2C 04 67 .I.;+Y.r,x.I.,.g
02CD0 03 73 01 82 2C E2 04 7D 01 49 02 50 1D 25 01 72 .s...b.}.I.P.%.r
02CE0 2C F8 01 49 00 3B 04 67 03 73 01 82 2C F6 04 7D ,x.I.;.g.s...v.}
02CF0 2A A8 01 72 2C F8 04 7D 02 C0 88 52 45 2D 45 4E *(.r,x.}.@.RE-EN
02D00 54 45 D2 2B A1 08 57 07 E2 04 BF 08 00 04 E0 29 TER+!.W.b.?....`)
02D10 FA 0B 41 0B 52 45 2D 45 4E 54 45 52 20 3F 20 1E z.A.RE-ENTER ? .
02D20 A4 01 82 2D 48 0B 41 1A 20 54 79 70 65 20 52 45 $.-H.A. Type RE
02D30 2D 45 4E 54 45 52 20 20 77 68 65 6E 20 72 65 61 -ENTER when rea
02D40 64 79 09 09 01 72 2D 52 2A 4E 01 49 00 E0 08 00 dy...r-R*N.I.`..
02D50 04 E0 02 C0 84 44 49 41 CC 2C FA 08 57 2A 4E 06 .`.@.DIAL,z.W*N.
02D60 10 1D 00 2A A8 01 49 00 20 0D FA 0A 53 04 D1 03 ...*(.I. .z.S.Q.
02D70 D5 06 10 01 5B 0A 53 03 46 03 C4 04 D1 2B A8 00 U...[.S.F.D.Q+(.

```


Memory dump

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02D80 AE 2D 75 02 C0 89 4F 52 49 47 49 4E 41 54 C5 2D .-u.@.ORIGINATE-
02D90 54 08 57 28 56 01 49 00 7F 01 49 00 04 08 19 06 T.W(V.I..I.....
02DA0 10 01 49 00 06 08 19 06 10 01 49 00 07 08 19 01 ..I.....I.....
02DB0 49 00 05 1D 00 2B 1A 28 78 01 82 2D C1 01 72 2D I.....+(x..-A-r-
02DC0 D2 2A 4E 0B 41 0A 4E 6F 20 63 61 72 72 69 65 72 R*N.A.No carrier
02DD0 11 BA 2D 05 02 C0 87 41 6E 73 69 6E 69 F4 2D 85 .:-..@.Ansinit-.
02DE0 08 57 01 49 2E 03 04 9C 01 49 0F 1C 04 E0 01 49 .W.I.....I...`.I
02DF0 00 0A 06 88 04 E0 02 C0 86 41 4E 53 57 45 D2 2D .....`.@.ANSWER-
02E00 D6 08 57 2D E0 2A 4E 06 10 1D 00 28 56 06 08 01 V.W-`*N....(V...
02E10 49 00 06 08 19 01 49 00 94 01 49 00 07 08 19 28 I.....I...I....(
02E20 B1 07 E2 04 BF 07 F1 04 E0 28 78 11 BA 02 C0 8B l.b.?.q.`(x...@.
02E30 53 45 4E 44 2D 53 43 52 45 45 CE 2D F8 08 57 04 SEND-SCREEN-x.W.
02E40 9C 09 09 0B 41 0F 53 65 6E 64 69 6E 67 20 53 63 ....A.Sending Sc
02E50 72 65 65 6E 20 15 8E 28 67 09 09 16 DE 01 49 04 reen ..(g...^I.
02E60 00 09 33 28 78 02 C0 8A 47 45 54 2D 53 43 52 45 ..3(x.@.GET-SCRE
02E70 45 CE 2E 2F 08 57 0B 41 0F 47 65 74 74 69 6E 67 EN./W.A.Getting
02E80 20 53 63 72 65 65 6E 20 04 9C 04 9C 15 8E 09 09 Screen .....
02E90 28 67 16 DE 01 49 04 00 06 08 01 5B 04 9C 03 46 (g.^I.....[...F
02EA0 03 C4 28 67 08 CF 28 78 08 EA 01 82 2E B0 03 1B .D(g.O(x.j...0..
02EB0 04 89 04 F0 00 AE 2E 9C 04 7D 16 59 19 06 28 78 ...p.....}.Y..(x
02EC0 18 BA 02 C0 84 32 2A 2A CE 2E 67 08 57 04 9C 03 ...@.2*N.g.W...
02ED0 52 01 82 2E DB 06 10 01 72 2E EB 06 10 04 89 06 R...[...r.k.....
02EE0 08 01 5B 06 18 05 67 00 AE 2E E3 02 C0 82 43 D3 ..[...g...c.@.CS
02EF0 2E C4 08 57 28 B1 2E CB 01 49 00 06 08 19 02 C0 .D.W(l.K.I.....@
02F00 83 43 52 D3 2E ED 08 57 2E CB 01 49 00 07 08 19 .CRS.m.W.K.I....
02F10 01 49 00 10 1D 25 06 08 01 49 00 07 08 19 02 C0 .I...%...I.....@
02F20 8E 43 48 41 4E 4E 45 4C 2D 53 45 4C 45 43 D4 2F .CHANNEL-SELECT/
02F30 00 08 57 28 67 2E F2 28 78 02 C0 8D 43 48 41 4E ..W(g.r(x.@.CHAN
02F40 4E 45 4C 2D 52 45 53 45 D4 2F 20 08 57 28 67 2F NEL-RESET/ .W(g/
02F50 06 28 78 02 C0 84 3F 4B 45 D9 2F 3B 08 57 28 36 .(x.@.?KEY/;.W(6
02F60 06 10 02 51 02 C0 88 4D 4F 4E 41 42 4F 52 D4 2F ...Q.@.MONABORT/
02F70 55 08 57 28 78 0B 41 0B 20 4E 6F 20 6D 6F 6E 69 U.W(x.A. No moni
02F80 74 6F 72 11 BA 02 C0 88 3F 4D 4F 4E 49 54 4F D2 tor...@.?MONITOR
02F90 2F 66 08 57 0B 41 01 40 01 49 02 00 1D 25 2F 5C /f.W.A.@.I...%/
02FA0 01 82 2F BA 08 CF 01 49 00 2A 03 73 01 82 2F B4 ../:.O.I.*.s.../4
02FB0 01 72 2F B6 2F 71 01 72 2F BC 2F 71 02 C0 84 58 .r/6/q.r/</q.@.X
02FC0 6D 69 F4 2F 87 08 57 28 B1 2F 92 0B 41 01 49 15 mit/..W(l/..A.I.
02FD0 A7 04 89 04 9C 04 FE 03 C4 04 89 01 5B 03 46 04 '.....~D...[.F.
02FE0 D1 06 18 1B 44 00 AE 2F DD 01 49 00 0D 08 FC 01 Q...D.../].I...|.
02FF0 49 01 20 1D 25 02 C0 84 58 4D 49 D4 2F BE 08 57 I. .%.@.XMIT/>.W
03000 07 59 04 BF 01 49 00 10 03 73 01 82 30 12 01 72 .Y.?.I...s...0..r
03010 30 22 0B 41 0B 44 65 63 6C 61 72 65 20 48 45 58 0".A.Declare HEX
03020 11 BA 28 67 2F C5 28 78 02 C0 83 43 52 A7 2F F7 .:(g/E(x.@.CR'/w
03030 08 57 01 49 00 0D 08 FC 02 C0 83 55 2E AE 30 2A .W.I...|.U..0*
03040 08 57 06 08 06 08 15 4C 02 C0 88 3F 48 45 58 43 .W.....L.@.?HEXC
03050 48 41 D2 30 3A 08 57 04 9C 01 49 00 30 03 90 04 HAR0:.W...I.0...
03060 89 04 9C 01 49 00 46 03 AE 04 FE 02 62 01 82 30 ....I.F...~b..0
03070 79 04 7D 06 08 01 72 30 8D 04 9C 01 49 00 39 03 y.}...r0....I.9.
03080 AE 04 89 01 49 00 41 03 90 02 51 03 52 02 C0 89 ....I.A...Q.R.@.
03090 43 4C 45 41 52 2D 4B 45 D9 30 4A 08 57 2F 5C 01 CLEAR-KEY0J.W/\
030A0 82 30 A7 08 CF 04 7D 02 C0 8A 53 45 52 50 52 49 .0'.O.}.@.SERPRI
030B0 4E 54 45 D2 30 8F 08 57 28 67 28 B1 28 78 01 49 NTER0..W(g(l(x.I
030C0 19 55 01 49 19 75 01 49 00 12 03 C4 04 E0 19 73 .U.I.u.I...D.`s
030D0 02 C0 85 41 48 2D 3E C2 30 A9 08 57 04 9C 01 49 .@.AH->B0).W...I
030E0 00 39 03 AE 01 82 30 F2 01 49 00 37 04 05 01 72 .9....0r.I.7...r
030F0 30 F8 01 49 00 30 04 05 02 C0 81 F6 30 D2 08 57 0x.I.0...@.v0R.W

```


Memory dump

```

03100 2F 92 0A 53 04 89 06 E3 04 E0 0B 41 01 44 04 FE /...S...c.`.A.D.~
03110 15 A7 04 89 30 40 30 30 30 9B 08 CF 01 49 00 20 .'...0@000..O.I.
03120 03 73 01 82 31 18 08 CF 01 49 00 20 03 73 01 82 .s...l...O.I. .s...
03130 31 36 01 72 31 3E 06 E3 04 E0 28 78 11 E6 08 CF 16.rl>.c.`(x.f.O
03140 04 9C 30 55 01 82 31 60 08 CF 30 DA 04 89 30 DA ..0U..l`.00Z..0Z
03150 01 49 00 10 05 67 03 C4 0A A4 06 08 01 72 31 76 .I...g.D.$...rlv
03160 04 9C 01 49 00 20 03 73 01 82 31 74 04 7D 06 08 ...I. .s...lt.)..
03170 01 72 31 76 06 10 01 82 31 3E 01 49 00 3B 03 73 .rlv....l>.I.;s
03180 03 52 01 82 31 18 06 E3 04 E0 02 C0 81 D6 30 FA .R..l...c.`.@.V0z
03190 08 57 07 59 04 BF 01 49 00 10 03 73 01 82 31 A4 .W.Y.?.I...s..l$
031A0 01 72 31 B4 0B 41 0B 44 65 63 6C 61 72 65 20 48 .rl4.A.Declare H
031B0 45 58 11 BA 28 67 30 FE 28 78 0B 41 12 52 65 63 EX.:(g0~(x.A.Rec
031C0 65 70 74 69 6F 6E 20 63 6F 6D 70 6C 65 74 65 02 eption complete.
031D0 C0 83 44 4F D3 31 8C 08 57 19 06 1D 53 09 09 0B @.DOSl..W...S...
031E0 41 0A 54 68 65 20 44 50 20 69 73 20 0A 53 0C DC A.The DP is .S.\
031F0 15 8E 0C F2 18 9A 02 C0 C9 41 53 53 45 4D 42 4C ...r...@IASSEMBL
03200 45 D2 31 D1 08 57 01 49 00 47 1A 2D 02 C0 85 44 ERlQ.W.I.G.-.@.D
03210 45 50 54 C8 31 F8 08 57 02 86 06 A1 04 BF 04 89 EPTHlx.W...!..?..
03220 04 05 06 18 13 4F 02 C0 82 2E D3 32 0E 08 57 32 .....O.@..S2..W2
03230 16 01 82 32 51 02 86 0A CD 06 A1 04 BF 0A CD 01 ...2Q...M.!..?..M.
03240 5B 03 46 15 9A 01 49 FF FE 00 D3 32 41 01 72 32 [.F...I.~.S2A.r2
03250 59 0B 41 05 45 6D 70 74 79 02 C0 89 44 55 4D 50 Y.A.Empty.@.DUMP
03260 2D 54 45 52 CD 32 28 08 57 01 49 01 00 04 05 04 -TERM2(.W.I.....
03270 9C 06 08 03 AE 01 82 32 83 04 67 01 49 01 00 01 .....2..g.I...
03280 72 32 8D 04 67 04 67 01 49 01 00 03 C4 20 9A 04 r2..g.g.I...D ..
03290 9C 06 08 03 AE 01 82 32 AB 04 89 01 49 01 00 03 .....2+...I...
032A0 C4 04 89 1E D5 06 08 01 72 32 B1 04 7D 04 7D 06 D...U...r2l.}).}.
032B0 10 01 82 32 69 02 C0 8B 53 43 52 45 45 4E 2D 44 ...2i.@.SCREEN-D
032C0 55 4D D0 32 5B 08 57 16 DE 01 49 04 00 32 67 02 UMP2[.W.^.I..2g.
032D0 C0 86 56 4F 43 41 42 BF 32 B7 08 57 07 34 04 BF @.VOCAB?27.W.4.?
032E0 01 49 00 04 04 05 0B D1 0F 6F 0B 41 11 20 69 73 .I.....Q.o.A. is
032F0 20 74 68 65 20 63 6F 6E 74 65 78 74 2C 20 07 42 the context, .B
03300 04 BF 01 49 00 04 04 05 0B D1 0F 6F 0B 41 1A 20 .?.I.....Q.o.A.
03310 69 73 20 74 68 65 20 63 75 72 72 65 6E 74 20 76 is the current v
03320 6F 63 61 62 75 6C 61 72 79 02 C0 85 56 4D 4F 56 ocalary.@.VMOV
03330 C5 32 D1 08 57 01 49 00 10 17 BC 06 18 08 19 28 E2Q.W.I...<....(
03340 78 02 C0 85 56 43 4F 50 D9 33 2B 08 57 04 9C 01 x.@.VCOPY3+.W...
03350 49 00 D0 33 33 01 49 D0 00 07 94 04 BF 01 49 04 I.P33.IP....?.I.
03360 00 02 FC 01 49 01 00 05 67 01 49 D0 00 01 49 04 ..|.I...g.IP..I.
03370 00 02 FC 33 33 07 94 04 BF 01 49 D0 00 01 49 04 ..|33...?.IP..I.
03380 00 02 FC 02 C0 87 56 53 48 41 44 4F D7 33 43 08 ..|.I.@.VSHADOW3C.
03390 57 04 9C 01 49 00 90 33 33 01 49 D0 00 07 94 04 W...I..33.IP....
033A0 BF 01 49 04 00 02 FC 01 49 D0 00 01 49 04 00 01 ?.I...|.IP..I...
033B0 49 00 20 08 68 01 49 00 F0 33 33 07 94 04 BF 01 I. .h.I.p33...?.
033C0 49 D0 00 01 49 04 00 02 FC 33 33 02 C0 86 3F 53 IP..I...|33.@.?S
033D0 50 41 43 C5 33 85 08 57 01 49 00 20 03 73 02 C0 PACE3..W.I. .s.@
033E0 86 3F 41 53 43 49 C9 33 CD 08 57 04 9C 01 49 00 .?ASCII3M.W...I.
033F0 20 03 90 04 89 01 49 00 7E 03 AE 02 62 03 52 02 .....I.....b.R.
03400 C0 86 3F 49 4E 44 45 D8 33 E0 08 57 06 08 04 89 @.?INDEX3`.W....
03410 16 DE 04 9C 01 49 00 40 03 C4 04 89 01 5B 03 46 .^...I.@.D...[.F
03420 04 D1 33 D6 01 82 34 2C 01 72 34 30 04 7D 06 10 .Q3V..4,.r40.}..
03430 03 46 04 D1 33 E9 01 82 34 3E 01 72 34 44 04 7D .F.Q3i..4>.r4D.}
03440 06 08 03 1B 00 AE 34 1E 02 C0 87 3F 53 43 52 45 .....4..@.?SCRE
03450 45 CE 34 01 08 57 06 08 04 89 16 DE 04 9C 01 49 EN4..W.....^...I
03460 04 00 03 C4 04 89 01 5B 03 46 04 D1 33 D6 01 82 ...D...[.F.Q3V..
03470 34 76 01 72 34 7A 04 7D 06 10 03 46 04 D1 33 E9 4v.r4z.}...F.Q3i

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Memory dump

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03480 01 82 34 88 01 72 34 8E 04 7D 06 08 03 1B 00 AE ..4..r4...}.....
03490 34 68 02 C0 85 49 4E 44 45 D8 34 4A 08 57 03 D5 4h.@.INDEX4J.W.U
034A0 04 89 01 5B 03 46 34 0A 01 82 34 BC 09 09 03 46 ...[.F4...4<...F
034B0 06 20 15 6F 09 63 06 08 03 46 16 1B 08 EA 01 82 . .o.c...F...j..
034C0 34 C4 03 1B 00 AE 34 A4 09 09 02 C0 8C 53 50 52 4D....4$...@.SPR
034D0 45 41 44 53 43 52 45 45 CE 34 94 08 57 04 9C 04 EADSCREEN4..W...
034E0 9C 06 08 04 89 03 D5 01 49 00 FA 04 89 01 5B 03 .....U.I.z...[.
034F0 46 34 54 01 82 34 FB 01 72 35 01 04 7D 03 46 03 F4T...4{.r5...}.F.
03500 1B 00 AE 34 EF 04 9C 03 52 01 82 35 25 0B 41 0F ...4o...R...5%.A.
03510 4E 6F 20 62 6C 61 6E 6B 20 73 63 72 65 65 6E 11 No blank screen.
03520 BA 01 72 35 37 01 5B 03 46 0A BC 03 46 1B FF 01 :.r57.[.F.<.F...
03530 49 FF FF 00 D3 35 27 27 F7 19 06 02 C0 83 45 4F I...S5'w...@.EO
03540 C6 34 CC 05 FB 00 13 84 49 4F 43 C2 35 3D 06 90 F4L.{...IOCB5=..
03550 00 54 86 53 45 43 54 4F D2 35 47 08 57 04 9C 01 .T.SECTOR5G.W...
03560 49 02 75 03 AE 01 82 35 7B 0B 41 0D 50 53 4E 20 I.u....5{.A.PSN
03570 74 6F 6F 20 6C 61 72 67 65 11 BA 06 08 06 18 13 too large.....
03580 16 16 DE 04 89 01 49 02 00 05 67 03 C4 04 9C 35 ..^...I...g.D...5
03590 4E 01 49 00 07 03 C4 04 E0 02 C0 86 4E 45 57 53 N.I...D.`.@.NEWS
035A0 44 D7 35 52 08 57 06 08 35 4E 01 49 00 04 03 C4 DW5R.W...5N.I...D
035B0 04 F0 35 4E 04 BF 35 5B 35 4E 06 18 03 C4 04 D1 .p5N.?5[5N...D.Q
035C0 03 C4 04 9C 04 D1 04 9C 01 49 00 7F 03 AE 04 FE .D...Q...I....~
035D0 04 FE 03 D5 35 4E 06 20 03 C4 04 F0 03 D5 04 BF .~.U5N. .D.p.U.?
035E0 35 4E 01 49 00 05 03 C4 04 E0 02 C0 86 47 45 54 5N.I...D.`.@.GET
035F0 53 45 C3 35 9B 08 57 35 4E 06 20 03 C4 04 D1 35 SEC5..W5N. .D.Q5
03600 4E 01 49 00 04 03 C4 04 D1 03 AE 01 82 36 43 35 N.I...D.Q....6C5
03610 4E 01 49 00 05 03 C4 04 BF 35 4E 01 49 00 04 03 N.I...D.?5N.I...
03620 C4 04 D1 03 C4 35 5B 35 4E 01 49 00 04 03 C4 04 D.Q.D5[5N.I...D.
03630 D1 03 D5 35 4E 01 49 00 04 03 C4 04 F0 06 10 01 Q.U5N.I...D.p...
03640 72 36 67 35 4E 06 18 03 C4 04 D1 06 20 03 C4 35 r6g5N...D.Q. .D5
03650 4E 06 18 03 C4 04 F0 35 A4 01 82 36 65 06 08 06 N...D.p5$.6e...
03660 10 01 72 36 67 06 08 01 82 35 F7 02 C0 84 4F 70 ..r6g....5w.@.Op
03670 65 EE 35 EC 08 57 35 4E 04 E0 06 08 35 4E 03 E7 en5l.W5N.`..5N.g
03680 04 F0 35 A4 01 82 36 98 0B 41 0B 45 6E 64 20 6F .p5$..6..A.End o
03690 66 20 66 69 6C 65 11 BA 35 F5 04 7D 02 C0 86 44 f file.:5u.}.@.D
036A0 49 53 4B 49 C4 36 6D 08 57 09 09 0B 41 09 44 69 ISKID6m.W...A.Di
036B0 73 6B 20 49 44 3A 20 06 08 35 5B 01 49 00 0C 03 sk ID: ..5[.I...
036C0 C4 04 9C 01 49 00 08 03 C4 01 49 00 2C 09 33 01 D...I...D.I.,.3.
036D0 49 00 05 14 AE 01 49 00 08 09 33 09 09 02 C0 87 I.....I...3....@.
036E0 2E 44 49 52 53 45 C3 36 9E 08 57 01 49 02 00 06 .DIRSEC6..W.I...
036F0 08 01 5B 08 EA 01 82 36 FF 03 1B 01 72 37 69 04 ..[.j..6.....r7i.
03700 9C 03 46 03 C4 04 9C 04 D1 33 E9 01 82 37 67 04 ..F.D...Q3i..7g.
03710 9C 04 9C 01 49 00 06 09 33 0B 41 01 2E 01 49 00 ....I...3.A...I.
03720 06 03 C4 06 20 09 33 06 20 14 AE 01 49 00 0A 03 ..D. .3. ...I...
03730 C4 04 BF 15 8E 07 0F 04 BF 04 9C 01 49 00 3C 03 D.?.....?...I.<.
03740 AE 01 82 37 53 04 7D 06 08 07 0F 04 E0 09 09 01 ...7S.}.....`...
03750 72 37 63 01 49 00 14 13 5F 01 49 00 14 04 89 04 r7c.I... .I.....
03760 05 14 AE 01 72 37 69 04 7D 01 49 00 10 00 D3 36 ....r7i.}.I...S6
03770 F3 04 7D 02 C0 83 44 49 D2 36 DF 08 57 36 A7 0B s.}.@.DIR6..W6'.
03780 41 10 44 69 72 65 63 74 6F 72 79 20 20 53 74 61 A.Directory Sta
03790 72 74 09 09 09 09 06 08 07 0F 04 E0 09 09 01 49 rt.....`...I
037A0 00 0A 06 10 01 5B 03 46 35 5B 36 E9 00 AE 37 A6 .....[.F5[6i..7&
037B0 09 09 19 06 02 C0 86 4E 45 57 4C 53 CE 37 75 08 .....@.NEWLSN7u.
037C0 57 35 4E 04 BF 04 9C 36 74 35 5B 1A D5 04 D1 04 W5N.?.?..6t5[.U.Q.
037D0 9C 01 49 00 79 03 AE 01 82 37 EB 0B 41 0B 45 6E ..I.y....7k.A.En
037E0 64 20 6F 66 20 66 69 6C 65 11 BA 03 D5 03 90 01 d of file.:U...
037F0 82 38 07 04 7D 35 4E 01 49 00 04 03 C4 04 F0 35 .8..}5N.I...D.p5

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Memory dump

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03800 F5 06 10 01 72 38 4B 04 9C 04 D1 04 FE 04 89 04 u...r8K...Q.~...
03810 05 04 89 06 20 03 C4 04 9C 04 D1 03 D5 35 4E 06 .... .D...Q.U5N.
03820 20 03 C4 04 F0 04 9C 03 D5 04 BF 35 4E 01 49 00 .D.p...U.?5N.I.
03830 05 03 C4 04 E0 35 4E 06 18 03 C4 04 D1 06 20 03 ..D. 5N...D.Q. .
03840 C4 35 4E 06 18 03 C4 04 F0 06 08 01 82 37 CB 02 D5N...D.p....7K.
03850 C0 85 46 4E 41 4D C5 37 B6 08 57 04 9C 04 9C 0A @.FNAME76.W.....
03860 53 06 10 03 C4 03 C4 0B 5D 06 20 02 FC 0B 5D 0A S...D.D.].|.].
03870 53 01 49 00 07 03 C4 06 20 02 FC 0A 53 03 C4 01 S.I...D. .|.S.D.
03880 49 00 07 04 FE 04 05 01 49 00 20 08 68 02 C0 86 I...~...I. .h.@.
03890 46 49 4C 45 49 C4 38 51 08 57 0B 41 13 46 69 6C FILEID8Q.W.A.Fil
038A0 65 20 49 44 3A 20 57 46 4F 52 54 48 2E 43 4D 20 e ID: WORTH.CM
038B0 02 C0 84 4F 50 45 CE 38 8F 08 57 19 06 01 49 00 .@.OPEN8..W...I.
038C0 20 0D FA 0A 53 03 D5 0A 53 04 D1 01 49 00 F7 01 .z.S.U.S.Q.I.w.
038D0 49 00 13 03 C4 06 10 1F E4 04 89 01 82 39 03 0A I...D...d....9..
038E0 53 03 C4 04 9C 03 D5 04 D1 06 20 02 51 07 BD 04 S.D...U.Q. .Q.=.
038F0 BF 05 67 07 26 04 E0 01 49 20 20 04 89 04 E0 01 ?g.&`.I ...`.
03900 72 39 05 04 7D 0A 53 01 49 00 0C 03 C4 0A 53 04 r9...}.S.I...D.S.
03910 9C 04 D1 03 D5 03 C4 01 5B 01 49 00 20 03 46 04 ..Q.U.D.[.I. .F.
03920 F0 00 AE 39 19 0A 53 03 D5 0A 53 04 D1 01 49 12 p..9..S.U.S.Q.I.
03930 52 0B D1 03 D5 06 10 1F E4 04 89 01 82 39 EB 06 R.Q.U...d....9k.
03940 18 04 67 03 73 01 82 39 53 04 7D 06 18 38 59 01 ..g.s..9S.}..8Y.
03950 72 39 E7 06 20 04 67 03 73 01 82 39 67 04 7D 06 r9g. .g.s..9g.}.
03960 20 38 59 01 72 39 E7 01 49 00 04 04 67 03 73 01 8Y.r9g.I...g.s.
03970 82 39 7F 04 7D 01 49 00 04 38 59 01 72 39 E7 01 .9.}.I..8Y.r9g.
03980 49 00 05 04 67 03 73 01 82 39 97 04 7D 01 49 00 I...g.s..9...}.I.
03990 05 38 59 01 72 39 E7 01 49 00 06 04 67 03 73 01 .8Y.r9g.I...g.s.
039A0 82 39 B7 04 7D 01 49 00 20 0A 53 01 49 00 06 03 .97.}.I. .S.I...
039B0 C4 04 F0 01 72 39 E7 01 49 00 07 04 67 03 73 01 D.p.r9g.I...g.s.
039C0 82 39 E5 04 7D 0A 53 01 49 00 08 03 C4 0B 5D 06 .9e.}.S.I...D.].
039D0 20 02 FC 0B 5D 0A 53 01 49 00 07 03 C4 06 20 02 .|.}.S.I...D. .
039E0 FC 01 72 39 E7 04 7D 01 72 39 ED 04 7D 0A 53 03 |.r9g.}.r9m.}.S.
039F0 D5 01 49 38 9A 01 49 00 0C 03 C4 1A D5 01 49 00 U.I8..I...D.U.I.
03A00 06 02 FC 04 89 01 49 00 06 03 C4 04 89 01 49 00 ..|...I...D...I.
03A10 07 03 C4 06 20 02 FC 06 10 01 49 00 0A 06 10 01 ..D. .|...I.....
03A20 5B 03 46 35 5B 01 49 02 00 0A 53 03 D5 01 49 00 [.F5[.I...S.U.I.
03A30 09 1F E4 04 89 01 82 3A 4F 03 46 35 5B 03 C4 03 ..d....:O.F5[.D.
03A40 D5 04 BF 04 89 04 7D 06 08 03 1B 01 72 3A 51 04 U.?...}.....r:Q.
03A50 7D 00 AE 3A 21 01 82 3A 6B 09 09 38 98 0B 41 09 }...!...k..8..A.
03A60 4E 6F 74 20 66 6F 75 6E 64 11 BA 36 74 02 C0 83 Not found.:6t.@.
03A70 2E 41 C8 38 B2 08 57 04 9C 01 49 00 09 03 AE 01 .AH82.W...I.....
03A80 82 3A 8F 01 49 00 37 03 C4 08 FC 01 72 3A 97 01 ...I.7.D.|.r:...
03A90 49 00 30 03 C4 08 FC 02 C0 85 2E 42 59 54 C5 3A I.O.D.|.@..BYTE:
03AA0 6F 08 57 04 9C 01 49 00 10 13 4F 3A 75 01 49 00 o.W...I...O:u.I.
03AB0 0F 02 51 3A 75 02 C0 84 2E 41 48 CC 3A 99 08 57 ..Q:u.@..AHL:...W
03AC0 01 49 00 20 06 08 01 5B 04 9C 03 46 03 C4 04 D1 .I. ...[...F.D.Q
03AD0 3A A1 00 AE 3A C8 04 7D 09 09 02 C0 84 2E 41 48 :!...:H.}...@..AH
03AE0 D0 3A B7 08 57 09 09 04 9C 01 49 02 00 03 C4 04 P:7.W.....I...D.
03AF0 89 01 5B 03 46 3A BE 01 49 00 20 00 D3 3A F3 02 ..[.F:>.I. .S:s.
03B00 C0 85 46 2D 4C 45 CE 3A DC 08 57 06 08 06 08 37 @.F-LEN:\.W....7
03B10 BF 04 9C 04 D1 04 9C 01 49 00 80 03 90 01 82 3B ?...Q...I.....;
03B20 2F 04 FE 03 C4 04 89 06 20 03 C4 01 72 3B 11 04 /..~.D... .D.r;..
03B30 7D 04 7D 02 C0 84 53 41 56 C5 3B 01 08 57 38 B9 }.}.@.SAVE;..W89
03B40 3B 09 04 9C 01 49 02 00 05 67 0A 53 03 90 01 82 ;....I...g.S....
03B50 3B 5A 01 49 00 1A 15 B9 11 BA 06 08 01 5B 03 46 ;Z.I...9....[.F
03B60 01 49 02 00 05 67 35 F5 01 49 02 00 02 FC 16 59 .I...g5u.I...|.Y
03B70 00 AE 3B 5E 19 06 02 C0 84 53 45 4E C4 3B 35 08 ..;^...@.SEND;5.

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03B80 57 38 B9 35 F5 04 9C 03 52 01 82 3B 95 04 7D 06 W895u...R.;...}.
03B90 10 01 72 3B C3 04 9C 28 67 3A E3 08 EA 01 82 3B ..r;C..(g:c.j...;
03BA0 AB 28 78 01 49 00 12 15 B9 11 BA 1E A4 01 82 3B +(x.I...9...$.;
03BB0 B9 04 7D 06 10 01 72 3B BB 06 08 28 78 01 82 3B 9.)...r;;...(x...;
03BC0 95 06 08 01 82 3B 83 02 C0 88 44 4F 57 4E 4C 4F .....;...@.DOWNLO
03BD0 41 C4 3B 78 08 57 38 B9 04 9C 35 F5 04 9C 03 52 AD;x.W89..5u...R
03BE0 01 82 3C 08 04 7D 0B 41 17 44 6F 77 6E 6C 6F 61 ..<...}.A.Downloa
03BF0 64 69 6E 67 20 69 73 20 63 6F 6D 70 6C 65 74 65 ding is complete
03C00 09 09 06 10 01 72 3C 18 01 49 02 00 04 FE 2F FE .....r<...I...~/~
03C10 01 49 02 00 03 C4 08 EA 01 82 3B D8 04 7D 02 C0 .I...D.j...;X.}.@
03C20 88 46 49 4C 45 4C 4F 41 C4 3B C9 08 57 38 B9 06 .FILELOAD;I.W89.
03C30 08 37 BF 01 49 01 F8 03 C4 04 BF 06 08 35 F5 04 .7?.I.x.D.?..5u.
03C40 9C 01 82 3C 5F 04 FE 1A D5 01 49 02 00 02 FC 04 ...<...~.U.I...|.
03C50 89 04 7D 01 49 02 00 03 C4 04 89 01 72 3C 65 1A ...}.I...D...r<e.
03C60 C6 04 7D 06 10 01 82 3C 3B 02 C0 89 51 55 49 54 F.}.....<;...@.QUIT
03C70 2E 46 4C 41 C7 3C 20 06 90 00 5E 88 57 4F 52 44 .FLAG< ...^.WORD
03C80 2E 50 54 D2 3C 6B 06 90 00 60 89 50 44 4F 54 51 .PTR<k...`.PDOTQ
03C90 2E 44 53 D0 3C 7B 08 57 3C 86 04 BF 03 E7 04 9C .DSP<{.W<...?.g..
03CA0 03 28 04 9C 04 D1 03 C4 0A BC 3C 86 04 E0 03 36 .(...Q.D.<<...`.6
03CB0 0B 03 09 33 02 C0 88 57 4F 52 44 2E 44 53 D0 3C ...3.@.WORD.DSP<
03CC0 8A 08 57 06 20 04 05 01 49 FF FF 0B 9C 04 9C 03 ..W. ...I.....
03CD0 D5 04 D1 01 49 00 3B 03 73 01 82 3C E3 06 10 3C U.Q.I.;s...<c...<
03CE0 77 04 E0 04 9C 04 D1 01 49 00 A0 02 51 01 49 00 w...Q.I..Q.I.
03CF0 80 03 73 01 82 3C FD 0F 6F 01 72 3C FF 04 7D 02 ..s...<}.o.r<...}.
03D00 C0 8A 42 52 41 4E 43 48 2E 44 53 D0 3C B6 08 57 @.BRANCH.DSP<6.W
03D10 0B 41 04 20 54 4F 20 3C 86 04 BF 03 E7 04 9C 3C .A. TO <...?.g...<
03D20 86 04 E0 04 BF 06 08 0C DC 15 80 0C F2 02 C0 86 ..`.?....\...r.@.
03D30 43 56 2E 44 53 D0 3D 01 08 57 0B 41 0E 2C 20 43 CV.DSP=.W.A., C
03D40 75 72 72 65 6E 74 6C 79 20 3D 20 02 C0 89 43 4F urrently = .@.CO
03D50 4E 53 54 2E 44 53 D0 3D 2F 08 57 01 49 10 4D 0B NST.DSP=/.W.I.M.
03D60 D1 0F 6F 3D 38 3C 86 04 BF 03 E7 04 BF 1E 71 06 Q.o=8<...?.g.?.q.
03D70 10 3C 77 04 E0 02 C0 89 55 53 45 52 56 2E 44 53 .<w...`.@.USERV.DS
03D80 D0 3D 4D 08 57 0B 41 04 55 53 45 52 3C 86 04 BF P=M.W.A.USER<...?
03D90 03 E7 04 BF 1E 71 3D 38 3C 86 04 BF 03 E7 04 BF .g.?.q=8<...?.g.?.
03DA0 01 49 00 10 06 88 04 BF 03 C4 04 BF 1E 71 06 10 .I.....?.D.?.q..
03DB0 3C 77 04 E0 02 C0 87 56 41 52 2E 44 53 D0 3D 77 <w...`.@.VAR.DSP=w
03DC0 08 57 01 49 10 62 0B D1 0F 6F 3D 38 3C 86 04 BF .W.I.b.Q.o=8<...?
03DD0 03 E7 04 BF 1E 71 06 10 3C 77 04 E0 02 C0 89 44 .g.?.q...<w...`.@.D
03DE0 4F 45 53 3E 2E 44 53 D0 3D B6 08 57 0B 41 05 44 OES>.DSP=6.W.A.D
03DF0 4F 45 53 3E 3C 86 04 BF 06 18 03 C4 04 BF 0A CD OES><...?.D.?.M
03E00 3C 86 04 E0 02 C0 89 56 4F 43 41 42 2E 44 53 D0 <...`.@.VOCAB.DSP
03E10 3D DE 08 57 0B 41 0B 56 4F 43 41 42 55 4C 41 52 ^=.W.A.VOCABULAR
03E20 59 20 3C 86 04 BF 0B D1 0F 6F 09 63 02 C0 89 44 Y <...?.Q.o.c.@.D
03E30 45 43 4F 4D 50 49 4C C5 3E 06 08 57 0E EE 03 52 ECOMPILE>..W.n.R
03E40 01 82 3E 62 06 20 14 AE 0B 41 11 3F 20 4E 6F 74 ..>b. ...A.? Not
03E50 20 69 6E 20 47 6C 6F 73 73 61 72 79 09 09 01 72 in Glossary...r
03E60 40 B8 04 7D 04 9C 04 9C 0A CD 04 BF 03 73 01 82 @8.}.....M.?.s..
03E70 3E 88 06 20 14 AE 0B 41 09 43 6F 64 65 20 77 6F >... ..A.Code wo
03E80 72 64 09 09 01 72 40 B8 06 08 3C 77 04 E0 04 9C rd...r@8...<w...
03E90 0A CD 3C 86 04 E0 09 09 0B 41 0C 44 65 63 6F 6D .M<...`.A.Decom
03EA0 70 69 6C 69 6E 67 20 0B D1 0F 6F 09 09 0B 41 0D piling .Q.o...A.
03EB0 43 46 41 20 20 20 20 20 28 43 46 41 29 09 09 3C CFA (CFA)...<
03EC0 86 04 BF 04 9C 06 08 0C DC 15 80 09 63 04 9C 04 ..?.....\...c...
03ED0 BF 01 49 00 06 1A 1C 01 49 00 05 14 AE 0C F2 04 ?.I.....I.....r.
03EE0 BF 01 49 01 4B 0A CD 04 67 03 73 01 82 3F 05 04 ?.I.K.M.g.s...?.
03EF0 7D 3C 86 04 BF 03 E7 04 9C 3C 86 04 E0 04 BF 1E }<...?.g...<...?.

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Memory dump

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03F00 71 01 72 40 A4 01 49 0D 0A 0A CD 04 67 03 73 01 q.r@$.I...M.g.s.
03F10 82 3F 27 04 7D 3C 86 04 BF 04 BF 3C C1 06 10 3C .?'<...?<A.<
03F20 77 04 E0 01 72 40 A4 01 49 01 84 0A CD 04 67 03 w.`.r@$.I...M.g.
03F30 73 01 82 3F 42 04 7D 0B 41 02 42 5A 3D 0E 01 72 s..?B.}.A.BZ=..r
03F40 40 A4 01 49 01 74 0A CD 04 67 03 73 01 82 3F 5D @$$.I.t.M.g.s..?]
03F50 04 7D 0B 41 02 42 52 3D 0E 01 72 40 A4 01 49 01 .}.A.BR=..r@$.I.
03F60 5D 0A CD 04 67 03 73 01 82 3F 77 04 7D 0B 41 03 ].M.g.s..?w.}.A.
03F70 44 4F 20 01 72 40 A4 01 49 18 39 0A CD 04 BF 04 DO .r@$.I.9.M.?.
03F80 67 03 73 01 82 3F A5 04 7D 3C 86 04 BF 03 E7 04 g.s..?%.}<...?g.
03F90 BF 01 49 18 39 04 BF 03 73 01 82 3F 9F 3E 12 3D ?.I.9.?.s..?>.=
03FA0 EA 01 72 40 A4 01 49 00 B0 0A CD 04 67 03 73 01 j.r@$.I.0.M.g.s.
03FB0 82 3F C3 04 7D 0B 41 05 4C 4F 4F 50 20 3D 0E 01 .?C.}.A.LOOP =..
03FC0 72 40 A4 01 49 00 D5 0A CD 04 67 03 73 01 82 3F r@$.I.U.M.g.s..?
03FD0 E2 04 7D 0B 41 06 2B 4C 4F 4F 50 20 3D 0E 01 72 b.}.A.+LOOP =..r
03FE0 40 A4 01 49 0B 43 0A CD 04 67 03 73 01 82 40 00 @$$.I.C.M.g.s..@.
03FF0 04 7D 0B 41 01 2E 1C 9F 3C 96 1C 9F 01 72 40 A4 .}.A....<....r@$
04000 01 49 07 5B 0A CD 04 BF 04 67 03 73 01 82 40 18 .I.[.M.?.g.s..@.
04010 04 7D 3D 83 01 72 40 A4 01 49 10 62 03 E7 04 BF .}=..r@$.I.b.g.?
04020 04 67 03 73 01 82 40 30 04 7D 3D C0 01 72 40 A4 .g.s..@0.}=@.r@$
04030 01 49 06 12 0A CD 04 BF 04 67 03 73 01 82 40 48 .I...M.?.g.s..@H
04040 04 7D 3D 59 01 72 40 A4 01 49 10 08 0A CD 04 BF .}=Y.r@$.I...M.?
04050 04 67 03 73 01 82 40 6F 04 7D 0B 41 02 3A 20 3C .g.s..@o.}.A.: <
04060 86 04 BF 06 18 03 C4 0B D1 0F 6F 01 72 40 A4 01 ..?...D.Q.o.r@$.
04070 49 0C 93 0A CD 04 67 03 73 01 82 40 9E 04 7D 0B I...M.g.s..@.}.
04080 41 08 43 4F 4D 50 49 4C 45 20 3C 86 04 BF 03 E7 A.COMPILE <...?g
04090 04 9C 3C 86 04 E0 04 BF 3C C1 01 72 40 A4 04 9C ..<...`.?<A.r@$.
040A0 3C C1 04 7D 09 09 06 18 3C 86 03 F2 3C 77 04 BF <A.}....<..r<w.?
040B0 08 EA 02 62 01 82 3E BF 09 09 02 C0 86 50 41 52 .j.b...>?...@.PAR
040C0 50 54 D2 3E 2E 08 57 07 D2 04 BF 04 89 06 10 17 PTR>..W.R.?.....
040D0 BC 01 49 00 FF 02 74 21 46 01 49 00 06 08 19 17 <.I...t!F.I.....
040E0 BC 02 C0 84 50 41 47 C5 40 BC 08 57 01 49 00 0D <.@.PAGE@<.W.I..
040F0 08 FC 01 49 00 8C 08 FC 06 10 07 6D 03 F2 02 C0 .|.I...|.m.r.@
04100 84 54 45 41 D2 40 E3 08 57 40 EA 19 F2 02 C0 88 .TEAR@c.W@j.r.@.
04110 44 49 53 4B 4C 49 53 D4 41 00 08 57 36 A7 06 08 DISKLISTA..W6'..
04120 04 FE 04 FE 03 D5 04 89 01 5B 03 46 34 54 01 82 .~.~.U...[.F4T..
04130 41 38 03 46 18 BA 03 D5 04 9C 06 18 03 AE 01 82 A8.F...U.....
04140 41 4C 04 7D 06 08 1D CF 40 EA 36 A7 00 AE 41 2A AL.}...O@j6'.A*
04150 04 7D 1D CF 02 C0 88 44 4F 43 55 4D 45 4E D4 41 .}.O.@.DOCUMENTA
04160 0F 08 57 01 49 00 48 1A 2D 02 C0 88 46 4C 4F 41 ..W.I.H.-.@.FLOA
04170 54 49 4E C7 41 56 08 57 01 49 00 48 1A 2D 02 C0 TINGAV.W.I.H.-.@
04180 84 54 41 53 CB 41 6B 08 57 02 C0 C8 44 4F 43 55 .TASKAk.W.@HDOCU
04190 4D 45 4E D4 41 80 10 A1 11 91 81 A0 4B CE 22 5F MENTA..!... KN"-
041A0 86 2E 56 48 44 52 B3 18 3B 08 57 09 09 01 49 00 ..VHDR3.;.W...I.
041B0 10 14 AE 0B 41 0F 56 6F 63 61 62 75 6C 61 72 79 ....A.Vocabulary
041C0 20 6C 69 73 74 09 09 0B 41 0A 20 20 4E 46 41 20 list...A. NFA
041D0 4E 61 6D 65 01 49 00 0C 14 AE 0B 41 16 40 4C 46 Name.I.....A.@LF
041E0 41 20 20 20 20 43 46 41 20 40 43 46 41 20 20 40 A CFA @CFA @
041F0 50 46 41 09 09 02 C0 86 56 4C 49 53 54 B3 41 A0 PFA...@.VLIST3A
04200 08 57 07 59 04 BF 0C DC 07 42 04 BF 04 BF 41 A9 .W.Y.?.\B.?.?A)
04210 09 09 06 08 07 0F 04 E0 04 9C 04 9C 01 49 00 05 .....I..
04220 1B 44 09 63 0F 6F 07 0F 04 BF 01 49 00 16 04 89 .D.c.o...?.I....
04230 04 05 14 AE 0B E7 04 9C 04 9C 04 9C 04 9C 04 9C .....g.....
04240 0A D9 04 BF 01 49 00 04 1B 44 06 18 14 AE 0A E5 .Y.?.I...D.....e
04250 04 9C 01 49 00 05 1B 44 04 BF 01 49 00 05 1A 1C ...I...D.?.I....
04260 06 18 14 AE 04 BF 01 49 00 04 1B 44 0A E5 04 9C .....?.I...D.e..
04270 04 BF 06 18 04 05 03 73 01 82 42 84 0B 41 05 20 .?.....s..B..A.

```


Memory dump

```

04280 43 6F 64 65 0B D1 04 D1 01 49 00 40 02 51 01 82 Code.Q.Q.I.@.Q..
04290 42 9F 0B 41 0A 20 49 6D 6D 65 64 69 61 74 65 07 B..A. Immediate.
042A0 C8 04 BF 06 3D 06 20 04 05 03 90 01 82 42 B3 01 H.?.=. ....B3.
042B0 72 42 BB 09 09 1D CF 40 EA 41 A9 0A D9 04 BF 04 rB;...O@jA).Y.?.
042C0 9C 03 52 08 EA 02 62 01 82 42 10 04 7D 07 59 04 ..R.j.b..B..}.Y.
042D0 E0 09 09 1D CF 02 C0 8A 43 41 54 2D 55 50 44 41 `...O.@.CAT-UPDA
042E0 54 C5 41 F7 08 57 01 49 00 04 16 DE 01 49 02 0F TEAw.W.I...^.I..
042F0 03 C4 04 9C 04 9C 04 D1 01 49 00 1F 02 62 04 89 .D.....Q.I...b..
04300 04 F0 03 D5 04 9C 01 49 00 2D 03 C4 04 89 01 5B .p.U...I.-.D...[
04310 01 49 00 FF 03 46 04 F0 00 AE 43 10 01 49 00 04 .I...F.p..C..I..
04320 16 DE 01 49 02 3D 03 C4 04 9C 04 89 04 F0 16 59 .^..I.=.D.....p.Y
04330 19 06 02 C0 84 2E 43 41 D4 42 D7 08 57 01 49 00 ...@..CATBW.W.I..
04340 04 16 DE 01 49 02 00 03 C4 01 49 00 50 20 9A 02 ..^..I...D.I.P...
04350 C0 86 56 4C 49 53 54 B2 43 34 08 57 07 59 04 BF @.VLIST2C4.W.Y.?
04360 0C DC 1D 9B 06 20 07 C8 04 E0 06 08 07 0F 04 E0 .\....H.`.....
04370 07 42 04 BF 04 BF 04 9C 04 9C 07 0F 04 BF 01 49 .B.?.?.....?.I
04380 00 3C 03 AE 01 82 43 B0 09 09 06 08 07 0F 04 E0 .<....C0.....
04390 07 C8 04 BF 01 49 00 39 03 AE 01 82 43 B0 1D CF .H.?.I.9....C0.O
043A0 40 EA 1D 9B 06 20 07 C8 04 E0 06 08 07 0F 04 E0 @j...H.`.....
043B0 06 08 14 CB 15 09 15 09 15 09 15 09 14 DA 09 33 ...K.....Z.3
043C0 04 9C 03 D5 04 D1 01 49 00 80 04 05 01 82 43 D8 ...U.Q.I.....CX
043D0 09 63 0F 6F 01 72 43 DA 04 7D 01 49 00 14 07 0F .c.o.rCZ.}.I....
043E0 04 BF 04 67 13 5F 04 9C 01 82 43 F0 01 72 43 F6 .?.g.....Cp.rCv
043F0 04 7D 01 49 00 14 04 05 14 AE 0B E7 0A D9 04 BF .}.I.....g.Y.?
04400 04 9C 03 52 08 EA 02 62 01 82 43 76 04 7D 09 09 ...R.j.b..Cv.}..
04410 1D CF 07 59 04 E0 02 C0 86 2E 49 4E 44 45 D8 43 .O.Y.`.@.INDEXC
04420 51 08 57 0B 41 11 53 63 72 65 65 6E 20 69 6E 64 Q.W.A.Screen ind
04430 65 78 20 66 6F 72 3A 36 A7 02 C0 84 44 49 52 A7 ex for:6'.@.DIR'
04440 44 18 08 57 37 7B 09 09 0B 41 18 43 6C 75 73 74 D..W7{...A.Clust
04450 65 72 20 61 6C 6C 6F 63 61 74 69 6F 6E 20 74 61 er allocation ta
04460 62 6C 65 09 09 43 3B 09 09 02 C0 8B 44 49 52 45 ble..C;...@.DIRE
04470 43 54 4F 52 49 45 D3 44 3B 08 57 0B 41 10 44 69 CTORIESD;.W.A.Di
04480 73 6B 20 64 69 72 65 63 74 6F 72 69 65 73 19 06 sk directories..
04490 09 09 09 09 18 25 44 42 09 09 09 09 18 73 44 42 .....%DB.....sDB
044A0 1D CF 02 C0 86 49 4E 44 45 58 B2 44 6B 08 57 44 .O.@.INDEX2Dk.WD
044B0 21 03 D5 04 89 01 5B 03 46 34 0A 01 82 44 CF 09 !.U...[.F4...DO.
044C0 09 03 46 06 20 15 6F 09 63 06 08 03 46 16 1B 08 ..F. .o.c...F...
044D0 EA 01 82 44 D7 03 1B 07 C8 04 BF 01 49 00 38 03 j..DW...H.?.I.8.
044E0 AE 01 82 44 ED 09 09 1D CF 40 EA 44 21 00 AE 44 ...Dm...O@jd!..D
044F0 B7 09 09 1D CF 02 C0 85 56 43 48 44 D2 44 A4 08 7...O.@.VCHDRD$.
04500 57 0B 41 04 4E 61 6D 65 01 49 00 0A 14 AE 0B 41 W.A.Name.I.....A
04510 04 54 79 70 65 01 49 00 14 14 AE 0B 41 05 56 61 .Type.I.....A.Va
04520 6C 75 65 09 09 09 09 02 C0 85 44 55 4D 50 B2 44 lue.....@.DUMP2D
04530 F7 08 57 0B 41 0B 4D 65 6D 6F 72 79 20 64 75 6D w.W.A.Memory dum
04540 70 09 09 09 09 07 59 04 BF 03 28 0C DC 04 67 03 p.....Y.?.(.\.g.
04550 C4 04 89 01 5B 03 46 04 9C 01 49 00 05 1B 44 04 D...[.F...I...D.
04560 9C 09 63 01 49 00 10 03 C4 04 89 04 67 04 67 01 ..c.I...D...g.g.
04570 5B 03 46 04 D1 09 63 06 18 1B 44 00 AE 45 71 06 [.F.Q.c...D..Eq.
04580 18 14 AE 01 5B 03 46 20 35 00 AE 45 85 08 EA 01 ....[.F 5..E..j.
04590 82 45 95 03 1B 07 C8 04 BF 01 49 00 38 03 AE 01 .E....H.?.I.8...
045A0 82 45 B9 09 09 1D CF 40 EA 0B 41 0B 4D 65 6D 6F .E9...O@j.A.Memo
045B0 72 79 20 64 75 6D 70 09 09 09 09 01 49 00 10 00 ry dump.....I...
045C0 D3 45 55 03 36 07 59 04 E0 09 09 1D CF 02 C0 88 SEU.6.Y.`...O.@.
045D0 53 48 4F 57 2E 56 41 D2 45 29 08 57 07 59 04 BF SHOW.VARE).W.Y.?
045E0 0C DC 09 09 01 49 00 14 14 AE 0B 41 09 56 41 52 .\....I.....A.VAR
045F0 49 41 42 4C 45 53 09 09 09 09 44 FF 07 42 04 BF IABLES.....D..B.?

```


Memory dump

04600	04 BF 0B E7 04 9C 0A E5 04 9C 04 BF 01 49 10 62	.?.g...e...?.I.b
04610	03 E7 04 BF 03 73 01 82 46 44 04 9C 3C 86 04 E0	.g.?.s..FD..<..`
04620	06 08 07 0F 04 E0 3C C1 07 0F 04 BF 01 49 00 0E	`<A...?.I..
04630	13 5F 01 49 00 0E 04 89 04 05 14 AE 3D C0 09 09	.I.....=@..
04640	01 72 46 46 04 7D 0A D9 04 BF 04 9C 03 52 01 82	.rFF.}.Y.?...R..
04650	46 5A 04 7D 06 10 01 72 46 5E 0B E7 06 08 08 EA	FZ.}...rF^.g...j
04660	02 62 01 82 46 04 07 59 04 E0 09 09 02 C0 89 53	.b..F..Y.`....@.S
04670	48 4F 57 2E 55 53 45 D2 45 CF 08 57 07 59 04 BF	HOW.USEREO.W.Y.?
04680	0C DC 09 09 01 49 00 14 14 AE 0B 41 0E 55 53 45	.\....I.....A.USE
04690	52 20 76 61 72 69 61 62 6C 65 73 09 09 09 09 07	R variables.....
046A0	42 04 BF 04 BF 0B E7 0B 41 2C 4E 61 6D 65 20 20	B.?.?.g.A,Name
046B0	20 20 20 20 20 20 20 20 54 79 70 65 20 20 20 20	Type
046C0	4F 66 66 73 65 74 20 20 20 20 20 20 20 20 20 20	Offset
046D0	20 56 61 6C 75 65 09 09 09 09 04 9C 0A E5 04 9C	Value.....e..
046E0	04 BF 01 49 07 5B 0A CD 04 BF 03 73 01 82 47 1A	.?.I.[.M.?.s..G.
046F0	04 9C 3C 86 04 E0 06 08 07 0F 04 E0 3C C1 07 0F	..<..`.....`<A..
04700	04 BF 01 49 00 0E 13 5F 01 49 00 0E 04 89 04 05	.?.I....I.....
04710	14 AE 3D 83 09 09 01 72 47 1C 04 7D 0A D9 04 BF	..=....rG..}.Y.?
04720	04 9C 03 52 01 82 47 30 04 7D 06 10 01 72 47 34	...R..G0.}...rG4
04730	0B E7 06 08 08 EA 02 62 01 82 46 DA 07 59 04 E0	.g...j.b..FZ.Y.`
04740	09 09 02 C0 8A 53 48 4F 57 2E 43 4F 4E 53 D4 46	...@.SHOW.CONSTF
04750	6E 08 57 07 59 04 BF 0C DC 09 09 01 49 00 14 14	n.W.Y.?.\....I...
04760	AE 0B 41 09 43 4F 4E 53 54 41 4E 54 53 09 09 09	..A.CONSTANTS...
04770	09 44 FF 07 42 04 BF 04 BF 0B E7 04 9C 0A E5 04	.D..B.?.?.g...e.
04780	9C 04 BF 01 49 06 1A 0A CD 04 BF 03 73 01 82 47	..?.I...M.?.s..G
04790	BB 04 9C 3C 86 04 E0 06 08 07 0F 04 E0 3C C1 07	;..<..`.....`<A.
047A0	0F 04 BF 01 49 00 0E 13 5F 01 49 00 0E 04 89 04	..?.I....I.....
047B0	05 14 AE 3D 59 09 09 01 72 47 BD 04 7D 0A D9 04	...=Y...rG=}.Y.
047C0	BF 04 9C 03 52 01 82 47 D1 04 7D 06 10 01 72 47	?...R..GQ.}...rG
047D0	D5 0B E7 06 08 08 EA 02 62 01 82 47 7B 07 59 04	U.g...j.b..G{.Y.
047E0	E0 09 09 02 C0 8A 53 48 4F 57 2E 56 4F 43 41 C2	`....@.SHOW.VOCAB
047F0	47 44 08 57 07 59 04 BF 0C DC 09 09 01 49 00 14	GD.W.Y.?.\....I..
04800	14 AE 0B 41 0C 56 4F 43 41 42 55 4C 41 52 49 45	...A.VOCABULARIE
04810	53 09 09 09 09 07 42 04 BF 04 BF 0B E7 04 9C 0A	S.....B.?.?.g...
04820	E5 04 9C 04 BF 01 49 18 39 0A CD 04 BF 03 73 01	e...?.I.9.M.?.s.
04830	82 48 45 04 9C 3C 86 04 E0 3E 12 09 09 06 18 03	.HE..<..`>.....
04840	C4 01 72 48 47 04 7D 0A D9 04 BF 04 9C 03 52 01	D.rHG.}.Y.?...R.
04850	82 48 5F 04 7D 04 7D 04 7D 06 10 01 72 48 63 0B	.H_}.}.}.rHc.
04860	E7 06 08 08 EA 02 62 01 82 48 1D 07 59 04 E0 09	g...j.b..H..Y.`.
04870	09 02 C0 85 5A 46 4C 41 C7 47 E5 06 90 00 62 86	..@.ZFLAGGe...b.
04880	5A 5A 44 49 43 D4 48 73 06 90 00 64 85 5A 48 45	ZZDICTHS...d.ZHE
04890	52 C5 48 7F 06 90 00 66 85 5A 5A 45 4E C4 48 8C	REH...f.ZZENDH.
048A0	06 90 00 68 85 5A 4E 41 4D C5 48 98 08 57 06 08	...h.ZNAMEH..W..
048B0	48 7B 04 E0 1A D5 04 D1 01 49 00 1F 02 51 04 89	H{.`.U.Q.I...Q..
048C0	04 D1 01 49 00 1F 02 51 0F 57 03 D5 06 10 01 5B	.Q.I...Q.W.U...[
048D0	1A D5 03 46 03 C4 04 D1 01 49 00 7F 02 51 04 89	.U.F.D.Q.I...Q..
048E0	03 46 03 C4 04 D1 01 49 00 7F 02 51 1A D5 03 AE	.F.D.Q.I...Q.U..
048F0	01 82 48 FC 06 10 48 7B 04 E0 03 1B 03 90 01 82	..H ..H{.`.....
04900	49 0C 01 49 FF FF 48 7B 04 E0 03 1B 00 AE 48 D0	I..I..H{.`.....HP
04910	48 7B 04 BF 03 52 01 82 49 32 04 D1 01 49 00 1F	H{.?.R..I2.Q.I..
04920	02 51 04 89 04 D1 01 49 00 1F 02 51 03 AE 01 72	.Q...Q.I...Q...r
04930	49 3C 1A C6 48 7B 04 BF 06 08 03 AE 02 C0 87 5A	I<.FH{.?......@.Z
04940	49 4E 53 45 52 D4 48 A4 08 57 48 94 04 BF 04 9C	INSERTH\$.WH...?..
04950	06 18 03 C4 48 A0 04 BF 48 94 04 BF 04 05 1B C6	...DH .?H...?..F
04960	06 18 48 A0 03 F2 48 88 04 BF 48 94 04 BF 04 E0	..H .rH...?H...?.`
04970	02 C0 86 5A 50 52 49 4E D4 49 3E 08 57 07 59 04	..@.ZPRINTI>.W.Y.

Memory dump

```
04980 BF 0C DC 1D 9B 48 A0 04 BF 01 49 C0 00 01 5B 07 ?.\..H.?.I@..[.
04990 0F 04 BF 01 49 00 3C 03 AE 01 82 49 B9 09 09 06 ..?.I.<....I9...
049A0 08 07 0F 04 E0 07 C8 04 BF 01 49 00 38 03 AE 01 ....`.H.?.I.8...
049B0 82 49 B9 1D CF 40 EA 1D 9B 03 46 04 BF 04 9C 01 .I9.O@j...F.?....
049C0 49 00 04 1B 44 09 63 0F 6F 01 49 00 14 07 0F 04 I...D.c.o.I.....
049D0 BF 04 67 13 5F 04 9C 01 82 49 DF 01 72 49 E5 04 ?.g._....I_rIe.
049E0 7D 01 49 00 14 04 05 14 AE 06 18 00 D3 49 8F 07 }.I.....SI..
049F0 59 04 E0 1D CF 02 C0 85 5A 53 4F 52 D4 49 72 08 Y.`.O.@.ZSORTIr.
04A00 57 01 49 C0 00 48 94 04 E0 48 94 04 BF 48 A0 04 W.I@.H..`H..?H .
04A10 BF 03 73 01 82 4A 1F 49 48 06 10 01 72 4A 3F 48 ?.s..J.IH...rJ?H
04A20 88 04 BF 48 94 04 BF 04 BF 48 AC 01 82 4A 37 49 ..?H..?.?H,..J7I
04A30 48 06 10 01 72 4A 3F 06 18 48 94 03 F2 06 08 01 H...rJ?...H..r...
04A40 82 4A 09 02 C0 85 5A 4C 49 53 D4 49 F7 08 57 01 .J..@.ZLISTIw.W.
04A50 49 C0 00 01 49 07 00 06 08 08 68 07 42 04 BF 04 I@..I.....h.B.?.
04A60 BF 04 9C 48 88 04 E0 01 49 C0 00 04 9C 04 9C 48 ?.H..`.I@.....H
04A70 94 04 E0 06 18 03 C4 48 A0 04 E0 04 E0 48 88 04 ..`...DH ..`.H..
04A80 BF 0B E7 0A D9 04 BF 04 9C 03 52 01 82 4A 97 04 ?.g.Y.?...R..J..
04A90 7D 06 10 01 72 4A 9F 48 88 04 E0 49 FF 06 08 08 }...rJ.H..`I....
04AA0 EA 02 62 01 82 4A 7D 49 7B 02 C0 88 5A 5A 45 44 j.b..J}I{.@.ZZED
04AB0 4C 49 53 D4 4A 45 08 57 01 49 22 BF 0A D9 04 9C LISTJE.W.I"?Y..
04AC0 04 9C 04 BF 04 89 04 FE 06 08 04 89 04 E0 22 57 ...?....~.....`"W
04AD0 4A 4D 04 E0 18 37 02 C0 86 46 49 4C 45 49 C4 4A JM.`.7.@.FILEIDJ
04AE0 AB 08 57 38 98 36 A7 09 09 02 C0 83 43 52 BF 4A +.W8.6'...@.CR?J
04AF0 D8 08 57 09 09 07 C8 04 BF 01 49 00 04 03 C4 06 X.W...H.?.I...D.
04B00 3D 03 AE 01 82 4B 0D 1D CF 40 EA 4A E1 02 C0 85 =....K..O@jJa.@.
04B10 2E 46 69 6C E5 4A EB 08 57 04 9C 01 49 00 0C 03 .FileJk.W...I...
04B20 73 01 82 4B 2B 04 7D 01 72 4B 69 04 9C 01 49 00 s..K+.).rKi...I.
04B30 0A 03 73 01 82 4B 3D 04 7D 01 72 4B 69 04 9C 01 ..s..K=.).rKi...
04B40 49 00 13 03 73 01 82 4B 53 04 7D 04 7D 06 10 01 I...s..KS.}).}...
04B50 72 4B 69 04 9C 01 49 00 0D 03 73 01 82 4B 67 4A rKi...I...s..KgJ
04B60 F1 04 7D 01 72 4B 69 08 FC 02 C0 88 2E 46 49 4C q.}.rKi.|.@..FIL
04B70 45 53 45 C3 4B 0F 08 57 04 9C 01 49 02 00 03 C4 ESECK..W...I...D
04B80 04 89 01 5B 03 46 04 D1 04 9C 35 43 03 73 08 EA ...[.F.Q..5C.s.j
04B90 02 62 01 82 4B A0 04 7D 06 10 03 1B 01 72 4B A2 .b..K .}.....rK"
04BA0 4B 17 00 AE 4B 84 02 C0 85 2E 46 49 4C C5 4B 6B K...K..@..FILEKk
04BB0 08 57 38 B9 4A E1 06 08 35 F5 04 9C 01 82 4B C6 .W89Ja..5u....KF
04BC0 4B 76 01 72 4B C8 04 7D 01 82 4B B6 02 C0 89 4C Kv.rKH.}..K6.@.L
04BD0 49 53 54 46 49 4C 45 D3 4B A8 08 57 18 25 01 49 ISTFILESK(.W.%.I
04BE0 02 16 1A 2D 18 73 02 C0 05 44 55 4D 50 32 20 20 ...-.s.@.DUMP2
```


Examples

This chapter is a collection of WFORTH examples. They are designed to be self-explanatory although not necessarily obvious. The examples are grouped in five general categories: decompiler, FORTH Dos, the CASE statement, the FORTH Assembler, and Floating point examples. The load screen for all of the examples is screen 75, and each example first lists its individual load screen and then executes. A brief explanation of each category is given below.

Decompiler examples: The load screen for these examples is screen 221. The examples themselves are simply a decompilation of key FORTH words which in turn provide insights into how the words work. For instance, the word ABORT contains the FORTH sign on message. The word ID uses information contained in the word ABORT to print the task ID. The word ROMIT changes the dictionary pointer and calls NODISK and NEW-FENCE. The word MESSAGE prints the message number always in decimal without changing the number base.

FORTH Dos examples: The load screen for these examples is screen 224. The FORTH Dos examples are intended to show how to access files. First the file WFORTH.CM is opened, and GETSEC is executed, bringing in the first sector. The first 40 bytes are then dumped (note that this is the same as shown in chapter 19 for locations 0-003Fh). The next example illustrates the random access feature, using the word NEWLSN. The third example shows logical sector 0 of the file, which contains the file chaining information (refer to MPM 201, appendix E for more details) and the disk directory. Finally, two teaching words, MEMORY-MAP and IOCB-SHOW are compiled and executed.

CASE examples: The load screen for these examples is screen 247. The decompiler and full screen editor also use the CASE statement.

Assembler examples: The load screen for these examples is screen 241. The first assembler example shows the invocation procedure for the assembler. It defines a no-operation word, the simplest word possible. The next example defines a word called SEEQ (set q). Compare this with the WFORTH word SETQ, which has been defined using the CREATE statement. The equivalence of assembled words and created words is thus shown. Following this, a non-trivial example is provided by assembling the word Pemit (printer emit). This example demonstrates how to deal with the computation stack and hardware I/O. Finally the words CODE and END-CODE are decompiled.

Floating point examples: The load screen for these examples is screen 223. These examples print the value of Pi, take the square root of 3, and solve two quadratic equations.

Load 75 , 4BE8 (EXAMPLES load screen)

(Akens, WHOI)

SCREEN 75

```
0 ( EXAMPLES load screen) ( Akens, WHOI)
1 BASE @ DECIMAL
2
3 ( This screen generates chapter 20)
4
5 CR
6 75 LIST
7 221 LOAD ( run decompiler examples)
8 224 LOAD ( run FORTH DOS examples)
9 247 LOAD ( run CASE examples) .FOOT PAGE
10 241 LOAD ( run assembler examples) FLUSH
11 223 LOAD ( run floating point examples) .FOOT PAGE
12
13
14 BASE ! ;S
15
```

Load 221 , 4BE8 (Decompiler example screen)

(Akens, WHOI)

SCREEN 221

```
0 ( Decompiler example screen) ( Akens, WHOI)
1 DECIMAL 221 LIST DECOMPILE ID .FOOT PAGE
2 DECOMPILE ABORT DECOMPILE ROMIT .FOOT PAGE
3 DECOMPILE MESSAGE
4 DECOMPILE ERROR
5 DECOMPILE >IN
6 DECOMPILE NOT
7 DECOMPILE WORD-79 .FOOT PAGE
8 DECOMPILE INDEX
9 DECOMPILE CMOVE>
10 DECOMPILE GRP .FOOT PAGE
11 DECOMPILE UART DECOMPILE TERM DECOMPILE TERM.GRP
12 DECOMPILE COMM DECOMPILE COMM.GRP .FOOT PAGE
13 DECOMPILE NEW-FENCE DECOMPILE NODISK .FOOT PAGE
14 DECOMPILE .FOOT DECOMPILE PAGE .FOOT PAGE
15 DECIMAL ;S
```

Decompiling ID

CFA	(CFA)	
1CD6	857	: ID
1CD8	149	4584 (11E8h)
1CDC	49C	DUP
1CDE	149	13 (000Dh)
1CE2	3C4	+
1CE4	149	16 (0010h)
1CE8	933	TYPE
1CEA	963	SPACE
1CEC	149	34 (0022h)
1CF0	3C4	+
1CF2	149	13 (000Dh)
1CF6	933	TYPE
1CF8	2C0	;S

Decompiling ABORT

CFA	(CFA)	
11E6	857	: ABORT
11E8	297	SP!
11EA	CF2	DECIMAL
11EC	610	1
11EE	17BC	GROUP
11F0	909	CR
11F2	B41	." Woods Hole FORTH"
1205	909	CR
1207	B41	." Version 1.800"
1217	909	CR
1219	167F	EMPTY-BUFFERS
121B	649	FIRST
121D	49C	DUP
121F	79F	PREV
1221	4E0	!
1223	794	USE
1225	4E0	!
1227	1837	FORTH
1229	11A7	DEFINITIONS
122B	1873	DR1
122D	610	1
122F	16DE	BLOCK
1231	47D	DROP
1233	18A9	OK
1235	11BA	QUIT
1237	2C0	;S

Decompiling ROMIT

CFA	(CFA)	
1E36	857	: ROMIT
1E38	A53	HERE
1E3A	149	2048 (0800h)
1E3E	134F	/
1E40	3D5	1+
1E42	149	2048 (0800h)
1E46	567	*
1E48	49C	DUP
1E4A	6E3	DP
1E4C	4E0	!
1E4E	ABC	1-
1E50	B41	." ROM it from 0 to "
1E64	1B55	HEX.
1E66	1B89	NODISK
1E68	1D53	NEW-FENCE
1E6A	2C0	;S

Decompiling MESSAGE

```

CFA      (CFA)
15B9      857      : MESSAGE
15BB      B41      ." Message "
15C7      759      BASE
15C9      4BF      @
15CB      489      SWAP
15CD      CF2      DECIMAL
15CF      158E     .
15D1      759      BASE
15D3      4E0      !
15D5      2C0      ;S

```

Decompiling ERROR

```

CFA      (CFA)
F28      857      : ERROR
F2A      6CE      WARNING
F2C      4BF      @
F2E      367      0<
F30      182      BZ TO F36
F34      F1A      (ABORT)
F36      A53      HERE
F38      B03      COUNT
F3A      933      TYPE
F3C      B41      ." ?"
F41      15B9     MESSAGE
F43      297      SP!
F45      705      IN
F47      4BF      @
F49      6FC      BLK
F4B      4BF      @
F4D      11BA     QUIT
F4F      2C0      ;S

```

Decompiling >IN

```

CFA      (CFA)
1C3F      857      : >IN
1C41      705      IN
1C43      2C0      ;S

```

Decompiling NOT

```

CFA      (CFA)
1C33      857      : NOT
1C35      352      0=
1C37      2C0      ;S

```

Decompiling WORD-79

```

CFA      (CFA)
1C4F      857      : WORD-79
1C51      DFA      WORD
1C53      A53      HERE
1C55      2C0      ;S

```

Decompiling INDEX

CFA	(CFA)	
349C	857	: INDEX
349E	3D5	1+
34A0	489	SWAP
34A2	15B	DO
34A4	346	I
34A6	340A	?INDEX
34A8	182	BZ TO 34BC
34AC	909	CR
34AE	346	I
34B0	620	3
34B2	156F	.R
34B4	963	SPACE
34B6	608	0
34B8	346	I
34BA	161B	.LINE
34BC	8EA	?TERMINAL
34BE	182	BZ TO 34C4
34C2	31B	LEAVE
34C4	AE	LOOP TO 34A4
34C8	909	CR
34CA	2C0	;S

Decompiling CMOVE>

CFA	(CFA)	
1BC6	857	: CMOVE>
1BC8	49C	DUP
1BCA	4FE	ROT
1BCC	3C4	+
1BCE	4FE	ROT
1BD0	4FE	ROT
1BD2	49C	DUP
1BD4	4FE	ROT
1BD6	3C4	+
1BD8	489	SWAP
1BDA	3D5	1+
1BDC	610	1
1BDE	15B	DO
1BE0	1AD5	2DUP
1BE2	346	I
1BE4	405	-
1BE6	4D1	C@
1BE8	489	SWAP
1BEA	346	I
1BEC	405	-
1BEE	4F0	C!
1BF0	AE	LOOP TO 1BE0
1BF4	1AC6	2DROP
1BF6	2C0	;S

Decompiling GRP

CFA	(CFA)	
7D2	690	USER 68 (0044h), Currently = 1 (0001h)

Decompiling UART

```

CFA      (CFA)
29FA      857      : UART
29FC      B41      ." Uart at group "
2A0D      759      BASE
2A0F      4BF      @
2A11      CDC      HEX
2A13      800      COMM.GRP
2A15      4BF      @
2A17      158E     .
2A19      909      CR
2A1B      759      BASE
2A1D      4E0      !
2A1F      2867     COMM
2A21      28B1     COMMINIT
2A23      292F     RSTBRK
2A25      608      0
2A27      2867     COMM
2A29      2836     STATUS
2A2B      2910     RCVCHAR?
2A2D      2878     TERM
2A2F      2836     STATUS
2A31      29DD     SENDCHAR?
2A33      182      BZ TO 2A25
2A37      909      CR
2A39      2C0      ;S

```

Decompiling TERM

```

CFA      (CFA)
2878      857      : TERM
287A      7F1      TERM.GRP
287C      4BF      @
287E      17BC     GROUP
2880      2C0      ;S

```

Decompiling TERM.GRP

```

CFA      (CFA)
7F1      690      USER 26 (001Ah), Currently = 1 (0001h)

```

Decompiling COMM

```

CFA      (CFA)
2867      857      : COMM
2869      800      COMM.GRP
286B      4BF      @
286D      17BC     GROUP
286F      2C0      ;S

```

Decompiling COMM.GRP

```

CFA      (CFA)
800      690      USER 28 (001Ch), Currently = 224 (00E0h)

```

Decompiling NEW-FENCE

```

CFA      (CFA)
1D53     857      : NEW-FENCE
1D55     BC1      LATEST
1D57     149      12 (000Ch)
1D5B     688      +ORIGIN
1D5D     4E0      !
1D5F     A53      HERE
1D61     149      28 (001Ch)
1D65     688      +ORIGIN
1D67     4E0      !
1D69     A53      HERE
1D6B     149      30 (001Eh)
1D6F     688      +ORIGIN
1D71     4E0      !
1D73     A53      HERE
1D75     6DA      FENCE
1D77     4E0      !
1D79     6F2      VOC-LINK
1D7B     4BF      @
1D7D     149      32 (0020h)
1D81     688      +ORIGIN
1D83     4E0      !
1D85     80C      Nextu
1D87     4BF      @
1D89     149      42 (002Ah)
1D8D     688      +ORIGIN
1D8F     4E0      !
1D91     2C0      ;S

```

Decompiling NODISK

```

CFA      (CFA)
1B89     857      : NODISK
1B8B     149      852 (0354h)
1B8F     ACD      2-
1B91     149      4584 (11E8h)
1B95     149      71 (0047h)
1B99     3C4      +
1B9B     4E0      !
1B9D     2C0      ;S

```


Decompiling .FOOT

```

CFA      (CFA)
1DCF      857      : .FOOT
1DD1      7C8      OUTL
1DD3      4BF      @
1DD5      63D      L/P
1DD7      ABC      1-
1DD9      405      -
1ddb      49C      DUP
1DDD      367      0<
1DDF      182      BZ TO 1DF7
1DE3      432      MINUS
1DE5      63D      L/P
1DE7      F57      MIN
1DE9      608      0
1DEB      15B      DO
1DED      909      CR
1DEF      AE       LOOP TO 1DED
1DF3      172      BR TO 1DF9
1DF7      47D      DROP
1DF9      608      0
1DFB      7C8      OUTL
1DFD      4E0      !
1DFF      1CD6     ID
1E01      149      5 (0005h)
1E05      14AE     SPACES
1E07      B41      ." Chapter "
1E12      1CC3     CHAPTER
1E14      4BF      @
1E16      1B6E     DEC.
1E18      149      15 (000Fh)
1E1C      14AE     SPACES
1E1E      B41      ." page "
1E26      76D      FLD
1E28      4BF      @
1E2A      1B6E     DEC.
1E2C      2C0      ;S

```

Decompiling PAGE

```

CFA      (CFA)
40EA      857      : PAGE
40EC      149      13 (000Dh)
40F0      8FC      EMIT
40F2      149      140 (008Ch)
40F6      8FC      EMIT
40F8      610      1
40FA      76D      FLD
40FC      3F2      +!
40FE      2C0      ;S

```

Load 224 , 4BE8 (FORTH DOS examples) (Akens, WHOI)

SCREEN 224

```
0 ( FORTH DOS examples) ( Akens, WHOI)
1 DECIMAL CR 224 LIST HEX
2
3 CR ." Opening WFORTH.CM:1" CR
4 OPEN WFORTH.CM:1 CR
5 ." This is the beginning of WFORTH.CM:1, at location 0000" CR
6 GETSEC 40 DUMP CR
7 ." This is sector 8 of WFORTH.CM:1 at location 0E00 h" CR
8 8 NEWLSN 40 DUMP CR
9 ." This is logical sector 0 of WFORTH.CM:1, the segment descript
10 ion word" CR 0 NEWLSN 10 DUMP CR
11 CR DECIMAL DIR .FOOT PAGE
12 235 LOAD MEMORY-MAP CR CR
13 236 LOAD CR IOCB-SHOW .FOOT PAGE
14
15 DECIMAL ;S
```

Opening WFORTH.CM:1

This is the beginning of WFORTH.CM:1, at location 0000

```
071F1 C0 00 05 30 36 71 00 61 01 63 1D 30 16 84 43 4F @..06q.a.c.0..CO
07201 4C C4 00 00 00 16 68 CB 18 3D 68 CA 18 4D 4A 5B LD....hK.=hJ.MJ[
07211 1B 4A 5B 1B F8 00 5B 1B 5B F8 20 30 38 84 57 41 .J[.x.[.x 08.WA
07221 52 CD 00 0D 00 36 F8 10 AF 68 CA 18 41 EA 68 62 RM...6x./hJ.Ajhb
```

This is sector 8 of WFORTH.CM:1 at location 0E00 h

```
073F5 01 82 0E 0E 06 FC 04 BF 16 DE 01 72 0E 12 06 B4 .....|.?^.r...4
07405 04 BF 07 05 04 BF 03 C4 04 89 01 96 0A 53 01 49 .?...?.D.....S.I
07415 00 22 08 98 07 05 03 F2 04 67 04 05 03 28 03 46 .".....r.g...(F
07425 0A 53 04 F0 03 C4 0A 53 03 D5 03 36 02 FC 02 C0 .S.p.D.S.U.6.|.@
```

This is logical sector 0 of WFORTH.CM:1, the segment description word

```
06FF1 25 01 F6 80 25 00 00 00 00 00 00 00 00 00 00 00 %v.%.....
```

Disk ID: WOODS HOLE FORTH SCREEN FILE VER 1.801

11 30 84

Directory Start

FLOAT .CM	121	ASM4TH.CM	48	FFORTH.CM	55	SYSGEN.CM	558
WFORTH.CM	502	FORTH .CM	540	COPY .CM	554	AFORTH.CM	10

(IOHW) Load 235 , 4BE8 (.BLOCKHDR .BUFSTAT MEMORY-MAP)

Address	block	update
---------	-------	--------

7BFB	-1	Yes
------	----	-----

77F7	-1	Yes
------	----	-----

73F3	-1	Yes
------	----	-----

6FEF	-1	Yes
------	----	-----

6BEB	-1	Yes
------	----	-----

67E7	-1	Yes
------	----	-----

63E3	-1	Yes
------	----	-----

5FDF	-1	Yes
------	----	-----

5BDB	550	Yes
------	-----	-----

57D7	539	Yes
------	-----	-----

5700	User area starts here	
------	-----------------------	--

56FE	Return stack starts down from here	
------	------------------------------------	--

5600	Terminal input buffer	
------	-----------------------	--

55FE	Computation stack starts down here	
------	------------------------------------	--

4D8B	Dictionary pointer	
------	--------------------	--

418B	FENCE	
------	-------	--

Load 236 , 4D8B (IOCB-SHOW)

(FORTH DOS teaching word)

The starting sector number is 502

The segment descriptor word offset is 0 bytes

There are 38 contiguous clusters for this SDW

1 clusters have been read via this SDW

The starting sector number for this SDW is 502

The buffer address is 7DFD

SCREEN 247

```

0 ( CASE-EXAMPLE ) ( Ray Duncan, Laboratory Microsystems)
1 BASE @ DECIMAL CR 247 LIST CR CR
2 : CASE-EXAMPLE ( Define a word called CASE-EXAMPLE)
3 ." The number is " ( NUMBER ... )
4 CASE ( Start the CASE statement)
5 1 OF ." one." ENDOF ( If NUMBER = 1, print One)
6 2 OF ." two." ENDOF ( If NUMBER = 2, print Two)
7 3 OF ." three." ENDOF ( If NUMBER = 3, print Three)
8 ." less than one or greater than three." ( If NUMBER is less
9 than 1 or greater than 3, print the message: Less than etc)
10 ENDCASE CR CR ; ( End the CASE statement and definition)
11
12 1 CASE-EXAMPLE ( NUMBER = 1)
13 0 CASE-EXAMPLE ( NUMBER = 0)
14 100 CASE-EXAMPLE ( NUMBER = 100)
15 FORGET CASE-EXAMPLE BASE ! ;S

```

The number is one.

The number is less than one or greater than three.

The number is less than one or greater than three.

Load 241 , 4EE3 (ASSEMBLER Examples) (Akens WHOI)

SCREEN 241

```
0 ( ASSEMBLER Examples ) ( Akens WHOI)
1 BASE @ DECIMAL CR 241 LIST HEX
2 ASSEMBLER ( Load the ASSEMBLER)
3
4 CODE NO-OP ( Start the code definition, CALL it NO-OP)
5 5 SEP ( return to NEXT) ( This word does nothing)
6 ( 5 SEP must terminate all code definitions)
7 END-CODE ( End the code definition)
8 CR ." This is the dictionary entry for NO-OP" CR
9 ' NO-OP NFA 10 DUMP ( Show structure of the new word)
10
11 CODE SEEQ SEQ 5 SEP END-CODE CR CR
12 ." These are the dictionary entries for SETQ AND SEEQ" CR
13 ' SETQ NFA 10 DUMP ' SEEQ NFA 10 DUMP
14 FORTH DEFINITIONS CR
15 DECIMAL .FOOT PAGE 220 LOAD ;S
```

Load 71 , 4EE3 (ASSEMBLER load screen) (CODE END-CODE) (Akens, McDaniels)

ASSEMBLER Message 4

Load 131 , C700 (R0 R1 R2 R3 R4 R5 R6 R7 R8 R9 RA RB RC RD RE RF) (Registers)

R0 Message 4

Load 132 , C790 (END-CODE C; ENDCODE) (1806 ASSEMBLER 2)

Load 133 , C7C8 (IS ?SBERROR) (1806 ASSEMBLER 3)

Load 134 , C850 (T5 T4 T3 T2 T1 NX IP UP SP PC RP IV DMAV) (Register Equates)

UP Message 4

Load 135 , C8DD (CRN LDN LDA INP PLO ETC) (1806 ASSEMBLER 5)

OUT Message 4

Load 136 , C982 (1BFI 1BSB ETC) (1806 ASSEMBLER 6)

Load 137 , CAC5 (2BFI LBR LBQ LBZ LBDF LBNQ LBNZ LBNF) (1806 ASSEMBLER 7)

Load 138 , CB2D (1BOP IDLE IRX ETC) (1 byte op codes, 1806 ASSEMBLER 8)

OR Message 4 AND Message 4 XOR Message 4

Load 139 , CCD8 (2BOP 1BF2BOP 2BF2BOP CR2BOP etc) (1806 ASSEMBLER 9)

Load 140 , CE50 (LBL1 LBL2 LBL3 LBL4 LAB1: LAB2: LAB3: LAB4: LAB1 LAB2 LAB3)

Load 141 , CF00 (A.0 A.1 PAGE) (1806 ASSEMBLER 11)

PAGE Message 4

Load 142 , CF43 (?NEXTPAGE ?PAGESPACE PAGEJUMP PAGEADJUST 1806 ASSEMBLER 12)

Assembler ends at CFD2

This is the dictionary entry for NO-OP

04F0E 85 4E 4F 2D 4F D0 4E F9 4F 18 D5 04 44 55 4D 50 .NO-OPNyO.U.DUMP

These are the dictionary entries for SETQ AND SEEQ

02160 84 53 45 54 D1 21 58 21 69 7B D5 84 52 45 54 D1 .SETQ!X!i{U.RETQ

04F19 84 53 45 45 D1 4F 0E 4F 22 7B D5 04 44 55 4D 50 .SEEQO.O"{U.DUMP

SCREEN 220

```

0 ( ASSEMBLER Examples 2) ( Akens WHOI)
1 DECIMAL CR 220 LIST CR HEX
2 CODE Pemit ( Number ... )
3 ( Name the word Pemit [printer emit])
4 R4 SEX R4 INC ( Point to the low byte of the top number)
5 LDX ( Get the low byte)
6 OFF XRI ( Invert the byte for the 646 board)
7 07F ANI ( Mask off the high bit for the 646 board)
8 STXD IRX ( Store masked byte and adjust stack)
9 HERE SBI ( Wait until EFl, BUSY, is false)
10 6 OUT ( Send the byte to the printer)
11 5 SEP ( Return to NEXT)
12 END-CODE ( End the definition)
13 CR CR ." This is the dictionary entry for Pemit" CR
14 ' Pemit NFA 20 DUMP ASSEMBLER DECOMPILE CODE DECOMPILE END-CODE
15 FORTH DECIMAL .FOOT PAGE ;S

```

This is the dictionary entry for Pemit

```

04F24 85 50 45 4D 49 D4 4F 19 4F 2E E4 14 F0 FB FF FA .PEMITO.O.d.p{.z
04F34 7F 73 60 34 37 66 D5 04 44 55 4D 50 20 20 20 20 s`47fU.DUMP

```

Decompiling CODE

```

CFA (CFA)
4F00 857 : CODE
4F02 C30 ?EXEC
4F04 FA6 CREATE
4F06 4EEF ASSEMBLER
4F08 CDC HEX
4F0A AEE !CSP
4F0C 2C0 ;S

```

Decompiling END-CODE

```

CFA (CFA)
C79B 857 : END-CODE
C79D 742 CURRENT
C79F 4BF @
C7A1 734 CONTEXT
C7A3 4E0 !
C7A5 C30 ?EXEC
C7A7 C5A ?CSP
C7A9 CCA SMUDGE
C7AB 2C0 ;S

```


SCREEN 223

```

0 ( Floating point examples) ( Akens, WHOI)
1 DECIMAL CR 223 LIST FLUSH
2 FLOATING ( Load the floating point screens and FLOAT.CM:1)
3 CR CR CR
4 ." PI is equal to " FPI F. CR CR
5 ." The square root of 3 is " 3. D->F FSQRT F. CR CR
6 ." The roots of: X**2 - 5X + 6 = 0 are: "
7 FLOAT .100000 01 FLOAT -.500000 01 FLOAT .600000 01
8 FQUAD
9 ." X = " F. ." , and X = " F. CR CR
10 ." The roots of: Y**2 + Y -20 = 0 are: "
11 1 S->D D->F 2DUP -20 S->D D->F FQUAD
12 ." Y = " F. ." , and Y = " F. CR
13
14 DECIMAL
15 ;S

```

```

Load 72 , 4F05 ( Floating point load screen) ( Stetten, Akens)
Load 143 , 7000 ( F0> F0=) ( Floating 0)
Load 144 , 7032 ( FLOAT.CM linkage) ( Floating 1)
Load 145 , 70FB ( BUFF FSPW) ( Floating USER variables) ( Floating 2)
Load 146 , 7111 ( [F.]) ( Floating 3)
Load 147 , 713F ( F.) ( Floating 4)
Load 148 , 7224 ( [FLOAT]) ( Floating 5)
Load 149 , 7253 ( [F+] F+) ( Floating 6)
Load 150 , 7298 ( [F-] F- FMINUS FABS) ( Floating 7)
Load 151 , 7311 ( [F*] F*) ( Floating 8)
Load 152 , 7356 ( [F/] F/) ( Floating 9)
Load 153 , 739D ( [FSQRT] FSQRT) ( Floating 10)
Load 154 , 73E2 ( 2OVER 2ROT) ( Floating 11)
Load 155 , 741A ( FQUAD) ( Quadratic solution) ( Floating 12)
Load 156 , 7478 ( F@ F!) ( Floating 13)
Load 157 , 74A6 ( FSIN) ( Floating 14)
Load 158 , 74C8 ( FCOS) ( Floating 15)
Load 159 , 74EA ( FARCTAN) ( Floating 16)
Load 160 , 750F ( [FEXP] FEXP) ( Floating 17)
Load 161 , 7552 ( [FLN] FLN) ( Floating 18)
Load 162 , 7593 ( F** FPI) ( Floating 19)
Load 163 , 75B7 ( FLOAT D->F) ( Floating 20)
FLOATING Message 4
Floating point is loaded

```

PI is equal to .314160 01

The square root of 3 is .173205 01

The roots of: $X^2 - 5X + 6 = 0$ are: $X = .299994$ 01 , and $X = .200004$ 01

The roots of: $Y^2 + Y - 20 = 0$ are: $Y = .400000$ 01 , and $Y = -.500000$ 01

Source Listing

The source listing (WFORTH.SRC) for the program FORTH.CM follows. This listing was generated from within FORTH by the word .FILE . The sources for this word are located on screens 232 and 233.

!M

```

0000 ;      0001 ..      Forth for the RCA 1804-1806, May 16, 1984
0000 ;      0002 ..
0000 ;      0003 .. This program is derived from fig-Forth.
0000 ;      0004 ..
0000 ;      0005 .. Contributions by:
0000 ;      0006 ..
0000 ;      0007 .. Jim Akens, Woods Hole Oceanographic Institute
0000 ;      0008 .. Dick Berger, Micro Amp Designs
0000 ;      0009 .. Ray Duncan, Laboratory Microsystems Inc.
0000 ;      0010 .. Jim McDaniels, Sunnyvale Ca.
0000 ;      0011 .. Gordon Flemming, Sylmar Ca.
0000 ;      0012 .. Gary Bradshaw, Esperance NY.
0000 ;      0013 .. George Stetten, Woods Hole, Ma
0000 ;      0014 ..
0000 ;      0015 .. This was derived from the original publication
0000 ;      0016 .. by the
0000 ;      0017 ..
0000 ;      0018 ..      FORTH INTEREST GROUP
0000 ;      0019 ..      P.O. BOX 1105
0000 ;      0020 ..      SAN CARLOS CA 94070
0000 ;      0021 ..
0000 ;      0022 ..
0000 ;      0023 .. This listing is released by J. Akens.
0000 ;      0024 ..
0000 ;      0025 ..
0000 ;      0026 .. This program is developed on the RCA
0000 ;      0027 .. MS 2000 development system. For full operation,
0000 ;      0028 .. it requires ram from 0 to 7FFF(H), UT 71 at
0000 ;      0029 .. 8000 thru 87FF(H), ram for UT 71 at 8800 thru
0000 ;      0030 .. 8FFF(H), and MicroDos loaded at 9000 thru BFFF(H).
0000 ;      0031 ..
0000 ;      0032 ..
0000 ;      0033 ..      MEMORY EQUATES
0000 ;      0034 ..
0000 ;      0035 SEEK EQU 087F6H..      TRACK SEEK ROUTINE
0000 ;      0036 DREAD EQU 087F9H..     DISK READ ROUTINE
0000 ;      0037 DWRITE EQU 087FCH..    DISK WRITE ROUTINE
0000 ;      0038 UT71 EQU 087F0H..      ENTRY POINT FOR MONITOR
0000 ;      0039 LIMITB EQU 07FFFH..     END OF DISK BUFFER AREA
0000 ;      0040 FIRSTB EQU 057D7H..     START OF DISK BUFFER AREA
0000 ;      0041 USAREA EQU 05700H..     INITIAL USER AREA
0000 ;      0042 RSTACK EQU 056FEH..     INITIAL RETURN STACK
0000 ;      0043 ITIB EQU 05600H..       INITIAL TERMINAL INPUT BUFFER
0000 ;      0044 CSTACK EQU 055FEH..     INITIAL COMPUTATION STACK
0000 ;      0045 ..
0000 ;      0046 ..
0000 ;      0047 .. REGISTER EQUATES
0000 ;      0048 ..
0000 ;      0049 .. R0 IS UNUSED
0000 ;      0050 .. R1 IS UNUSED
0000 ;      0051 RP EQU 2.. RETURN POINTER
0000 ;      0052 .. R3 IS THE MACHINE LANGUAGE PROGRAM COUNTER

```



```

0000 ;          0053 SP EQU 4..  STACK POINTER
0000 ;          0054 .. R5 IS THE PROGRAM COUNTER FOR NEXT
0000 ;          0055 .. R6 IS THE INITIAL RETURN STACK LOCATION
0000 ;          0056 UP EQU 7..  USER POINTER
0000 ;          0057 IP EQU 8..  INTERPRETIVE POINTER
0000 ;          0058 .. R9 IS THE INSTRUCTION POINTER USED BY NEXT
0000 ;          0059 .. RA IS A GENERAL PURPOSE REGISTER
0000 ;          0060 .. RB IS A GENERAL PURPOSE REGISTER
0000 ;          0061 .. RC IS A GENERAL PURPOSE REGISTER
0000 ;          0062 .. RD IS A GENERAL PURPOSE REGISTER
0000 ;          0063 .. RE IS UNUSED BY FORTH
0000 ;          0064 .. RF IS A GENERAL PURPOSE REGISTER
0000 ;          0065 ..
0000 ;          0066 ..
0000 ;          0067 ..  ORG #0000
0000 ;          0068 ..
0000 C00005;    0069      LBR CLD
0003 3036;      0070      BR WARM
0005 71;        0071 CLD  DIS
0006 00;        0072      DC 0..  DISABLE INTERRUPTS
0007 61;        0073      OUT 1
0008 01;        0074      DC 1..  SET UP UART
0009 63;        0075      OUT 3
000A 1D;        0076      DC 01DH
000B 3016;      0077      BR COLD
000D ;          0078 ..
000D ;          0079 ..
000D 84;        0080      DC 084H
000E 434F4C;    0081      DC 'COL'
0011 C4;        0082      DC 0C4H..  *    COLD    *
0012 0000;      0083      DC 00000H
0014 0016;      0084      DC (COLD)
0016 68CB183D;  0085 COLD  RLDI RB, FRTH+14.. INSERT LATEST AND VOC-LINK
001A 68CA184D;  0086      RLDI RA, PARMS+12.. INTO FORTH
001E 4A5B1B4A5B; 0087      LDA RA;STR RB;INC RB;LDA RA;STR RB
0023 1BF8005B1B5B; 0088      INC RB;LDI 0;STR RB;INC RB;STR RB
0029 F820;      0089      LDI 020H .. NUMBER OF PARAMETERS TO COPY
002B 3038;      0090      BR WARM+2
002D ;          0091 ..
002D 84;        0092      DC 084H
002E 574152;    0093      DC 'WAR'
0031 CD;        0094      DC 0CDH..  *    WARM    *
0032 000D;      0095      DC (COLD-9)
0034 0036;      0096      DC (WARM)
0036 F810;      0097 WARM  LDI 010H..  NUMBER OF PARAMETERS TO COPY
0038 AF;        0098      PLO RF
0039 68CA1841;  0099      RLDI RA, PARMS.. POINT TO PARAMETERS
003D EA;        0100      SEX RA
003E 686268646865; 0101      RLXA RP;RLXA SP;RLXA R5..SET STACKS, NEXT
0044 686668676868; 0102      RLXA R6;RLXA UP;RLXA IP..SET COLD, UP, FIRST WORD
004A EB68B7;    0103      SEX RB;RNX UP..  COPY 7 TO B
004D 4A5B1B;    0104 WRMLP  LDA RA;STR RB;INC RB..SET USER VARIABLES
0050 2F8F3A4D;  0105      DEC RF;GLO RF;BNZ WRMLP
0054 D5;        0106      SEP R5..  GO START INTERPRETER

```



```

0055 ;                0107 ..
0055 8245C6;          0108      DC 08245H,0C6H..      *      EF      *
0058 002D;            0109      DC (WARM-9)
005A 05FB;            0110      DC (CONST)
005C 005E;            0111      DC (EFTBL)
005E 3C6F306C;        0112 EFTBL  BN1 NOF;BR YES.. THESE ARE HELPFUL AIDS
0062 3D6F306C;        0113      BN2 NOF;BR YES.. IN COMPILING FLAG TEST PGMS.
0066 3E6F306C;        0114      BN3 NOF;BR YES
006A 3F6F;            0115      BN4 NOF
006C F801C8;          0116 YES  LDI 1;LSKP
006F F8002454;         0117 NOF  LDI 0;DEC SP;STR SP
0073 24F80054D5;      0118      DEC SP;LDI 0;STR SP;SEP R5
0078 3C78D5;          0119 WEF1  BN1 $;SEP R5
007B 3D7BD5;          0120 WEF2  BN2 $;SEP R5
007E 3E7ED5;          0121 WEF3  BN3 $;SEP R5
0081 3F81D5;          0122 WEF4  BN4 $;SEP R5
0084 3484D5;          0123 WEF1N  B1 $;SEP R5
0087 3587D5;          0124 WEF2N  B2 $;SEP R5
008A 368AD5;          0125 WEF3N  B3 $;SEP R5
008D 378DD5;          0126 WEF4N  B4 $;SEP R5
0090 ;                0127 ..
0090 ;                0128 ..*****  INNER INTERPRETER LOOP  *****
0090 ;                0129 ..      EXITS WITH X=SP,P=3
0090 ;                0130 ..
0090 E86869;          0131 GETNXT  SEX IP;RLXA R9
0093 E96863E4;         0132 WBR  SEX R9;RLXA R3;SEX SP
0097 D3;               0133      SEP R3
0098 3090;             0134 NEXT  BR GETNXT
009A ;                 0135      ..
009A ;                 0136      ..
009A E368B6;          0137 RETN  SEX R3;RNX R6.. STANDARD RETURN ROUTINE
009D E212;             0138      SEX RP;INC RP..      STARTS HERE.  GET TO IT
009F 6866;             0139      RLXA R6..      BY INCREMENTING R5 TWICE
00A1 22D3;             0140      DEC RP;SEP R3
00A3 309A;             0141      BR RETN..      GET BACK TO 'NEXT' LOOP
00A5 ;                 0142 ..
00A5 ;                 0143 .. RUNTIME PROCEEDURE COMPILED BY LOOP.  INCREMENTS
00A5 ;                 0144 .. THE INDEX AND TESTS FOR COMPLETION
00A5 ;                 0145 ..
00A5 86;               0146      DC 086H
00A6 284C4F4F50;       0147      DC '(LOOP'
00AB A9;               0148      DC 0A9H..      *      (LOOP)      *
00AC 0055;             0149      DC (EFTBL-9)
00AE ;                 0150 LUPE
00AE 00B0;             0151      DC ( $+2)
00B0 16E2;             0152      INC R6;SEX RP..      INCREMENT TOP NUMBER
00B2 1212;             0153 COMP  INC RP;INC RP
00B4 86F722;           0154      GLO R6;SM;DEC RP..      TEST
00B7 9677FE;           0155      GHI R6;SMB;SHL
00BA 3BC1;             0156      BNF CEND..      KEEP LOOPING
00BC 22E86868D5;       0157      DEC RP;SEX IP;RLXA IP;SEP R5
00C1 18181212;         0158 CEND  INC IP;INC IP;INC RP;INC RP
00C5 686622D5;         0159      RLXA R6;DEC RP;SEP R5
00C9 ;                 0160 ..

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00C9 ;          0161 .. RUNTIME PROCEEDURE COMPILED BY +LOOP.  ADDS TOP
00C9 ;          0162 .. TO INDEX & TESTS FOR COMPLETION
00C9 ;          0163 ..
00C9 87;        0164      DC 087H
00CA 282B4C4F4F50; 0165      DC '(+LOOP'
00D0 A9;        0166      DC 0A9H..      *      (+LOOP)      *
00D1 00A5;      0167      DC (LUPE-9)
00D3 ;          0168 PLUPE
00D3 00D5;      0169      DC ( $+2)
00D5 14;        0170      INC SP
00D6 86F4A624;  0171      GLO R6;ADD;PLO R6;DEC SP
00DA 9674B64414E2; 0172      GHI R6;ADC;PHI R6;LDA SP;INC SP;SEX RP
00E0 FE3BB2;    0173      SHL;BNF COMP..  BRANCH IF POSITIVE
00E3 121286F522; 0174      INC RP;INC RP;GLO R6;SD;DEC RP
00E8 967530B9;  0175      GHI R6;SDB;BR COMP+7
00EC ;          0176 ..
00EC ;          0177 .. SEARCH DICTIONARY FOR A MATCH, STARTING AT THE
00EC ;          0178 .. ADDRESS ON TOP OF STACK, TRYING FOR A MATCH
00EC ;          0179 .. WITH TEXT AT ADDRESS ONE DOWN ON STACK.  RETURNS
00EC ;          0180 .. THE PFA, LENGTH BYTE, AND TRUE FLAG IF A GOOD
00EC ;          0181 .. MATCH WAS FOUND.  RETURNS ONLY FALSE FLAG IF
00EC ;          0182 .. THERE WAS NO MATCH.
00EC ;          0183 ..
00EC 86;        0184      DC 086H
00ED 2846494E44; 0185      DC '(FIND'
00F2 A9;        0186      DC 0A9H..      *      (FIND)      *
00F3 00C9;      0187      DC (PLUPE-10)
00F5 ;          0188 FIND
00F5 00F7;      0189      DC ( $+2)
00F7 686A;      0190      RLXA RA
00F9 686B24;    0191      RLXA RB;DEC SP
00FC EA0A52;    0192 LOOP1 SEX RA;LDN RA;STR RP.. SAVE LENGTH
00FF 4BF3FA3F;  0193      LDA RB;XOR;ANI 03FH;LBNZ BADLEN.. BRANCH IF BADLEN
0103 CA0127;
0106 1A4BF3FE;  0194 NEXCHR INC RA;LDA RB;XOR;SHL.. COMPARE NEXT CHAR.
010A 3A28;      0195      BNZ BADCHR..  BRANCH IF NO MATCH ON 7 CHARS
010C 7E3206;    0196      SHLC;BZ NEXCHR.. LOOP IF NOT LAST CHARACTER
010F 4AFA80;    0197 LOOP2 LDA RA;ANI 080H.. CHECK FOR END OF STRING
0112 320F;      0198      BZ LOOP2
0114 E48AFC0473; 0199      SEX SP;GLO RA;ADI 4;STXD.. LEAVE PFA
0119 9A7C0073;  0200      GHI RA;ADCI 0;STXD
011D 0273F80073; 0201      LDN RP;STXD;LDI 0;STXD.. LEAVE LENGTH BYTE
0122 F8FF7354;  0202      LDI 0FFH;STXD;STR SP..  LEAVE TRUE FLAG
0126 D5;        0203      SEP R5..  EXIT
0127 1A;        0204 BADLEN INC RA
0128 4AFA803228; 0205 BADCHR LDA RA;ANI 080H;BZ BADCHR
012D 0A3A3B;    0206      LDN RA;BNZ BOK
0130 1A0A2A;    0207      INC RA;LDN RA;DEC RA
0133 3A3B;      0208      BNZ BOK
0135 F800E47354; 0209      LDI 0;SEX SP;STXD;STR SP
013A D5;        0210      SEP R5
013B EA686A;    0211 BOK SEX RA;RLXA RA
013E 24E4;      0212      DEC SP;SEX SP
0140 C000F9;    0213      LBR LOOP1-3

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0143 ;          0214 ..
0143 ;          0215 .. THE FOLLOWING IS COMPILED INTO COLON DEF-
0143 ;          0216 .. INITIONS TO CAUSE NEXT LITERAL NUMBER TO BE PUT
0143 ;          0217 .. ON THE COMPUTATIONAL STACK
0143 ;          0218 ..
0143 83;          0219      DC 083H
0144 4C49;        0220      DC 'LI'
0146 D4;          0221      DC 0D4H..      *      LIT      *
0147 00EC;        0222      DC (FIND-9)
0149 ;          0223 LIT
0149 014B;        0224      DC ( $+2).. LITERAL
014B E8686AE4;    0225      SEX IP;RLXA RA;SEX SP
014F 24;          0226      DEC SP
0150 68AA14D5;    0227      RSXD RA;INC SP;SEP R5
0154 ;          0228 ..
0154 ;          0229 .. RUN TIME PROCEEDURE TO COPY LOOP CONTROL
0154 ;          0230 .. PARAMETERS TO THE RETURN STACK
0154 ;          0231 ..
0154 84;          0232      DC 084H
0155 28444F;      0233      DC '(DO'
0158 A9;          0234      DC 0A9H..      *      (DO)      *
0159 0143;        0235      DC (LIT-6)
015B ;          0236 PDO
015B 015D;        0237      DC ( $+2)
015D E268A6E4;    0238      SEX RP;RSXD R6;SEX SP
0161 6866686B;    0239      RLXA R6;RLXA RB
0165 E268ABD5;    0240      SEX RP;RSXD RB;SEP R5
0169 ;          0241 ..
0169 ;          0242 .. THE FOLLOWING IS THE RUN TIME UNCONDITIONAL
0169 ;          0243 .. BRANCH USED BY DO,LOOP,AGAIN, ETC.
0169 ;          0244 ..
0169 86;          0245      DC 086H
016A 4252414E43;  0246      DC 'BRANC'
016F C8;          0247      DC 0C8H..      *      BRANCH      *
0170 0154;        0248      DC (PDO-7)
0172 ;          0249 BRCH
0172 0174;        0250      DC ( $+2)
0174 E86868D5;    0251 BRANCH SEX IP;RLXA IP;SEP R5
0178 ;          0252 ..
0178 ;          0253 .. BRANCH IF TOP OF STACK IS ZERO
0178 ;          0254 ..
0178 87;          0255      DC 087H
0179 304252414E43; 0256      DC '0BRANC'
017F C8;          0257      DC 0C8H..      *      0BRANCH      *
0180 0169;        0258      DC (BRCH-9)
0182 ;          0259 ZBRCH
0182 0184;        0260      DC ( $+2)
0184 44F114;      0261      LDA SP;OR;INC SP
0187 3274;        0262      BZ BRANCH
0189 1818D5;      0263      INC IP;INC IP;SEP R5
018C ;          0264 ..
018C ;          0265 ..
018C ;          0266 .. ENCLOSE IS THE
018C ;          0267 .. TEXT SCANNING PRIMITIVE, USED BY 'WORD'. EXPECTS

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018C ;          0268 .. ADDR1, C, ON THE STACK.
018C ;          0269 .. C IS A DELIMITER. IT DELETES C FROM THE
018C ;          0270 .. STACK, AND ADDS N1 (BYTE OFFSET TO FIRST NON-
018C ;          0271 .. DELIMITER CHARACTER), N2 (OFFSET TO THE FIRST
018C ;          0272 .. DELIMITER AFTER THE TEXT), AND N3 (OFFSET TO THE
018C ;          0273 .. FIRST CHARACTER NOT INCLUDED. THIS PROCEDURE
018C ;          0274 .. TREATS A NULL AS AN UNCONDITIONAL DELIMITER.
018C ;          0275 ..
018C 87;          0276 DC 087H
018D 454E434C4F53; 0277 DC 'ENCLOS'
0193 C5;          0278 DC 0C5H.. * ENCLOSE *
0194 0178;        0279 DC (ZBRCH-10)
0196 ;          0280 ENCL
0196 0198;        0281 DC ( $+2)
0198 1414;        0282 INC SP;INC SP..POINT TO ADDR
019A 686B242424; 0283 RLXA RB;DEC SP;DEC SP;DEC SP.. RB IS POINTER
019F 0452;        0284 LDN SP;STR RP.. SAVE DELIMITER
01A1 E2F800AA;    0285 SEX RP;LDI 0;PLO RA.. ZERO CHARACTER COUNT
01A5 BABC;        0286 PHI RA;PHI RC
01A7 0BF7;        0287 LOP1 LDN RB;SM.. SAME AS THE DELIMITER?
01A9 3AAF;        0288 BNZ FRST.. NO. FOUND FIRST NON-DELIMITER
01AB 1B1A30A7;    0289 INC RB;INC RA;BR LOP1.. KEEP LOOKING
01AF E48A73AC;    0290 FRST SEX SP;GLO RA;STXD;PLO RC.. SAVE OFFSET N1
01B3 9A73BC;      0291 GHI RA;STXD;PHI RC
01B6 F80073737354; 0292 LDI 0;STXD;STXD;STXD;STR SP
01BC 14E2;        0293 INC SP;SEX RP.. SP POINTS TO N3
01BE 0B32C8;      0294 LOP2 LDN RB;BZ NULL.. FOUND A NULL
01C1 F732E3;      0295 SM;BZ DELIM.. EXIT WHEN DELIMITER FOUND
01C4 1B1A30BE;    0296 INC RB;INC RA;BR LOP2.. LOOP TILL FOUND
01C8 8AE473;      0297 NULL GLO RA;SEX SP;STXD.. SAVE OFFSET TO NULL
01CB 9A5460;      0298 GHI RA;STR SP;IRX
01CE 8CF73AD9;    0299 GLO RC;SM;BNZ SKIP.. SAME AS OFFSET N1?
01D2 249CF7143AD9; 0300 DEC SP;GHI RC;SM;INC SP;BNZ SKIP
01D8 1A;          0301 INC RA.. YES. ADD 1
01D9 9A145414;    0302 SKIP GHI RA;INC SP;STR SP;INC SP..POINT TO N2
01DD 8A54;        0303 GLO RA;STR SP.. SAVE IT
01DF 242424;      0304 DEC SP;DEC SP;DEC SP.. FIX STACK
01E2 D5;          0305 SEP R5
01E3 1A8A54;      0306 DELIM INC RA;GLO RA;STR SP
01E6 249A54142A; 0307 DEC SP;GHI RA;STR SP;INC SP;DEC RA
01EB 30D9;        0308 BR SKIP
01ED ;          0309 ..
01ED ;          0310 ..
01ED ;          0311 ..
01ED 87;          0312 DC 087H
01EE 455845435554; 0313 DC 'EXECUT'
01F4 C5;          0314 DC 0C5H.. * EXECUTE *
01F5 018C;        0315 DC (ENCL-10)
01F7 ;          0316 EXE
01F7 01F9;        0317 DC ( $+2)
01F9 6869;        0318 RLXA R9
01FB F893A5;      0319 LDI A.0(WBR);PLO R5
01FE D5;          0320 SEP R5
01FF ;          0321 ..

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01FF ;          0322 ..
01FF ;          0323 ..
01FF 8255AF;    0324      DC 08255H,0AFH..      *      U/      *
0202 01ED;     0325      DC (EXE-10)
0204 ;         0326 USLSH
0204 0206;     0327      DC ( $+2)
0206 686F686B686A; 0328      RLXA RF;RLXA RB;RLXA RA.. DIVIDEND IN B & A
020C 2468AF1414; 0329      DEC SP;RSXD RF;INC SP;INC SP.. DIVISOR ON STACK
0211 F811AF;    0330      LDI 011H;PLO RF..      RF.0 IS LOOP COUNTER
0214 FE;       0331      SHL..          RESET DF
0215 8A7EAA;    0332 LCP5  GLO RA;SHLC;PLO RA.. SHIFT QUOTIENT HALF (HI)
0218 9A7EBA;    0333      GHI RA;SHLC;PHI RA
021B 2F8F3245;  0334      DEC RF;GLO RF;BZ USLSX.. SEE IF TIME TO QUIT
021F 8B7EAB;    0335      GLO RB;SHLC;PLO RB..  SHIFT REMAINDER HALF (LO)
0222 9B7EBB;    0336      GHI RB;SHLC;PHI RB
0225 8BF7BF;    0337      GLO RB;SM;PHI RF.. CONDITIONAL SUBTRACT
0228 249B7714;  0338      DEC SP;GHI RB;SMB;INC SP
022C CB0215;    0339      LBNF LCP5
022F BB9FABC00215; 0340      PHI RB;GHI RF;PLO RB;LBR LCP5
0235 ;         0341 ..
0235 8255AA;    0342      DC 08255H,0AAH..      *      U*      *
0238 01FF;     0343      DC (USLSH-5)
023A ;         0344 USTAR
023A 023C;     0345      DC ( $+2).. 16 BY 16 BIT UNSIGNED MPY -> 32
023C 686A;     0346      RLXA RA.. GET ONE IN A
023E 14E2;     0347      INC SP;SEX RP..      POINT TO LO HALF OF OTHER
0240 688605CE;  0348      SCAL R6, UMULT..      DO UNSIGNED MULTIPLY
0244 E4;       0349      SEX SP..      POINT BACK TO STACK
0245 68AB68AA14D5; 0350 USLSX  RSXD RB;RSXD RA;INC SP;SEP R5
024B ;         0351 ..
024B 83;       0352      DC 083H
024C 414E;     0353      DC 'AN'
024E C4;       0354      DC 0C4H..      *      AND      *
024F 0235;     0355      DC (USTAR-5)
0251 ;         0356 FAND
0251 0253;     0357      DC ( $+2).. LOGICAL AND TOP 2 NUMBERS
0253 686A14;    0358      RLXA RA;INC SP
0256 8AF273;    0359      GLO RA;AND;STXD
0259 9AF254D5;  0360      GHI RA;AND;STR SP;SEP R5
025D ;         0361 ..
025D 824FD2;    0362      DC 0824FH,0D2H..      *      OR      *
0260 024B;     0363      DC (FAND-6)
0262 ;         0364 FFOR
0262 0264;     0365      DC ( $+2).. LOGICAL OR TOP TWO NUMBERS
0264 686A14;    0366      RLXA RA;INC SP
0267 8AF173;    0367      GLO RA;OR;STXD
026A 9AF154D5;  0368      GHI RA;OR;STR SP;SEP R5
026E ;         0369 ..
026E 83;       0370      DC 083H
026F 584F;     0371      DC 'XO'
0271 D2;       0372      DC 0D2H..      *      XOR      *
0272 025D;     0373      DC (FFOR-5)
0274 ;         0374 FXOR
0274 0276;     0375      DC ( $+2)

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0276 686A14;      0376      RLXA RA;INC SP
0279 8AF373;      0377      GLO RA;XOR;STXD
027C 9AF354D5;    0378      GHI RA;XOR;STR SP;SEP R5
0280 ;            0379      ..
0280 83;          0380      DC 083H
0281 5350;        0381      DC 'SP'
0283 C0;          0382      DC 0C0H..      *   SP@   *
0284 026E;        0383      DC (FXOR-6)
0286 ;            0384      FSPAT
0286 0288;        0385      DC ( $+2)
0288 EA68B4E424;  0386      SEX RA;RNX SP;SEX SP;DEC SP
028D 68AA14D5;    0387      RSXD RA;INC SP;SEP R5
0291 ;            0388      ..
0291 83;          0389      DC 083H
0292 5350;        0390      DC 'SP'
0294 A1;          0391      DC 0A1H..      *   SP!   *
0295 0280;        0392      DC (FSPAT-6)
0297 ;            0393      SP1
0297 0299;        0394      DC ( $+2).. INITIALIZE SP FROM S0
0299 87FC06AA;    0395      GLO UP;ADI 6;PLO RA
029D 977C00BA;    0396      GHI UP;ADCI 0;PHI RA
02A1 EA6864D5;    0397      SEX RA;RLXA SP;SEP R5
02A5 ;            0398      ..
02A5 83;          0399      DC 083H
02A6 5250;        0400      DC 'RP'
02A8 A1;          0401      DC 0A1H..      *   RP!   *
02A9 0291;        0402      DC (SP1-6)
02AB ;            0403      RP1
02AB 02AD;        0404      DC ( $+2).. INITIALIZE RP FROM R0
02AD 87FC08AA;    0405      GLO UP;ADI 8;PLO RA
02B1 977C00BA;    0406      GHI UP;ADCI 0;PHI RA
02B5 EA686222;    0407      SEX RA;RLXA RP;DEC RP
02B9 30C6;        0408      BR SEMIS1
02BB ;            0409      ..
02BB 823BD3;      0410      DC 0823BH,0D3H..      *   ;S   *
02BE 02A5;        0411      DC (RP1-6).. UNNEST. (STOP INTERPRETING SCREEN)
02C0 ;            0412      SEMIS
02C0 02C2;        0413      DC ( $+2)
02C2 E868B612;    0414      SEX IP;RNX R6;INC RP
02C6 42B602A6;    0415      SEMIS1 LDA RP;PHI R6;LDN RP;PLO R6
02CA D5;          0416      SEP R5
02CB ;            0417      ..
02CB 85;          0418      DC 085H
02CC 44494749;    0419      DC 'DIGI'
02D0 D4;          0420      DC 0D4H..      *   DIGIT   *
02D1 02BB;        0421      DC (SEMIS-5)
02D3 ;            0422      DGT
02D3 02D5;        0423      DC ( $+2)
02D5 686A1404;    0424      RLXA RA;INC SP;LDN SP.. GET NUMBER
02D9 FF30CB0358;  0425      SMI 030H;LBNF NONE.. BRANCH IF LESS THAN 0
02DE FF1133E7;    0426      SMI 011H;BDF DOK.. BRANCH IF A OR MORE
02E2 FFF9C30358;  0427      SMI 0F9H;LBDF NONE.. BR. IF BETWEEN 9 & A
02E7 FC0A7324;    0428      DOK ADI 00AH;STXD;DEC SP.. SAVE IT
02EB F7CB035B;    0429      SM;LBNF ZONE.. COMPARE WITH BASE

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02EF 1414;          0430      INC SP;INC SP
02F1 C00358;        0431      LBR NONE
02F4 ;              0432      ..
02F4 85;            0433      DC 085H
02F5 434D4F56;      0434      DC 'CMOV'
02F9 C5;            0435      DC 0C5H..          * CMOVE *
02FA 02CB;          0436      DC (DGT-8)
02FC ;              0437 CMOVE
02FC 02FE;          0438      DC ( $+2)..          MOVE CHARACTERS IN MEMORY
02FE 44FC01BF;      0439      LDA SP;ADI 1;PHI RF
0302 44AF2F;        0440      LDA SP;PLO RF;DEC RF
0305 686A;          0441      RLXA RA..      RA IS 'TO', RF IS 'COUNT'
0307 686B;          0442      RLXA RB..      RB IS 'FROM'
0309 9F3212;        0443 LUUP  GHI RF;BZ END2
030C 4B5A1A2F;      0444      LDA RB;STR RA;INC RA;DEC RF
0310 3009;          0445      BR LUUP
0312 D5;            0446 END2  SEP R5
0313 ;              0447      ..
0313 85;            0448      DC 085H
0314 4C454156;      0449      DC 'LEAV'
0318 C5;            0450      DC 0C5H..          * LEAVE *
0319 02F4;          0451      DC (CMOVE-8)
031B ;              0452 LVE
031B 031D;          0453      DC ( $+2)..      FORCE TERMINATION OF A DO LOOP
031D E21212;        0454      SEX RP;INC RP;INC RP
0320 68A6D5;        0455      RSXD R6;SEP R5
0323 ;              0456      ..
0323 823ED2;        0457      DC 0823EH,0D2H..          * >R *
0326 0313;          0458      DC (LVE-8)
0328 ;              0459 GR
0328 032A;          0460      DC ( $+2)..      MOVE TOP NUMBER TO RETURN STACK
032A E268A6;        0461      SEX RP;RSXD R6
032D E46866;        0462      SEX SP;RLXA R6
0330 D5;            0463      SEP R5
0331 ;              0464      ..
0331 8252BE;        0465      DC 08252H,0BEH..          * R> *
0334 0323;          0466      DC (GR-5)
0336 ;              0467 RG
0336 0338;          0468      DC ( $+2)..      TRANSFER TOP OF RETN TO COMP ST.
0338 2468A6;        0469      DEC SP;RSXD R6..      COPY BOTTOM
033B 14;            0470      INC SP
033C 1242B6;        0471      INC RP;LDA RP;PHI R6
033F 02A6;          0472      LDN RP;PLO R6
0341 D5;            0473      SEP R5
0342 ;              0474      ..
0342 81C9;          0475      DC 081C9H..          * I *
0344 0331;          0476      DC (RG-5)
0346 ;              0477 I
0346 0348;          0478      DC ( $+2)..      COPY TOP OF RETN TO TOP OF COMP.
0348 2468A6;        0479      DEC SP;RSXD R6
034B 14D5;          0480      INC SP;SEP R5
034D ;              0481      ..
034D 8230BD;        0482      DC 08230H,0BDH..          * 0= *
0350 0342;          0483      DC (I-4)

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0352 ;          0484 ZEQL
0352 0354;      0485          DC ( $+2).. SET FLAG IF TOP = 0
0354 44;        0486          LDA SP
0355 F1325B;    0487          OR;BZ ZONE
0358 F800C8;    0488 NONE LDI 0;LSKP
035B F801;      0489 ZONE LDI 001H
035D 73F80054D5; 0490          STXD;LDI 0;STR SP;SEP R5
0362 ;          0491          ..
0362 8230BC;    0492          DC 08230H,0BCH..          *    0<    *
0365 034D;      0493          DC (ZEQL-5)
0367 ;          0494 ZLESS
0367 0369;      0495          DC ( $+2).. SET F Message 8 LAG IF TOP IS NEGATIVE
0369 44FE335B;  0496          LDA SP;SHL;BDF ZONE
036D 3058;      0497          BR NONE
036F ;          0498          ..
036F 81BD;      0499          DC 081BDH..          *    =    *
0371 0362;      0500          DC (ZLESS-5)
0373 ;          0501 EQL
0373 0375;      0502          DC ( $+2).. SET FLAG IF TOP 2 ARE EQUAL
0375 686A9AF3BA14; 0503          RLXA RA;GHI RA;XOR;PHI RA;INC SP
037B 8AF3549AF1; 0504          GLO RA;XOR;STR SP;GHI RA;OR
0380 3285;      0505          BZ ZZONE
0382 F800C8;    0506 NNONE LDI 0;LSKP
0385 F80173F80054; 0507 ZZONE LDI 1;STXD;LDI 0;STR SP9SEP R5
038B D5;
038C ;          0508          ..
038C 81BC;      0509          DC 081BCH..          *    <    *
038E 036F;      0510          DC (EQL-4)
0390 ;          0511 LESS
0390 0392;      0512          DC ( $+2).. SET FLAG IF SECOND < TOP
0392 686A14;    0513          RLXA RA;INC SP.. GET TOP INTO RA
0395 8AF524;    0514          GLO RA;SD;DEC SP
0398 04FB8054;  0515          LDN R4;XRI 080H;STR R4
039C 9AFB8075;  0516          GHI RA;XRI 080H;SDB
03A0 14;        0517 FLGLES INC SP
03A1 F8007EFB0173; 0518          LDI 0;SHLC;XRI 01;STXD
03A7 F654;      0519          SHR;STR SP
03A9 D5;        0520          SEP R5
03AA ;          0521          ..
03AA 81BE;      0522          DC 081BEH..          *    >    *
03AC 038C;      0523          DC (LESS-4)
03AE ;          0524 GTR
03AE 03B0;      0525          DC ( $+2).. SET FLAG IF SECOND > TOP
03B0 686A14;    0526          RLXA RA;INC SP
03B3 8AF724;    0527          GLO RA;SM;DEC SP
03B6 04FB8054;  0528          LDN R4;XRI 080H;STR R4
03BA 9AFB807730A0; 0529          GHI RA;XRI 080H;SMB;BR FLGLES
03C0 ;          0530          ..
03C0 81AB;      0531          DC 081ABH..          *    +    *
03C2 03AA;      0532          DC (GTR-4)
03C4 ;          0533 PLUS
03C4 03C6;      0534          DC ( $+2).. ADD TOP TWO SIGNED NUMBERS
03C6 686A14;    0535          RLXA RA;INC SP
03C9 8AF4;      0536          GLO RA;ADD

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03CB 73;          0537 DPLS1  STXD
03CC 9A7454;      0538      GHI RA;ADC;STR SP
03CF D5;          0539      SEP R5
03D0 ;           0540      ..
03D0 8231AB;      0541      DC 08231H,0ABH..      * 1+ *
03D3 03C0;        0542      DC (PLUS-4)
03D5 ;           0543 PLUS1
03D5 03D7;        0544      DC ( $+2)..  ADD 1 TO TOP NUMBER
03D7 F801;        0545      LDI 1.. GET NUMBER
03D9 E414;        0546 PLS1X  SEX SP;INC SP
03DB F473F8007454; 0547      ADD;STXD;LDI 0;ADC;STR SP
03E1 D5;          0548      SEP R5
03E2 ;           0549      ..
03E2 8232AB;      0550      DC 08232H,0ABH..      * 2+ *
03E5 03D0;        0551      DC (PLUS1-5)
03E7 ;           0552 PLUS2
03E7 03E9;        0553      DC ( $+2)
03E9 F80230D9;    0554      LDI 2;BR PLS1X
03ED ;           0555      ..
03ED 822BA1;      0556      DC 0822BH,0A1H..      * +! *
03F0 03E2;        0557      DC (PLUS2-5)
03F2 ;           0558 PLUS3
03F2 03F4;        0559      DC ( $+2)
03F4 686B1B;      0560      RLXA RB;INC RB
03F7 686AEB;      0561      RLXA RA;SEX RB
03FA 8AF473;      0562      GLO RA;ADD;STXD
03FD 9A7473D5;    0563      GHI RA;ADC;STXD;SEP R5
0401 ;           0564      ..
0401 81AD;        0565      DC 081ADH..      * - *
0403 03ED;        0566      DC (PLUS3-5)
0405 ;           0567 MINS
0405 0407;        0568      DC ( $+2)
0407 686A14;      0569      RLXA RA;INC SP
040A 8AF573;      0570      GLO RA;SD;STXD
040D 9A7554;      0571      GHI RA;SDB;STR SP
0410 D5;          0572      SEP R5
0411 ;           0573      ..
0411 8244AB;      0574      DC 08244H,0ABH..      * D+ *
0414 0401;        0575      DC (MINS-4)
0416 ;           0576 DPLUS
0416 0418;        0577      DC ( $+2)..  ADD TWO DOUBLE PRECISION NUMBERS
0418 686A686B;    0578      RLXA RA;RLXA RB
041C 141414;      0579      INC SP;INC SP;INC SP
041F 8BF4739B7473; 0580      GLO RB;ADD;STXD;GHI RB;ADC;STXD
0425 8A74C003CB;  0581      GLO RA;ADC;LBR DPLS1
042A ;           0582      ..
042A 85;          0583      DC 085H
042B 4D494E55;    0584      DC 'MINU'
042F D3;          0585      DC 0D3H..      * MINUS *
0430 0411;        0586      DC (DPLUS-5)
0432 ;           0587 MINUS
0432 0434;        0588      DC ( $+2)..  NEGATE TOP NUMBER ON STACK
0434 14FF00;      0589      INC SP;SMI 0
0437 04FBFF7C0073; 0590 MINOS  LDN SP;XRI 0FFH;ADCI 0;STXD

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043D 04FBFF7C0054; 0591      LDN SP;XRI 0FFH;ADCI 0;STR SP
0443 D5;           0592      SEP R5
0444 ;             0593      ..
0444 86;           0594      DC 086H
0445 444D494E55;  0595      DC 'DMINU'
044A D3;           0596      DC 0D3H..          * DMINUS *
044B 042A;        0597      DC (MINUS-8)
044D ;            0598 DMIN
044D 044F;        0599      DC ( $+2).. NEGATE TOP DBL NUMBER
044F 141414;      0600      INC SP;INC SP;INC SP
0452 04FBFFFC0173; 0601      LDN SP;XRI 0FFH;ADI 1;STXD
0458 04FBFF7C0073; 0602      LDN SP;XRI 0FFH;ADCI 0;STXD
045E 3037;        0603      BR MINOS
0460 ;            0604      ..
0460 84;           0605      DC 084H
0461 4F5645;      0606      DC 'OVE'
0464 D2;           0607      DC 0D2H..          * OVER *
0465 0444;        0608      DC (DMIN-9)
0467 ;            0609 OVER
0467 0469;        0610      DC ( $+2).. COPY NEXT LOWER TO TOP
0469 EB68B4;      0611      SEX RB;RNX SP
046C 686A686AE4;  0612      RLXA RA;RLXA RA;SEX SP
0471 24;          0613      DEC SP
0472 68AA14D5;    0614      RSXD RA;INC SP;SEP R5
0476 ;            0615      ..
0476 84;           0616      DC 084H
0477 44524F;      0617      DC 'DRO'
047A D0;           0618      DC 0D0H..          * DROP *
047B 0460;        0619      DC (OVER-7)
047D ;            0620 DROP
047D 047F;        0621      DC ( $+2)
047F 1414D5;      0622      INC SP;INC SP;SEP R5
0482 ;            0623      ..
0482 84;           0624      DC 084H
0483 535741;      0625      DC 'SWA'
0486 D0;           0626      DC 0D0H..          * SWAP *
0487 0476;        0627      DC (DROP-7)
0489 ;            0628 SWAP
0489 048B;        0629      DC ( $+2)
048B 686A686B24;  0630      RLXA RA;RLXA RB;DEC SP
0490 68AA68AB;    0631      RSXD RA;RSXD RB
0494 14D5;        0632      INC SP;SEP R5
0496 ;            0633      ..
0496 83;           0634      DC 083H
0497 4455;        0635      DC 'DU'
0499 D0;           0636      DC 0D0H..          * DUP *
049A 0482;        0637      DC (SWAP-7)
049C ;            0638 DUP
049C 049E;        0639      DC ( $+2).. DUPLICATE TOP OF STACK
049E 686A242424;  0640      RLXA RA;DEC SP;DEC SP;DEC SP
04A3 68AA14D5;    0641      RSXD RA;INC SP;SEP R5
04A7 ;            0642      ..
04A7 86;           0643      DC 086H
04A8 544F47474C;  0644      DC 'TOGGL'

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04AD C5;          0645          DC 0C5H..          * TOGGLE *
04AE 0496;        0646          DC (DUP-6)
04B0 ;           0647 TGLE
04B0 04B2;        0648          DC ( $+2).. XOR A CHARACTER IN MEMORY WITH 'C'
04B2 ;           0649          .. (ADDR B -> )
04B2 686A;        0650          RLXA RA
04B4 686BEB;      0651          RLXA RB;SEX RB
04B7 8AF35BD5;    0652          GLO RA;XOR;STR RB;SEP R5
04BB ;           0653          ..
04BB 81C0;        0654          DC 081C0H..          * @ *
04BD 04A7;        0655          DC (TGLE-9)
04BF ;           0656 AT
04BF 04C1;        0657          DC ( $+2).. GET CONTENTS, USING LOCATION
04C1 686A24;      0658          RLXA RA;DEC SP
04C4 EA686AE4;    0659          SEX RA;RLXA RA;SEX SP
04C8 68AA14D5;    0660          RSXD RA;INC SP;SEP R5
04CC ;           0661          ..
04CC 8243C0;      0662          DC 08243H,0C0H..          * C@ *
04CF 04BB;        0663          DC (AT-4)
04D1 ;           0664 CAT
04D1 04D3;        0665          DC ( $+2).. GET CHARACTER FROM MEMORY
04D3 686A240A;    0666          RLXA RA;DEC SP;LDN RA
04D7 73F80054;    0667          STXD;LDI 0;STR SP
04DB D5;          0668          SEP R5
04DC ;           0669          ..
04DC 81A1;        0670          DC 081A1H..          * ! *
04DE 04CC;        0671          DC (CAT-5)
04E0 ;           0672 EX
04E0 04E2;        0673          DC ( $+2).. STORE NUMBER AT ADDRESS
04E2 686A;        0674          RLXA RA
04E4 686BEA1A;    0675          RLXA RB;SEX RA;INC RA
04E8 68ABD5;      0676          RSXD RB;SEP R5
04EB ;           0677          ..
04EB 8243A1;      0678          DC 08243H,0A1H..          * C! *
04EE 04DC;        0679          DC (EX-4)
04F0 ;           0680 CEX
04F0 04F2;        0681          DC ( $+2).. STORE CHARACTER AT ADDRESS
04F2 686A14;      0682          RLXA RA;INC SP
04F5 445AD5;      0683          LDA SP;STR RA;SEP R5
04F8 ;           0684          ..
04F8 83524FD4;    0685          DC 08352H,04FD4H..          * ROT *
04FC 04EB;        0686          DC (CEX-5)
04FE ;           0687 ROT
04FE 0500;        0688          DC ( $+2).. ROTATE TOP THREE NUMBERS
0500 686A;        0689          RLXA RA
0502 686B686C24;  0690          RLXA RB;RLXA RC;DEC SP
0507 68AB68AA68AC; 0691          RSXD RB;RSXD RA;RSXD RC
050D 14D5;        0692          INC SP;SEP R5
050F ;           0693          ..
050F 84;          0694          DC 084H
0510 2D4455;      0695          DC '-DU'
0513 D0;          0696          DC 0D0H..          * -DUP *
0514 04F8;        0697          DC (ROT-6)
0516 ;           0698 MDUP

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0516 0518;          0699          DC ( $+2)..  DUPLICATE TOP IF NON ZERO
0518 686A24;        0700          RLXA RA;DEC SP
051B 9AF12424;      0701          GHI RA;OR;DEC SP;DEC SP
051F CE;            0702          LSZ
0520 68AA;          0703          RSXD RA
0522 14D5;          0704          INC SP;SEP R5
0524 ;              0705          ..
0524 834142D3;      0706          DC 08341H,042D3H..          *   ABS   *
0528 050F;          0707          DC (MDUP-7)
052A ;              0708 ABS
052A 052C;          0709          DC ( $+2)..  RETURN ABSOLUTE VALUE OF NUMBER
052C 04FE;          0710          LDN SP;SHL
052E C30434;        0711          LBDF MINUS+2
0531 D5;            0712          SEP R5
0532 ;              0713          ..
0532 84;            0714          DC 084H
0533 444142;        0715          DC 'DAB'
0536 D3;            0716          DC 0D3H..          *   DABS   *
0537 0524;          0717          DC (ABS-6)
0539 ;              0718 DABS
0539 053B;          0719          DC ( $+2)..  RETURN ABSOLUTE VALEU OF DBL #.
053B 04FE;          0720          LDN SP;SHL
053D C3044F;        0721          LBDF DMIN+2
0540 D5;            0722          SEP R5
0541 ;              0723          ..
0541 834D41D8;      0724          DC 0834DH,041D8H..          *   MAX   *
0545 0532;          0725          DC (DABS-7)
0547 ;              0726 MAX
0547 0549;          0727          DC ( $+2)..  LEAVE GREATER OF 2 NUMBERS
0549 686A;          0728          RLXA RA
054B 148AF524;      0729          INC SP;GLO RA;SD;DEC SP
054F 04FB8054;      0730          LDN R4;XRI 080H;STR R4
0553 9AFB80BA75;    0731          GHI RA;XRI 080H;PHI RA;SDB
0558 335E;          0732          BDF MAXEX1
055A 1468AA14;      0733          INC SP;RSXD RA;INC SP
055E 04FB8054;      0734 MAXEX1  LDN R4;XRI 080H;STR R4
0562 D5;            0735 MAXEX  SEP R5
0563 ;              0736          ..
0563 81AA;          0737          DC 081AAH..          *   *   *
0565 0541;          0738          DC (MAX-6)
0567 ;              0739 STAR
0567 0569;          0740          DC ( $+2)..  16BIT S2C * 16BIT S2C -> 16 S2C
0569 E26886057E;    0741          SEX RP;SCAL R6, SMULT..  GO GET A 32 BIT RESULT
056E 1414;          0742          INC SP;INC SP..  DROP HI 16 BITS
0570 D5;            0743          SEP R5..          EXIT
0571 ;              0744          ..
0571 ;              0745          ..
0571 ;              0746          ..
0571 824DAA;        0747          DC 0824DH,0AAH..          *   M*   *
0574 0563;          0748          DC (STAR-4)
0576 ;              0749 MSTAR
0576 0578;          0750          DC ( $+2)..  16BIT S2C * 16 BIT S2C -> 32 S2C
0578 E26886057ED5; 0751          SEX RP;SCAL R6, SMULT;SEP R5
057E ;              0752          ..

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057E ;          0753 .. THE FOLLOWING SUBROUTINE WILL MULTIPLY THE TOP
057E ;          0754 .. TWO SIGNED NUMBERS ON THE STACK AND LEAVE A 32
057E ;          0755 .. BIT SIGNED RESULT ON THE STACK
057E E4686A;    0756 SMULT SEX SP;RLXA RA.. GET MULTIPLIER IN A
0581 F800AF;    0757 LDI 0;PLO RF.. SET P/N FLAG
0584 44FE3B96;  0758 LDA SP;SHL;BNF SPPOS.. BRANCH IF POS.
0588 04FBFFFC0173; 0759 LDN SP;XRI 0FFH;ADI 1;STXD
058E 04FBFF7C0054; 0760 LDN SP;XRI 0FFH;ADCI 0;STR SP
0594 141F;      0761 INC SP;INC RF
0596 9AFE3BA4;  0762 SPPOS GHI RA;SHL;BNF APOS1
059A 9AFBFFBA8A; 0763 GHI RA;XRI 0FFH;PHI RA;GLO RA
059F FBFFAA1AF;  0764 XRI 0FFH;PLO RA;INC RA;INC RF
05A4 E2688605CE; 0765 APOS1 SEX RP;SCAL R6, UMULT..DO UNSIGNED MULTIPLY
05A9 E48FF63BC6; 0766 SEX SP;GLO RF;SHR;BNF MULT1.. CHECK SIGN
05AE 8BFBFFFC01AB; 0767 GLO RB;XRI 0FFH;ADI 1;PLO RB
05B4 9BFBFF7C00BB; 0768 GHI RB;XRI 0FFH;ADCI 0;PHI RB
05BA 8AFBFF7C00AA; 0769 GLO RA;XRI 0FFH;ADCI 0;PLO RA
05C0 9AFBFF7C00BA; 0770 GHI RA;XRI 0FFH;ADCI 0;PHI RA
05C6 68AB68AA14E2; 0771 MULT1 RSXD RB;RSXD RA;INC SP;SEX RP
05CC 6896;      0772 SRET R6
05CE ;          0773 ..
05CE ;          0774 ..
05CE ;          0775 ..
05CE ;          0776 .. THIS ROUTINE WILL MULTIPLY TWO UNSIGNED 16 BIT
05CE ;          0777 .. NUMBERS, LEAVING A 32 BIT RESULT IN RA(HI) AND
05CE ;          0778 .. RB(LO). THE MULTIPLIER IS IN A, THE MULTIPLI
05CE ;          0779 .. CAND IS POINTED TO BY SP. ENTRY IS WITH SP
05CE ;          0780 .. POINTING TO THE LOW BYTE. THE HI BYTE IS IN NEXT
05CE ;          0781 .. LOWER MEMORY LOCATION. SP IS RETURNED
05CE ;          0782 .. UNCHANGED. RC.0 IS DESTROYED.
05CE E4F810AC;  0783 UMULT SEX SP;LDI 16;PLO RC
05D2 68CB0000;  0784 RLDI RB, 00000H.. ZERO OUT RB
05D6 8BFEAB;    0785 MPLX2 GLO RB;SHL;PLO RB
05D9 9B7EBB;    0786 GHI RB;SHLC;PHI RB
05DC 8A7EAA;    0787 GLO RA;SHLC;PLO RA
05DF 9A7EBA;    0788 GHI RA;SHLC;PHI RA
05E2 3BF4;      0789 BNF MPLX1.. BRANCH IF NO CARRY
05E4 8BF4AB24;  0790 GLO RB;ADD;PLO RB;DEC SP
05E8 9B74BB14;  0791 GHI RB;ADC;PHI RB;INC SP
05EC 8A7C00AA;  0792 GLO RA;ADCI 0;PLO RA
05F0 9A7C00BA;  0793 GHI RA;ADCI 0;PHI RA
05F4 2C8C3AD6;  0794 MPLX1 DEC RC;GLO RC;BNZ MPLX2
05F8 E26896;    0795 SEX RP;SRET R6
05FB ;          0796 ..
05FB ;          0797 ..
05FB ;          0798 ..
05FB ;          0799 ..
05FB E96869;    0800 CONST SEX R9;RLXA R9
05FE ;          0801 ..
05FE ;          0802 ..
05FE 24E468A914; 0803 VAR DEC SP;SEX SP;RSXD R9;INC SP
0603 D5;        0804 SEP R5
0604 ;          0805 ..
0604 ;          0806 ..

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0604 ;          0807 .. THE FOLLOWING ARE FORTH CONSTANTS
0604 ;          0808 ..
0604 81B0;       0809      DC 081B0H..          #    0    #
0606 0571;       0810      DC (MSTAR-5)
0608 ;          0811 ZERO
0608 05FB;       0812      DC (CONST)
060A 0000;       0813      DC 00000H..PUT ZERO ON STACK
060C ;          0814 ..
060C 81B1;       0815      DC 081B1H..          #    1    #
060E 0604;       0816      DC (ZERO-4)
0610 ;          0817 ONE
0610 05FB;       0818      DC (CONST)
0612 0001;       0819      DC 00001H..      PUT ONE ON STACK
0614 ;          0820 ..
0614 81B2;       0821      DC 081B2H..          #    2    #
0616 060C;       0822      DC (ONE-4)
0618 ;          0823 TWO
0618 05FB;       0824      DC (CONST)
061A 0002;       0825      DC 00002H.. PUT A 2 ON STACK
061C ;          0826 ..
061C 81;         0827      DC 081H
061D B3;         0828      DC 0B3H..          *    3    *
061E 0614;       0829      DC (TWO-4)
0620 ;          0830 THREE
0620 05FB;       0831      DC (CONST)
0622 0003;       0832      DC 00003H.. PUT A 3 ON STACK
0624 ;          0833 ..
0624 82;         0834      DC 082H
0625 42;         0835      DC 'B'
0626 CC;         0836      DC 0CCH..          *    BL    *
0627 061C;       0837      DC (THREE-4)
0629 ;          0838 BL
0629 05FB;       0839      DC (CONST)
062B 0020;       0840      DC 00020H.. PUT ASCII BLANK ON STACK
062D ;          0841 ..
062D 83;         0842      DC 083H
062E 432F;       0843      DC 'C/'
0630 CC;         0844      DC 0CCH..          *    C/L    *
0631 0624;       0845      DC (BL-5)
0633 ;          0846 CL
0633 05FB;       0847      DC (CONST)
0635 0040;       0848      DC 00040H.. NUMBER OF CHARACTERS PER LINE
0637 ;          0849 ..
0637 83;         0850      DC 083H
0638 4C2F;       0851      DC 'L/'
063A D0;         0852      DC 0D0H..          *    L/P    *
063B 062D;       0853      DC (CL-6)
063D ;          0854 LPP
063D 05FB;       0855      DC (CONST)
063F 003C;       0856      DC 0003CH.. LINES PER (PRINTED) PAGE
0641 ;          0857 ..
0641 85;         0858      DC 085H
0642 46495253;   0859      DC 'FIRS'
0646 D4;         0860      DC 0D4H..          *    FIRST    *

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0647 0637;      0861      DC (LPP-6)
0649 ;          0862 FIRST
0649 05FB;      0863      DC (CONST)
064B 57D7;      0864      DC (FIRSTB)..FIRST DISK BUFFER
064D ;          0865      ..
064D 85;        0866      DC 085H
064E 4C494D49;  0867      DC 'LIMI'
0652 D4;        0868      DC 0D4H..      *      LIMIT      *
0653 0641;      0869      DC (FIRST-8)
0655 ;          0870 LIMIT
0655 05FB;      0871      DC (CONST)
0657 7FFF;      0872      DC (LIMITB)..END OF BUFFER AREA
0659 ;          0873      ..
0659 85;        0874      DC 085H
065A 422F4255;  0875      DC 'B/BU'
065E C6;        0876      DC 0C6H..      *      B/BUF      *
065F 064D;      0877      DC (LIMIT-8)
0661 ;          0878 BBUF
0661 05FB;      0879      DC (CONST)
0663 0400;      0880      DC 00400H.. BYTES PER BUFFER
0665 ;          0881      ..
0665 85;        0882      DC 085H
0666 422F5343;  0883      DC 'B/SC'
066A D2;        0884      DC 0D2H..      *      B/SCR      *
066B 0659;      0885      DC (BBUF-8)
066D ;          0886 BSCR
066D 05FB;      0887      DC (CONST)
066F 0001;      0888      DC 00001H.. BUFFERS PER SCREEN
0671 ;          0889      ..
0671 86;        0890      DC 086H
0672 4F52494749; 0891      DC 'ORIGI'
0677 CE;        0892      DC 0CEH..      *      ORIGIN      *
0678 0665;      0893      DC (BSCR-8)
067A ;          0894 ORGN
067A 05FB;      0895      DC (CONST)
067C 1841;      0896      DC (PARMS).. ORIGIN AREA FOR MODS
067E ;          0897      ..
067E 879        0898      DC 087H
067F 2B4F52494749; 0899      DC '+ORIGI'
0685 CE;        0900      DC 0CEH..      *      +ORIGIN      *
0686 0671;      0901      DC (ORGN-9)
0688 ;          0902 PORGN
0688 0857;      0903      DC (NEST)
068A 067A;      0904      DC (ORGN).. VECTOR TO SETUPS
068C 03C4;      0905      DC (PLUS)
068E 02C0;      0906      DC (SEMIS)
0690 ;          0907      ..
0690 ;          0908      ..
0690 ;          0909      ..
0690 ;          0910      ..
0690 ;          0911      ..
0690 24E91987;  0912 USER DEC SP;SEX R9;INC R9;GLO UP
0694 F4542429;  0913      ADD;STR SP;DEC SP;DEC R9
0698 977454;    0914      GHI UP;ADC;STR SP

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069B D5;          0915      SEP R5
069C ;           0916      ..
069C ;           0917      ..
069C ;           0918      ..  THE FOLLOWING ARE USER VARIABLES
069C ;           0919      ..
069C 8253B0;      0920      DC 08253H,0B0H..          $    S0    $
069F 067E;       0921      DC (PORG-10)
06A1 ;           0922      SO
06A1 0690;       0923      DC (USER)
06A3 0006;       0924      DC 00006H.. STORED BOTTOM OF STACK
06A5 ;           0925      ..
06A5 8252B0;     0926      DC 08252H,0B0H..          $    R0    $
06A8 069C;       0927      DC (SO-5)
06AA ;           0928      RO
06AA 0690;       0929      DC (USER)
06AC 0008;       0930      DC 00008H.. BOTTOM OF RETURN STACK
06AE ;           0931      ..
06AE 83;         0932      DC 083H
06AF 5449;       0933      DC 'TI'
06B1 C2;         0934      DC 0C2H..          $    TIB    $
06B2 06A5;       0935      DC (RO-5)
06B4 ;           0936      TIB
06B4 0690;       0937      DC (USER)
06B6 000A;       0938      DC 0000AH.. TERMINAL INPUT BUFFER LOC.
06B8 ;           0939      ..
06B8 85;         0940      DC 085H
06B9 57494454;   0941      DC 'WIDT'
06BD C8;         0942      DC 0C8H..          *    WIDTH    *
06BE 06AE;       0943      DC (TIB-6)
06C0 ;           0944      WIDTH
06C0 0690;       0945      DC (USER)
06C2 000C;       0946      DC 0000CH.. MAX WORD LENGTH
06C4 ;           0947      ..
06C4 87;         0948      DC 087H
06C5 5741524E494E; 0949      DC 'WARNIN'
06CB C7;         0950      DC 0C7H..          $    WARNING    $
06CC 06B8;       0951      DC (WIDTH-8)
06CE ;           0952      WRNG
06CE 0690;       0953      DC (USER)
06D0 000E;       0954      DC 0000EH
06D2 ;           0955      ..
06D2 85;         0956      DC 085H
06D3 46454E43;   0957      DC 'FENC'
06D7 C5;         0958      DC 0C5H..          $    FENCE    $
06D8 06C4;       0959      DC (WRNG-10)
06DA ;           0960      FNCE
06DA 0690;       0961      DC (USER)
06DC 0010;       0962      DC 00010H.. DICTIONARY FENCE
06DE ;           0963      ..
06DE 8244D0;     0964      DC 08244H,0D0H..          $    DP    $
06E1 06D2;       0965      DC (FNCE-8)
06E3 ;           0966      DP
06E3 0690;       0967      DC (USER)
06E5 0012;       0968      DC 00012H.. DICTIONARY POINTER

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06E7 ; 0969 ..
06E7 88; 0970 DC 088H
06E8 564F432D4C49; 0971 DC 'VOC-LIN'
06EE 4E;
06EF CB; 0972 DC 0CBH.. * VOC-LINK *
06F0 06DE; 0973 DC (DP-5)
06F2 ; 0974 VL
06F2 0690; 0975 DC (USER)
06F4 0014; 0976 DC 00014H.. VOCABULARY LINK
06F6 ; 0977 ..
06F6 83; 0978 DC 083H
06F7 424C; 0979 DC 'BL'
06F9 CB; 0980 DC 0CBH.. $ BLK $
06FA 06E7; 0981 DC (VL-11)
06FC ; 0982 BLK
06FC 0690; 0983 DC (USER)
06FE 0040; 0984 DC 00040H.. BLOCK BEING INTERPRETED.
0700 ; 0985 ..
0700 8249CE; 0986 DC 08249H,0CEH.. $ IN $
0703 06F6; 0987 DC (BLK-6)
0705 ; 0988 FIN
0705 0690; 0989 DC (USER)
0707 0048; 0990 DC 00048H.. BYTE OFFSET OF INP TEXT BUF.
0709 ; 0991 ..
0709 83; 0992 DC 083H
070A 4F55; 0993 DC 'OU'
070C D4; 0994 DC 0D4H.. $ OUT $
070D 0700; 0995 DC (FIN-5).. NUMBER INCREMENTED BY EMIT
070F ; 0996 FOUT
070F 0690; 0997 DC (USER)
0711 004A; 0998 DC 0004AH
0713 ; 0999 ..
0713 83; 1000 DC 083H
0714 5343; 1001 DC 'SC'
0716 D2; 1002 DC 0D2H.. $ SCR $
0717 0709; 1003 DC (FOUT-6)
0719 ; 1004 FSCR
0719 0690; 1005 DC (USER)
071B 004C; 1006 DC 0004CH.. MOST RECENTLY LISTED SCREEN
071D ; 1007 ..
071D 86; 1008 DC 086H
071E 4F46465345; 1009 DC 'OFFSE'
0723 D4; 1010 DC 0D4H.. $ OFFSET $
0724 0713; 1011 DC (FSCR-6)
0726 ; 1012 OFST
0726 0690; 1013 DC (USER)
0728 004E; 1014 DC 0004EH.. DISK DRIVE OFFSET
072A ; 1015 ..
072A 87; 1016 DC 087H
072B 434F4E544558; 1017 DC 'CONTEX'
0731 D4; 1018 DC 0D4H.. $ CONTEXT $
0732 071D; 1019 DC (OFST-9)
0734 ; 1020 CNTX
0734 0690; 1021 DC (USER)

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0736 0020;          1022      DC 00020H
0738 ;              1023      ..
0738 87;            1024      DC 087H
0739 43555252454E; 1025      DC 'CURREN'
073F D4;            1026      DC 0D4H..          $  CURRENT  $
0740 072A;          1027      DC (CNTX-10)
0742 ;              1028      CRNT
0742 0690;          1029      DC (USER)
0744 0022;          1030      DC 00022H
0746 ;              1031      ..
0746 85;            1032      DC 085H
0747 53544154;      1033      DC 'STAT'
074B C5;            1034      DC 0C5H..          *  STATE  *
074C 0738;          1035      DC (CRNT-10)
074E ;              1036      STT
074E 0690;          1037      DC (USER)
0750 0024;          1038      DC 00024H..  COMPILATION STATE
0752 ;              1039      ..
0752 84;            1040      DC 084H
0753 424153;        1041      DC 'BAS'
0756 C5;            1042      DC 0C5H..          $  BASE  $
0757 0746;          1043      DC (STT-8)
0759 ;              1044      BASE
0759 0690;          1045      DC (USER)
075B 0026;          1046      DC 00026H..  NUMBER BASE IN USE
075D ;              1047      ..
075D 83;            1048      DC 083H
075E 4450;          1049      DC 'DP'
0760 CC;            1050      DC 0CCH..          $  DPL  $
0761 0752;          1051      DC (BASE-7)
0763 ;              1052      DPL
0763 0690;          1053      DC (USER)
0765 0028;          1054      DC 00028H..  DECIMAL POINT LOCATION
0767 ;              1055      ..
0767 83;            1056      DC 083H
0768 464C;          1057      DC 'FL'
076A C4;            1058      DC 0C4H..          *  FLD  *
076B 075D;          1059      DC (DPL-6)
076D ;              1060      FLD
076D 0690;          1061      DC (USER)
076F 002A;          1062      DC 0002AH..  NUMBER FIELD FORMATTING
0771 ;              1063      ..
0771 83;            1064      DC 083H
0772 4353;          1065      DC 'CS'
0774 D0;            1066      DC 0D0H..          *  CSP  *
0775 0767;          1067      DC (FLD-6)
0777 ;              1068      CSP
0777 0690;          1069      DC (USER)
0779 002C;          1070      DC 0002CH..  TEMPORARY STACK POSITION
077B ;              1071      ..
077B 8252A3;        1072      DC 08252H,0A3H..          $  R#  $
077E 0771;          1073      DC (CSP-6)
0780 ;              1074      RNU
0780 0690;          1075      DC (USER)

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0782 002E;          1076          DC 0002EH.. EDITING CURSOR LOCATION
0784 ;              1077 ..
0784 83;            1078          DC 083H
0785 484C;          1079          DC 'HL'
0787 C4;            1080          DC 0C4H..          $   HLD   $
0788 077B;          1081          DC (RNU-5)
078A ;              1082 HLD
078A 0690;          1083          DC (USER)
078C 0030;          1084          DC 00030H.. NUMBER CONVERSION VARIABLE
078E ;              1085 ..
078E 83;            1086          DC 083H
078F 5553;          1087          DC 'US'
0791 C5;            1088          DC 0C5H..          $   USE   $
0792 0784;          1089          DC (HLD-6)
0794 ;              1090 USE
0794 0690;          1091          DC (USER)
0796 0032;          1092          DC 00032H.. NEXT BUFFER TO USE
0798 ;              1093 ..
0798 84;            1094          DC 084H
0799 505245;        1095          DC 'PRE'
079C D6;            1096          DC 0D6H..          $   PREV   $
079D 078E;          1097          DC (USE-6)
079F ;              1098 PREV
079F 0690;          1099          DC (USER)
07A1 0034;          1100          DC 00034H.. PREVIOUSLY USED BUFFER
07A3 ;              1101 ..
07A3 89;            1102          DC 089H
07A4 555345522D49; 1103          DC 'USER-IOC'
07AA 4F43;          1104          DC 0C2H..          *   USER-IOCB   *
07AC C2;            1105          DC (PREV-7)
07AD 0798;          1106 DV
07AF ;              1107          DC (USER)
07AF 0690;          1108          DC 00036H.. DISK IOCB AREA.
07B1 0036;          1109 ..
07B3 ;              1110          DC 087H
07B3 87;            1111          DC 'SCR/DS'
07B4 5343522F4453; 1112          DC 0CBH          .. *   SCR/DSK   *
07BA CB;            1113          DC (DV-12).. SCREENS PER DISK
07BB 07A3;          1114 SCRDSK
07BD ;              1115          DC (USER)
07BD 0690;          1116          DC 00016H
07BF 0016;          1117 ..
07C1 ;              1118          DC 084H
07C1 84;            1119          DC 'OUT'
07C2 4F5554;        1120          DC 0CCH..          *   OUTL   *
07C5 CC;            1121          DC (SCRDSK-10).. OUTPUT LINES
07C6 07B3;          1122 OUTLL
07C8 ;              1123          DC (USER)
07C8 0690;          1124          DC 00042H.. INCREMENTED BY CR
07CA 0042;          1125 ..
07CC ;              1126          DC 083H
07CC 83;            1127          DC 'GR'
07CD 4752;          1128          DC 0D0H..          *   GRP   *
07CF D0;

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07D0 07C1;          1129      DC (OUTLL-7)..   SET BY GROUP
07D2 ;              1130 GRP
07D2 0690;          1131      DC (USER)
07D4 0044;          1132      DC 00044H..   CURRENT GROUP NUMBER
07D6 ;              1133      ..
07D6 89;            1134      DC 089H
07D7 4D4F44454D2E; 1135      DC 'MODEM.GR'
07DD 4752;
07DF D0;            1136      DC 0D0H
07E0 07CC;          1137      DC (GRP-6)
07E2 ;              1138 MGRP
07E2 0690;          1139      DC (USER)
07E4 0018;          1140      DC 00018H..MODEM GROUP
07E6 ;              1141      ..
07E6 88;            1142      DC 088H
07E7 5445524D2E47; 1143      DC 'TERM.GR'
07ED 52;
07EE D0;            1144      DC 0D0H
07EF 07D6;          1145      DC (MGRP-12)
07F1 ;              1146 TGRP
07F1 0690;          1147      DC (USER)
07F3 001A;          1148      DC 0001AH.. TERMINAL GROUP
07F5 ;              1149      ..
07F5 88;            1150      DC 088H
07F6 434F4D4D2E47; 1151      DC 'COMM.GR'
07FC 52;
07FD D0;            1152      DC 0D0H
07FE 07E6;          1153      DC (TGRP-11)
0800 ;              1154 CGRP
0800 0690;          1155      DC (USER)
0802 001C;          1156      DC 0001CH.. COMM GROUP
0804 ;              1157      ..
0804 85;            1158      DC 085H
0805 4E657874;      1159      DC 'Next'
0809 F5;            1160      DC 0F5H
080A 07F5;          1161      DC (CGRP-11)
080C ;              1162 NEXTU
080C 0690;          1163      DC (USER)
080E 001E;          1164      DC 0001EH..NEXT USER VARIABLE
0810 ;              1165      ..
0810 ;              1166      ..
0810 ;              1167      ..
0810 ;              1168      ..   END OF USER VARIABLES
0810 ;              1169      ..
0810 ;              1170      ..
0810 ;              1171      ..
0810 ;              1172      .. THE FOLLOWING ROUTINE USES THE VALUES ON THE STACK
0810 ;              1173      .. TO SEND A BYTE TO AN OUTPUT PORT
0810 ;              1174      .. STACK ACTION ( DATA PORT ... )
0810 ;              1175      ..
0810 86;            1176      DC 086H
0811 4F55545055;    1177      DC 'OUTPU'
0816 D4;            1178      DC 0D4H..   * OUTPUT *
0817 0804;          1179      DC (NEXTU-8)

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0819 ;                1180 OUTPUT
0819 081B;            1181      DC ( $+2)..  SEND BYTE OUT
081B 14686A;          1182      INC SP;RLXA RA
081E 9AFA07FEFC25;    1183      GHI RA;ANI 007H;SHL;ADI A.0(VCTRS)..COMPUTE BRANCH
0824 A3;              1184      PLO R3..      INTERPRETIVE BRANCH
0825 14D5;            1185 VCTRS  INC SP;SEP R5
0827 61D5;            1186      OUT 1;SEP R5
0829 62D5;            1187      OUT 2;SEP R5
082B 63D5;            1188      OUT 3;SEP R5
082D 64D5;            1189      OUT 4;SEP R5
082F 65D5;            1190      OUT 5;SEP R5
0831 66D5;            1191      OUT 6;SEP R5
0833 67D5;            1192      OUT 7;SEP R5
0835 ;                1193      ..
0835 ;                1194      ..
0835 ;                1195      ..
0835 85;              1196      DC 085H
0836 494E5055;        1197      DC 'INPU'
083A D4;              1198      DC 0D4H..      *   INPUT   *
083B 0810;            1199      DC (OUTPUT-9)
083D ;                1200 INPUT
083D 083F;            1201      DC ( $+2)..  READ IN A BYTE
083F E222F8D573;      1202      SEX RP;DEC RP;LDI 0D5H;STXD
0844 F82473;          1203      LDI 024H;STXD
0847 E404;            1204      SEX SP;LDN SP
0849 F35414;          1205      XOR;STR SP;INC SP..      ZERO HI HALF
084C 04FA073A53;      1206      LDN SP;ANI 007H;BNZ OKGO..  GET PORT #
0851 24D5;            1207      DEC SP;SEP R5..  NO GO IF PORT 0
0853 F96852;          1208 OKGO  ORI 068H;STR RP..  STORE INPUT INSTRUCTION
0856 D2;              1209      SEP RP..      GO DO IT
0857 ;                1210      ..
0857 ;                1211      ..
0857 ;                1212      .. NEST is used to start all FORTH
0857 ;                1213      .. colon definitions.
0857 ;                1214      ..
0857 E268A6;          1215 NEST  SEX RP;RSXD R6..  PUSH DOWN STACK
085A E668B8;          1216      SEX R6;RNX IP..  SAVE INTERPRETIVE POINTER
085D E868B9;          1217      SEX IP;RNX R9..  GET NEW INTERPRETIVE POINT
0860 D5;              1218      SEP R5
0861 ;                1219      ..
0861 84;              1220      DC 084H
0862 46494C;          1221      DC 'FIL'
0865 CC;              1222      DC 0CCH..      *   FILL   *
0866 0835;            1223      DC (INPUT-8)
0868 ;                1224 FILL
0868 086A;            1225      DC ( $+2)..  FILL MEMORY WITH A CHARACTER
086A 686F;            1226 ERS01  RLXA RF..  BYTE IS IN RF.0
086C 686B;            1227      RLXA RB..  COUNT IS IN RB
086E 686A;            1228      RLXA RA..  ADDRESS IS IN RA
0870 E2;              1229      SEX RP
0871 8B52;            1230 FILLOP  GLO RB;STR RP
0873 9BF1327D;        1231      GHI RB;OR;BZ FILLEX
0877 8F5A1A2B3071;    1232      GLO RF;STR RA;INC RA;DEC RB;BR FILLOP
087D D5;              1233 FILLEX  SEP R5

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087E ; 1234 ..
087E 85; 1235 DC 085H
087F 45524153; 1236 DC 'ERAS'
0883 C5; 1237 DC 0C5H.. * ERASE *
0884 0861; 1238 DC (FILL-7)
0886 ; 1239 ERS
0886 0888; 1240 DC ( $+2).. ERASE MEMORY (FILL WITH #00)
0888 F80024; 1241 LDI 0;DEC SP
088B 73C0086A; 1242 STXD;LBR ERS01.. GO DO IT
088F ; 1243 ..
088F 86; 1244 DC 086H
0890 424C414E4B; 1245 DC 'BLANK'
0895 D3; 1246 DC 0D3H.. * BLANKS *
0896 087E; 1247 DC (ERS-8)
0898 ; 1248 BLNK
0898 089A; 1249 DC ( $+2).. FILL MEMORY WITH BLANKS (#20)
089A F820C0088A; 1250 LDI 020H;LBR ERS+4
089F ; 1251 ..
089F ; 1252 ..
089F ; 1253 ..
089F ; 1254 .. THIS SUBROUTINE WILL ADD THE NUMBER
089F ; 1255 .. IN D TO THE UP (USER POINTER) AND RETURN THE
089F ; 1256 .. RESULT IN RB WITH 1 ADDED TO IT
089F ; 1257 ..
089F ; 1258 ..
089F 5287F4AB; 1259 USRADD STR RP;GLO UP;ADD;PLO RB
08A3 977C00BB1B; 1260 GHI UP;ADCI 0;PHI RB;INC RB
08A8 6896; 1261 SRET R6
08AA ; 1262 ..
08AA 84; 1263 DC 084H
08AB 484F4C; 1264 DC 'HOL'
08AE C4; 1265 DC 0C4H.. * HOLD *
08AF 088F; 1266 DC (BLNK-9)
08B1 ; 1267 HOLD
08B1 08B3; 1268 DC ( $+2).. INSERT CHAR. INTO OUTPUT STRING
08B3 E2F830; 1269 SEX RP;LDI 030H;SCAL R6, USRADD.. POINT B AT HLD
08B6 6886089F;
08BA 0BFF015B2BAA; 1270 LDN RB;SMI 1;STR RB;DEC RB;PLO RA.. SUBT. 1
08C0 0B7F005BBA14; 1271 LDN RB;SMBI 0;STR RB;PHI RA;INC SP
08C6 445AD5; 1272 LDA SP;STR RA;SEP R5.. STORE BYTE & EXIT
08C9 ; 1273 ..
08C9 ; 1274 ..
08C9 ; 1275 ..
08C9 ; 1276 ..
08C9 83; 1277 DC 083H
08CA 4B45; 1278 DC 'KE'
08CC D9; 1279 DC 0D9H.. * KEY *
08CD 08AA; 1280 DC (HOLD-7)
08CF ; 1281 KEY
08CF 08D1; 1282 DC ( $+2).. READ INPUT FROM KEYBOARD
08D1 24; 1283 DEC SP
08D2 6BF63BD2; 1284 KEY1 INP 3;SHR;BNF KEY1
08D6 6AFA7F73; 1285 INP 2;ANI 07FH;STXD
08DA F80054D5; 1286 LDI 0;STR SP;SEP R5

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08DE ; 1287 ..
08DE 89; 1288 DC 089H
08DF 3F5445524D49; 1289 DC '?TERMINA'
08E5 4E41;
08E7 CC; 1290 DC 0CCH.. * ?TERMINAL *
08E8 08C9; 1291 DC (KEY-6)
08EA ; 1292 QTERM
08EA 08EC; 1293 DC ( $+2).. TEST FOR BREAK KEY
08EC 246BFA0873; 1294 DEC SP;INP 3;ANI 8;STXD..TEST FE BIT
08F1 6AF354; 1295 INP 2;XOR;STR SP
08F4 D5; 1296 SEP R5
08F5 ; 1297 ..
08F5 84; 1298 DC 084H
08F6 454D49; 1299 DC 'EMI'
08F9 D4; 1300 DC 0D4H.. * EMIT *
08FA 08DE; 1301 DC (QTERM-12)
08FC ; 1302 EMIT
08FC 08FE; 1303 DC ( $+2)
08FE E26886098CD5; 1304 SEX RP;SCAL R6, EMMIT;SEP R5
0904 ; 1305 ..
0904 8243D2; 1306 DC 08243H,0D2H.. * CR *
0907 08F5; 1307 DC (EMIT-7)
0909 ; 1308 CR
0909 090B; 1309 DC ( $+2).. CRLF TO TERMINAL
090B 24F80D54; 1310 DEC SP;LDI 00DH;STR SP
090F E26886099C; 1311 SEX RP;SCAL R6, CSEND1.. SEND CR
0914 24F80A54; 1312 DEC SP;LDI 00AH;STR SP
0918 6886099C; 1313 SCAL R6, CSEND1.. SEND LF
091C F8426886089F; 1314 LDI 042H;SCAL R6, USRADD.. POINT TO OUTL
0922 0BFC015B2B; 1315 LDN RB;ADI 1;STR RB;DEC RB.. INCREMENT OUTL
0927 0B7C005B; 1316 LDN RB;ADCI 0;STR RB
092B D5; 1317 TYPEX SEP R5
092C ; 1318 ..
092C 84; 1319 DC 084H
092D 545950; 1320 DC 'TYP'
0930 C5; 1321 DC 0C5H.. * TYPE *
0931 0904; 1322 DC (CR-5)
0933 ; 1323 TYPE
0933 0935; 1324 DC ( $+2).. TYPE TO TERMINAL USING COUNT AND
0935 E2F84A; 1325 SEX RP;LDI 04AH;SCAL R6, USRADD
0938 6886089F;
093C E4686A; 1326 SEX SP;RLXA RA.. COUNT -> RA
093F 686D; 1327 RLXA RD.. ADDRESS -> RD
0941 EB8AF473; 1328 SEX RB;GLO RA;ADD;STXD
0945 9A7473E2; 1329 GHI RA;ADC;STXD;SEX RP
0949 8A52; 1330 TYPLP GLO RA;STR RP
094B 9AF1C2092B; 1331 GHI RA;OR;LBZ TYPEX
0950 244D54; 1332 DEC SP;LDA RD;STR SP
0953 6886099C; 1333 SCAL R6, CSEND1
0957 2AC00949; 1334 DEC RA;LBR TYPLP
095B ; 1335 ..
095B 85; 1336 DC 085H
095C 53504143; 1337 DC 'SPAC'
0960 C5; 1338 DC 0C5H.. * SPACE *

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0961 092C;          1339      DC (TYPE-7)
0963 ;              1340 SPC
0963 0965;          1341      DC ( $+2)
0965 24F82073;      1342      DEC SP;LDI 020H;STXD
0969 C008FE;        1343      LBR EMIT+2
096C ;              1344      ..
096C ;              1345      .. THE FOLLOWING ROUTINES ALLOW CALLS INTO THE
096C ;              1346      .. UTILITY PROGRAM. IT SETS UP R4 AND 5 FOR
096C ;              1347      ..THE STANDARD CALL AND RETURN ROUTINES
096C ;              1348      ..
096C 68A4;          1349 SCRT  RSXD R4.. SAVE R4
096E 68C40977;      1350      RLDI R4, CALLR
0972 15156896;      1351      INC R5;INC R5;SRET R6
0976 ;              1352      ..
0976 D3;            1353 CALLX  SEP R3
0977 E268A6E668B3;  1354 CALLR  SEX RP;RSXD R6;SEX R6;RNX R3
097D 6863E23076;    1355      RLXA R3;SEX RP;BR CALLX
0982 ;              1356      ..
0982 126864;        1357 SCRTX  INC RP;RLXA R4
0985 2268C50098;    1358      DEC RP;RLDI R5, NEXT;SRET R6
098A 6896;          1359      ..
098C ;              1360      ..
098C ;              1361      ..
098C ;              1362      .. THIS SUBROUTINE WILL EMIT A CHARACTER AND
098C ;              1363      .. INCREMENT THE VARIABLE 'OUT'
098C ;              1364      ..
098C F84A6886089F;  1365 EMMIT  LDI 04AH;SCAL R6, USRADD.. POINT TO 'OUT'
0992 0BFC015B2B;    1366      LDN RB;ADI 1;STR RB;DEC RB.. INCREMENT 'OUT'
0997 0B7C005B;      1367      LDN RB;ADCI 0;STR RB
099B 14;            1368      INC SP..      POINT TO BYTE TO SEND
099C ;              1369      ..
099C ;              1370      .. THE FOLLOWING SENDS THE CHARACTER ON THE STACK
099C ;              1371      .. TO THE TERMINAL.
099C ;              1372      ..
099C 6BFE3B9C;      1373 CSEND1  INP 3;SHL;BNF CSEND1
09A0 E462E2;        1374      SEX SP;OUT 2;SEX RP
09A3 6896;          1375      SRET R6
09A5 ;              1376      ..
09A5 ;              1377      ..
09A5 ;              1378      ..
09A5 8A;            1379      DC 08AH
09A6 424C4F434B2D; 1380      DC 'BLOCK-REA'
09AC 524541;        1381      DC 0C4H..      * BLOCK-READ *
09AF C4;            1382      DC (SPC-8)
09B0 095B;          1383 BLKRD
09B2 ;              1384      DC ( $+2).. READ A BLOCK INTO BUFFER AREA
09B2 09B4;          1385      RLXA RF.. SET UP RF TO IOCB
09B4 686F;          1386      SEX RP;SCAL R6, SCRT
09B6 E26886096C;    1387      RSXD R8;RSXD R7.. SAVE REGISTERS 7 & 8
09BB 68A868A7;      1388      CALL SEEK;CALL DREAD.. READ 512 BYTES
09BF D487F6D487F9;  1389      CALL SETUP.. SET UP FOR NEXT 512 BYTES
09C5 D41778;        1390      CALL DREAD.. READ NEXT 512 BYTES
09C8 D487F9;

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09CB 30F4;          1391      BR BLKEX
09CD ;              1392      ..
09CD 8B;            1393      DC 08BH
09CE 424C4F434B2D; 1394      DC 'BLOCK-WRIT'
09D4 57524954;      1395
09D8 C5;            1395      DC 0C5H..      * BLOCK-WRITE *
09D9 09A5;          1396      DC (BLKRD-13)
09DB ;              1397      BLKWT
09DB 09DD;          1398      DC ( $+2)..  WRITE A BLOCK TO DISK
09DD 686F;          1399      RLXA RF..  SET RF TO IOCB FROM STACK
09DF E26886096C;    1400      SEX RP;SCAL R6, SCRT
09E4 68A868A7;      1401      RSXD R8;RSXD R7..  SAVE 7 & 8
09E8 D487F6D487FC; 1402      CALL SEEK;CALL DWRITE
09EE D41778;         1403      CALL SETUP
09F1 D487FC;         1404      CALL DWRITE
09F4 1268676868;    1405      BLKEX  INC RP;RLXA R7;RLXA R8
09F9 22;             1406      DEC RP..      FIX RETURN POINTER
09FA 68860982;       1407      SCAL R6, SCRTX
09FE D5;             1408      SEP R5
09FF ;              1409      ..
09FF ;              1410      ..
09FF ;              1411      ..
09FF 85;             1412      DC 085H
0A00 4D2F4D4F;       1413      DC 'M/MO'
0A04 C4;             1414      DC 0C4H..      *   M/MOD   *
0A05 09CD;           1415      DC (BLKWT-14)
0A07 ;               1416      MSMOD
0A07 0A09;           1417      DC ( $+2)..  ( UD1 UN2 -- UR UD3 )
0A09 686F;           1418      RLXA RF..  DIVISOR TO RF
0A0B 686B686A;       1419      RLXA RB;RLXA RA..  DIVIDEND TO B & C
0A0F 68CC0000;       1420      RLDI RC, 00000H..      RC SET UP FOR REMAINDER
0A13 248F739F54;     1421      DEC SP;GLO RF;STXD;GHI RF;STR SP
0A18 14F821AF;       1422      INC SP;LDI 33;PLO RF..  SET UP COUNT
0A1C FE;             1423      SHL..      SET DF=0
0A1D 8A7EAA;         1424      MSMOD3  GLO RA;SHLC;PLO RA..  START 48 BIT SHIFT
0A20 9A7EBA;         1425      GHI RA;SHLC;PHI RA
0A23 8B7EAB;         1426      GLO RB;SHLC;PLO RB
0A26 9B7EBB;         1427      GHI RB;SHLC;PHI RB
0A29 2F8F;           1428      DEC RF;GLO RF..  TEST COUNT BEFORE SHIFTING
0A2B C20A44;         1429      LBZ MSMODX..  RC TO SEE IF DONE.
0A2E 8C7EAC;         1430      GLO RC;SHLC;PLO RC
0A31 9C7EBC;         1431      GHI RC;SHLC;PHI RC..  DONE WITH SHIFT
0A34 8CF7BF;         1432      GLO RC;SM;PHI RF..  SEE IF DIVISOR WILL GO
0A37 249C7714;       1433      DEC SP;GHI RC;SMB;INC SP
0A3B CB0A1D;         1434      LBNF MSMOD3..  BRANCH IF IT WONT GO
0A3E BC9FAC;         1435      PHI RC;GHI RF;PLO RC..  SUBTRACT IT IF IT WILL
0A41 C00A1D;         1436      LBR MSMOD3
0A44 68AC;           1437      MSMODX  RSXD RC..  REMAINDER -> STACK
0A46 68AA68AB;       1438      RSXD RA;RSXD RB..  QUOTIENT -> STACK
0A4A 14D5;           1439      INC SP;SEP R5
0A4C ;               1440      ..
0A4C ;               1441      ..
0A4C ;               1442      ..
0A4C 84;             1443      DC 084H

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0A4D 484552;      1444      DC 'HER'
0A50 C5;          1445      DC 0C5H..      *   HERE   *
0A51 09FF;        1446      DC (MSMOD-8)
0A53 ;            1447 HERE
0A53 0A55;        1448      DC ( $+2)
0A55 E2;          1449      SEX RP
0A56 F8126886089F; 1450      LDI 012H;SCAL R6, USRADD.. B=ADDRESS OF DP
0A5C 240B5424;    1451      DEC SP;LDN RB;STR SP;DEC SP.. PUT DP ON STACK
0A60 2B0B54D5;    1452      DEC RB;LDN RB;STR SP;SEP R5
0A64 ;            1453      ..
0A64 85;          1454      DC 085H
0A65 414C4C4F;    1455      DC 'ALLO'
0A69 D4;          1456      DC 0D4H..      *   ALLOT   *
0A6A 0A4C;        1457      DC (HERE-7)
0A6C ;            1458 ALLOT
0A6C 0A6E;        1459      DC ( $+2)..      ALLOT SPACE AT HERE
0A6E E2;          1460      SEX RP
0A6F F8126886089F; 1461      LDI 012H;SCAL R6, USRADD.. B=ADDRESS OF DP.0
0A75 E4686A;      1462      SEX SP;RLXA RA..      TOP OF STACK IN A
0A78 EB;          1463 ALLOT1 SEX RB..      ADD IT TO @RB
0A79 8AF473;      1464      GLO RA;ADD;STXD
0A7C 9A7473D5;    1465      GHI RA;ADC;STXD;SEP R5
0A80 ;            1466      ..
0A80 81AC;        1467      DC 081ACH..      *       *
0A82 0A64;        1468      DC (ALLOT-8)
0A84 ;            1469 COMMA
0A84 0A86;        1470      DC ( $+2)..      STORE TOP AT HERE AND
0A86 E2;          1471      SEX RP
0A87 F8116886089F; 1472      LDI 011H;SCAL R6, USRADD.. ALLOT 2 BYTES
0A8D EB686F2B;    1473      SEX RB;RLXA RF;DEC RB.. F=ADDRESS OF HERE
0A91 445F1F;      1474      LDA SP;STR RF;INC RF.. STORE HI HALF AT HERE
0A94 F802;        1475      LDI 2..      SET UP TO ALLOT 2
0A96 AA445F;      1476 COMMA1 PLO RA;LDA SP;STR RF.. STORE LO HALF
0A99 F800BAC00A78; 1477      LDI 0;PHI RA;LBR ALLOT1.. GO ALLOT FOR IT
0A9F ;            1478      ..
0A9F 8243AC;      1479      DC 08243H,0ACH..      *   C,   *
0AA2 0A80;        1480      DC (COMMA-4)
0AA4 ;            1481 CCMA
0AA4 0AA6;        1482      DC ( $+2)..      STORE TOP CHAR. AT HERE
0AA6 E2;          1483      SEX RP
0AA7 F8116886089F; 1484      LDI 011H;SCAL R6, USRADD.. AND ALLOT 1 BYTE
0AAD EB686F2B;    1485      SEX RB;RLXA RF;DEC RB
0AB1 14F801;      1486      INC SP;LDI 1
0AB4 C00A96;      1487      LBR COMMA1..      GO DO IT
0AB7 ;            1488      ..
0AB7 8231AD;      1489      DC 08231H,0ADH..      *   1-   *
0ABA 0A9F;        1490      DC (CCMA-5)
0ABC ;            1491 ONEMIN
0ABC 0ABE;        1492      DC ( $+2)..      SUBTRACT 1 FROM TOP
0ABE F801;        1493      LDI 1
0AC0 14;          1494 ONMNS1 INC SP
0AC1 F573F80075;  1495      SD;STXD;LDI 0;SDB
0AC6 54D5;        1496      STR SP;SEP R5
0AC8 ;            1497      ..

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0AC8 8232AD;      1498      DC 08232H,0ADH..      *      2-      *
0ACB 0AB7;        1499      DC (ONEMIN-5)
0ACD ;           1500      TWOMIN
0ACD 0ACF;        1501      DC ( $+2)..      SUBTRACT 2 FROM TOP
0ACF F80230C0;    1502      LDI 2;BR ONMNS1
0AD3 ;           1503      ..
0AD3 83;          1504      DC 083H
0AD4 4C46;        1505      DC 'LF'
0AD6 C1;          1506      DC 0C1H..      *      LFA      *
0AD7 0AC8;        1507      DC (TWOMIN-5)
0AD9 ;           1508      LFA
0AD9 0ADB;        1509      DC ( $+2)..      CONVERT PFA TO LFA
0ADB F80430C0;    1510      LDI 4;BR ONMNS1..      SUBTRACT 4 FROM TOP
0ADF ;           1511      ..
0ADF 83;          1512      DC 083H
0AE0 4346;        1513      DC 'CF'
0AE2 C1;          1514      DC 0C1H..      *      CFA      *
0AE3 0AD3;        1515      DC (LFA-6)
0AE5 ;           1516      CFA
0AE5 0ACF;        1517      DC (TWOMIN+2)..      CONVERT PFA TO CFA
0AE7 ;           1518      ..
0AE7 84214353D0;  1519      DC 08421H,04353H,0D0H..      *      !CSP      *
0AEC 0ADF;        1520      DC (CFA-6)
0AEE ;           1521      DCSP
0AEE 0AF0;        1522      DC ( $+2)..      SAVE SP IN CSP
0AF0 E2;          1523      SEX RP
0AF1 F82C6886089F; 1524      LDI 02CH;SCAL R6, USRADD.. RB=ADDRESS OF CSP.0
0AF7 EB68A4D5;    1525      SEX RB;RSXD SP;SEP R5.. SAVE SP THERE
0AFB ;           1526      ..
0AFB 85;          1527      DC 085H
0AFC 434F554E;    1528      DC 'COUN'
0B00 D4;          1529      DC 0D4H..      *      COUNT      *
0B01 0AE7;        1530      DC (DCSP-7)
0B03 ;           1531      CNT
0B03 0B05;        1532      DC ( $+2)..      GET CHARACTER COUNT ON STACK
0B05 686B24;      1533      RLXA RB;DEC SP
0B08 4B;          1534      LDA RB..      GET COUNT
0B09 68AB;        1535      RSXD RB..      STORE ADDRESS ON STACK
0B0B 73F80054;    1536      STXD;LDI 0;STR SP..      STORE COUNT ON STACK
0B0F D5;          1537      SEP R5
0B10 ;           1538      ..
0B10 89;          1539      DC 089H
0B11 2D545241494C; 1540      DC '-TRAILIN'
0B17 494E;
0B19 C7;          1541      DC 0C7H..      *      -TRAILING      *
0B1A 0AFB;        1542      DC (CNT-8)
0B1C ;           1543      TRLG
0B1C 0B1E;        1544      DC ( $+2)..      ADJUST CHARACTER COUNT TO DELETE
0B1E 686B14;      1545      RLXA RB;INC SP..      TRAILING BLANKS
0B21 8BF4AA24;    1546      GLO RB;ADD;PLO RA;DEC SP
0B25 9B74BA24;    1547      GHI RB;ADC;PHI RA;DEC SP.. A=LAST CHAR
0B29 2A0AFB20;    1548      TRL1 DEC RA;LDN RA;XRI 020H..      SEE IF BLANK
0B2D 3A36;        1549      BNZ TRL2..      NO.      EXIT
0B2F 2B8B3A29;    1550      DEC RB;GLO RB;BNZ TRL1..      LOOP BACK TILL..

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0B33 9B3A29;      1551      GHI RB;BNZ TRL1..      NONE LEFT
0B36 68AB14D5;    1552 TRL2  RSXD RB;INC SP;SEP R5
0B3A ;            1553      ..
0B3A ;            1554      ..      *      (".")      *
0B3A 84;          1555      DC 084H
0B3B 282E22;      1556      DC '(. "'
0B3E A9;          1557      DC 0A9H
0B3F 0B10;        1558      DC (TRLG-12)
0B41 ;            1559 PDQ
0B41 0B43;        1560      DC ( $+2).. TYPE COUNT CHARACTERS TO TERMINAL
0B43 485224;      1561      LDA IP;STR RP;DEC SP.. GET ADDR & COUNT
0B46 68A873;      1562      RSXD IP;STXD
0B49 F80054E2;    1563      LDI 0;STR SP;SEX RP
0B4D 88F4A8;      1564      GLO IP;ADD;PLO IP.. RE-POSITION IP PAST TEXT
0B50 987C00B8;    1565      GHI IP;ADCI 0;PHI IP
0B54 C00935;      1566      LBR TYPE+2..      GO TYPE TEXT
0B57 ;            1567      ..
0B57 83;          1568      DC 083H
0B58 5041;        1569      DC 'PA'
0B5A C4;          1570      DC 0C4H..      *      PAD      *
0B5B 0B3A;        1571      DC (PDQ-7)
0B5D ;            1572 PAD
0B5D 0B5F;        1573      DC ( $+2).. GET ADDRESS OF PAD TO STACK
0B5F E2;          1574      SEX RP
0B60 F8116886089F; 1575      LDI 011H;SCAL R6, USRADD.. POINT TO DP
0B66 EB686F;      1576      SEX RB;RLXA RF..      RF POINTS TO HERE
0B69 E424;        1577      SEX SP;DEC SP..      POINT TO FREE SPACE
0B6B 8FFC4473;    1578      GLO RF;ADI 044H;STXD.. LEAVE ADDRESS OF PAD
0B6F 9F7C0054;    1579      GHI RF;ADCI 0;STR SP
0B73 D5;          1580      SEP R5
0B74 ;            1581      ..
0B74 822BAD;      1582      DC 0822BH,0ADH..      *      +-      *
0B77 0B57;        1583      DC (PAD-6)
0B79 ;            1584 PM
0B79 0B7B;        1585      DC ( $+2).. NEGATE N1 IF N2 IS NEGATIVE
0B7B 4414FE;      1586      LDA SP;INC SP;SHL
0B7E C30434D5;    1587      LBDF MINUS+2;SEP R5
0B82 ;            1588      ..
0B82 83442BAD;    1589      DC 08344H,02BADH..      *      D+-      *
0B86 0B74;        1590      DC (PM-5)
0B88 ;            1591 DPM
0B88 0B8A;        1592      DC ( $+2).. NEGATE DOUBLE NUMBER D1 IF N2 NEG.
0B8A 4414FE;      1593      LDA SP;INC SP;SHL
0B8D C3044FD5;    1594      LBDF DMIN+2;SEP R5
0B91 ;            1595      ..
0B91 88;          1596      DC 088H
0B92 545241564552; 1597      DC 'TRAVERS'
0B98 53;          1598
0B99 C5;          1599      DC 0C5H..      * TRAVERSE *
0B9A 0B82;        1599      DC (DPM-6)
0B9C ;            1600 TRVS
0B9C 0857;        1601      DC (NEST)
0B9E 0489;        1602      DC (SWAP)
0BA0 ;            1603 TR1

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0BA0 0467;      1604      DC (OVER)
0BA2 03C4;      1605      DC (PLUS)
0BA4 0149;      1606      DC (LIT)
0BA6 007F;      1607      DC 0007FH
0BA8 0467;      1608      DC (OVER)
0BAA 04D1;      1609      DC (CAT)
0BAC 0390;      1610      DC (LESS)
0BAE 0182;      1611      DC (ZBRCH)
0BB0 0BA0;      1612      DC (TR1)
0BB2 0489;      1613      DC (SWAP)
0BB4 047D;      1614      DC (DROP)
0BB6 02C0;      1615      DC (SEMIS)
0BB8 ;          1616      ..
0BB8 86;        1617      DC 086H
0BB9 4C41544553; 1618      DC 'LATES'
0BBE D4;        1619      DC 0D4H..      * LATEST *
0BBF 0B91;      1620      DC (TRVS-11)
0BC1 ;          1621      LTST
0BC1 0857;      1622      DC (NEST)
0BC3 0742;      1623      DC (CRNT)
0BC5 04BF;      1624      DC (AT)
0BC7 04BF;      1625      DC (AT)
0BC9 02C0;      1626      DC (SEMIS)
0BCB ;          1627      ..
0BCB 834E46C1;  1628      DC 0834EH,046C1H..      * NFA *
0BCF 0BB8;      1629      DC (LTST-9)      ..NAME FIELD ADDRESS
0BD1 ;          1630      NFA
0BD1 0857;      1631      DC (NEST)
0BD3 0149;      1632      DC (LIT)
0BD5 0005;      1633      DC 00005H
0BD7 0405;      1634      DC (MINS)
0BD9 0149;      1635      DC (LIT)
0BDB FFFF;      1636      DC 0FFFFH
0BDD 0B9C;      1637      DC (TRVS)
0BDF 02C0;      1638      DC (SEMIS)
0BE1 ;          1639      ..
0BE1 835046C1;  1640      DC 08350H,046C1H..      * PFA *
0BE5 0BCB;      1641      DC (NFA-6)      ..PARAMETER FIELD ADDRESS
0BE7 ;          1642      PFA
0BE7 0857;      1643      DC (NEST)
0BE9 0610;      1644      DC (ONE)
0BEB 0B9C;      1645      DC (TRVS)
0BED 0149;      1646      DC (LIT)
0BEF 0005;      1647      DC 00005H
0BF1 03C4;      1648      DC (PLUS)
0BF3 02C0;      1649      DC (SEMIS)
0BF5 ;          1650      ..
0BF5 86;        1651      DC 086H
0BF6 3F4552524F; 1652      DC '?ERRO'
0BFB D2;        1653      DC 0D2H..      * ?ERROR *
0BFC 0BE1;      1654      DC (PFA-6)
0BFE ;          1655      QERR
0BFE 0857;      1656      DC (NEST)
0C00 0489;      1657      DC (SWAP)

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0C02 0182;          1658      DC (ZBRCH)
0C04 0C0C;          1659      DC ( $+8)
0C06 0F28;          1660      DC (ERROR)
0C08 0172;          1661      DC (BRCH)
0C0A 0C0E;          1662      DC ( $+4)
0C0C 047D;          1663      DC (DROP)
0C0E 02C0;          1664      DC (SEMIS)
0C10 ;              1665      ..
0C10 85;             1666      DC 085H
0C11 3F434F4D;       1667      DC '?COM'
0C15 D0;             1668      DC 0D0H..      * ?COMP      *
0C16 0BF5;           1669      DC (QERR-9)
0C18 ;              1670      QCMP
0C18 0857;           1671      DC (NEST)
0C1A 074E;           1672      DC (STT)
0C1C 04BF;           1673      DC (AT)
0C1E 0352;           1674      DC (ZEQAL)
0C20 0149;           1675      DC (LIT)
0C22 0011;           1676      DC 00011H
0C24 0BFE;           1677      DC (QERR)
0C26 02C0;           1678      DC (SEMIS)
0C28 ;              1679      ..
0C28 85;             1680      DC 085H
0C29 3F455845;       1681      DC '?EXE'
0C2D C3;             1682      DC 0C3H..      * ?EXEC      *
0C2E 0C10;           1683      DC (QCMP-8)
0C30 ;              1684      EXC
0C30 0857;           1685      DC (NEST)
0C32 074E;           1686      DC (STT)
0C34 04BF;           1687      DC (AT)
0C36 0149;           1688      DC (LIT)
0C38 0012;           1689      DC 00012H
0C3A 0BFE;           1690      DC (QERR)
0C3C 02C0;           1691      DC (SEMIS)
0C3E ;              1692      ..
0C3E 86;             1693      DC 086H
0C3F 3F50414952;     1694      DC '?PAIR'
0C44 D3;             1695      DC 0D3H..      * ?PAIRS      *
0C45 0C28;           1696      DC (EXC-8)
0C47 ;              1697      QPR
0C47 0857;           1698      DC (NEST)
0C49 0405;           1699      DC (MINS)
0C4B 0149;           1700      DC (LIT)
0C4D 0013;           1701      DC 00013H
0C4F 0BFE;           1702      DC (QERR)
0C51 02C0;           1703      DC (SEMIS)
0C53 ;              1704      ..
0C53 843F4353D0;     1705      DC 0843FH,04353H,0D0H..      * ?CSP      *
0C58 0C3E;           1706      DC (QPR-9)
0C5A ;              1707      QCSP
0C5A 0857;           1708      DC (NEST)
0C5C 0286;           1709      DC (FSPAT)
0C5E 0777;           1710      DC (CSP)
0C60 04BF;           1711      DC (AT)

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0C62 0405;          1712      DC (MINS)
0C64 0149;          1713      DC (LIT)
0C66 0014;          1714      DC 00014H
0C68 0BFE;          1715      DC (QERR)
0C6A 02C0;          1716      DC (SEMIS)
0C6C ;              1717      ..
0C6C 88;             1718      DC 088H
0C6D 3F4C4F414449; 1719      DC '?LOADIN'
0C73 4E;
0C74 C7;             1720      DC 0C7H..      * ?LOADING *
0C75 0C53;          1721      DC (QCSP-7)
0C77 ;              1722      QLDG
0C77 0857;          1723      DC (NEST)
0C79 06FC;          1724      DC (BLK)
0C7B 04BF;          1725      DC (AT)
0C7D 0352;          1726      DC (ZEQAL)
0C7F 0149;          1727      DC (LIT)
0C81 0016;          1728      DC 00016H
0C83 0BFE;          1729      DC (QERR)
0C85 02C0;          1730      DC (SEMIS)
0C87 ;              1731      ..
0C87 87;             1732      DC 087H
0C88 434F4D50494C; 1733      DC 'COMPIL'
0C8E C5;             1734      DC 0C5H..      *  COMPILE  *
0C8F 0C6C;          1735      DC (QLDG-11)
0C91 ;              1736      CMPL
0C91 0857;          1737      DC (NEST)
0C93 0C18;          1738      DC (QCMP)
0C95 0336;          1739      DC (RG)
0C97 049C;          1740      DC (DUP)
0C99 03E7;          1741      DC (PLUS2)
0C9B 0328;          1742      DC (GR)
0C9D 04BF;          1743      DC (AT)
0C9F 0A84;          1744      DC (COMMA)
0CA1 02C0;          1745      DC (SEMIS)
0CA3 ;              1746      ..
0CA3 C1DB;          1747      DC 0C1DBH..      *      [      *
0CA5 0C87;          1748      DC (CMPL-10)
0CA7 ;              1749      LB
0CA7 0857;          1750      DC (NEST)
0CA9 0608;          1751      DC (ZERO)
0CAB 074E;          1752      DC (STT)
0CAD 04E0;          1753      DC (EX)
0CAF 02C0;          1754      DC (SEMIS)
0CB1 ;              1755      ..
0CB1 81DD;          1756      DC 081DDH..      *      ]      *
0CB3 0CA3;          1757      DC (LB-4)
0CB5 ;              1758      RTB
0CB5 0857;          1759      DC (NEST)
0CB7 0149;          1760      DC (LIT)
0CB9 00C0;          1761      DC 000C0H
0CBB 074E;          1762      DC (STT)
0CBD 04E0;          1763      DC (EX)
0CBF 02C0;          1764      DC (SEMIS)

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0CC1 ; 1765 ..
0CC1 86; 1766 DC 086H
0CC2 534D554447; 1767 DC 'SMUDG'
0CC7 C5; 1768 DC 0C5H.. * SMUDGE *
0CC8 0CB1; 1769 DC (RTB-4)
0CCA ; 1770 SMDG
0CCA 0857; 1771 DC (NEST)
0CCC 0BC1; 1772 DC (LTST)
0CCE 0149; 1773 DC (LIT)
0CD0 0020; 1774 DC 00020H
0CD2 04B0; 1775 DC (TGLE)
0CD4 02C0; 1776 DC (SEMIS)
0CD6 ; 1777 ..
0CD6 834845D8; 1778 DC 08348H,045D8H.. * HEX *
0CDA 0CC1; 1779 DC (SMDG-9)
0CDC ; 1780 MHEX
0CDC 0857; 1781 DC (NEST)
0CDE 0149; 1782 DC (LIT)
0CE0 0010; 1783 DC 00010H
0CE2 0759; 1784 DC (BASE)
0CE4 04E0; 1785 DC (EX)
0CE6 02C0; 1786 DC (SEMIS)
0CE8 ; 1787 ..
0CE8 87; 1788 DC 087H
0CE9 444543494D41; 1789 DC 'DECIMA'
0CEF CC; 1790 DC 0CCH.. * DECIMAL *
0CF0 0CD6; 1791 DC (MHEX-6)
0CF2 ; 1792 MDCML
0CF2 0857; 1793 DC (NEST)
0CF4 0149; 1794 DC (LIT)
0CF6 000A; 1795 DC 0000AH
0CF8 0759; 1796 DC (BASE)
0CFA 04E0; 1797 DC (EX)
0CFC 02C0; 1798 DC (SEMIS)
0CFE ; 1799 ..
0CFE 87; 1800 DC 087H
0CFF 283B434F4445; 1801 DC ' (;CODE'.. * (;CODE) *
0D05 A9; 1802 DC 0A9H
0D06 0CE8; 1803 DC (MDCML-10)
0D08 ; 1804 PCODE
0D08 0857; 1805 DC (NEST)
0D0A 0336; 1806 DC (RG).. CALLED BY ;CODE
0D0C 0BC1; 1807 DC (LTST)
0D0E 0BE7; 1808 DC (PFA)
0D10 0AE5; 1809 DC (CFA)
0D12 04E0; 1810 DC (EX)
0D14 02C0; 1811 DC (SEMIS)
0D16 ; 1812 ..
0D16 C5; 1813 DC 0C5H
0D17 3B434F44; 1814 DC ' ;COD'
0D1B C5; 1815 DC 0C5H.. * ;CODE *
0D1C 0CFE; 1816 DC (PCODE-10)
0D1E ; 1817 CODE
0D1E 0857; 1818 DC (NEST)

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0D20 0C5A;          1819          DC (QCSP)
0D22 0C91;          1820          DC (CMPL)
0D24 0D08;          1821          DC (PCODE)
0D26 0CA7;          1822          DC (LB)
0D28 0CCA;          1823          DC (SMDG)
0D2A 02C0;          1824          DC (SEMIS)
0D2C ;              1825          ..
0D2C 86;            1826          DC 086H
0D2D 4558504543;    1827          DC 'EXPEC'
0D32 D4;            1828          DC 0D4H..      * EXPECT *
0D33 0D16;          1829          DC (CODE-8)
0D35 ;              1830 EXPT
0D35 0857;          1831          DC (NEST)
0D37 0467;          1832          DC (OVER)
0D39 03C4;          1833          DC (PLUS)
0D3B 0467;          1834          DC (OVER)
0D3D 015B;          1835          DC (PDO)
0D3F ;              1836 EXPT4
0D3F 08CF;          1837          DC (KEY)
0D41 049C;          1838          DC (DUP)
0D43 0149;          1839          DC (LIT)
0D45 000E;          1840          DC 0000EH
0D47 0688;          1841          DC (PORG)
0D49 04BF;          1842          DC (AT)
0D4B 0373;          1843          DC (EQL)
0D4D 0182;          1844          DC (ZBRCH)
0D4F 0D6D;          1845          DC (EXPT1)
0D51 047D;          1846          DC (DROP)
0D53 0149;          1847          DC (LIT)
0D55 0008;          1848          DC 00008H
0D57 0467;          1849          DC (OVER)
0D59 0346;          1850          DC (I)
0D5B 0373;          1851          DC (EQL)
0D5D 049C;          1852          DC (DUP)
0D5F 0336;          1853          DC (RG)
0D61 0ACD;          1854          DC (TWOMIN)
0D63 03C4;          1855          DC (PLUS)
0D65 0328;          1856          DC (GR)
0D67 0405;          1857          DC (MINS)
0D69 0172;          1858          DC (BRCH)
0D6B 0D93;          1859          DC (EXPT2)
0D6D ;              1860 EXPT1
0D6D 049C;          1861          DC (DUP)
0D6F 0149;          1862          DC (LIT)
0D71 000D;          1863          DC 0000DH
0D73 0373;          1864          DC (EQL)
0D75 0182;          1865          DC (ZBRCH)
0D77 0D85;          1866          DC (EXPT3)
0D79 031B;          1867          DC (LVE)
0D7B 047D;          1868          DC (DROP)
0D7D 0629;          1869          DC (BL)
0D7F 0608;          1870          DC (ZERO)
0D81 0172;          1871          DC (BRCH)
0D83 0D87;          1872          DC (EXPT5)

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0D85 ; 1873 EXPT3
0D85 049C; 1874 DC (DUP)
0D87 ; 1875 EXPT5
0D87 0346; 1876 DC (I)
0D89 04F0; 1877 DC (CEX)
0D8B 0608; 1878 DC (ZERO)
0D8D 0346; 1879 DC (I)
0D8F 03D5; 1880 DC (PLUS1)
0D91 04E0; 1881 DC (EX)
0D93 ; 1882 EXPT2
0D93 08FC; 1883 DC (EMIT)
0D95 00AE; 1884 DC (LUPE)
0D97 0D3F; 1885 DC (EXPT4)
0D99 047D; 1886 DC (DROP)
0D9B 02C0; 1887 DC (SEMIS)
0D9D ; 1888 ..
0D9D 85; 1889 DC 085H
0D9E 51554552; 1890 DC 'QUER'
0DA2 D9; 1891 DC 0D9H.. * QUERY *
0DA3 0D2C; 1892 DC (EXPT-9).. INPUT LINE OF TEXT
0DA5 ; 1893 QUER
0DA5 0857; 1894 DC (NEST)
0DA7 06B4; 1895 DC (TIB)
0DA9 04BF; 1896 DC (AT)
0DAB 0149; 1897 DC (LIT)
0DAD 0080; 1898 DC 00080H
0DAF 0D35; 1899 DC (EXPT)
0DB1 0608; 1900 DC (ZERO)
0DB3 0705; 1901 DC (FIN)
0DB5 04E0; 1902 DC (EX)
0DB7 02C0; 1903 DC (SEMIS)
0DB9 ; 1904 ..
0DB9 C180; 1905 DC 0C180H.. * (NULL) *
0DBB 0D9D; 1906 DC (QUER-8)
0DBD ; 1907 X
0DBD 0857; 1908 DC (NEST)
0DBF 06FC; 1909 DC (BLK)
0DC1 04BF; 1910 DC (AT)
0DC3 0182; 1911 DC (ZBRCH)
0DC5 0DED; 1912 DC (X2)
0DC7 0610; 1913 DC (ONE)
0DC9 06FC; 1914 DC (BLK)
0DCB 03F2; 1915 DC (PLUSS)
0DCD 0608; 1916 DC (ZERO)
0DCF 0705; 1917 DC (FIN)
0DD1 04E0; 1918 DC (EX)
0DD3 06FC; 1919 DC (BLK)
0DD5 04BF; 1920 DC (AT)
0DD7 0149; 1921 DC (LIT)
0DD9 0007; 1922 DC 00007H
0ddb 0251; 1923 DC (FAND)
0DDD 0352; 1924 DC (ZEQUAL)
0DDF 0182; 1925 DC (ZBRCH)
0DE1 0DE9; 1926 DC (X1)

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0DE3 0C30;	1927	DC (EXC)
0DE5 0336;	1928	DC (RG)
0DE7 047D;	1929	DC (DROP)
0DE9 ;	1930 X1	
0DE9 0172;	1931	DC (BRCH)
0DEB 0DF1;	1932	DC (XEND)
0DED ;	1933 X2	
0DED 0336;	1934	DC (RG)
0DEF 047D;	1935	DC (DROP)
0DF1 ;	1936 XEND	
0DF1 02C0;	1937	DC (SEMIS)
0DF3 ;	1938	..
0DF3 84;	1939	DC 084H
0DF4 574F52;	1940	DC 'WOR'
0DF7 C4;	1941	DC 0C4H..
0DF8 0DB9;	1942	DC (X-4)
0DFA ;	1943 WORD	
0DFA 0857;	1944	DC (NEST)
0DFC 06FC;	1945	DC (BLK)
0DFE 04BF;	1946	DC (AT)
0E00 0182;	1947	DC (ZBRCH)
0E02 0E0E;	1948	DC (WD1)
0E04 06FC;	1949	DC (BLK)
0E06 04BF;	1950	DC (AT)
0E08 16DE;	1951	DC (BLOCK)
0E0A 0172;	1952	DC (BRCH)
0E0C 0E12;	1953	DC (WD2)
0E0E ;	1954 WD1	
0E0E 06B4;	1955	DC (TIB)
0E10 04BF;	1956	DC (AT)
0E12 ;	1957 WD2	
0E12 0705;	1958	DC (FIN)
0E14 04BF;	1959	DC (AT)
0E16 03C4;	1960	DC (PLUS)
0E18 0489;	1961	DC (SWAP)
0E1A 0196;	1962	DC (ENCL)
0E1C 0A53;	1963	DC (HERE)
0E1E 0149;	1964	DC (LIT)
0E20 0022;	1965	DC 00022H
0E22 0898;	1966	DC (BLNK)
0E24 0705;	1967	DC (FIN)
0E26 03F2;	1968	DC (PLUSS)
0E28 0467;	1969	DC (OVER)
0E2A 0405;	1970	DC (MINS)
0E2C 0328;	1971	DC (GR)
0E2E 0346;	1972	DC (I)
0E30 0A53;	1973	DC (HERE)
0E32 04F0;	1974	DC (CEX)
0E34 03C4;	1975	DC (PLUS)
0E36 0A53;	1976	DC (HERE)
0E38 03D5;	1977	DC (PLUS1)
0E3A 0336;	1978	DC (RG)
0E3C 02FC;	1979	DC (CMOVE)
0E3E 02C0;	1980	DC (SEMIS)

* WORD *

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0E40 ; 1981 ..
0E40 88; 1982 DC 088H
0E41 284E554D4245; 1983 DC '(NUMBER'
0E47 52;
0E48 A9; 1984 DC 0A9H.. * (NUMBER) *
0E49 0DF3; 1985 DC (WORD-7)
0E4B ; 1986 PNMBR
0E4B 0857; 1987 DC (NEST)
0E4D 03D5; 1988 DC (PLUS1)
0E4F 049C; 1989 DC (DUP)
0E51 0328; 1990 DC (GR)
0E53 04D1; 1991 DC (CAT)
0E55 0759; 1992 DC (BASE)
0E57 04BF; 1993 DC (AT)
0E59 02D3; 1994 DC (DGT)
0E5B 0182; 1995 DC (ZBRCH)
0E5D 0E89; 1996 DC (PNM2)
0E5F 0489; 1997 DC (SWAP)
0E61 0759; 1998 DC (BASE)
0E63 04BF; 1999 DC (AT)
0E65 023A; 2000 DC (USTAR)
0E67 047D; 2001 DC (DROP)
0E69 04FE; 2002 DC (ROT)
0E6B 0759; 2003 DC (BASE)
0E6D 04BF; 2004 DC (AT)
0E6F 023A; 2005 DC (USTAR)
0E71 0416; 2006 DC (DPLUS)
0E73 0763; 2007 DC (DPL)
0E75 04BF; 2008 DC (AT)
0E77 03D5; 2009 DC (PLUS1)
0E79 0182; 2010 DC (ZBRCH)
0E7B 0E83; 2011 DC (PNM1)
0E7D 0610; 2012 DC (ONE)
0E7F 0763; 2013 DC (DPL)
0E81 03F2; 2014 DC (PLUSS)
0E83 ; 2015 PNM1
0E83 0336; 2016 DC (RG)
0E85 0172; 2017 DC (BRCH)
0E87 0E4D; 2018 DC (PNMBR+2)
0E89 ; 2019 PNM2
0E89 0336; 2020 DC (RG)
0E8B 02C0; 2021 DC (SEMIS)
0E8D ; 2022 ..
0E8D 86; 2023 DC 086H
0E8E 4E554D4245; 2024 DC 'NUMBE'
0E93 D2; 2025 DC 0D2H.. * NUMBER *
0E94 0E40; 2026 DC (PNMBR-11)
0E96 ; 2027 NMBR
0E96 0857; 2028 DC (NEST)
0E98 0608; 2029 DC (ZERO)
0E9A 0608; 2030 DC (ZERO)
0E9C 04FE; 2031 DC (ROT)
0E9E 049C; 2032 DC (DUP)
0EA0 03D5; 2033 DC (PLUS1)

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0EA2 04D1;      2034      DC (CAT)
0EA4 0149;      2035      DC (LIT)
0EA6 002D;      2036      DC 0002DH
0EA8 0373;      2037      DC (EQL)
0EAA 049C;      2038      DC (DUP)
0EAC 0328;      2039      DC (GR)
0EAE 03C4;      2040      DC (PLUS)
0EB0 0149;      2041      DC (LIT)
0EB2 FFFF;      2042      DC 0FFFFH      ..  -1
0EB4 ;          2043      NMB1
0EB4 0763;      2044      DC (DPL)
0EB6 04E0;      2045      DC (EX)
0EB8 0E4B;      2046      DC (PNMBR)
0EBA 049C;      2047      DC (DUP)
0EBC 04D1;      2048      DC (CAT)
0EBE 0629;      2049      DC (BL)
0EC0 0405;      2050      DC (MINS)
0EC2 0182;      2051      DC (ZBRCH)
0EC4 0EDA;      2052      DC (NMB2)
0EC6 049C;      2053      DC (DUP)
0EC8 04D1;      2054      DC (CAT)
0ECA 0149;      2055      DC (LIT)
0ECC 002E;      2056      DC 0002EH
0ECE 0405;      2057      DC (MINS)
0ED0 0608;      2058      DC (ZERO)
0ED2 0BFE;      2059      DC (QERR)
0ED4 0608;      2060      DC (ZERO)
0ED6 0172;      2061      DC (BRCH)
0ED8 0EB4;      2062      DC (NMB1)
0EDA ;          2063      NMB2
0EDA 047D;      2064      DC (DROP)
0EDC 0336;      2065      DC (RG)
0EDE 0182;      2066      DC (ZBRCH)
0EE0 0EE4;      2067      DC (NMB3)
0EE2 044D;      2068      DC (DMIN)
0EE4 ;          2069      NMB3
0EE4 02C0;      2070      DC (SEMIS)
0EE6 ;          2071      ..
0EE6 85;        2072      DC 085H
0EE7 2D46494E;  2073      DC '-FIN'
0EEB C4;        2074      DC 0C4H..      *  -FIND  *
0EEC 0E8D;      2075      DC (NMBR-9)
0EEE ;          2076      MFIND
0EEE 0857;      2077      DC (NEST)
0EF0 0629;      2078      DC (BL)
0EF2 0DFA;      2079      DC (WORD)
0EF4 0A53;      2080      DC (HERE)
0EF6 0734;      2081      DC (CNTX)
0EF8 04BF;      2082      DC (AT)
0EFA 04BF;      2083      DC (AT)
0EFC 00F5;      2084      DC (FIND)
0EFE 049C;      2085      DC (DUP)
0F00 0352;      2086      DC (ZEQUAL)
0F02 0182;      2087      DC (ZBRCH)

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0F04 0F0E;      2088      DC (MF1)
0F06 047D;      2089      DC (DROP)
0F08 0A53;      2090      DC (HERE)
0F0A 0BC1;      2091      DC (LTST)
0F0C 00F5;      2092      DC (FIND)
0F0E ;          2093 MF1
0F0E 02C0;      2094      DC (SEMIS)
0F10 ;          2095      ..
0F10 87;        2096      DC 087H
0F11 2841424F5254; 2097      DC '(ABORT'
0F17 A9;        2098      DC 0A9H.. * (ABORT) *
0F18 0EE6;      2099      DC (MFIND-8)
0F1A ;          2100 PABRT
0F1A 0857;      2101      DC (NEST)
0F1C 11E6;      2102      DC (ABORT)
0F1E 02C0;      2103      DC (SEMIS)
0F20 ;          2104      ..
0F20 85;        2105      DC 085H
0F21 4552524F;  2106      DC 'ERRO'
0F25 D2;        2107      DC 0D2H.. * ERROR *
0F26 0F10;      2108      DC (PABRT-10)
0F28 ;          2109 ERROR
0F28 0857;      2110      DC (NEST)
0F2A 06CE;      2111      DC (WRNG)
0F2C 04BF;      2112      DC (AT)
0F2E 0367;      2113      DC (ZLESS)
0F30 0182;      2114      DC (ZBRCH)
0F32 0F36;      2115      DC (ERR1)
0F34 0F1A;      2116      DC (PABRT)
0F36 ;          2117 ERR1
0F36 0A53;      2118      DC (HERE)
0F38 0B03;      2119      DC (CNT)
0F3A 0933;      2120      DC (TYPE)
0F3C 0B41;      2121      DC (PDQ)
0F3E 02;        2122      DC 002H
0F3F 203F;      2123      DC ' ? '
0F41 15B9;      2124      DC (MSG)
0F43 0297;      2125      DC (SP1)
0F45 0705;      2126      DC (FIN)
0F47 04BF;      2127      DC (AT)
0F49 06FC;      2128      DC (BLK)
0F4B 04BF;      2129      DC (AT)
0F4D 11BA;      2130      DC (QUIT)
0F4F 02C0;      2131      DC (SEMIS)
0F51 ;          2132      ..
0F51 83;        2133      DC 083H
0F52 4D49;      2134      DC 'MI'
0F54 CE;        2135      DC 0CEH.. * MIN *
0F55 0F20;      2136      DC (ERROR-8)
0F57 ;          2137 MIN
0F57 0857;      2138      DC (NEST)
0F59 0467;      2139      DC (OVER)
0F5B 0467;      2140      DC (OVER)
0F5D 03AE;      2141      DC (GTR)

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0F5F 0182;          2142      DC (ZBRCH)
0F61 0F65;          2143      DC (MNL)
0F63 0489;          2144      DC (SWAP)
0F65 ;              2145 MNL
0F65 047D;          2146      DC (DROP)
0F67 02C0;          2147      DC (SEMIS)
0F69 ;              2148      ..
0F69 83;            2149      DC 083H
0F6A 4944;          2150      DC 'ID'
0F6C AE;            2151      DC 0AEH.. * ID. *
0F6D 0F51;          2152      DC (MIN-6)
0F6F ;              2153 ID
0F6F 0857;          2154      DC (NEST)
0F71 0B5D;          2155      DC (PAD)
0F73 0149;          2156      DC (LIT)
0F75 0020;          2157      DC 00020H
0F77 0149;          2158      DC (LIT)
0F79 005F;          2159      DC 0005FH
0F7B 0868;          2160      DC (FILL)
0F7D 049C;          2161      DC (DUP)
0F7F 0BE7;          2162      DC (PFA)
0F81 0AD9;          2163      DC (LFA)
0F83 0467;          2164      DC (OVER)
0F85 0405;          2165      DC (MINS)
0F87 0B5D;          2166      DC (PAD)
0F89 0489;          2167      DC (SWAP)
0F8B 02FC;          2168      DC (CMOVE)
0F8D 0B5D;          2169      DC (PAD)
0F8F 0B03;          2170      DC (CNT)
0F91 0149;          2171      DC (LIT)
0F93 001F;          2172      DC 0001FH
0F95 0251;          2173      DC (FAND)
0F97 0933;          2174      DC (TYPE)
0F99 0963;          2175      DC (SPC)
0F9B 02C0;          2176      DC (SEMIS)
0F9D ;              2177      ..
0F9D 86;            2178      DC 086H
0F9E 4352454154;    2179      DC 'CREAT'
0FA3 C5;            2180      DC 0C5H.. * CREATE *
0FA4 0F69;          2181      DC (ID-6)
0FA6 ;              2182 CRTE
0FA6 0857;          2183      DC (NEST)
0FA8 0286;          2184      DC (FSPAT)
0FAA 0A53;          2185      DC (HERE)
0FAC 0149;          2186      DC (LIT)
0FAE 00A0;          2187      DC 000A0H
0FB0 03C4;          2188      DC (PLUS)
0FB2 0390;          2189      DC (LESS)
0FB4 0618;          2190      DC (TWO)
0FB6 0BFE;          2191      DC (QERR)
0FB8 0EEE;          2192      DC (MFIND)
0FBA 0182;          2193      DC (ZBRCH)
0FBC 0FCC;          2194      DC (CRT1)
0FBE 047D;          2195      DC (DROP)

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0FC0 0BD1;          2196          DC (NFA)
0FC2 0F6F;          2197          DC (ID)
0FC4 0149;          2198          DC (LIT)
0FC6 0004;          2199          DC 00004H
0FC8 15B9;          2200          DC (MSG)
0FCA 0963;          2201          DC (SPC)
0FCC ;              2202  CRT1
0FCC 0A53;          2203          DC (HERE)
0FCE 049C;          2204          DC (DUP)
0FD0 04D1;          2205          DC (CAT)
0FD2 06C0;          2206          DC (WIDTH)
0FD4 04BF;          2207          DC (AT)
0FD6 0F57;          2208          DC (MIN)
0FD8 03D5;          2209          DC (PLUS1)
0FDA 0A6C;          2210          DC (ALLOT)
0FDC 049C;          2211          DC (DUP)
0FDE 0149;          2212          DC (LIT)
0FE0 00A0;          2213          DC 000A0H
0FE2 04B0;          2214          DC (TGLE)
0FE4 0A53;          2215          DC (HERE)
0FE6 0610;          2216          DC (ONE)
0FE8 0405;          2217          DC (MINS)
0FEA 0149;          2218          DC (LIT)
0FEC 0080;          2219          DC 00080H
0FEE 04B0;          2220          DC (TGLE)
0FF0 0BC1;          2221          DC (LTST)
0FF2 0A84;          2222          DC (COMMA)
0FF4 0742;          2223          DC (CRNT)
0FF6 04BF;          2224          DC (AT)
0FF8 04E0;          2225          DC (EX)
0FFA 0A53;          2226          DC (HERE)
0FFC 03E7;          2227          DC (PLUS2)
0FFE 0A84;          2228          DC (COMMA)
1000 02C0;          2229          DC (SEMIS)
1002 ;              2230          ..
1002 C1BA;          2231          DC 0C1BAH..      * : *
1004 0F9D;          2232          DC (CRTE-9)
1006 ;              2233  COLON
1006 0857;          2234          DC (NEST)
1008 0C30;          2235          DC (EXC).. (IMMEDIATE EXECUTION)
100A 0AEE;          2236          DC (DCSP)
100C 0742;          2237          DC (CRNT)
100E 04BF;          2238          DC (AT)
1010 0734;          2239          DC (CNTX)
1012 04E0;          2240          DC (EX)
1014 0FA6;          2241          DC (CRTE)
1016 0CB5;          2242          DC (RTB)
1018 0149;          2243          DC (LIT)
101A FFFE;          2244          DC 0FFFEH      .. -2
101C 06E3;          2245          DC (DP)
101E 03F2;          2246          DC (PLUSS)
1020 0C91;          2247          DC (CMPL)
1022 0857;          2248          DC (NEST)
1024 02C0;          2249          DC (SEMIS)

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1026 ;                2250      ..
1026 85;              2251      DC 085H
1027 21434F44;        2252      DC '!COD'
102B C5;              2253      DC 0C5H..      * !CODE *
102C 1002;            2254      DC (COLON-4)
102E ;                2255      DCODE
102E 0857;            2256      DC (NEST)
1030 0FA6;            2257      DC (CRTE)
1032 0CCA;            2258      DC (SMDG)
1034 0BC1;            2259      DC (LTST)
1036 0BE7;            2260      DC (PFA)
1038 0AE5;            2261      DC (CFA)
103A 04E0;            2262      DC (EX)
103C 0A84;            2263      DC (COMMA)
103E 02C0;            2264      DC (SEMIS)
1040 ;                2265      ..
1040 88;              2266      DC 088H
1041 434F4E535441;    2267      DC 'CONSTAN'
1047 4E;
1048 D4;              2268      DC 0D4H..      * CONSTANT *
1049 1026;            2269      DC (DCODE-8)
104B ;                2270      CNST
104B 0857;            2271      DC (NEST)
104D 0149;            2272      DC (LIT)
104F 05FB;            2273      DC (CONST)
1051 102E;            2274      DC (DCODE)
1053 02C0;            2275      DC (SEMIS)
1055 ;                2276      ..
1055 88;              2277      DC 088H
1056 564152494142;    2278      DC 'VARIABLE'
105C 4C;
105D C5;              2279      DC 0C5H..      * VARIABLE *
105E 1040;            2280      DC (CNST-11)
1060 ;                2281      VARB
1060 0857;            2282      DC (NEST)
1062 0149;            2283      DC (LIT)
1064 05FE;            2284      DC (VAR)
1066 102E;            2285      DC (DCODE)
1068 02C0;            2286      DC (SEMIS)
106A ;                2287      ..
106A 84;              2288      DC 084H
106B 555345;          2289      DC 'USE'
106E D2;              2290      DC 0D2H..      * USER *
106F 1055;            2291      DC (VARB-11)
1071 ;                2292      USR
1071 0857;            2293      DC (NEST)
1073 0149;            2294      DC (LIT)
1075 0690;            2295      DC (USER)
1077 102E;            2296      DC (DCODE)
1079 02C0;            2297      DC (SEMIS)
107B ;                2298      ..
107B 87;              2299      DC 087H
107C 3C4255494C44;    2300      DC '<BUILD'
1082 D3;              2301      DC 0D3H..      * <BUILDS *

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1083 106A;          2302      DC (USR-7)
1085 ;              2303 LBLD
1085 0857;          2304      DC (NEST)
1087 0608;          2305      DC (ZERO)
1089 104B;          2306      DC (CNST)
108B 02C0;          2307      DC (SEMIS)
108D ;              2308      ..
108D 85;            2309      DC 085H
108E 444F4553;      2310      DC 'DOES'
1092 BE;            2311      DC 0BEH..      * DOES> *
1093 107B;          2312      DC (LBLD-10)
1095 ;              2313 DOESG
1095 0857;          2314      DC (NEST)
1097 0336;          2315      DC (RG)
1099 0BC1;          2316      DC (LTST)
109B 0BE7;          2317      DC (PFA)
109D 04E0;          2318      DC (EX)
109F 0D08;          2319      DC (PCODE)
10A1 ;              2320      ..
10A1 E268A6;        2321 DUZ1 SEX RP;RSXD R6.. PUSH TO RETURN STACK
10A4 E668B8;        2322      SEX R6;RNX IP.. NEST 1 LEVEL
10A7 E96868;        2323      SEX R9;RLXA IP.. GET NEXT INTERPRETIVE ADDRESS
10AA 24E468A9;      2324      DEC SP;SEX SP;RSXD R9..NXT BYTE POINTER->ST
10AE 14D5;          2325      INC SP;SEP R5
10B0 ;              2326      ..
10B0 C7;            2327      DC 0C7H
10B1 4C4954455241;  2328      DC 'LITERA'
10B7 CC;            2329      DC 0CCH..      * LITERAL *
10B8 108D;          2330      DC (DOESG-8)..      IMMEDIATE EXECUTION
10BA ;              2331 LTL
10BA 0857;          2332      DC (NEST)
10BC 074E;          2333      DC (STT)
10BE 04BF;          2334      DC (AT)
10C0 0182;          2335      DC (ZBRCH)
10C2 10CA;          2336      DC (LT1)
10C4 0C91;          2337      DC (CMPL)
10C6 0149;          2338      DC (LIT)
10C8 0A84;          2339      DC (COMMA)
10CA ;              2340 LT1
10CA 02C0;          2341      DC (SEMIS)
10CC ;              2342      ..
10CC C8;            2343      DC 0C8H
10CD 444C49544552;  2344      DC 'DLITERA'
10D3 41;            2345      DC 0CCH..      * DLITERAL *
10D4 CC;            2346      DC (LTL-10).. IMMEDIATE EXECUTION
10D5 10B0;          2347 DLT1
10D7 ;              2348      DC (NEST)
10D7 0857;          2349      DC (STT)
10D9 074E;          2350      DC (AT)
10DB 04BF;          2351      DC (ZBRCH)
10DD 0182;          2352      DC (DLTL1)
10DF 10E7;          2353      DC (SWAP)
10E1 0489;          2354      DC (LTL)
10E3 10BA;          2354      DC (LTL)

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10E5 10BA;          2355          DC (LTL)
10E7 ;              2356 DLTL1
10E7 02C0;          2357          DC (SEMIS)
10E9 ;              2358          ..
10E9 86;             2359          DC 086H
10EA 3F53544143;    2360          DC '?STAC'
10EF CB;             2361          DC 0CBH..          * ?STACK *
10F0 10CC;           2362          DC (DLTL-11)
10F2 ;              2363 QSTK
10F2 0857;           2364          DC (NEST)
10F4 06A1;           2365          DC (SO)
10F6 04BF;           2366          DC (AT)
10F8 049C;           2367          DC (DUP)
10FA 0286;           2368          DC (FSPAT)
10FC 0390;           2369          DC (LESS)
10FE 0610;           2370          DC (ONE)
1100 0BFE;           2371          DC (QERR)
1102 0149;           2372          DC (LIT)
1104 0100;           2373          DC 00100H
1106 0405;           2374          DC (MINS)
1108 0286;           2375          DC (FSPAT)
110A 03AE;           2376          DC (GTR)
110C 0149;           2377          DC (LIT)
110E 0007;           2378          DC 00007H
1110 0BFE;           2379          DC (QERR)
1112 02C0;           2380          DC (SEMIS)
1114 ;              2381          ..
1114 89;             2382          DC 089H
1115 494E54455250; 2383          DC 'INTERPRE'
111B 5245;           2384          DC 0D4H..          * INTERPRET *
111D D4;             2385          DC (QSTK-9)
111E 10E9;           2386 INPT
1120 ;              2387          DC (NEST)
1120 0857;           2388          DC (MFIND)
1122 0EEE;           2389          DC (ZBRCH)
1124 0182;           2390          DC (PT1)
1126 1144;           2391          DC (STT)
1128 074E;           2392          DC (AT)
112A 04BF;           2393          DC (LESS)
112C 0390;           2394          DC (ZBRCH)
1130 113A;           2395          DC (PT2)
1132 0AE5;           2396          DC (CFA)
1134 0A84;           2397          DC (COMMA)
1136 0172;           2398          DC (BRCH)
1138 113E;           2399          DC (PT3)
113A ;              2400 PT2
113A 0AE5;           2401          DC (CFA)
113C 01F7;           2402          DC (EXE)
113E ;              2403 PT3
113E 10F2;           2404          DC (QSTK)
1140 0172;           2405          DC (BRCH)
1142 115E;           2406          DC (PT4)
1144 ;              2407 PT1

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1144 0A53;          2408          DC (HERE)
1146 0E96;          2409          DC (NMBR)
1148 0763;          2410          DC (DPL)
114A 04BF;          2411          DC (AT)
114C 03D5;          2412          DC (PLUS1)
114E 0182;          2413          DC (ZBRCH)
1150 1158;          2414          DC (PT5)
1152 10D7;          2415          DC (DLTL)
1154 0172;          2416          DC (BRCH)
1156 115C;          2417          DC (PT6)
1158 ;              2418 PT5
1158 047D;          2419          DC (DROP)
115A 10BA;          2420          DC (LTL)
115C ;              2421 PT6
115C 10F2;          2422          DC (QSTK)
115E ;              2423 PT4
115E 0172;          2424          DC (BRCH)
1160 1122;          2425          DC (INPT+2)
1162 02C0;          2426          DC (SEMIS)
1164 ;              2427          ..
1164 8A;             2428          DC 08AH
1165 564F43414255; 2429          DC 'VOCABULAR'
116B 4C4152;
116E D9;             2430          DC 0D9H..      * VOCABULARY *
116F 1114;          2431          DC (INPT-12)
1171 ;              2432 VBLY
1171 0857;          2433          DC (NEST)
1173 1085;          2434          DC (LBLD)
1175 0149;          2435          DC (LIT)
1177 81A0;          2436          DC 081A0H
1179 0A84;          2437          DC (COMMA)
117B 0742;          2438          DC (CRNT)
117D 04BF;          2439          DC (AT)
117F 0AE5;          2440          DC (CFA)
1181 0A84;          2441          DC (COMMA)
1183 0A53;          2442          DC (HERE)
1185 06F2;          2443          DC (VL)
1187 04BF;          2444          DC (AT)
1189 0A84;          2445          DC (COMMA)
118B 06F2;          2446          DC (VL)
118D 04E0;          2447          DC (EX)
118F 1095;          2448          DC (DOESG)
1191 ;              2449 VB1
1191 03E7;          2450          DC (PLUS2)
1193 0734;          2451          DC (CNTX)
1195 04E0;          2452          DC (EX)
1197 02C0;          2453          DC (SEMIS)
1199 ;              2454          ..
1199 8B;             2455          DC 08BH
119A 444546494E49; 2456          DC 'DEFINITION'
11A0 54494F4E;
11A4 D3;             2457          DC 0D3H..      * DEFINITIONS *
11A5 1164;          2458          DC (VBLY-13)
11A7 ;              2459 DFN

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11A7 0857;          2460          DC (NEST)
11A9 0734;          2461          DC (CNTX)
11AB 04BF;          2462          DC (AT)
11AD 0742;          2463          DC (CRNT)
11AF 04E0;          2464          DC (EX)
11B1 02C0;          2465          DC (SEMIS)
11B3 ;              2466          ..
11B3 84;            2467          DC 084H
11B4 515549;        2468          DC 'QUI'
11B7 D4;            2469          DC 0D4H.. * QUIT *
11B8 1199;          2470          DC (DFN-14)
11BA ;              2471          QUIT
11BA 0857;          2472          DC (NEST)
11BC 0608;          2473          DC (ZERO)
11BE 06FC;          2474          DC (BLK)
11C0 04E0;          2475          DC (EX)
11C2 0CA7;          2476          DC (LB)
11C4 ;              2477          Q2
11C4 02AB;          2478          DC (RP1)
11C6 0909;          2479          DC (CR)
11C8 0DA5;          2480          DC (QUER)
11CA 1120;          2481          DC (INPT)
11CC 074E;          2482          DC (STT)
11CE 04BF;          2483          DC (AT)
11D0 0352;          2484          DC (ZEQAL)
11D2 0182;          2485          DC (ZBRCH)
11D4 11D8;          2486          DC (Q1)
11D6 18A9;          2487          DC (OK)
11D8 ;              2488          Q1
11D8 0172;          2489          DC (BRCH)
11DA 11C4;          2490          DC (Q2)
11DC 02C0;          2491          DC (SEMIS)
11DE ;              2492          ..
11DE 85;            2493          DC 085H
11DF 41424F52;      2494          DC 'ABOR'
11E3 D4;            2495          DC 0D4H.. * ABORT *
11E4 11B3;          2496          DC (QUIT-7)
11E6 ;              2497          ABORT
11E6 0857;          2498          DC (NEST)
11E8 0297;          2499          DC (SP1)
11EA 0CF2;          2500          DC (MDCML)
11EC 0610;          2501          DC (ONE)
11EE 17BC;          2502          DC (GROUP)
11F0 0909;          2503          DC (CR)
11F2 0B41;          2504          DC (PDQ)
11F4 10;            2505          DC 16
11F5 576F6F647320; 2506          DC 'Woods Hole FORTH'
11FB 486F6C652046;
1201 4F525448;
1205 0909;          2507          DC (CR)
1207 0B41;          2508          DC (PDQ)
1209 0D;            2509          DC 13
120A 56657273696F; 2510          DC 'Version 1.700'
1210 6E20312E3730;

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1216 30;
1217 0909;      2511      DC (CR)
1219 167F;      2512      DC (MTBUF)
121B 0649;      2513      DC (FIRST)
121D 049C;      2514      DC (DUP)
121F 079F;      2515      DC (PREV)
1221 04E0;      2516      DC (EX)
1223 0794;      2517      DC (USE)
1225 04E0;      2518      DC (EX)
1227 1837;      2519      DC (FRTH+8)
1229 11A7;      2520      DC (DFN)
122B 1873;      2521      DC (DRONE)
122D 0610;      2522      DC (ONE)
122F 16DE;      2523      DC (BLOCK)
1231 047D;      2524      DC (DROP)
1233 18A9;      2525      DC (OK)
1235 11BA;      2526      DC (QUIT)
1237 02C0;      2527      DC (SEMIS)
1239 ;          2528      ..
1239 C1BB;      2529      DC 0C1BBH..      *      ;      *
123B 11DE;      2530      DC (ABORT-8)
123D ;          2531      SEMIC
123D 0857;      2532      DC (NEST)
123F 0C5A;      2533      DC (QCSP)
1241 0C91;      2534      DC (CMPL)
1243 02C0;      2535      DC (SEMIS)
1245 0CCA;      2536      DC (SMDG)
1247 0CA7;      2537      DC (LB)
1249 02C0;      2538      DC (SEMIS)
124B ;          2539      ..
124B C22EA2;    2540      DC 0C22EH,0A2H..      *      .      "      *
124E 1239;      2541      DC (SEMIC-4)
1250 ;          2542      DOTQ
1250 0857;      2543      DC (NEST)
1252 0149;      2544      DC (LIT)
1254 0022;      2545      DC 00022H
1256 074E;      2546      DC (STT)
1258 04BF;      2547      DC (AT)
125A 0182;      2548      DC (ZBRCH)
125C 1270;      2549      DC (DOTQ1)
125E 0C91;      2550      DC (CMPL)
1260 0B41;      2551      DC (PDQ)
1262 0DFA;      2552      DC (WORD)
1264 0A53;      2553      DC (HERE)
1266 04D1;      2554      DC (CAT)
1268 03D5;      2555      DC (PLUS1)
126A 0A6C;      2556      DC (ALLOT)
126C 0172;      2557      DC (BRCH)
126E 1278;      2558      DC (DOTQ2)
1270 ;          2559      DOTQ1
1270 0DFA;      2560      DC (WORD)
1272 0A53;      2561      DC (HERE)
1274 0B03;      2562      DC (CNT)
1276 0933;      2563      DC (TYPE)

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1278 ;                2564 DOTQ2
1278 02C0;            2565          DC (SEMIS)
127A ;                2566          ..
127A C9;              2567          DC 0C9H
127B 5B434F4D5049; 2568          DC '[COMPILE'
1281 4C45;
1283 DD;              2569          DC 0DDH..      * [COMPILE] *
1284 124B;            2570          DC (DOTQ-5)      .. (IMMEDIATE)
1286 ;                2571 BCOMP
1286 0857;            2572          DC (NEST)
1288 0EEE;            2573          DC (MFIND)
128A 0352;            2574          DC (ZEQAL)
128C 0608;            2575          DC (ZERO)
128E 0BFE;            2576          DC (QERR)
1290 047D;            2577          DC (DROP)
1292 0AE5;            2578          DC (CFA)
1294 0A84;            2579          DC (COMMA)
1296 02C0;            2580          DC (SEMIS)
1298 ;                2581          ..
1298 89;              2582          DC 089H
1299 494D4D454449; 2583          DC 'IMMEDIAT'
129F 4154;
12A1 C5;              2584          DC 0C5H..      * IMMEDIATE *
12A2 127A;            2585          DC (BCOMP-12)
12A4 ;                2586 IMMED
12A4 0857;            2587          DC (NEST)
12A6 0BC1;            2588          DC (LTST)
12A8 0149;            2589          DC (LIT)
12AA 0040;            2590          DC 00040H
12AC 04B0;            2591          DC (TGLE)
12AE 02C0;            2592          DC (SEMIS)
12B0 ;                2593          ..
12B0 C1A8;            2594          DC 0C1A8H..      * ( *
12B2 1298;            2595          DC (IMMED-12)
12B4 ;                2596 PAREN
12B4 0857;            2597          DC (NEST)
12B6 0149;            2598          DC (LIT)
12B8 0029;            2599          DC 00029H
12BA 0DFA;            2600          DC (WORD)
12BC 02C0;            2601          DC (SEMIS)
12BE ;                2602          ..
12BE C1A7;            2603          DC 0C1A7H..      * ' * (TICK)
12C0 12B0;            2604          DC (PAREN-4)
12C2 ;                2605 TICK
12C2 0857;            2606          DC (NEST)
12C4 0EEE;            2607          DC (MFIND)
12C6 0352;            2608          DC (ZEQAL)
12C8 0608;            2609          DC (ZERO)
12CA 0BFE;            2610          DC (QERR)
12CC 047D;            2611          DC (DROP)
12CE 10BA;            2612          DC (LTL)
12D0 02C0;            2613          DC (SEMIS)
12D2 ;                2614          ..
12D2 86;              2615          DC 086H

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12D3 464F524745;    2616          DC 'FORGE'
12D8 D4;            2617          DC 0D4H..  *  FORGET  *
12D9 12BE;          2618          DC (TICK-4)
12DB ;              2619  FORG
12DB 0857;          2620          DC (NEST)
12DD 0742;          2621          DC (CRNT)
12DF 04BF;          2622          DC (AT)
12E1 0734;          2623          DC (CNTX)
12E3 04BF;          2624          DC (AT)
12E5 0405;          2625          DC (MINS)
12E7 0149;          2626          DC (LIT)
12E9 0018;          2627          DC 00018H
12EB 0BFE;          2628          DC (QERR)
12ED 12C2;          2629          DC (TICK)
12EF 049C;          2630          DC (DUP)
12F1 06DA;          2631          DC (FNCE)
12F3 04BF;          2632          DC (AT)
12F5 0390;          2633          DC (LESS)
12F7 0149;          2634          DC (LIT)
12F9 0015;          2635          DC 00015H
12FB 0BFE;          2636          DC (QERR)
12FD 049C;          2637          DC (DUP)
12FF 0BD1;          2638          DC (NFA)
1301 06E3;          2639          DC (DP)
1303 04E0;          2640          DC (EX)
1305 0AD9;          2641          DC (LFA)
1307 04BF;          2642          DC (AT)
1309 0734;          2643          DC (CNTX)
130B 04BF;          2644          DC (AT)
130D 04E0;          2645          DC (EX)
130F 02C0;          2646          DC (SEMIS)
1311 ;              2647          ..
1311 824DAF;        2648          DC 0824DH,0AFH..  *  M/  *
1314 12D2;          2649          DC (FORG-9)
1316 ;              2650  MSLAS
1316 0857;          2651          DC (NEST)
1318 0467;          2652          DC (OVER)
131A 0328;          2653          DC (GR)
131C 0328;          2654          DC (GR)
131E 0539;          2655          DC (DABS)
1320 0346;          2656          DC (I)
1322 052A;          2657          DC (ABS)
1324 0204;          2658          DC (USLSH)
1326 0336;          2659          DC (RG)
1328 0346;          2660          DC (I)
132A 0274;          2661          DC (FXOR)
132C 0B79;          2662          DC (PM)
132E 0489;          2663          DC (SWAP)
1330 0336;          2664          DC (RG)
1332 0B79;          2665          DC (PM)
1334 0489;          2666          DC (SWAP)
1336 02C0;          2667          DC (SEMIS)
1338 ;              2668          ..
1338 842F4D4FC4;    2669          DC 0842FH,04D4FH,0C4H..  *  /MOD  *

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133D 1311;          2670      DC (MSLAS-5)
133F ;              2671 SLMOD
133F 0857;          2672      DC (NEST)
1341 0328;          2673      DC (GR)
1343 15DE;          2674      DC (STOD)
1345 0336;          2675      DC (RG)
1347 1316;          2676      DC (MSLAS)
1349 02C0;          2677      DC (SEMIS)
134B ;              2678      ..
134B 81AF;          2679      DC 081AFH..      *      /      *
134D 1338;          2680      DC (SLMOD-7)
134F ;              2681 SLASH
134F 0857;          2682      DC (NEST)
1351 133F;          2683      DC (SLMOD)
1353 0489;          2684      DC (SWAP)
1355 047D;          2685      DC (DROP)
1357 02C0;          2686      DC (SEMIS)
1359 ;              2687      ..
1359 834D4FC4;      2688      DC 0834DH,04FC4H..      *      MOD      *
135D 134B;          2689      DC (SLASH-4)
135F ;              2690 MODD
135F 0857;          2691      DC (NEST)
1361 133F;          2692      DC (SLMOD)
1363 047D;          2693      DC (DROP)
1365 02C0;          2694      DC (SEMIS)
1367 ;              2695      ..
1367 85;            2696      DC 085H
1368 2A2F4D4F;      2697      DC '* /MO'
136C C4;            2698      DC 0C4H..      *      * /MOD      *
136D 1359;          2699      DC (MODD-6)
136F ;              2700 SSMOD
136F 0857;          2701      DC (NEST)
1371 0328;          2702      DC (GR)
1373 0576;          2703      DC (MSTAR)
1375 0336;          2704      DC (RG)
1377 1316;          2705      DC (MSLAS)
1379 02C0;          2706      DC (SEMIS)
137B ;              2707      ..
137B 822AAF;        2708      DC 0822AH,0AFH..      *      * /      *
137E 1367;          2709      DC (SSMOD-8)
1380 ;              2710 SSLA
1380 0857;          2711      DC (NEST)
1382 136F;          2712      DC (SSMOD)
1384 0489;          2713      DC (SWAP)
1386 047D;          2714      DC (DROP)
1388 02C0;          2715      DC (SEMIS)
138A ;              2716      ..
138A 84;            2717      DC 084H
138B 424143;        2718      DC 'BAC'
138E CB;            2719      DC 0CBH      ..      BACK
138F 137B;          2720      DC (SSLA-5)      ..
1391 ;              2721 BACK
1391 0857;          2722      DC (NEST)
1393 0A84;          2723      DC (COMMA)

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1395 02C0;          2724      DC (SEMIS)
1397 ;             2725      ..
1397 ;             2726      ..
1397 ;             2727      .. THE FOLLOWING ARE IMMEDIATE WORDS
1397 ;             2728      ..WHICH ARE USED WHEN COMPILING.
1397 ;             2729      ..
1397 ;             2730      ..
1397 C5;           2731      DC 0C5H
1398 42454749;     2732      DC 'BEGI'
139C CE;           2733      DC 0CEH      .. BEGIN
139D 138A;         2734      DC (BACK-7)
139F ;             2735 BEGIN
139F 0857;         2736      DC (NEST)
13A1 0C18;         2737      DC (QCMP)
13A3 0A53;         2738      DC (HERE)
13A5 0610;         2739      DC (ONE)
13A7 02C0;         2740      DC (SEMIS)
13A9 ;             2741      ..
13A9 C5;           2742      DC 0C5H
13AA 454E4449;     2743      DC 'ENDI'
13AE C6;           2744      DC 0C6H      .. ENDIF
13AF 1397;         2745      DC (BEGIN-8)
13B1 ;             2746 ENDIFF
13B1 0857;         2747      DC (NEST)
13B3 0C18;         2748      DC (QCMP)
13B5 0618;         2749      DC (TWO)
13B7 0C47;         2750      DC (QPR)
13B9 0A53;         2751      DC (HERE)
13BB 0489;         2752      DC (SWAP)
13BD 04E0;         2753      DC (EX)
13BF 02C0;         2754      DC (SEMIS)
13C1 ;             2755      ..
13C1 C4;           2756      DC 0C4H
13C2 544845;       2757      DC 'THE'
13C5 CE;           2758      DC 0CEH      .. THEN
13C6 13A9;         2759      DC (ENDIFF-8)
13C8 ;             2760 THEN
13C8 0857;         2761      DC (NEST)
13CA 13B1;         2762      DC (ENDIFF)
13CC 02C0;         2763      DC (SEMIS)
13CE ;             2764      ..
13CE C244CF;       2765      DC 0C244H,0CFH      .. DO
13D1 13C1;         2766      DC (THEN-7)
13D3 ;             2767 DO
13D3 0857;         2768      DC (NEST)
13D5 0C91;         2769      DC (CMPL)
13D7 015B;         2770      DC (PDO)
13D9 0A53;         2771      DC (HERE)
13DB 0620;         2772      DC (THREE)
13DD 02C0;         2773      DC (SEMIS)
13DF ;             2774      ..
13DF C44C4F4FD0;   2775      DC 0C44CH,04F4FH,0D0H      .. LOOP
13E4 13CE;         2776      DC (DO-5)
13E6 ;             2777 LOOP

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13E6 0857;      2778      DC (NEST)
13E8 0620;      2779      DC (THREE)
13EA 0C47;      2780      DC (QPR)
13EC 0C91;      2781      DC (CMPL)
13EE 00AE;      2782      DC (LUPE)
13F0 1391;      2783      DC (BACK)
13F2 02C0;      2784      DC (SEMIS)
13F4 ;          2785      ..
13F4 C5;        2786      DC 0C5H
13F5 2B4C4F4F;  2787      DC '+LOO'
13F9 D0;        2788      DC 0D0H      .. +LOOP
13FA 13DF;      2789      DC (LOOP-7)
13FC ;          2790 PLOOP
13FC 0857;      2791      DC (NEST)
13FE 0620;      2792      DC (THREE)
1400 0C47;      2793      DC (QPR)
1402 0C91;      2794      DC (CMPL)
1404 00D3;      2795      DC (PLUPE)
1406 1391;      2796      DC (BACK)
1408 02C0;      2797      DC (SEMIS)
140A ;          2798      ..
140A C5;        2799      DC 0C5H
140B 554E5449;  2800      DC 'UNTI'
140F CC;        2801      DC 0CCH      .. UNTIL
1410 13F4;      2802      DC (PLOOP-8)
1412 ;          2803 UNTIL
1412 0857;      2804      DC (NEST)
1414 0610;      2805      DC (ONE)
1416 0C47;      2806      DC (QPR)
1418 0C91;      2807      DC (CMPL)
141A 0182;      2808      DC (ZBRCH)
141C 1391;      2809      DC (BACK)
141E 02C0;      2810      DC (SEMIS)
1420 ;          2811      ..
1420 C3454EC4;  2812      DC 0C345H,04EC4H      .. END
1424 140A;      2813      DC (UNTIL-8)
1426 ;          2814 ENDD
1426 0857;      2815      DC (NEST)
1428 1412;      2816      DC (UNTIL)
142A 02C0;      2817      DC (SEMIS)
142C ;          2818      ..
142C C5;        2819      DC 0C5H
142D 41474149;  2820      DC 'AGAI'
1431 CE;        2821      DC 0CEH      .. AGAIN
1432 1420;      2822      DC (ENDD-6)
1434 ;          2823 AGAIN
1434 0857;      2824      DC (NEST)
1436 0610;      2825      DC (ONE)
1438 0C47;      2826      DC (QPR)
143A 0C91;      2827      DC (CMPL)
143C 0172;      2828      DC (BRCH)
143E 1391;      2829      DC (BACK)
1440 02C0;      2830      DC (SEMIS)
1442 ;          2831      ..

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1442 C6;          2832      DC 0C6H
1443 5245504541;  2833      DC 'REPEA'
1448 D4;          2834      DC 0D4H      .. REPEAT
1449 142C;        2835      DC (AGAIN-8)
144B ;           2836 REPEA
144B 0857;       2837      DC (NEST)
144D 0328;       2838      DC (GR)
144F 0328;       2839      DC (GR)
1451 1434;       2840      DC (AGAIN)
1453 0336;       2841      DC (RG)
1455 0336;       2842      DC (RG)
1457 0618;       2843      DC (TWO)
1459 0405;       2844      DC (MINS)
145B 13B1;       2845      DC (ENDIFF)
145D 02C0;       2846      DC (SEMIS)
145F ;           2847      ..
145F C249C6;     2848      DC 0C249H,0C6H      .. IF
1462 1442;       2849      DC (REPEA-9)
1464 ;           2850 IFF
1464 0857;       2851      DC (NEST)
1466 0C91;       2852      DC (CMPL)
1468 0182;       2853      DC (ZBRCH)
146A 0A53;       2854      DC (HERE)
146C 0608;       2855      DC (ZERO)
146E 0A84;       2856      DC (COMMA)
1470 0618;       2857      DC (TWO)
1472 02C0;       2858      DC (SEMIS)
1474 ;           2859      ..
1474 C4;         2860      DC 0C4H
1475 454C53;     2861      DC 'ELS'
1478 C5;         2862      DC 0C5H      .. ELSE
1479 145F;       2863      DC (IFF-5)
147B ;           2864 ELSEE
147B 0857;       2865      DC (NEST)
147D 0618;       2866      DC (TWO)
147F 0C47;       2867      DC (QPR)
1481 0C91;       2868      DC (CMPL)
1483 0172;       2869      DC (BRCH)
1485 0A53;       2870      DC (HERE)
1487 0608;       2871      DC (ZERO)
1489 0A84;       2872      DC (COMMA)
148B 0489;       2873      DC (SWAP)
148D 0618;       2874      DC (TWO)
148F 13B1;       2875      DC (ENDIFF)
1491 0618;       2876      DC (TWO)
1493 02C0;       2877      DC (SEMIS)
1495 ;           2878      ..
1495 C5;         2879      DC 0C5H
1496 5748494C;   2880      DC 'WHIL'
149A C5;         2881      DC 0C5H      .. WHILE
149B 1474;       2882      DC (ELSEE-7)
149D ;           2883 WHILE
149D 0857;       2884      DC (NEST)
149F 1464;       2885      DC (IFF)

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14A1 03E7;          2886      DC (PLUS2)
14A3 02C0;          2887      DC (SEMIS)
14A5 ;              2888      ..
14A5 ;              2889      .. END OF COMPILER WORDS
14A5 ;              2890      ..
14A5 ;              2891      ..
14A5 ;              2892      ..
14A5 86;            2893      DC 086H
14A6 5350414345;    2894      DC 'SPACE'
14AB D3;             2895      DC 0D3H      .. SPACES
14AC 1495;           2896      DC (WHILE-8)
14AE ;              2897      SPACS
14AE 0857;           2898      DC (NEST)
14B0 0608;           2899      DC (ZERO)
14B2 0547;           2900      DC (MAX)
14B4 0516;           2901      DC (MDUP)
14B6 0182;           2902      DC (ZBRCH)
14B8 14C4;           2903      DC (SPAX1)
14BA 0608;           2904      DC (ZERO)
14BC 015B;           2905      DC (PDO)
14BE ;              2906      SPAX2
14BE 0963;           2907      DC (SPC)
14C0 00AE;           2908      DC (LUPE)
14C2 14BE;           2909      DC (SPAX2)
14C4 ;              2910      SPAX1
14C4 02C0;           2911      DC (SEMIS)
14C6 ;              2912      ..
14C6 823CA3;         2913      DC 0823CH,0A3H      .. <#
14C9 14A5;           2914      DC (SPACS-9)
14CB ;              2915      BDIGS
14CB 0857;           2916      DC (NEST)
14CD 0B5D;           2917      DC (PAD)
14CF 078A;           2918      DC (HLD)
14D1 04E0;           2919      DC (EX)
14D3 02C0;           2920      DC (SEMIS)
14D5 ;              2921      ..
14D5 8223BE;         2922      DC 08223H,0BEH      .. #>
14D8 14C6;           2923      DC (BDIGS-5)
14DA ;              2924      EDIGS
14DA 0857;           2925      DC (NEST)
14DC 047D;           2926      DC (DROP)
14DE 047D;           2927      DC (DROP)
14E0 078A;           2928      DC (HLD)
14E2 04BF;           2929      DC (AT)
14E4 0B5D;           2930      DC (PAD)
14E6 0467;           2931      DC (OVER)
14E8 0405;           2932      DC (MINS)
14EA 02C0;           2933      DC (SEMIS)
14EC ;              2934      ..
14EC 84;             2935      DC 084H
14ED 534947;         2936      DC 'SIG'
14F0 CE;             2937      DC 0CEH      .. SIGN
14F1 14D5;           2938      DC (EDIGS-5)
14F3 ;              2939      SIGN

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14F3 0857;      2940      DC (NEST)
14F5 04FE;      2941      DC (ROT)
14F7 0367;      2942      DC (ZLESS)
14F9 0182;      2943      DC (ZBRCH)
14FB 1503;      2944      DC (SIGN1)
14FD 0149;      2945      DC (LIT)
14FF 002D;      2946      DC 0002DH
1501 08B1;      2947      DC (HOLD)
1503 ;          2948 SIGN1
1503 02C0;      2949      DC (SEMIS)
1505 ;          2950      ..
1505 81A3;      2951      DC 081A3H      .. #
1507 14EC;      2952      DC (SIGN-7)
1509 ;          2953 DIG
1509 0857;      2954      DC (NEST)
150B 0759;      2955      DC (BASE)
150D 04BF;      2956      DC (AT)
150F 0A07;      2957      DC (MSMOD)
1511 04FE;      2958      DC (ROT)
1513 0149;      2959      DC (LIT)
1515 0009;      2960      DC 00009H
1517 0467;      2961      DC (OVER)
1519 0390;      2962      DC (LESS)
151B 0182;      2963      DC (ZBRCH)
151D 1525;      2964      DC (DIG1)
151F 0149;      2965      DC (LIT)
1521 0007;      2966      DC 00007H
1523 03C4;      2967      DC (PLUS)
1525 ;          2968 DIG1
1525 0149;      2969      DC (LIT)
1527 0030;      2970      DC 00030H
1529 03C4;      2971      DC (PLUS)
152B 08B1;      2972      DC (HOLD)
152D 02C0;      2973      DC (SEMIS)
152F ;          2974      ..
152F 8223D3;    2975      DC 08223H,0D3H      .. #S
1532 1505;      2976      DC (DIG-4)
1534 ;          2977 DIGS
1534 0857;      2978      DC (NEST)
1536 ;          2979 DIGS1
1536 1509;      2980      DC (DIG)
1538 0467;      2981      DC (OVER)
153A 0467;      2982      DC (OVER)
153C 0262;      2983      DC (FFOR)
153E 0352;      2984      DC (ZEQAL)
1540 0182;      2985      DC (ZBRCH)
1542 1536;      2986      DC (DIGS1)
1544 02C0;      2987      DC (SEMIS)
1546 ;          2988      ..
1546 83442ED2;  2989      DC 08344H,02ED2H      .. D.R
154A 152F;      2990      DC (DIGS-5)
154C ;          2991 DDOTR
154C 0857;      2992      DC (NEST)
154E 0328;      2993      DC (GR)

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1550 0489;	2994	DC (SWAP)	
1552 0467;	2995	DC (OVER)	
1554 0539;	2996	DC (DABS)	
1556 14CB;	2997	DC (BDIGS)	
1558 1534;	2998	DC (DIGS)	
155A 14F3;	2999	DC (SIGN)	
155C 14DA;	3000	DC (EDIGS)	
155E 0336;	3001	DC (RG)	
1560 0467;	3002	DC (OVER)	
1562 0405;	3003	DC (MINS)	
1564 14AE;	3004	DC (SPACS)	
1566 0933;	3005	DC (TYPE)	
1568 02C0;	3006	DC (SEMIS)	
156A ;	3007	..	
156A 822ED2;	3008	DC 0822EH,0D2H	.. .R
156D 1546;	3009	DC (DDOTR-6)	
156F ;	3010	DOTR	
156F 0857;	3011	DC (NEST)	
1571 0328;	3012	DC (GR)	
1573 15DE;	3013	DC (STOD)	
1575 0336;	3014	DC (RG)	
1577 154C;	3015	DC (DDOTR)	
1579 02C0;	3016	DC (SEMIS)	
157B ;	3017	..	
157B 8244AE;	3018	DC 08244H,0AEH	.. D.
157E 156A;	3019	DC (DOTR-5)	
1580 ;	3020	DDOT	
1580 0857;	3021	DC (NEST)	
1582 0608;	3022	DC (ZERO)	
1584 154C;	3023	DC (DDOTR)	
1586 0963;	3024	DC (SPC)	
1588 02C0;	3025	DC (SEMIS)	
158A ;	3026	..	
158A 81AE;	3027	DC 081AEH	.. . (DOT)
158C 157B;	3028	DC (DDOT-5)	
158E ;	3029	DOT	
158E 0857;	3030	DC (NEST)	
1590 15DE;	3031	DC (STOD)	
1592 1580;	3032	DC (DDOT)	
1594 02C0;	3033	DC (SEMIS)	
1596 ;	3034	..	
1596 81BF;	3035	DC 081BFH	.. ?
1598 158A;	3036	DC (DOT-4)	
159A ;	3037	QUES	
159A 0857;	3038	DC (NEST)	
159C 04BF;	3039	DC (AT)	
159E 158E;	3040	DC (DOT)	
15A0 02C0;	3041	DC (SEMIS)	
15A2 ;	3042	..	
15A2 8255AE;	3043	DC 08255H,0AEH	.. U.
15A5 1596;	3044	DC (QUES-4)	
15A7 ;	3045	UDOT	
15A7 0857;	3046	DC (NEST)	
15A9 0608;	3047	DC (ZERO)	


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15AB 1580;          3048      DC (DDOT)
15AD 02C0;          3049      DC (SEMIS)
15AF ;              3050      ..
15AF 87;            3051      DC 087H
15B0 4D4553534147; 3052      DC 'MESSAG'
15B6 C5;            3053      DC 0C5H .. MESSAGE
15B7 15A2;          3054      DC (UDOT-5)
15B9 ;              3055 MSG
15B9 0857;          3056      DC (NEST)
15BB 0B41;          3057      DC (PDQ)
15BD 09;            3058      DC 009H
15BE 204D65737361; 3059      DC ' Message '
15C4 676520;
15C7 075904BF0489; 3060      DC (BASE); DC (AT); DC (SWAP)
15CD 0CF2158E;      3061      DC (MDCML); DC (DOT)
15D1 075904E0;      3062      DC (BASE); DC (EX)
15D5 02C0;          3063      DC (SEMIS)
15D7 ;              3064      ..
15D7 ;              3065      ..
15D7 84;            3066      DC 084H
15D8 532D3E;        3067      DC 'S->'
15DB C4;            3068      DC 0C4H .. S->D
15DC 15AF;          3069      DC (MSG-10)
15DE ;              3070 STOD
15DE 15E0;          3071      DC ( $+2)
15E0 E40424;        3072      SEX SP;LDN SP;DEC SP
15E3 FEF800C7;      3073      SHL;LDI 0;LSNF
15E7 F8FF;          3074      LDI 0FFH
15E9 7354D5;        3075      STXD;STR SP;SEP R5
15EC ;              3076      ..
15EC 86;            3077      DC 086H
15ED 284C494E45;    3078      DC '(LINE'
15F2 A9;            3079      DC 0A9H .. (LINE)
15F3 15D7;          3080      DC (STOD-7)
15F5 ;              3081 PLINE
15F5 0857;          3082      DC (NEST)
15F7 0328;          3083      DC (GR)
15F9 0149;          3084      DC (LIT)
15FB 0040;          3085      DC 00040H
15FD 0661;          3086      DC (BBUF)
15FF 136F;          3087      DC (SSMOD)
1601 0336;          3088      DC (RG)
1603 066D;          3089      DC (BSCR)
1605 0567;          3090      DC (STAR)
1607 03C4;          3091      DC (PLUS)
1609 16DE;          3092      DC (BLOCK)
160B 03C4;          3093      DC (PLUS)
160D 0149;          3094      DC (LIT)
160F 0040;          3095      DC 00040H
1611 02C0;          3096      DC (SEMIS)
1613 ;              3097      ..
1613 85;            3098      DC 085H
1614 2E4C494E;      3099      DC '.LIN'
1618 C5;            3100      DC 0C5H .. .LINE

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1619 15EC;          3101      DC (PLINE-9)
161B ;             3102 DLINE
161B 0857;         3103      DC (NEST)
161D 15F5;         3104      DC (PLINE)
161F 0B1C;         3105      DC (TRLG)
1621 0933;         3106      DC (TYPE)
1623 02C0;         3107      DC (SEMIS)
1625 ;             3108      ..
1625 84;           3109      DC 084H
1626 2B4255;       3110      DC '+BU'
1629 C6;           3111      DC 0C6H      .. +BUF
162A 1613;         3112      DC (DLINE-8)
162C ;             3113 PBUF
162C 0857;         3114      DC (NEST) ..      ADVANCE THE BUFFER
162E 0661;         3115      DC (BBUF)
1630 0149;         3116      DC (LIT)
1632 0004;         3117      DC 00004H
1634 03C4;         3118      DC (PLUS)
1636 03C4;         3119      DC (PLUS)
1638 049C;         3120      DC (DUP)
163A 0655;         3121      DC (LIMIT)
163C 0373;         3122      DC (EQL)
163E 0182;         3123      DC (ZBRCH)
1640 1646;         3124      DC (PBUF1)
1642 047D;         3125      DC (DROP)
1644 0649;         3126      DC (FIRST)
1646 ;             3127 PBUF1
1646 049C;         3128      DC (DUP)
1648 079F;         3129      DC (PREV)
164A 04BF;         3130      DC (AT)
164C 0405;         3131      DC (MINS)
164E 02C0;         3132      DC (SEMIS)
1650 ;             3133      ..
1650 86;           3134      DC 086H
1651 5550444154;   3135      DC 'UPDAT'
1656 C5;           3136      DC 0C5H      .. UPDATE
1657 1625;         3137      DC (PBUF-7)
1659 ;             3138 UPDAT
1659 0857;         3139      DC (NEST)
165B 079F;         3140      DC (PREV)
165D 04BF;         3141      DC (AT)
165F 04BF;         3142      DC (AT)
1661 0149;         3143      DC (LIT)
1663 8000;         3144      DC 08000H
1665 0262;         3145      DC (FFOR)
1667 079F;         3146      DC (PREV)
1669 04BF;         3147      DC (AT)
166B 04E0;         3148      DC (EX)
166D 02C0;         3149      DC (SEMIS)
166F ;             3150      ..
166F 8D;           3151      DC 08DH
1670 454D5054592D; 3152      DC 'EMPTY-BUFFER'
1676 425546464552;
167C D3;           3153      DC 0D3H.. * EMPTY-BUFFERS *

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167D 1650;          3154      DC (UPDAT-9)
167F ;              3155 MTBUF
167F 0857;          3156      DC (NEST)
1681 0649;          3157      DC (FIRST)
1683 0655;          3158      DC (LIMIT)
1685 0467;          3159      DC (OVER)
1687 0405;          3160      DC (MINS)
1689 0886;          3161      DC (ERS)
168B 02C0;          3162      DC (SEMIS)
168D ;              3163      ..
168D 86;             3164      DC 086H
168E 4255464645;    3165      DC 'BUFFE'
1693 D2;             3166      DC 0D2H      .. BUFFER
1694 166F;          3167      DC (MTBUF-16)
1696 ;              3168 BUFBE
1696 0857;          3169      DC (NEST)
1698 0794;          3170      DC (USE)
169A 04BF;          3171      DC (AT)
169C 049C;          3172      DC (DUP)
169E 0328;          3173      DC (GR)
16A0 ;              3174 BUFF1
16A0 162C;          3175      DC (PBUF)
16A2 0182;          3176      DC (ZBRCH)
16A4 16A0;          3177      DC (BUFF1)
16A6 0794;          3178      DC (USE)
16A8 04E0;          3179      DC (EX)
16AA 0346;          3180      DC (I)
16AC 04BF;          3181      DC (AT)
16AE 0367;          3182      DC (ZLESS)
16B0 0182;          3183      DC (ZBRCH)
16B2 16C6;          3184      DC (BUFF2)
16B4 0346;          3185      DC (I)
16B6 03E7;          3186      DC (PLUS2)
16B8 0346;          3187      DC (I)
16BA 04BF;          3188      DC (AT)
16BC 0149;          3189      DC (LIT)
16BE 7FFF;          3190      DC 07FFFH
16C0 0251;          3191      DC (FAND)
16C2 0608;          3192      DC (ZERO)
16C4 173C;          3193      DC (RSIW)
16C6 ;              3194 BUFF2
16C6 0346;          3195      DC (I)
16C8 04E0;          3196      DC (EX)
16CA 0346;          3197      DC (I)
16CC 079F;          3198      DC (PREV)
16CE 04E0;          3199      DC (EX)
16D0 0336;          3200      DC (RG)
16D2 03E7;          3201      DC (PLUS2)
16D4 02C0;          3202      DC (SEMIS)
16D6 ;              3203      ..
16D6 85;             3204      DC 085H
16D7 424C4F43;      3205      DC 'BLOC'
16DB CB;             3206      DC 0CBH      .. BLOCK
16DC 168D;          3207      DC (BUFBE-9)

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16DE ;          3208 BLOCK
16DE 0857;      3209          DC (NEST)
16E0 0726;      3210          DC (OFST)
16E2 04BF;      3211          DC (AT)
16E4 03C4;      3212          DC (PLUS)
16E6 0328;      3213          DC (GR)
16E8 079F;      3214          DC (PREV)
16EA 04BF;      3215          DC (AT)
16EC 049C;      3216          DC (DUP)
16EE 04BF;      3217          DC (AT)
16F0 0346;      3218          DC (I)
16F2 0405;      3219          DC (MINS)
16F4 049C;      3220          DC (DUP)
16F6 03C4;      3221          DC (PLUS)
16F8 0182;      3222          DC (ZBRCH)
16FA 172E;      3223          DC (BLOC1)
16FC ;          3224 BLOC2
16FC 162C;      3225          DC (PBUF)
16FE 0352;      3226          DC (ZEQAL)
1700 0182;      3227          DC (ZBRCH)
1702 1716;      3228          DC (BLOC3)
1704 047D;      3229          DC (DROP)
1706 0346;      3230          DC (I)
1708 1696;      3231          DC (BUFFE)
170A 049C;      3232          DC (DUP)
170C 0346;      3233          DC (I)
170E 0610;      3234          DC (ONE)
1710 173C;      3235          DC (RSLW)
1712 0618;      3236          DC (TWO)
1714 0405;      3237          DC (MINS)
1716 ;          3238 BLOC3
1716 049C;      3239          DC (DUP)
1718 04BF;      3240          DC (AT)
171A 0346;      3241          DC (I)
171C 0405;      3242          DC (MINS)
171E 049C;      3243          DC (DUP)
1720 03C4;      3244          DC (PLUS)
1722 0352;      3245          DC (ZEQAL)
1724 0182;      3246          DC (ZBRCH)
1726 16FC;      3247          DC (BLOC2)
1728 049C;      3248          DC (DUP)
172A 079F;      3249          DC (PREV)
172C 04E0;      3250          DC (EX)
172E ;          3251 BLOC1
172E 0336;      3252          DC (RG)
1730 047D;      3253          DC (DROP)
1732 03E7;      3254          DC (PLUS2)
1734 02C0;      3255          DC (SEMIS)
1736 ;          3256          ..
1736 83522FD7;  3257          DC 08352H,02FD7H          .. R/W
173A 16D6;      3258          DC (BLOCK-8)
173C ;          3259 RSLW
173C 0857;      3260          DC (NEST)
173E 0489;      3261          DC (SWAP)

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1740 07BD;          3262      DC (SCRDSK)
1742 04BF;          3263      DC (AT)
1744 133F;          3264      DC (SLMOD)
1746 07AF;          3265      DC (DV)
1748 04F0;          3266      DC (CEX)
174A 0618;          3267      DC (TWO)
174C 0567;          3268      DC (STAR)
174E 07AF;          3269      DC (DV)
1750 03D5;          3270      DC (PLUS1)
1752 04E0;          3271      DC (EX)
1754 0489;          3272      DC (SWAP)
1756 07AF;          3273      DC (DV)
1758 0620;          3274      DC (THREE)
175A 03C4;          3275      DC (PLUS)
175C 04E0;          3276      DC (EX)
175E 07AF;          3277      DC (DV)
1760 0489;          3278      DC (SWAP)
1762 0182;          3279      DC (ZBRCH)
1764 176C;          3280      DC (RWRITE)
1766 09B2;          3281      DC (BLKRD)
1768 0172;          3282      DC (BRCH)
176A 176E;          3283      DC (RWRITE+2)
176C ;              3284      RWRITE
176C 09DB;          3285      DC (BLKWT)
176E 07D2;          3286      DC (GRP)
1770 04BF;          3287      DC (AT)
1772 17BC;          3288      DC (GROUP)
1774 17A4;          3289      DC (CDER)
1776 02C0;          3290      DC (SEMIS)
1778 ;              3291      ..
1778 EF1F1F1F;      3292      SETUP SEX RF;INC RF;INC RF;INC RF
177C 0FFC0273;      3293      LDN RF;ADI 2;STXD
1780 0FFC0173;      3294      LDN RF;ADI 1;STXD
1784 0F7C0073;      3295      LDN RF;ADCI 0;STXD
1788 D487F6;        3296      CALL SEEK
178B D5;            3297      SEP R5
178C ;              3298      ..
178C 84;            3299      DC 084H
178D 436465;        3300      DC 'Cde'
1790 F2;            3301      DC 0F2H
1791 1736;          3302      DC (RSLW-6)
1793 ;              3303      CDERR
1793 1795;          3304      DC ( $+2)
1795 248D54;        3305      DEC SP;GLO RD; STR SP
1798 24F80054D5;    3306      DEC SP;LDI 000H;STR SP;SEP R5
179D ;              3307      ..
179D 84;            3308      DC 084H
179E 434445;        3309      DC 'CDE'
17A1 D2;            3310      DC 0D2H..      *      CDER      *
17A2 178C;          3311      DC (CDERR-7)
17A4 ;              3312      CDER
17A4 0857;          3313      DC (NEST)..      CHECK FOR DISK ERROR,
17A6 1793;          3314      DC (CDERR)
17A8 0182;          3315      DC (ZBRCH)

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17AA 17B2;          3316      DC (CDEX)
17AC 0149;          3317      DC (LIT)
17AE 0008;          3318      DC 00008H
17B0 15B9;          3319      DC (MSG)
17B2 ;              3320  CDEX
17B2 02C0;          3321      DC (SEMIS)
17B4 ;              3322      ..
17B4 85;             3323      DC 085H
17B5 47524F55;      3324      DC 'GROU'
17B9 D0;             3325      DC 0D0H..      *   GROUP   *
17BA 179D;          3326      DC (CDER-7)..    ( GROUP.NO   ...   )
17BC ;              3327  GROUP
17BC 17BE;          3328      DC ( $+2)
17BE F845A7;        3329      LDI 045H;PLO R7..  POINT TO USER VAR GRP
17C1 140457;        3330      INC SP;LDN SP;STR R7..  COPY STACK # TO GRP
17C4 F800A7;        3331      LDI 000H;PLO R7..      RESTORE R7
17C7 E461;          3332      SEX SP;OUT 1..    DO GROUP SELECT
17C9 D5;             3333      SEP R5
17CA ;              3334      ..
17CA ;              3335      ..
17CA ;              3336      ..
17CA 84;             3337      DC 084H
17CB 4C4F41;        3338      DC 'LOA'
17CE C4;             3339      DC 0C4H      ..  LOAD
17CF 17B4;          3340      DC (GROUP-8)
17D1 ;              3341  LOAD
17D1 0857;          3342      DC (NEST)
17D3 06FC;          3343      DC (BLK)
17D5 04BF;          3344      DC (AT)
17D7 0328;          3345      DC (GR)
17D9 0705;          3346      DC (FIN)
17DB 04BF;          3347      DC (AT)
17DD 0328;          3348      DC (GR)
17DF 0608;          3349      DC (ZERO)
17E1 0705;          3350      DC (FIN)
17E3 04E0;          3351      DC (EX)
17E5 066D;          3352      DC (BSCR)
17E7 0567;          3353      DC (STAR)
17E9 06FC;          3354      DC (BLK)
17EB 04E0;          3355      DC (EX)
17ED 1120;          3356      DC (INPT)
17EF 0336;          3357      DC (RG)
17F1 0705;          3358      DC (FIN)
17F3 04E0;          3359      DC (EX)
17F5 0336;          3360      DC (RG)
17F7 06FC;          3361      DC (BLK)
17F9 04E0;          3362      DC (EX)
17FB 02C0;          3363      DC (SEMIS)
17FD ;              3364      ..
17FD C3;             3365      DC 0C3H
17FE 2D2D;          3366      DC '---'
1800 BE;            3367      DC 0BEH      ..  -->
1801 17CA;          3368      DC (LOAD-7)
1803 ;              3369  ARROW

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1803 0857;      3370      DC (NEST)
1805 0C77;      3371      DC (QLDG)
1807 0608;      3372      DC (ZERO)
1809 0705;      3373      DC (FIN)
180B 04E0;      3374      DC (EX)
180D 066D;      3375      DC (BSCR)
180F 06FC;      3376      DC (BLK)
1811 04BF;      3377      DC (AT)
1813 0467;      3378      DC (OVER)
1815 135F;      3379      DC (MODD)
1817 0405;      3380      DC (MINS)
1819 06FC;      3381      DC (BLK)
181B 03F2;      3382      DC (PLUSS)
181D 02C0;      3383      DC (SEMIS)
181F ;          3384      ..
181F 834452B0;  3385      DC 08344H,052B0H ..      DRO
1823 17FD;      3386      DC (ARROW-6)
1825 ;          3387      DRZER
1825 0857;      3388      DC (NEST)
1827 0608;      3389      DC (ZERO)
1829 0726;      3390      DC (OFST)
182B 04E0;      3391      DC (EX)
182D 02C0;      3392      DC (SEMIS)
182F ;          3393      ..
182F ;          3394      ..
182F ;          3395      FRTH
182F C5;        3396      DC 0C5H
1830 464F5254;  3397      DC 'FORT'
1834 C8;        3398      DC 0C8H      .. FORTH (IMMEDIATE)
1835 181F;      3399      DC (DRZER-6)
1837 10A1;      3400      DC (DUZ1)
1839 1191;      3401      DC (VB1)
183B 81A0;      3402      DC 081A0H
183D 18FE;      3403      DC (FLUSH-8).. DICTIONARY LINK. THIS MUST
183F ;          3404      .. POINT TO THE LAST WORD DEFINED BY THIS ASSEMBLY.
183F 0000;      3405      DC 00000H
1841 ;          3406      ..
1841 ;          3407      ..
1841 ;          3408      ..
1841 ;          3409      ..
1841 ;          3410      ..PARAMETER TABLE
1841 ;          3411      .. THE FOLLOWING 6 VALUES ARE USED TO INITIALIZE
1841 ;          3412      ..REGISTERS AT COLD OR WARM START.
1841 ;          3413      ..
1841 ;          3414      PARMS
1841 56FE;      3415      DC (RSTACK)..      R2, RETURN STACK POS.
1843 55FE;      3416      DC (CSTACK)..      +2      R4, COMPUTATION STACK
1845 0098;      3417      DC (NEXT)..      +4      INNER INTERPRETER, R5
1847 0016;      3418      DC (COLD)..      +6      COLD START VECTOR R6
1849 5700;      3419      DC (USAREA)..      +8      R7, USER AREA
184B 11E8;      3420      DC (ABORT+2)..      +10     R8, INITIAL TASK
184D ;          3421      ..
184D ;          3422      ..
184D ;          3423      .. THE NEXT 8 VALUES ARE PLACED IN USER

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184D ;          3424  ..VARIABLES 0 THRU 0E AT COLD OR WARM START.
184D ;          3425  ..
184D ;          3426  ..
184D 18FE;      3427      DC (FLUSH-8)..      +12  LAST DICTIONARY ENTRY
184F 007F;      3428      DC 0007FH..      +14  BACKSPACE CHAR.
1851 5700;      3429      DC (USAREA)..      USER AREA
1853 55FE;      3430      DC (CSTACK)..      COMPUTATION STACK
1855 56FE;      3431      DC (RSTACK)..      RETURN STACK
1857 5600;      3432      DC (ITIB)..      TERMINAL INPUT BUFFER
1859 001F;      3433      DC 0001FH..      NAME FIELD WIDTH
185B 0000;      3434      DC 00000H..      WARNING
185D ;          3435  ..
185D ;          3436  ..
185D ;          3437  .. THE FOLLOWING EIGHT VALUES ARE INSERTED IN USER
185D ;          3438  ..VARIABLES 10 THRU 1E AT COLD START.
185D ;          3439  ..
185D ;          3440  ..
185D 192A;      3441      DC (LEND)..      FENCE
185F 192A;      3442      DC (LEND)..      DICTIONARY POINTER
1861 183F;      3443      DC (FRTH+16)..      VOC-LINK
1863 013B;      3444      DC 0013BH..      SCREENS PER DISK
1865 00F0;      3445      DC 000F0H..      MODEM GROUP
1867 0001;      3446      DC 00001H..      TERMINAL GROUP
1869 00E0;      3447      DC 000E0H..      COMM UART GROUP
186B 0050;      3448      DC 00050H..      NEXT USER VARIABLE
186D ;          3449  ..
186D ;          3450  .. This is the end of the parameter table.
186D ;          3451  ..
186D ;          3452  ..
186D 834452B1;  3453      DC 08344H,052B1H      ..DR1
1871 182F;      3454      DC (FRTH)
1873 ;          3455  DRONE
1873 0857;      3456      DC (NEST)
1875 066D;      3457      DC (BSCR)
1877 07BD;      3458      DC (SCRDSK)
1879 04BF;      3459      DC (AT)
187B 0567;      3460      DC (STAR)
187D 0726;      3461      DC (OFST)
187F 04E0;      3462      DC (EX)
1881 02C0;      3463      DC (SEMIS)
1883 ;          3464  ..
1883 ;          3465  ..
1883 83;         3466      DC 083H
1884 4D4F;      3467      DC 'MO'
1886 CE;        3468      DC 0CEH..      *   MON   *
1887 186D;      3469      DC (DRONE-6)
1889 ;          3470  MON
1889 188B;      3471      DC ( $+2)
188B 9EFA7FBE;  3472      GHI RE;ANI 07FH;PHI RE.. JUMP TO MONITOR UT71
188F C087F0;    3473      LBR UT71
1892 ;          3474  ..
1892 85;        3475      DC 085H
1893 28444F53;  3476      DC '(DOS'
1897 A9;        3477      DC 0A9H..      *   (DOS)   *

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1898 1883;          3478      DC (MON-6)
189A ;             3479 PDOS
189A 189C;         3480      DC ( $+2).. RETURN TO DISK OP SYSTEM
189C F890B0F805A0; 3481      LDI 090H;PHI R0;LDI 005H;PLO R0
18A2 E0D0;         3482      SEX R0;SEP R0
18A4 ;             3483      ..
18A4 82;           3484      DC 082H
18A5 4F;           3485      DC 'O'
18A6 CB;           3486      DC 0CBH..      *      OK      *
18A7 1892;         3487      DC (PDOS-8)
18A9 ;             3488 OK
18A9 0857;         3489      DC (NEST)
18AB 0B41;         3490      DC (PDQ)
18AD 03;           3491      DC 003H
18AE 204F4B;       3492      DC ' OK'
18B1 02C0;         3493      DC (SEMIS)
18B3 ;             3494      ..
18B3 84;           3495      DC 084H
18B4 4C4953;       3496      DC 'LIS'
18B7 D4;           3497      DC 0D4H..      *      LIST      *
18B8 18A4;         3498      DC (OK-5)
18BA ;             3499 LIST
18BA 0857;         3500      DC (NEST)
18BC 0CF2;         3501      DC (MDCML)
18BE 0909;         3502      DC (CR)
18C0 049C;         3503      DC (DUP)
18C2 0719;         3504      DC (FSCR)
18C4 04E0;         3505      DC (EX)
18C6 0B41;         3506      DC (PDQ)
18C8 07;           3507      DC 007H
18C9 53435245454E; 3508      DC 'SCREEN '
18CF 20;           3509      DC (DOT)
18D0 158E;         3510      DC (LIT)
18D2 0149;         3511      DC 00010H
18D4 0010;         3512      DC (ZERO)
18D6 0608;         3513      DC (PDO)
18DA ;             3514 LIST1
18DA 0909;         3515      DC (CR)
18DC 0346;         3516      DC (I)
18DE 0149;         3517      DC (LIT)
18E0 0003;         3518      DC 00003H
18E2 156F;         3519      DC (DOTR)
18E4 0963;         3520      DC (SPC)
18E6 0346;         3521      DC (I)
18E8 0719;         3522      DC (FSCR)
18EA 04BF;         3523      DC (AT)
18EC 161B;         3524      DC (DLINE)
18EE 08EA;         3525      DC (QTERM)
18F0 0182;         3526      DC (ZBRCH)
18F2 18F6;         3527      DC (LIST2)
18F4 031B;         3528      DC (LVE)
18F6 ;             3529 LIST2
18F6 00AE;         3530      DC (LUPE)

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18F8 18DA;          3531      DC (LIST1)
18FA 0909;          3532      DC (CR)
18FC 02C0;          3533      DC (SEMIS)
18FE ;              3534      ..
18FE 85;            3535      DC 085H
18FF 464C5553;      3536      DC 'FLUS'
1903 C8;            3537      DC 0C8H      .. FLUSH
1904 18B3;          3538      DC (LIST-7)
1906 ;              3539      FLUSH
1906 0857;          3540      DC (NEST)
1908 0655;          3541      DC (LIMIT)
190A 0649;          3542      DC (FIRST)
190C 0405;          3543      DC (MINS)
190E 0661;          3544      DC (BBUF)
1910 0149;          3545      DC (LIT)
1912 0004;          3546      DC 00004H
1914 03C4;          3547      DC (PLUS)
1916 134F;          3548      DC (SLASH)
1918 0608;          3549      DC (ZERO)
191A 015B;          3550      DC (PDO)
191C ;              3551      FL1
191C 0149;          3552      DC (LIT)
191E 7FFF;          3553      DC 07FFFH
1920 1696;          3554      DC (BUFFE)
1922 047D;          3555      DC (DROP)
1924 00AE;          3556      DC (LUPE)
1926 191C;          3557      DC (FL1)
1928 02C0;          3558      DC (SEMIS)
192A ;              3559      ..
192A C4;            3560      LEND      NOP      .. INITIAL FENCE IS HERE
192B ;              3561      ..
192B ;              3562      END
0000
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Cross Reference Listing for the Source

The cross reference listing generated by ASM8 is given below. This listing was generated from within FORTH by the word .FILE . The sources for this word are located on screens 232 and 233.

ABORT	1185	3497	2102	3230	3430
ABS	0225	0708	0717	0827	
ACATN	1434	3823	3825	3840	
ALICE	0460	1428	1468	2210	2226
ALLOT	0478	1483	1477		
APORT	0244	0762	0782		
ARROW	1803	3369	3386		
AT	0486	0826	0823	1424	1622
			1842	1886	1910
			1993	1999	2004
			2129	2207	2234
			2411	2439	2444
			2632	2642	2659
			2747	2742	2747
			2717	2740	2782
			2723		
BACK	1393	1747	2734	2782	2809
BACKE	0128	0202	0702		
BAILIN	0127	0204	0793		
BAGE	0789	1004	1081	1796	1982
			2062		
BEAT	0867	0878	0882	2086	2112
BEOM	1266	2247	2288		
BIDGE	1408	2912	2923	2987	
BELIN	1394	2732	2745		
BE	0429	0826	0848	1869	2049
BLK	0460	0882	0887	1724	1809
			2474	2473	2524
BLINK	0294	1402	1391		
BLIND	0282	1182	1396	2247	
BLINT	0908	1397	1412	2242	
BLIN	0898	1248	1386	1986	
BLOCK	1728	2281	2223		
BLOCK	1670	2224	2247		
BLOCK	1716	2238	2238		
BLOCK	1828	2208	1821	2223	2228
BOK	0138	0211	0206		
BRANCH	0176	0221	0262		
BRECH	0172	0249	0288	1861	1871
			2298	2416	2424
			2292		
BSCR	0880	0886	0882	1080	2222
BUTY	1640	2174	2177		
BUTY	1626	2194	2184		
BUTY	1626	2168	2207	2221	2224
CALLS	0977	1384	1320		
CALLS	0978	1323	1322		
CAT	0401	0664	0671	1808	1801
COM	0444	1481	1480		

CROSS REFERENCE LISTING

SYMBOL	ADDR	DEF	REFERENCES							
ABORT	11E6	2497	2102	2530	3420					
ABS	052A	0708	0717	2657						
AGAIN	1434	2823	2835	2840						
ALLOT	0A6C	1458	1468	2210	2556					
ALLOT1	0A78	1463	1477							
APOS1	05A4	0765	0762							
ARROW	1803	3369	3386							
AT	04BF	0656	0663	1624	1625	1673	1687	1711	1725	1743
			1842	1896	1910	1920	1946	1950	1956	1959
			1993	1999	2004	2008	2082	2083	2112	2127
			2129	2207	2224	2238	2334	2350	2366	2392
			2411	2439	2444	2462	2483	2547	2622	2624
			2632	2642	2644	2929	2956	3039	3060	3130
			3141	3142	3147	3171	3181	3188	3211	3215
			3217	3240	3263	3287	3344	3347	3377	3459
			3523							
BACK	1391	2721	2734	2783	2796	2809	2829			
BADCHR	0128	0205	0195	0205						
BADLEN	0127	0204	0193							
BASE	0759	1044	1051	1784	1796	1992	1998	2003	2955	3060
			3062							
BBUF	0661	0878	0885	3086	3115	3544				
BCOMP	1286	2571	2585							
BDIGS	14CB	2915	2923	2997						
BEGIN	139F	2735	2745							
BL	0629	0838	0845	1869	2049	2078				
BLK	06FC	0982	0987	1724	1909	1914	1919	1945	1949	2128
			2474	3343	3354	3361	3376	3381		
BLKEX	09F4	1405	1391							
BLKRD	09B2	1383	1396	3281						
BLKWT	09DB	1397	1415	3285						
BLNK	0898	1248	1266	1966						
BLOC1	172E	3251	3223							
BLOC2	16FC	3224	3247							
BLOC3	1716	3238	3228							
BLOCK	16DE	3208	1951	2523	3092	3258				
BOK	013B	0211	0206	0208						
BRANCH	0174	0251	0262							
BRCH	0172	0249	0258	1661	1858	1871	1931	1952	2017	2061
			2398	2405	2416	2424	2489	2557	2828	2869
			3282							
BSCR	066D	0886	0893	3089	3352	3375	3457			
BUFF1	16A0	3174	3177							
BUFF2	16C6	3194	3184							
BUFEE	1696	3168	3207	3231	3554					
CALLR	0977	1354	1350							
CALLX	0976	1353	1355							
CAT	04D1	0664	0671	1609	1991	2034	2048	2054	2205	2554
CCMA	0AA4	1481	1490							

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CDER	17A4	3312	3289	3326						
CDERR	1793	3303	3311	3314						
CDEX	17B2	3320	3316							
CEND	00C1	0158	0156							
CEX	04F0	0680	0686	1877	1974	3266				
CFA	0AE5	1516	1520	1809	2261	2396	2401	2440	2578	
CGRP	0800	1154	1161							
CL	0633	0846	0853							
CLD	0005	0071	0069							
CMOVE	02FC	0437	0451	1979	2168					
CMPL	0C91	1736	1748	1820	2247	2337	2534	2550	2769	2781
			2794	2807	2827	2852	2868			
CNST	104B	2270	2280	2306						
CNT	0B03	1531	1542	2119	2170	2562				
CNTX	0734	1020	1027	2081	2239	2451	2461	2623	2643	
CODE	0D1E	1817	1829							
COLD	0016	0085	0077	0084	0095	3418				
COLON	1006	2233	2254							
COMMA	0A84	1469	1480	1744	2222	2228	2263	2339	2397	2437
			2441	2445	2579	2723	2856	2872		
COMMA1	0A96	1476	1487							
COMP	00B2	0153	0173	0175						
CONST	05FB	0800	0110	0812	0818	0824	0831	0839	0847	0855
			0863	0871	0879	0887	0895	2273		
CR	0909	1308	1322	2479	2503	2507	2511	3502	3515	3532
CRNT	0742	1028	1035	1623	2223	2237	2438	2463	2621	
CRT1	0FCC	2202	2194							
CRTE	0FA6	2182	2232	2241	2257					
CSEND1	099C	1373	1311	1313	1333	1373				
CSP	0777	1068	1073	1710						
CSTACK	55FE		0044	3416	3430					
DABS	0539	0718	0725	2655	2996					
DCODE	102E	2255	2269	2274	2285	2296				
DCSP	0AEE	1521	1530	2236						
DDOT	1580	3020	3028	3032	3048					
DDOTR	154C	2991	3009	3015	3023					
DELIM	01E3	0306	0295							
DFN	11A7	2459	2470	2520						
DGT	02D3	0422	0436	1994						
DIG	1509	2953	2976	2980						
DIG1	1525	2968	2964							
DIGS	1534	2977	2990	2998						
DIGS1	1536	2979	2986							
DLINE	161B	3102	3112	3524						
DLTL	10D7	2347	2362	2415						
DLTL1	10E7	2356	2352							
DMIN	044D	0598	0608	0721	1594	2068				
DO	13D3	2767	2776							
DOESG	1095	2313	2330	2448						
DOK	02E7	0428	0426							
DOT	158E	3029	3036	3040	3061	3509				
DOTQ	1250	2542	2570							
DOTQ1	1270	2559	2549							
DOTQ2	1278	2564	2558							

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DOTR	156F	3010	3019	3519						
DP	06E3	0966	0973	2245	2639					
DPL	0763	1052	1059	2007	2013	2044	2410			
DPLS1	03CB	0537	0581							
DPLUS	0416	0576	0586	2006						
DPM	0B88	1591	1599							
DREAD	87F9		0036	1388	1390					
DRONE	1873	3455	2521	3469						
DROP	047D	0620	0627	1614	1663	1846	1868	1886	1929	1935
			2001	2064	2089	2146	2195	2419	2524	2577
			2611	2685	2693	2714	2926	2927	3125	3229
			3253	3555						
DRZER	1825	3387	3399							
DUP	049C	0638	0646	1740	1838	1852	1861	1874	1989	2032
			2038	2047	2053	2085	2161	2204	2211	2367
			2514	2630	2637	3120	3128	3172	3216	3220
			3232	3239	3243	3248	3503			
DUZ1	10A1	2321	3400							
DV	07AF	1106	1113	3265	3269	3273	3277			
DWRITE	87FC		0037	1402	1404					
EDIGS	14DA	2924	2938	3000						
EFTBL	005E	0112	0111	0149						
ELSEE	147B	2864	2882							
EMIT	08FC	1302	1307	1343	1883					
EMMIT	098C	1365	1304							
ENCL	0196	0280	0315	1962						
END2	0312	0446	0443							
ENDD	1426	2814	2822							
ENDIFF	13B1	2746	2759	2762	2845	2875				
EQL	0373	0501	0510	1843	1851	1864	2037	3122		
ERR1	0F36	2117	2115							
ERROR	0F28	2109	1660	2136						
ERS	0886	1239	1247	1250	3161					
ERS01	086A	1226	1242							
EX	04E0	0672	0679	1753	1763	1785	1797	1810	1881	1902
			1918	2045	2225	2240	2262	2318	2447	2452
			2464	2475	2516	2518	2640	2645	2753	2919
			3062	3148	3179	3196	3199	3250	3271	3276
			3351	3355	3359	3362	3374	3391	3462	3505
EXC	0C30	1684	1696	1927	2235					
EXE	01F7	0316	0325	2402						
EXPT	0D35	1830	1892	1899						
EXPT1	0D6D	1860	1845							
EXPT2	0D93	1882	1859							
EXPT3	0D85	1873	1866							
EXPT4	0D3F	1836	1885							
EXPT5	0D87	1875	1872							
FAND	0251	0356	0363	1923	2173	3191				
FFOR	0262	0364	0373	2983	3145					
FILL	0868	1224	1238	2160						
FILLEX	087D	1233	1231							
FILLOP	0871	1230	1232							
FIN	0705	0988	0995	1901	1917	1958	1967	2126	3346	3350
			3358	3373						

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FIND	00F5	0188	0222	2084	2092						
FIRST	0649	0862	0869	2513	3126	3157	3542				
FIRSTB	57D7		0040	0864							
FL1	191C	3551	3557								
FLD	076D	1060	1067								
FLGLES	03A0	0517	0529								
FLUSH	1906	3539	3403	3427							
FNCE	06DA	0960	0965	2631							
FORG	12DB	2619	2649								
FOUT	070F	0996	1003								
FRST	01AF	0290	0288								
FRTH	182F	3395	0085	2519	3443	3454					
FSCR	0719	1004	1011	3504	3522						
FSPAT	0286	0384	0392	1709	2184	2368	2375				
FXOR	0274	0374	0383	2661							
GETNXT	0090	0131	0134								
GR	0328	0459	0466	1742	1856	1971	1990	2039	2653	2654	
			2673	2702	2838	2839	2993	3012	3083	3173	
			3213	3345	3348						
GROUP	17BC	3327	2502	3288	3340						
GRP	07D2	1130	1137	3286							
GTR	03AE	0524	0532	2141	2376						
HERE	0A53	1447	1457	1963	1973	1976	2080	2090	2118	2185	
			2203	2215	2226	2408	2442	2553	2561	2738	
			2751	2771	2854	2870					
HLD	078A	1082	1089	2918	2928						
HOLD	08B1	1267	1280	2947	2972						
I	0346	0477	0483	1850	1876	1879	1972	2656	2660	3180	
			3185	3187	3195	3197	3218	3230	3233	3241	
			3516	3521							
ID	0F6F	2153	2181	2197							
IFF	1464	2850	2863	2885							
IMMED	12A4	2586	2595								
INPT	1120	2386	2425	2431	2481	3356					
INPUT	083D	1200	1223								
IP	0008		0057	0102	0131	0157	0157	0158	0158	0225	
			0251	0251	0263	0263	0414	1216	1217	1561	
			1562	1564	1564	1565	1565	2322	2323		
			0043	3432							
ITIB	5600		1291	1837							
KEY	08CF	1281	1284								
KEY1	08D2	1284	1757	1822	2476	2537					
LB	0CA7	1749	2312	2434							
LBLD	1085	2303	0339	0340							
LCP5	0215	0332	3441	3442							
LEND	192A	3560	1610	2189	2369	2393	2633	2962			
LESS	0390	0511	1515	2163	2641						
LFA	0AD9	1508	0877	3121	3158	3541					
LIMIT	0655	0870	0039	0872							
LIMITB	7FFF		18BA	3499	3538						
LIST	18BA	3499	18DA	3514	3531						
LIST1	18DA	3514	18F6	3529	3527						
LIST2	18F6	3529	0149	0223	0235	1606	1632	1635	1646	1675	1688
LIT	0149	0223			1713	1727	1760	1773	1782	1794	1839
											1847

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			1862	1897	1921	1964	2035	2041	2055	2156
			2158	2171	2186	2198	2212	2218	2243	2272
			2283	2294	2338	2372	2377	2435	2544	2589
			2598	2626	2634	2945	2959	2965	2969	3084
			3094	3116	3143	3189	3317	3510	3517	3545
			3552							
LOAD	17D1	3341	3368							
LOOP	13E6	2777	2789							
LOOP1	00FC	0192	0213							
LOOP2	010F	0197	0198							
LOP1	01A7	0287	0289							
LOP2	01BE	0294	0296							
LPP	063D	0854	0861							
LTL	10CA	2340	2336							
LTL	10BA	2331	2346	2354	2355	2420	2612			
LTST	0BC1	1621	1629	1772	1807	2091	2221	2259	2316	2588
LUPE	00AE	0150	0167	1884	2782	2908	3530	3556		
LUUP	0309	0443	0445							
LVE	031B	0452	0458	1867	3528					
MAX	0547	0726	0738	2900						
MAXEX	0562	0735								
MAXEX1	055E	0734	0732							
MDCML	0CF2	1792	1803	2500	3061	3501				
MDUP	0516	0698	0707	2901						
MF1	0F0E	2093	2088							
MFIND	0EEE	2076	2099	2192	2388	2573	2607			
MGRP	07E2	1138	1145							
MHEX	0CDC	1780	1791							
MIN	0F57	2137	2152	2208						
MINOS	0437	0590	0603							
MIN5	0405	0567	0575	1634	1699	1712	1857	1970	2050	2057
			2165	2217	2374	2625	2844	2932	3003	3131
			3160	3219	3237	3242	3380	3543		
MINUS	0432	0587	0597	0711	1587					
MN1	0F65	2145	2143							
MODD	135F	2690	2699	3379						
MON	1889	3470	3478							
MPLX1	05F4	0794	0789							
MPLX2	05D6	0785	0794							
MSG	15B9	3055	2124	2200	3069	3319				
MSLAS	1316	2650	2670	2676	2705					
MSMOD	0A07	1416	1446	2957						
MSMOD3	0A1D	1424	1434	1436						
MSMODX	0A44	1437	1429							
MSTAR	0576	0749	0810	2703						
MTBUF	167F	3155	2512	3167						
MULT1	05C6	0771	0766							
NEST	0857	1215	0903	1601	1622	1631	1643	1656	1671	1685
			1698	1708	1723	1737	1750	1759	1771	1781
			1793	1805	1818	1831	1894	1908	1944	1987
			2028	2077	2101	2110	2138	2154	2183	2234
			2248	2256	2271	2282	2293	2304	2314	2332
			2348	2364	2387	2433	2460	2472	2498	2532
			2543	2572	2587	2597	2606	2620	2651	2672

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			2682	2691	2701	2711	2722	2736	2747	2761
			2768	2778	2791	2804	2815	2824	2837	2851
			2865	2884	2898	2916	2925	2940	2954	2978
			2992	3011	3021	3030	3038	3046	3056	3082
			3103	3114	3139	3156	3169	3209	3260	3313
			3342	3370	3388	3456	3489	3500	3540	
NEXCHR	0106	0194	0196							
NEXT	0098	0134	1358	3417						
NEXTU	080C	1162	1179							
NFA	0BD1	1630	1641	2196	2638					
NMB1	0EB4	2043	2062							
NMB2	0EDA	2063	2052							
NMB3	0EE4	2069	2067							
NMBR	0E96	2027	2075	2409						
NNONE	0382	0506								
NOF	006F	0117	0112	0113	0114	0115				
NONE	0358	0488	0425	0427	0431	0497				
NULL	01C8	0297	0294							
OFST	0726	1012	1019	3210	3390	3461				
OK	18A9	3488	2487	2525	3498					
OKGO	0853	1208	1206							
ONE	0610	0817	0822	1644	1913	2012	2216	2370	2501	2522
			2739	2805	2825	3234				
ONEMIN	0ABC	1491	1499							
ONMNS1	0AC0	1494	1502	1510						
ORGN	067A	0894	0901	0904						
OUTLL	07C8	1122	1129							
OUTPUT	0819	1180	1199							
OVER	0467	0609	0619	1604	1608	1832	1834	1849	1969	2139
			2140	2164	2652	2931	2961	2981	2982	2995
			3002	3159	3378					
PABRT	0F1A	2100	2108	2116						
PAD	0B5D	1572	1583	2155	2166	2169	2917	2930		
PAREN	12B4	2596	2604							
PARMS	1841	3414	0086	0099	0896					
PBUF	162C	3113	3137	3175	3225					
PBUF1	1646	3127	3124							
PCODE	0D08	1804	1816	1821	2319					
PDO	015B	0236	0248	1835	2770	2905	3513	3550		
PDOS	189A	3479	3487							
PDQ	0B41	1559	1571	2121	2504	2508	2551	3057	3490	3506
PFA	0BE7	1642	1654	1808	2162	2260	2317			
PLINE	15F5	3081	3101	3104						
PLOOP	13FC	2790	2802							
PLS1X	03D9	0546	0554							
PLUPE	00D3	0168	0187	2795						
PLUS	03C4	0533	0542	0905	1605	1648	1833	1855	1960	1975
			2040	2188	2967	2971	3091	3093	3118	3119
			3212	3221	3244	3275	3547			
PLUS1	03D5	0543	0551	1880	1977	1988	2009	2033	2209	2412
			2555	3270						
PLUS2	03E7	0552	0557	1741	2227	2450	2886	3186	3201	3254
PLUSS	03F2	0558	0566	1915	1968	2014	2246	3382		
PM	0B79	1584	1590	2662	2665					

PNM1	0E83	2015	2011								
PNM2	0E89	2019	1996								
PNMBR	0E4B	1986	2018	2026	2046						
PORGN	0688	0902	0921	1841							
PREV	079F	1098	1105	2515	3129	3140	3146	3198	3214	3249	
PT1	1144	2407	2390								
PT2	113A	2400	2395								
PT3	113E	2403	2399								
PT4	115E	2423	2406								
PT5	1158	2418	2414								
PT6	115C	2421	2417								
Q1	11D8	2488	2486								
Q2	11C4	2477	2490								
QCMP	0C18	1670	1683	1738	2737	2748					
QCSP	0C5A	1707	1721	1819	2533						
QERR	0BFE	1655	1669	1677	1690	1702	1715	1729	2059	2191	
			2371	2379	2576	2610	2628	2636			
QLDG	0C77	1722	1735	3371							
QPR	0C47	1697	1706	2750	2780	2793	2806	2826	2867		
QSTK	10F2	2363	2385	2404	2422						
QTERM	08EA	1292	1301	3525							
QUER	0DA5	1893	1906	2480							
QUES	159A	3037	3044								
QUIT	11BA	2471	2130	2496	2526						
REPEA	144B	2836	2849								
RETN	009A	0137	0141								
RG	0336	0467	0476	1739	1806	1853	1928	1934	1978	2016	
			2020	2065	2315	2659	2664	2675	2704	2841	
			2842	3001	3014	3088	3200	3252	3357	3360	
RNU	0780	1074	1081								
RO	06AA	0928	0935								
ROT	04FE	0687	0697	2002	2031	2941	2958				
RP	0002		0051	0101	0138	0138	0140	0152	0153	0153	
			0154	0157	0158	0158	0159	0172	0174	0174	
			0174	0192	0201	0238	0240	0284	0285	0293	
			0347	0407	0407	0414	0415	0415	0454	0454	
			0454	0461	0471	0471	0472	0741	0751	0765	
			0771	0795	1202	1202	1208	1209	1215	1229	
			1230	1259	1269	1304	1311	1325	1329	1330	
			1354	1355	1357	1358	1374	1386	1400	1405	
			1406	1449	1460	1471	1483	1523	1561	1563	
			1574	2321							
RP1	02AB	0403	0411	2478							
RSLW	173C	3259	3193	3235	3302						
RSTACK	56FE		0042	3415	3431						
RTB	0CB5	1758	1769	2242							
RWRITE	176C	3284	3280	3283							
SCRDSK	07BD	1114	1121	3262	3458						
SCRT	096C	1349	1386	1400							
SCRTX	0982	1357	1407								
SEEK	87F6		0035	1388	1402	3296					
SEMIC	123D	2531	2541								
SEMIS	02C0	0412	0421	0906	1615	1626	1638	1649	1664	1678	
			1691	1703	1716	1730	1745	1754	1764	1776	

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			1786	1798	1811	1824	1887	1903	1937	1980
			2021	2070	2094	2103	2131	2147	2176	2229
			2249	2264	2275	2286	2297	2307	2341	2357
			2380	2426	2453	2465	2491	2527	2535	2538
			2565	2580	2592	2601	2613	2646	2667	2677
			2686	2694	2706	2715	2724	2740	2754	2763
			2773	2784	2797	2810	2817	2830	2846	2858
			2877	2887	2911	2920	2933	2949	2973	2987
			3006	3016	3025	3033	3041	3049	3063	3096
			3107	3132	3149	3162	3202	3255	3290	3321
			3363	3383	3392	3463	3493	3533	3558	
SEMIS1	02C6	0415	0408							
SETTUP	1778	3292	1389	1403						
SIGN	14F3	2939	2952	2999						
SIGN1	1503	2948	2944							
SKIP	01D9	0302	0299	0300	0308					
SLASH	134F	2681	2689	3548						
SIMOD	133F	2671	2680	2683	2692	3264				
SMDG	0CCA	1770	1779	1823	2258	2536				
SMULT	057E	0756	0741	0751						
SO	06A1	0922	0927	2365						
SP	0004		0053	0101	0117	0117	0118	0118	0132	0170
			0171	0172	0172	0191	0199	0202	0209	0209
			0212	0212	0225	0226	0227	0238	0261	0261
			0282	0282	0283	0283	0283	0284	0290	0292
			0293	0297	0298	0300	0300	0302	0302	0302
			0303	0304	0304	0304	0306	0307	0307	0307
			0329	0329	0329	0338	0338	0347	0349	0350
			0358	0360	0366	0368	0376	0378	0386	0386
			0386	0387	0397	0424	0424	0428	0430	0430
			0439	0440	0462	0469	0470	0479	0480	0486
			0490	0496	0503	0504	0507	0513	0514	0517
			0519	0526	0527	0535	0538	0546	0546	0547
			0569	0571	0579	0579	0579	0589	0590	0591
			0591	0600	0600	0600	0601	0602	0611	0612
			0613	0614	0622	0622	0630	0632	0640	0640
			0640	0641	0658	0659	0660	0666	0667	0682
			0683	0690	0692	0700	0701	0701	0704	0710
			0720	0729	0729	0733	0733	0742	0742	0756
			0758	0759	0760	0760	0761	0766	0771	0783
			0790	0791	0803	0803	0803	0912	0913	0913
			0914	1182	1185	1204	1204	1205	1205	1206
			1207	1241	1271	1272	1283	1286	1294	1295
			1310	1310	1312	1312	1326	1332	1332	1342
			1368	1374	1421	1421	1422	1433	1433	1439
			1451	1451	1451	1452	1462	1474	1476	1486
			1494	1496	1525	1533	1536	1545	1546	1547
			1552	1561	1563	1577	1577	1579	1586	1586
			1593	1593	2324	2324	2325	3072	3072	3072
			3075	3305	3305	3306	3306	3330	3330	3332
SP1	0297	0393	0402	2125	2499					
SPACS	14AE	2897	2914	3004						
SPAX1	14C4	2910	2903							
SPAX2	14BE	2906	2909							

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SPC	0963	1340	1382	2175	2201	2907	3024	3520			
SPPOS	0596	0762	0758								
SSLA	1380	2710	2720								
SSMOD	136F	2700	2709	2712	3087						
STAR	0567	0739	0748	3090	3268	3353	3460				
STOD	15DE	3070	2674	3013	3031	3080					
STT	074E	1036	1043	1672	1686	1752	1762	2333	2349	2391	
			2482	2546							
SWAP	0489	0628	0637	1602	1613	1657	1961	1997	2144	2167	
			2353	2663	2666	2684	2713	2752	2873	2994	
			3060	3261	3272	3278					
TGLE	04B0	0647	0655	1775	2214	2220	2591				
TGRP	07F1	1146	1153								
THEN	13C8	2760	2766								
THREE	0620	0830	0837	2772	2779	2792	3274				
TIB	06B4	0936	0943	1895	1955						
TICK	12C2	2605	2618	2629							
TR1	0BA0	1603	1612								
TRL1	0B29	1548	1550	1551							
TRL2	0B36	1552	1549								
TRLG	0B1C	1543	1558	3105							
TRVS	0B9C	1600	1620	1637	1645						
TWO	0618	0823	0829	2190	2749	2843	2857	2866	2874	2876	
			3236	3267							
TWOMIN	0ACD	1500	1507	1517	1854						
TYPE	0933	1323	1339	1566	2120	2174	2563	3005	3106		
TYPEX	092B	1317	1331								
TYPLP	0949	1330	1334								
UDOT	15A7	3045	3054								
UMULT	05CE	0783	0348	0765							
UNTIL	1412	2803	2813	2816							
UP	0007		0056	0102	0103	0395	0396	0405	0406	0912	
			0914	1259	1260						
UPDAT	1659	3138	3154								
USAREA	5700		0041	3419	3429						
USE	0794	1090	1097	2517	3170	3178					
USER	0690	0912	0923	0929	0937	0945	0953	0961	0967	0975	
			0983	0989	0997	1005	1013	1021	1029	1037	
			1045	1053	1061	1069	1075	1083	1091	1099	
			1107	1115	1123	1131	1139	1147	1155	1163	
			2295								
USLSH	0204	0326	0343	2658							
USLSX	0245	0350	0334								
USR	1071	2292	2302								
USRADD	089F	1259	1269	1314	1325	1365	1450	1461	1472	1484	
			1524	1575							
USTAR	023A	0344	0355	2000	2005						
UT71	87F0		0038	3473							
VAR	05FE	0803	2284								
VARB	1060	2281	2291								
VB1	1191	2449	3401								
VBLV	1171	2432	2458								
VCTRS	0825	1185	1183								
VL	06F2	0974	0981	2443	2446						

WARM	0036	0097	0070	0090	0096	0109				
WBR	0093	0132	0319							
WD1	0E0E	1954	1948							
WD2	0E12	1957	1953							
WEF1	0078	0119								
WEF1N	0084	0123								
WEF2	007B	0120								
WEF2N	0087	0124								
WEF3	007E	0121								
WEF3N	008A	0125								
WEF4	0081	0122								
WEF4N	008D	0126								
WHILE	149D	2883	2896							
WIDTH	06C0	0944	0951	2206						
WORD	0DFA	1943	1985	2079	2552	2560	2600			
WRMLP	004D	0104	0105							
WRNG	06CE	0952	0959	2111						
X	0DBD	1907	1942							
X1	0DE9	1930	1926							
X2	0DED	1933	1912							
XEND	0DF1	1936	1932							
YES	006C	0116	0112	0113	0114					
ZBRCH	0182	0259	0279	1611	1658	1844	1865	1911	1925	1947
			1995	2010	2051	2066	2087	2114	2142	2193
			2335	2351	2389	2394	2413	2485	2548	2808
			2853	2902	2943	2963	2985	3123	3176	3183
			3222	3227	3246	3279	3315	3526		
ZEQUAL	0352	0484	0493	1674	1726	1924	2086	2484	2574	2608
			2984	3226	3245					
ZERO	0608	0811	0816	1751	1870	1878	1900	1916	2029	2030
			2058	2060	2305	2473	2575	2609	2855	2871
			2899	2904	3022	3047	3192	3349	3372	3389
			3512	3549						
ZLESS	0367	0494	0500	2113	2942	3182				
ZONE	035B	0489	0429	0487	0496					
ZZONE	0385	0507	0505							

Known Deviations from fig-FORTH

Woods Hole FORTH is modeled after fig-FORTH as outlined in the fig-FORTH installation manual. There are a few exceptions, however, as listed below. In most cases, these are subtle enhancements and should still allow Fig-FORTH programs to run without problems.

1. `ENCLOSE`, the text scanning primitive used by `LOAD`, can handle up to 32767(d) blanks, instead of 255 as in Fig-FORTH. This means that the system will not generate message 7 if more than 255 blank characters are within a screen.
2. `CR` increments the `USER` variable `OUTL`. `OUTL` is a new `USER` variable which keeps track of the number of lines which have been printed in a fashion analogous to `OUT`, the character counter. A new constant `L/P` (lines per page) has been added. By comparing `OUTL` with `L/P`, the user can decide when to issue form feeds for a printer. The `USER` variable `FLD`, unused by fig-FORTH, is used as a page counter. It is incremented by the word `PAGE`.
3. `ABORT` has two actions which are different from the fig model. First, `ABORT` selects drive 1 as the default drive rather than drive zero. This is done so that a library of system programs can be maintained on drive zero, and applications can be completely contained on the disk in drive one. Secondly, `ABORT` includes the sequence: 1 BLOCK DROP to force a drive head recalibration. This is required after a system reset. For an application that does not have disk hardware, this will cause a system crash. Therefore, the code must be changed to:
`0 0= DROP`. This patch is performed by the word `NODISK`. Screen 83 has the code required to install both of these patches.
4. The word `MESSAGE` always prints the message number in base 10 (decimal) so there is no confusion as to which message is issued. `MESSAGE` does not change the current number `BASE`. When writing

application programs that do not use disks, it is best to avoid calling ERROR or MESSAGE; rather, when an error is detected, the user should print a text message stored in the dictionary and deal with the problem so execution can continue without interruption.

5. MESSAGE does not access the disk for a text message when WARNING is positive. In the fig-FORTH model, a positive value for WARNING will cause a text message to be printed, rather than a message number.
6. The word INDEX is given special consideration in WFORTH. By convention, all screens reserve line 0 as the index line. The index line is enclosed within parentheses and treated as a comment when loading the screen. Within the index line are the names of all words defined on that screen. The word INDEX uses a word ?INDEX to decide whether to print the index line. An index line will be printed by INDEX only if there are no non-printing characters on line zero and if line 0 contains at least 1 printing character. Therefore, an index over the entire range of screens (DECIMAL 65 249 INDEX (CR)) yields a directory to the sources of all words defined on screens, skipping screens without meaningful comment lines.
7. >IN, according to the FORTH 79 standard is included. It is defined as : >IN IN ;. The FORTH 79 word : NOT 0=; is included also.
8. WORD-79 is included, defined according to FORTH 79. It is defined as : WORD-79 WORD HERE ;
The definition of WORD frequently causes problems when transporting programs from other FORTH systems. Check carefully for the occurrence of WORD in existing FORTH programs.
9. CMOVE> (character move up), a FORTH 83 standard word, is included. This is for memory block moves where the source and destination overlap and the source address is lower than the destination address.
10. EDIT, a full screen editor is included in the Fig-EDITOR vocabulary. EDIT is configured for a Televideo 910+ terminal and may require

- changes for other terminals.
11. L and T (list and type) which are normally EDITOR words, are also defined in FORTH. When executed in FORTH, they change the context vocabulary to EDITOR and then behave normally as L and T.
 12. There is a non-standard word GROUP, which takes the top number from the stack and uses it to perform the RCA 2 level I/O select. There is also a new USER variable, GRP, which holds the value of the group most recently selected by GROUP. The use of GROUP allows the user to restore the group number to its previous value after executing I/O words.
 13. There is a set of communications words which facilitate terminal emulation, modem communication, and uploading and downloading of files and memory blocks.
 14. There is a set of disk access words to facilitate reading and modifying operating system files.
 15. There is a set of documentation words. The purpose of these words and screens is to make documentation of a particular application version of FORTH easy. Chapters 11 through 22 were generated in this manner.
 16. The words PRINTER and NOPRINT allow full printer support. As supplied, PRINTER, and NOPRINT support a parallel printer, using the CDP 18S646 card, but executing the word SERPRINTER will redirect all printer output to a uart assigned to the communications group for use with a serial printer.
 17. A single pass Assembler for 1806 mnemonics is included.
 18. 32 bit floating point arithmetic is included as a loadable option. It is not rigorously FORTH-like, because the actual program must be loaded separately and called in a slow fashion. The floating point

words are loaded by the word FLOATING. A file called FFORTH.CM is included which has floating point support already compiled. When floating point is used, it is loaded into the last four screen buffers, reducing the number of buffers available from 10 to 6. This is essentially transparent to the user, as all memory pointers are reassigned.

REFERENCES

FORTH ENCYCLOPEDIA, second edition:

Derick and Baker; Mountain View Press, P.O. Box 4656, Mountain View, CA 94040.

This publication was used as the primary model for Woods Hole fig-FORTH. It is the most important reference work, because of the thorough explanation of each word.

STARTING FORTH:

Leo Brodie

This is an important tutorial, although it describes the FORTH INC. dialect of FORTH, not fig-FORTH. As a result, some differences occur with the editor and with the syntax of individual words. The glossary of Woods Hole FORTH should be used to explain the behavior of WFORTH words, rather than STARTING FORTH.

Fig-FORTH Installation Manual;

William F. Ragsdale; published by the FORTH Interest Group, P.O. Box 1105, San Carlos, CA 94070

Fig-FORTH 1802;

published by the FORTH Interest Group.

These are the publications for the implementation of fig-FORTH. The installation manual contains the original published model, as well as the sources for and a description of the fig-Editor. These publications are indispensable.

Mad-FORTH:

Dick Berger, Micro Amp Designs.

This version of FORTH, based on Fig-FORTH 1802 was the starting point for Woods Hole FORTH.

PC FORTH and Z80 FORTH:

Ray Duncan, Laboratory Microsystems

These two excellent implementations of FORTH, although written in 79

standard FORTH, were used to insure a high degree of transportability with Woods Hole FORTH. PC FORTH was used on an IBM personal computer. Z80 FORTH was used on an RCA MS2080 development systems. A 2080 development system is composed of:

- 1 RCA MS2000 development system, with CPU card removed
- 1 RCA MB80 CPU card
- 1 RCA 18S641 UART card
- the TPM operation system (a CP/M clone)
- UT80 UTILITY Program

RCA MPM 201 and MPM 201C (supplement)

User Manual for the 1802, 1804, 1805, and 1806 Microprocessors.

These are useful manuals for the 1800 series microprocessors.

RCA MPM 207

Floating point Arithmetic Subroutines.

This document provides the basis for Woods Hole Floating Point.

RCA MPM 241 P1

User Manual for the RCA Microdisk Development System.

All operating system programs, including SUBMIT are described here. This is a very good operating system.

FORTH DIMENSIONS

Published by the FORTH Interest Group. This is the journal of the FORTH Interest Group. Published approximately quarterly, it provides numerous papers on general FORTH problems, as well as highly specialized applications of FORTH. Many dialects of FORTH are represented here.

Alvin User's Manual and Alvin Data Systems User's Manual

Published by Woods Hole Oceanographic Institution. This publication describes, among other things, the Alvin data system. Much of software for the Alvin data system was written in Woods Hole FORTH.

Woods Hole FORTH is available from:

Jim Akens

Alvin Group, Woods Hole Oceanographic Institution,

86 Water Street

Woods Hole, Ma 02543

The FORTH ENCYCLOPEDIA and STARTING FORTH are available from:

Mountain View Press

P.O. Box 4656

Mountain View, CA 94040

PC FORTH is available from:

Laboratory Microsystems

4147 Beethoven Street

Los Angeles, CA 90066

The fig-FORTH Installation Manual, fig-FORTH 1802 and FORTH DIMENSIONS are available from:

FORTH INTEREST GROUP

P.O. Box 1105

San Carlos, CA 94070

The MS 2000 and MS 2080 development systems and the RCA documents are available from:

RCA

Route 202

Somerville, NJ 08876

GLOSSARY

Each word in the glossary contains 4 entries; the name, computation stack behavior, pronunciation, and a description of the word's behavior. NAME is the actual entry which causes execution. Stack behavior is indicated within < before NAME was executed, the value of BEFORE (a 16 bit value) was on the stack. After NAME is executed, the stack has two values; AFTER.2nd is the lower number, and AFTER.TOP is the top value on the stack. Notice that the indicated stack behavior is only relative to the word being executed. In fact, the stack contains an unknown number of items. The word DEPTH leaves, as the top number on the stack, the number of 16 bit items on the stack. The notation ANY.NAME indicates that a FORTH word is required. There are 8 general types of numbers on the stack.

Examples

Meaning

NUMBER N	represent a single 16 bit signed number;
U	represents a 16 bit unsigned number;
DOUBLE D	represent a 32 bit signed number;
UD	represents an unsigned 32 bit number;
F	represents a 32 bit floating point number. The first 8 bits represent a signed exponent (base 10) and the remaining 24 bits represent a signed 24 bit mantissa (base 10).
CHARACTER CHAR	represents an 8 bit character. Although a 16 bit number is on the stack, only the least significant 8 bits are used.
ADDRESS ADDR	represent a 16 bit address, normally interpreted as an unsigned number.
FLAG f	represents a flag, a 16 bit number. The value zero represents the false condition. Any non-zero value signifies true.

< ... > Null

Null is a pseudonym for the ascii character 00. It is sometimes called X in fig-FORTH literature. Null causes an exit from INTERPRET. Control is returned to the procedure which called interpret.

! < NUMBER ADDRESS ... > Store

! stores a 16 bit NUMBER at ADDRESS.

!BLK < ... > Store block

!BLK is a primitive used by EDIT.

!CODE < ADDRESS.LIT ADDRESS ... > Store Code

!CODE is a Woods Hole FORTH defining word, used in building CONSTANTS, VARIABLES and USER variables.

!CSP < ... > Store Current Stack Pointer

!CSP is a word used by the compiler with CSP and ?CSP for compiler security. It stores the current stack pointer address in the USER variable CSP .

!CUR < CURSOR ... > Store Cursor

Store cursor location in the USER variable CUR . Check for range 0 to 3FF(h).

< UNSIGNED.DOUBLE ... DOUBLE.QUOTIENT > Sharp

Sharp converts 1 digit of the DOUBLE number on the stack to ASCII, using the current number BASE. The output string is constructed, starting with the least significant digit, just before the PAD buffer. Each time # is invoked, one digit is converted. See Starting FORTH, by Leo Brodie, for a complete discussion of <# # #S and #> .

#> < D ... ADDRESS LENGTH > Sharp Greater Than

#> is used to terminate a pictured numeric output expression. It drops the double number left by #, and replaces it with the beginning ADDRESS of the converted string and the LENGTH of the string, in a form suitable for TYPE.

#S < UNSIGNED.DOUBLE ... 0 0 > Sharp S

Sharp S converts a double unsigned number to an ASCII string located 1 byte before pad. #S must be used within the <# # #> structure. The current number BASE is used in the conversion.

' < ... PFA > Tick

Tick places the parameter field address of the specified word on the stack. It is used in the form:
' ANY.WORD

(< ... > Left Parenthesis

(is used to mark the start of a comment. (is a FORTH word; therefore, it must be separated from the comment by one or more spaces. The right parentheses symbol terminates the comment.

(+LOOP) < INCREMENT ... > Parentheses Plus Loop

(+LOOP) is the run time procedure for +LOOP.

(. ") < ... > Parentheses Dot Quote

(. ") is the run time procedure that is compiled into a definition by . " . It prints the string and moves the FORTH instruction pointer past the string.

(;CODE) < ... > Parentheses Semi-Colon Code

(;CODE) is the run time procedure for words defined by ;CODE. Refer to <BUILDS, DOES>, AND ;CODE for a discussion of defining words.

(ABORT) < ALL.STACK.VALUES ... > Parentheses Abort

(ABORT) is an intermediate word used between ERROR and ABORT. It is normally executed when WARNING is negative, and simply executes ABORT. Replacing the CFA of ABORT in (ABORT) with the CFA of a user's error routine allows the user to customize a task's error trapping. If warning is zero or positive, the message number is printed, and QUIT is executed.

(DO) < LIMIT INDEX ... > Parentheses Do

(DO) is the run time procedure compiled by DO. It is not normally called by a user.

(DOS) < ... > Parentheses DOS

Return to the disk operating system, MicroDos at 9003(h). This is the primitive version of the FORTH word DOS.


```
(FIND)          < STRING.ADDRESS NFA ... PFA LENGTH TRUE.FLAG >
                  if successful
                  < STRING.ADDRESS NFA ... FALSE.FLAG >
                  if unsuccessful
```

Parentheses Find

(FIND) performs a dictionary search for the specified NFA until a match is found (successful) or a link field of zero is encountered (unsuccessful).

```
(LINE)          < LINE.NUMBER SCREEN.NUMBER ...
                ADDRESS.BEGIN.LINE LINE.LENGTH >
                                     Parentheses Line
```

(LINE) is the primitive form of .LINE . It finds the line number on the screen number desired by .LINE .

(LOOP) < ... > Parentheses Loop

(LOOP) is the execution time procedure for LOOP. It is compiled into a definition by LOOP. This is not normally called by the user.

(NUMBER) < DOUBLE.NUMBER STRING.ADDRESS ... DOUBLE.NUMBER
CHAR.ADDRESS >
Number

(NUMBER) is a primitive used by NUMBER.

* $\langle N_1 N_2 \dots N_3 \rangle$ Times

* multiplies 2 single (16 bit) numbers and leaves their 16 bit signed product. Overflow is possible, and no error message is issued if overflow occurs.

```

*/                                < MULTIPLIER MULTIPLICAND DIVISOR ... QUOTIENT >
                                   Times Divide

```

Times Divide performs the multiplication and division, but uses a 32 bit intermediate result for greater accuracy.

```

*/MOD      < MULTIPLICAND MULTIPLIER DIVISOR ... REMAINDER
           QUOTIENT >
                                           Times Divide Mod

```

Times Divide Mod performs the indicated operations, but uses an intermediate 32 bit result for greater accuracy.

$$+ \quad \langle N_1 \ N_2 \ \dots \ N_{1+N_2} \rangle \quad \text{Plus}$$

+ adds two numbers and replaces them with one number, their 16 bit sum. Overflow is possible, and no error message is issued if an overflow occurs.

--> < ... > Next Block

`-->` is used at the end of a screen to force interpretation to continue from the next sequential screen. See also `;S`.

```
-DUP          < N1 ... N1 N1 > if N1 <> 0   Dash dup
              < N1 ... N1 >      if N1 = 0
```

- DUP duplicates the top stack item if it is not equal to zero.

```
-FIND          < ... PFA LENGTH TRUE.FLAG > Dash Find
               or
               < ... PFA LENGTH FALSE.FLAG >
```

Dash Find reads a word from the input stream and searches the CONTEXT and CURRENT vocabularies for a match. The top number is a true flag (non zero) if a match is found.

```
-TRAILING          < STRING.ADDRESS LENGTH ... STRING.ADDRESS
                   NEW.LENGTH >
                   Dash Trailing
```

-TRAILING will alter the LENGTH of a character string to suppress trailing spaces before calling TYPE.

. < NUMBER ... > Print or Dot

PRINT removes the top item from the stack and prints it as a signed number in the current number BASE.

.	"	<	...	>	Dot quote
---	---	---	-----	---	-----------

." is used to send messages to the terminal. It is used in the form: ." This is a message" . Since dot quote is a FORTH word it must be followed by a space. The terminating delimiter is the quote symbol, and no space is required before the terminator.

```
.. < ... 0 0 > Dot Dot
```

This is a bug in fig-FORTH. NUMBER interprets this as the double number 0. This word is not found in the dictionary.

```
.AH          < NIBBLE ... >          Print Ascii-hex
                                         nibble
```

.AH interprets the top stack number as a 4 bit nibble and prints it in Ascii-hex notation (0-F).This is a primitive used by SEND.

```

.AHL          < START.ADDRESS ... >      Print ASCII
                                         Hex Line

```

This word will print 64 characters starting at START.ADDRESS.
This is a primitive used by SEND.

```
.ASCII < CHARACTER ... > Print ASCII
```

This word prints the character if printable, otherwise, the symbol "." . This is a primitive used by DUMP.

```
.BYTE          < NUMBER ... >          Print Byte
```

This is a primitive used by SEND. It interprets the NUMBER as an 8 bit byte and prints it in Ascii-hex notation.

```
.CAT          <  ...  >          Print Cluster
          < TABLE ... ALLOCATION TABLE >
          Allocation Table
```

This word prints the cluster allocation table for the selected drive. The first bit represents sector 10(d). Since a directory and cluster allocation table (sectors 0-9) are always occupied, from the MicroDos point of view, the first 10 sectors are not represented in the cluster allocation table.

.CUR	< ... >	Move Cursor
------	---------	-------------

This is a primitive used by EDIT. It moves the curser to the location specified in the USER variable CUR .

```
.DIRSEC          < SECTOR.BUFFER.ADDRESS ... >
                                     Print directory
```

Print the directory information contained in 1 sector. This is a primitive used by DIR . In MDOS, the disk directory occupies the first 9 sectors on the disk.

.FOOT < ... > Print Footer

This word prints the message: "Woods Hole 1806 FORTH, Version X.XXX", 10 spaces "page" NUMBER, where NUMBER is the value of FLD ; followed by a carriage return. .FOOT resets OUTL, the line counter to zero. .FOOT is normally followed by PAGE .

```

.LINE      < LINE.NUMBER SCREEN.NUMBER ... >
                                     Print Line

```

Print line prints 1 line of text from the desired screen. This is the root of the FORTH word INDEX, which prints line 0 over a given range of screens. Trailing blanks are suppressed, so typing speed is optimized.

```
.R          < NUMBER FIELD.WIDTH ... >   Print Right
                                              Justified
```

The NUMBER is printed, padded with leading spaces, for a total number of characters equal to FIELD.WIDTH. The current number BASE is used.

1-	< N ... N-1 >	One Minus
1- subtracts one from the top number on the computation stack.		
2	< ... 2 >	Two
2 is a CONSTANT equal to 2.		
2**N	< N ... 2**N >	Two to the Nth Power
Raise 2 to the Nth power, for 0 < N < 256		
2+	< N ... N+2 >	Two plus
2+ adds two to the top number on the computation stack.		
2-	< N ... N-2 >	Two Minus
2- subtracts two from the top number on the computation stack.		
2DROP	< N1 N2 ... > or < D ... >	Two Drop
This word drops the double number on the computation stack.		
2DUP	< N1 N2 ... N1 N2 N1 N2 > or < D ... D D >	Two DUP
This word duplicates the double number on top of the computation stack.		
2SWAP	< D1 D2 ... D2 D1 > or < N1 N2 N3 N4 ... N3 N4 N1 N2 >	Two Swap
The word performs a double number swap on the computation stack.		
3	< ... 3 >	Three
3 is a CONSTANT equal to 3.		
:	< ... >	Colon
: is used to start colon definitions. It is used in the form: : NAME (words to be executed) ;		
;	< ... >	Semi Colon
; is used to terminate a colon definition. It may only be used within a colon definition.		

;CODE	< ... >	Parentheses Semi-Colon
-------	---------	------------------------

;CODE is a defining word normally used in conjunction with <BUILDS . ;CODE is very similar to DOES> except that ;CODE defines the beginning of a code procedure, while DOES> defines the beginning of a high level procedure. ;CODE starts the machine code procedure which is executed when the defined words are executed. See <BUILDS, ;CODE, and DOES> in the FORTH Encyclopedia.

;S	< ... >	Semi Colon S
----	---------	--------------

;S is the run time procedure compiled by ; into a colon definition. Its purpose is to return to the calling word by popping the return address from the return stack. It is also used to terminate the interpretation of a screen. Namely, it must be the last FORTH statement on a screen, and anything following it is ignored.

<	< N1 N2... FLAG >	Less than
---	-------------------	-----------

< compares the top two numbers. If N1 is less than N2, the top number, the flag is true (non-zero). Notice that 32000 -32000 < works properly.

<#	< D ... D >	Less than Sharp
----	-------------	-----------------

<# begins a pictured numeric (binary to ASCII) conversion. Note that the double number to be converted must be positive. Therefore, DABS should be used if the number might be negative.

<BUILDS	< ... >	Builds
---------	---------	--------

<BUILDS is a defining word. Words created by <BUILDS are used to create other words. <BUILDS creates the dictionary header for the new definitions. Words between <BUILDS and DOES> are executed at compile time of the new definitions. The words following DOES> are executed at execution time of the new word. VOCABULARY is a word that uses <BUILDS DOES> to create new vocabularies; however, this is a non-trivial example. Most ASSEMBLER mnemonics are created by <BUILDS DOES> words and are simple examples of the <BUILDS DOES> construct.

=	< N1 N2 ... FLAG >	Equal
---	--------------------	-------

= compares the top two numbers on the stack and replaces them with a flag. The flag is true (non-zero) if the two numbers are equal.

>	< N1 N2 ... FLAG >	Greater Than
---	--------------------	--------------

> compares the top two values. If N1 is greater than N2, the top number, the flag is true (non-zero). Notice that 32000 -32000 > works properly.

>IN < ... DATA ADDRESS > To In

>IN is a USER variable that points to the byte offset count from the beginning of the currently interpreted block to the end of the word most recently interpreted. This is the FORTH 79 standard version of IN .

>R < NUMBER ... > To R

>R removes a NUMBER from the computation stack and leaves it on the return stack. It is usually used with R> to temporarily store numbers on the return stack. The use of >R and R> must be balanced within a colon definition.

? < ADDRESS ... > Question Mark

Question Mark fetches the 16 bit number at ADDRESS and prints it, signed in the current number BASE.

?ASCII < CHARACTER ... FLAG > Question ASCII

This word returns a true flag if the character is printable (31d < CHARACTER < 127d).

?CARRIER < ... FLAG > Question Carrier

This word loops for approximately 5 seconds while looking for incoming carrier at the modem. It returns a true flag (non zero) when it detects carrier, or a false flag (0) after 5 seconds. This word is used by the word ORIGINATE.

?COMP < ... > Question Compile

?COMP issues MESSAGE 17(d) and executes QUIT if the system is not in compile mode. The test is to examine the value of the USER variable STATE. STATE is non-zero if compiling.

?CSP < ... > Question Current Stack Pointer

?CSP checks to see if the current stack pointer position is equal to that stored in the USER variable CSP. If not, message 20(d) is issued, followed by QUIT. This is part of the compiler security which is built into the fig-FORTH model.

?EF1 < ... FLAG > Question External Flag 1

This word leaves a flag on the stack corresponding to the value of external flag 1 (1 = TRUE = 0 volts; 0 = FALSE = 5 volts).

?EF2 <... FLAG >

Question External
Flag 2

This word leaves a flag on the stack corresponding to the value of external flag 2 (1 = TRUE = 0 volts; 0 = FALSE = 5 volts).

?EF3 < ... FLAG > Question External
Flag 3

This word leaves a flag on the stack corresponding to the value of external flag 3 (1 = TRUE = 0 volts; 0 = FALSE = 5 volts).

?EF4 < ... FLAG > Question External
Flag 4

This word leaves a flag on the stack corresponding to the value of external flag 4 (1 = TRUE = 0 volts; 0 = FALSE = 5 volts).

?ERROR < FLAG MESSAGE.NUMBER ... > Question Error

?ERROR issues the specified message and executes QUIT if the flag is true (non-zero).

?EXEC	< ... >	Question Execute
-------	---------	------------------

?EXEC issues MESSAGE 18(d) and executes QUIT if the system is not in execute mode. The test is to examine the value of the USER variable STATE. STATE equals 0 if executing.

?HEXCHAR	< CHARACTER ... FLAG >	Question Hex Character
----------	------------------------	---------------------------

?HEXCHAR checks to see if the number on the stack is a valid hex character. The flag is true (non zero) if it is a valid character.

?INDEX < SCREEN.NUMBER ... FLAG > Question Index

This word returns a true flag (non zero) if the index line (line 0) of SCREEN.NUMBER is considered a valid index. This is so, if there are no non-printing characters and if the index line is not blank. This word works just like ?SCREEN, but only looks at line 0. Note that this test is not foolproof. A disk which has just been formatted will on certain screens pass the test, although a valid index line does not exist.

?KEY	< ... FLAG >	Question Key
------	--------------	--------------

This word checks the status of the selected uart. It returns a true flag if there is a character available, including a break.

?LOADING < ... > Question Loading

?LOADING checks the USER variable BLK to see if the system is loading from disk. If not, it issues message 22(d) and then executes QUIT.

?MONITOR < ... > Question Monitor

This word performs a simple check to see whether it is talking to a standard 1800 utility program. It assumes that communication with the target is via the uart at COMM.GRP. It types "@" to the target, which is an illegal command for the RCA utilities, waits 200 milliseconds and looks at the last received character. This should be * for the utility programs. MONABORT is called if this is not true.

?PAIRS < N1 N2 ... > Question Pairs

?PAIRS compares the top two numbers on the stack. If N1 does not equal N2, ?PAIRS issues message 19 (D) and executes QUIT. This word is used during compilation to insure that conditionals are paired properly, such as IF ... THEN.

?SCREEN < SCREEN.NUMBER ... FLAG > Question Screen

This word returns a true flag (non zero) if SCREEN.NUMBER is considered a valid screen. A screen is considered valid if there are no lower case characters and if the screen is not blank. Note that this test is not foolproof. For instance, a disk which has just been formatted will, on certain screens pass the test, although a valid screen does not exist.

?SPACE < CHARACTER ... FLAG > Question Space

This word returns a true flag if the character is a space (20H).

?STACK < ... > Question Stack

?STACK checks for stack overflow or underflow. If over or underflow is found, message 7 is issued and QUIT is then executed.

?TERMINAL < ... FLAG > Question Terminal

?TERMINAL is used to determine whether the break key has been depressed. In Woods Hole FORTH, ?TERMINAL only checks for breaks, not any key as some FORTH systems do. A true flag (non-zero) indicates a break condition.

?Y/N < ... FLAG > Question Yes or No

Wait for a key from the uart at the present group. If character equals Y or y, print "Y", FLAG = 1; otherwise print "N", FLAG = 0

@ < ADDRESS ... NUMBER > Fetch
@ reads a 16 bit NUMBER from memory at ADDRESS and leaves it on the stack.

ABORT < ... > Abort

ABORT is the least destructive restart of FORTH. It resets the parameter stack, displays the sign on message and version number, sets CURRENT and CONTEXT to FORTH, sets BASE to decimal, empties the disk buffers, and selects drive one as the default drive. Selecting drive one is contrary to FIG FORTH practice, but makes for better disk management in the MS 2000 system.

ABS < SIGNED.NUMBER ... ABSOLUTE.NUMBER >
Absolute

ABS converts a signed single number to its absolute value.

AGAIN < ... > Again

AGAIN is used to terminate the BEGIN AGAIN endless loop structure. AGAIN causes an unconditional branch back to the word following BEGIN.

AH->B < ASCII.HEX.CHARACTER ... BINARY.NUMBER >
Convert ascii-hex to binary

Convert ASCII hex character to binary with no error checking. This word is a primitive used by RECEIVE.

ALLOT < NUMBER ... > Allot

ALLOT moves the dictionary pointer (DP) by adding NUMBER to the dictionary pointer (DP). This is useful for making arrays from VARIABLES or reserving space within the dictionary.

ALLOTU < NUMBER ... > Allot User

ALLOTU will add NUMBER to Nextu, the USER variable pointer. This is an easy way to allot space in the USER variable area. By using NEXTUSER and ALLOTU, it becomes easy to effeciently utilize the USER variable area. As an example:
NEXTUSER ANY.NAME 6 ALLOTU (cr)

This sequence will define a new USER variable called ANY.NAME and allot 6 additional bytes. Therefore when ANY.NAME is executed, it leaves on the computation stack the address of an 8 byte cell.

Screen 228 contains the source for the word SHOW.USER, which shows the status of all curently defined USER variables. This word is not precompiled into WFORTH.CM, and must be loaded before use.

Nextu is reset in COLD by item 42(d) of the parameter table.

BASE < ... ADDRESS > Base

BASE is a USER variable which contains the current number base used for binary to ASCII (output) and ASCII to binary (input) number conversions.

BEEP < ... > Beep

Pseudonym for BELL. It sends the BELL character (07h) to the terminal.

BEGIN < ... > Begin

Begin is used to mark the beginning of the indefinite loop structures. These are:

BEGIN (any words)	UNTIL
BEGIN (any words)	END
BEGIN (any words)	AGAIN
BEGIN (any words)	WHILE REPEAT

BELL < ... > Bell

BELL sends the ASCII BELL character (07h) to the selected uart.

BL < ... 20(h) > B L

BL is a CONSTANT equal to 20(h). This is the ASCII character for blank or space.

BLANKS < BEGINNING.ADDRESS LENGTH ... > Blanks

BLANKS fills memory, starting at BEGINNING.ADDRESS for LENGTH bytes, with the ASCII character blank (20h). This is a byte (8 bit) operation. LENGTH refers to the number of bytes.

BLK < ... BLK > BLK

BLK is a USER variable which contains the number of the BLOCK currently being interpreted. If BLK contains 0, the input stream is from the terminal. QUIT sets BLK to zero.

BLOCK < BLOCK.NUMBER ... DATA.ADDRESS > Block

BLOCK is used to transfer data to/from mass storage, normally disk. BLOCK may call BUFFER and R/W. BLOCK can be called by the user; for instance "0 BLOCK DROP" will force a disk head recalibration for the selected drive by forcing the disk drive to seek information on track 0. This is required immediately after a hardware system reset.

BLOCK-READ < IOCB.ADDRESS ... > Block Read

BLOCK-READ is the word which actually performs DISK-reads via utility program UT71. It reads two sectors (1 screen) from the disk.

BLOCK-WRITE < IOCB.ADDRESS ... > Block Write

BLOCK-WRITE is the word which actually performs DISK-writes via utility program UT71. It writes two sectors (1 screen) to disk.

BRANCH < ... > Branch

BRANCH is compiled into definitions by ELSE, AGAIN, LOOP, +LOOP and REPEAT. It causes an unconditional branch by adding the compiled offset (stored in the two bytes following the CFA of OBRANCH) to the Instruction Pointer (IP).

BRANCH.DSP < ... > Branch Display

Decompile the branch at WORD.PTR. This is a primitive used by the decompiler.

BUFFER < BLOCK.NUMBER ... DATA.ADDRESS >
Buffer

BUFFER is the word which writes an allocated buffer to disk, if updated, when all buffers are full and one block must leave memory. Buffer is not normally used directly, but rather, is called by the word BLOCK.

BYE < ... > Bye

This word calls FLUSH and then returns to the monitor program UT71.

C! < CHARACTER ADDRESS ... > Character Store

C! stores 1 byte (the low byte of CHARACTER) at ADDRESS.

C, < CHARACTER ... > C Comma

C, stores the low byte of CHARACTER into the next available dictionary location and increments by 1 the dictionary pointer (DP). Notice that C, only stores the low byte of CHARACTER, not a full 16 bit word.

C/L < ... VALUE > Characters Per Line

C/L is a CONSTANT whose value is equal to the number of characters per line on a screen. It is normally 64(d).

C@ < ADDRESS ... CHARACTER > Character Fetch

C@ retrieves 1 byte (8 bits) from ADDRESS and leaves it as a 16 bit number on the stack. The high 8 bits on the stack are equal to 0.

CASE < ... > Case

This is the CASE statement by Dr. Charles Eaker. It is described fully in FORTH Dimensions Volume II, page 37. The CASE statements serves as a computed go to in FORTH. It is used in the following form.

```
: TASK < NUMBER ... >
CASE
NUMBER1 OF (Words) ENDOF
NUMBERN OF (Words) ENDOF
(No-Match Words)
ENDCASE ;
```

Task expects a number on the stack (NUMBER1 through NUMBERN). It then looks for a match with the arguments of the statements. If a match is found, the words between OF and ENDOF are executed and the word TASK is terminated. If there is no match, the NO-MATCH words are executed. Notice that there are no restrictions on numbers. They can be computed dynamically and FORTH operations may be interleaved between OF-ENDOF pairs. The stack behavior shown for CASE, OF, ENDOF and ENDCASE is not the actual stack action, but merely the stack action perceived by the programmer. The additional stack numbers are for compiler security. CASE is an IMMEDIATE word.

CAT-UPDATE < ... > Cluster Allocation Table Update

This word marks the cluster allocation table of the diskette in the selected drive, to show sectors 130 through 499 as occupied. This corresponds to screens 65 through 249. This protects screens 65 through 249 from the operating system.

CDER < ... > Check Disk Error

CDER examines register D.0 after the call to DWRITE in UT71. If an error is found, message 8 is printed, and execution continues. This is a primitive used by R/W.

CFA < PARAMETER.FIELD.ADDRESS...CODE.FIELD.ADDRESS >
CFA

CFA converts a Parameter Field Address (PFA) of a dictionary definition to its Code Field Address (CFA). CFA is defined as : CFA 2- ;

CHANNEL-RESET	< CHANNEL.NUMBER ... >	Channel Reset
---------------	------------------------	---------------

This word requires the WHOI uart switcher card. It resets the remote computer connected to CHANNEL.NUMBER. Consult the section on special hardware for the schematic of this card.

CHANNEL-SELECT	< CHANNEL.NUMBER ... >	Channel Select
----------------	------------------------	----------------

This word switches the uart at CHANNEL.NUMBER of the uart switcher card to the uart at the comm group. The group number in force is not affected.

CHAPTER < ... ADDRESS > Chapter

CHAPTER is a user variable used by the word .FOOT . The user is responsible for initializing and updating CHAPTER . See screens 73 and 74 for examples.

CLEAR < SCREEN.NUMBER ... > Clear

This word fills SCREEN.NUMBER with blanks. It does not necessarily write this screen to the disk, however. FLUSH must be called to insure that a blank screen is written to disk.

CLEAR-KEY < ... > Clear Key

CLEAR-KEY checks the currently selected uart for a character. If there is a character present, it reads it and then drops it.

CLS < ... > Clear Screen

This word sends the CLEAR-SCREEN character (26d) to the terminal.

CMOVE: < SOURCE.ADDRESS DEST.ADDRESS LENGTH ... >
Character Move

CMOVE moves LENGTH bytes from SOURCE.ADDRESS to DEST.ADDRESS starting at SOURCE.ADDRESS. If DEST.ADDRESS is greater than SOURCE.ADDRESS but less than SOURCE.ADDRESS+LENGTH, use CMOVE> (character move up).

```
CMOVE>                                < SOURCE.ADDRESS DEST'.ADDRESS LENGTH ... >
                                         Character Move Up
```

CMOVE> moves LENGTH bytes from SOURCE.ADDRESS to DEST.ADDRESS, starting at SOURCE.ADDRESS + LENGTH - 1 (the end of the block). CMOVE> is used when the destination string overlaps the source string, and is higher than the source string.

COLD < ALL.VALUES ... > Cold

Cold initializes USER variable 10(h) through 1E(h), FENCE, DP, VOC-LINK SCR/DSK, MODEM.GRP, TERM.GRP, COMM.GRP AND Nextu, and then executes WARM. Entering FORTH at 0000 causes a COLD start.

COMM < ... > Communication

This word selects the group whose number is contained in the variable COMM.GRP. This is group E0(h) for normal operation.

COMM.CTL < ... ADDRESS > Communication Control

This VARIABLE hold the value of the control byte for the communications uart. This is normally 1D(h) for the CDP1854A uart.

COMM.GRP < ... ADDRESS > Communication Group

This USER variable contains the value of the group number for the communication uart. This is normally E0(h) for the 18S641 uart card or F0(h) for the 18S653VI modem card.

COMMINIT < ... > Communication Initialization

This word initializes the uart at the selected group.

COMPILE < ... > Compile

COMPILE will compile the Code Field Address (CFA) of the word following COMPILE in the input stream, into the dictionary.

CONS < ... > Console

This word unconditionally selects group 1 for terminal communication. It does not change TERM.VAR.

CONST.DSP < ... > Constant Display

Display the CONSTANT whose address is contained in the USER variable WORD.PTR. This word is a primitive used by the decompiler.

CONSTANT < N ... > Constant

A CONSTANT is defined in the form:
 N CONSTANT ANY.NAME
 where N is the value of the named CONSTANT.
 When a constant is used, the value of the CONSTANT is left on the stack. CONSTANT differs from VARIABLE and USER in that the value is left on the stack when the name is invoked, rather than the address of the value.

< ... ADDRESS >

Context

CONTEXT is a USER variable which points to the Name Field Address (NFA) of the most recently defined word of the VOCABULARY that is to be searched first. ABORT causes CONTEXT to point to FORTH. CONTEXT is changed by executing a VOCABULARY name.

COPY

< SOURCE.SCREEN DESTINATION.SCREEN ... >
Copy

Copy

This word duplicates SOURCE.SCREEN at DESTINATION.SCREEN. Note that COPY is a FORTH word, not a FIG Editor word. FLUSH must still be called to insure that DESTINATION.SCREEN is written to disk.

COUNT

```
< STRING.ADDRESS ... STRING.ADDRESS+1 LENGTH >  
Count
```

Count

COUNT increments STRING.ADDRESS and leaves the LENGTH of the string at the top stack item. COUNT assumes that the byte pointed to by STRING.ADDRESS contains a count of the number of characters in the following string.

CR

< ... >

Carriage Return

CR sends carriage return-line feed to the output device. It also increments the USER variable OUTL. This is not FIG-FORTH behavior, but it allows the user to keep track of output lines in a manner analogous to OUT, the USER variable counting output characters. The user is totally responsible for initializing and checking OUTL.

CR'

< ... >

Carriage Return
Prime

Type carriage return without line feed. This is used when sending messages to target computers. It is defined as :

```
HEX : CR' 0D EMIT ;
```

CREATE

< ... >

Create

CREATE is a defining word used to create the header portion of a FORTH definition. It creates the name field, link field, and code field. The word : (COLON) uses CREATE.

CRS

< CHANNEL.NUMBER ... >

Channel Reset

This word is the primitive for CHANNEL-RESET, and it requires the WHOI Uart switcher card. See Chapter 2 for the schematic.

CS

< CHANNEL.NUMBER ... >

Channel Select

This word is the primitive for CHANNEL SELECT, and it requires the WHOI Uart switcher card. See Chapter 2 for the schematic.

CSP

< ... ADDRESS >

Compiler Stack
Pointer

CSP is a USER variable which is used by the compiler to temporarily store the stack pointer position for compiler security checking.

CTL=>

< NUMBER ... >

Control Output

This word sends the control byte on the stack to the uart of the selected group. Normally this means 1D(h) is sent to port 3. CTL=> is for a CDP1854A uart.

CUR

< ... ADDRESS >

Cursor

This USER variable is used by EDIT to store the cursor position.

CURRENT

< ... ADDRESS >

Current

CURRENT is a USER variable which points to the Name Field Address (NFA) of the most recently defined word in the CURRENT vocabulary; the vocabulary to which definitions are currently being appended. When a new word is defined, the contents of CURRENT become the link of the newly defined word.

CV.DSP

< ... >

Current value
display

Current value display is a primitive used by the decompiler. It types the text message: Currently = .

Cder

< ... >

Check disk error

Cder is a primitive used by CDER. It checks to see if there was a disk error.

D+

< D1 D2 ... D1+D2 >

D Plus

D+ adds two signed double numbers and replaces them with the double (32 bit) signed sum. Overflow is possible, and no error is reported if overflow occurs.

D+-

< D1 N2 ... D3 >

Double plus Minus

D3 equals D1 if N2 is positive. D3 equals -D1 if N2 is negative. In any case N1 is dropped from the stack. This word is a primitive used by DABS.

D.

< DOUBLE.NUMBER ... >

Double Print

D. prints the top two stack numbers as a signed double number (32 bit) in the current number BASE.

DIAL

< ... >

Dial

This word expects a string to follow it. The delimiter is a space or carriage return. DIAL then examines the string and acts upon it. The valid characters are:

The digits 0 through 9. These are dialed directly.
The symbols #(pound) and *(star). Those are dialed directly.
The symbol ,(comma). This forces a 250 millisecond wait.
The symbol ;(semicolon). This forces a wait for a dialtone.

DIAL will execute QUIT after 5 seconds without a dialtone.
DIAL should be followed by ORIGINATE to enter terminal emulation mode.

DIALINIT

< ... >

Dial Initialization

This word sets the modem for dialing. It is a primitive used by DIAL.

DIALTONE

< ... >

Dialtone

This word loops for approximately 5 seconds while checking for a dialtone at the modem at MODEM.GRP. It executes QUIT if no dialtone is detected after 5 seconds.

DIGIT

< CHARACTER BASE ... BINARY.DIGIT TRUE.FLAG > or
< CHARACTER BASE ... FALSE.FLAG >

Digit

DIGIT converts an ASCII character to a binary number if it can. A false flag (zero) indicates that DIGIT could not convert the character using the present BASE.

DIR

< ... >

Directory

Directory prints the name and starting sector number of each file on the disk in the selected drive.

DISKID

< ... >

Disk ID

DISKID prints bytes 12 (D) through 63 (D) of sector 0 of the disk in the selected drive. For a disk created by the operating system program "SYSGEN", this is the disk ID and creation date.

DISKLIST

< STARTING.SCREEN ENDING.SCREEN ... >

Disk List

This word lists screens STARTING.SCREEN through ENDING.SCREEN. The list can be prematurely terminated with the break key. The listing can be directed to a printer by executing the word PRINTER before executing DISKLIST .

DLITERAL < DOUBLE.NUMBER ... > Double Literal

DLITERAL compiles a double number from the stack as a double literal into a colon definition.

DMINUS < DOUBLE ... NEGATIVE.DOUBLE >
D Minus

DMINUS negates the signed DOUBLE number on the stack by replacing it with the 32 bit 2's complement number.

DO < Limit# Start# ... > D0

DO is used to build a DO Loop in conjunction with LOOP or +LOOP in the forms:

: EXAMPLE1 Limit# Start# "loop body words" LOOP ;
: EXAMPLE2 Limit# Start# DO "loop body words" Increment# +LOOP ;
Within the loop, the value of the index can be brought to the stack with the word I . Limit# and Start# need not be defined in the word that contains the loop. They may be supplied on the stack when the word containing the loop is executed. In the case of both examples, the index is incremented (by 1 for LOOP, or by Increment# for +LOOP) until the index equals or exceeds Limit#. At that point the loop is exited and the word following LOOP or +LOOP is executed. DO must be used within a colon definition.

DOES> < ... > Does

DOES> is a defining word normally used in conjunction with <BUILDS. DOES> starts the high level words which are executed when the defined words are executed. See <BUILDS in the FORTH Encyclopedia for a thorough explanation.

DOES.DSP < ... > Does display

Does display is a primitive used by the decompiler.

DOS < ... > Disk Operating System

This word unconditionally returns to the disk operating system at 9005(h). The disk operating system must have been loaded previously.

DOWNLOAD < SOURCE.ADDRESS LENGTH TARGET.ADDR ... >
Download

DOWNLOAD moves a block of data from SOURCE.ADDRESS of length LENGTH to a target processor at address TARGET.ADDRESS. The target computer is connected to a uart at the COMM.GRP (communications group). The target computer must be running an RCA utility program. BASE must be HEX to use the word DOWNLOAD. The connection to the target computer is via its terminal input.

EDITL < ... > EDIT SCREEN L

Edit the screen at SCN, the screen most recently called by LIST. EDITL changes the CONTEXT vocabulary to EDITOR.

EDITOR < ... > Editor

This word selects the EDITOR vocabulary. The editor is the fig line editor, described in the fig Installation Manual.

EF < ... CONSTANT > External Flag

EF is a constant which points to a group of routines for monitoring the external flags. EF is a primitive used to create the external flag words, W1 WN2 EF3, etc.

ELSE < ... > Else

Else is used within an IF ELSE THEN structure at the beginning of the false portion of the test. The use of ELSE is optional in the IF ELSE THEN structure.

EMIT < CHARACTER ... > Emit

EMIT sends CHARACTER to the output device and increments the USER variable OUT. Total output format control is possible using the word OUT. See the source for VLIST as an example.

EMIT' < CHARACTER ... > Emit Tick

EMIT' is a version of EMIT which sends CHARACTER to the uart at COMM.GRP. This is a primitive used by the communication utilities.

EMPTY-BUFFERS < ... > Empty Buffers

Empty buffers clears all buffers to value 00. The update and terminating words are set to 00. EMPTY-BUFFERS is executed within the word ABORT and therefore by COLD and WARM also.

ENCLOSE < STRING.ADDRESS DELIMITER ... STRING.ADDRESS NON. DECIM.OFFSET DECIM.OFFSET TOTAL.OFFSET > Enclose

ENCLOSE performs a parsing function on a character string. ENCLOSE is the primitive used by WORD. This version of ENCLOSE does not conform to fig-FORTH in that it allows more than 256(d) consecutive spaces be contained on a screen before executing ;S or --> .

ESC	< ... 1B(h) >	Escape
This word is a CONSTANT, which returns the ASCII value of the character escape (1Bh).		
ESC'	< ... >	Escape Tick
This word sends an escape character 1B(h) through the uart at COMM.GRP.		
EXECUTE	< CODE.FIELD.ADDRESS ... >	Execute
EXECUTE executes the word whose Code Field Address (CFA) is on the stack. This word is called by INTERPRET' as part of the indefinite loop QUIT, and is normally only used in this way.		
EXPECT	< BUFFER.ADDRESS COUNT ... >	Expect
EXPECT receives characters from the terminal until COUNT characters are received or a carriage return is encountered. The string is stored at BUFFER.ADDRESS.		
F-LEN	< ... FILE.LENGTH >	File Length
File Length is a primitive used by SAVE. It returns the length of the file that is presently open or an irrelevant number if no file is open.		
FENCE	< ... ADDRESS >	Fence
FENCE is a USER variable which holds the lower limit for FORGET'. FORGET' will not forget any word located below FENCE. NEW-FENCE will move the fence to protect all words presently defined, and change the value of FENCE and DP in the boot-up parameter table.		
FILEID	< ... >	File ID
This word will print the name of the file most recently opened by OPEN.		
FILELOAD	< ... >	File load
Usage: FILELOAD FILESPEC (cr) File load will load any binary file, into the block of memory specified by the file itself. It loads by complete sectors, however, and will write beyond the actual end of the file if the file doesn't end on a sector boundary.		
FILL	< BEGINNING.ADDRESS LENGTH CHARACTER >	Fill
This word fills memory starting at BEGINNING.ADDRESS for LENGTH bytes with CHARACTER. This is a byte operation. LENGTH refers to the number of bytes.		

FIRST < ... First.address > First

FIRST is a CONSTANT whose value is equal to the address of the first available byte in the disk buffer area.

FLD < ... ADDRESS > FLD

FLD is a USER variable which was originally intended to control field length in pictured numeric output. It is presently unused in FIG FORTH. In Woods Hole FORTH it is used for page numbering. FLD is incremented by the word PAGE. The user is responsible for initializing FLD.

FLOATING < ... > Floating point

FLOATING will load the floating point words from screens 143 through 163, into the last 4 screen buffers. Once they have been loaded, FLOATING merely displays a message stating that Floating point is loaded.

FLUSH < ... > Flush

FLUSH writes to disk all buffers that are presently flagged as updated.

FNAME < ... > File Name

This is a primitive used by OPEN.

FORGET < ... > Forget

FORGET removes definitions from the dictionary from the most recently defined word to the word specified. The CURRENT and CONTEXT vocabularies must be the same or message 24(d) is issued, and nothing is forgotten. FORGET searches for the most recent occurrence of the word. If the value contained in FENCE is less than the NFA of the word, then DP (the Dictionary Pointer) is moved to the forgotten word and new words are then compiled there. The usage is:
FORGET ANY.NAME (cr)

FORTH < ... > FORTH

Executing FORTH causes CONTEXT to point to the FORTH vocabulary. FORTH is the main VOCABULARY of FORTH systems. All new vocabularies link to FORTH.

GET-SCREEN < SCREEN.NUMBER ... > Get Screen

This word is used to transfer screens between FORTH systems. It assumes that another FORTH system is connected to the uart at COMM.GRP.

To Use: N GET-SCREEN (at the receiving end; then)
 M SEND-SCREEN (at the sending end)

where N1 is the screen number being received and N2 is the screen number being sent

GETSEC

< ... BUFFER.ADDRESS >

Get Sector

This is the sequential file access word. Each time it is executed it reads a sector into the buffer and returns the BUFFER.ADDRESS of the next sector in the opened file, or a zero if the end of the file is reached. Notice that a file can be changed by calling GETSEC, changing the file in memory, and then executing: UPDATE FLUSH.

GOTOXY

< X Y ... >

Move Cursor to X, Y

This word moves the cursor to row X, column Y. 0, 0 is the top left corner. This word must be changed for different terminals. GOTOXY is used by EDIT, the full screen editor.

GROUP

< NUMBER ... >

Group

GROUP does two level group select using the RCA convention by sending NUMBER to port 1 and also storing NUMBER in the USER variable GRP. By combined use of GROUP and GRP, it is possible to perform I/O without disturbing group selections currently in force. R/W will restore the group number to its previous value after performing I/O from the disk. This is particularly important if the terminal group is to be something other than group 1. Refer to the source for PARPTR for an example of the usage of GRP and GROUP.

GRP

< ... ADDRESS >

GRP

GRP is a user variable which contains the group number most recently selected by the word GROUP. The use of GRP and GROUP allows the programmer to restore a group number after I/O. This is especially useful where I/O might change the group number, as in disk calls to DREAD AND DWRITE in UT71. UT71 sets the group number to 01 after I/O. By executing: GRP @ GROUP after non-FORTH I/O the group which was most recently selected by the word GROUP is restored. This allows full terminal operation from a group other than 01. R/W uses this convention. The word ANSWER relies on this fact to permit full terminal operation from the modem at group FO(h).

HERE

< ... ADDRESS >

Here

HERE places the address of the next available dictionary location on the stack.

HEX

< ... >

Hex

HEX sets the USER variable BASE to 16. This causes all numeric input and output conversions to be performed in base 16(d).

HEX.

< N ... >

Hex print

Hex print will print the number N in hex, regardless of the present number BASE, without changing BASE.

IN

< ... ADDRESS >

In

IN is a USER variable which contains the byte offset from the beginning of the input buffer (whether TIB or disk buffer) to the end of the word most recently interpreted. >IN is the FORTH-79 equivalent for IN.

INDEX

< STARTING.SCREEN ENDING.SCREEN ... >

Index

This word prints the index line for the screens STARTING.SCREEN through ENDING.SCREEN, if the index line passes the ?INDEX test. In this implementation of FORTH, the names of all words defined on a screen are listed within parentheses on line zero of that screen. If this convention is followed, then the Index serves as a directory to the defining (source) screens.

INPUT

< PORT.NUMBER ... CHARACTER >

Input

Input will read an I/O port. No group select is performed, the user is responsible for group select.

INTERPRET

< ... >

Interpret

INTERPRET is referred to as FORTH's outer interpreter. INTERPRET simply interprets the text input stream from the terminal if BLK equals zero, or from disk if BLK is non-zero. INTERPRET first searches the CONTEXT, then CURRENT vocabularies for a match. If one is found, the word is compiled or executed, depending on the state of the system. If no match is found, interpret attempts to convert the word to a number, either placing it on the stack or compiling the number depending on the state of the system. If the word cannot be converted to a number, then message 0 is issued. INTERPRET is an endless BEGIN AGAIN loop which is terminated by the word null. INTERPRET is used by 2 words, QUIT and LOAD.

IOCB

< ... ADDRESS.OF.IOCB >

This is a 9 byte VARIABLE used as an I/O control block for FORTH disk file activity. It is allotted as follows:

IOCB: 2 bytes: Starting sector number.

IOCB 2+: 1 byte: offset into current segment description block for current segment description word.

IOCB 3+: 1 byte: number of contiguous sectors pointed to by the current segment word.

IOCB 4+: 1 byte: number of sectors which have already been read from the current segment description word.

IOCB 5+: 2 bytes: starting sector number for the contiguous block pointed to by the current segment word.

IOCB 7+: 2 bytes: buffer address for the current sector.

For a complete description of the pointer block, refer to RCA document MPM 241 Pl, page E-5.

IOCB-SHOW

< ... >

I/O Control block
show

This is a teaching word which explains the variable IOCB.

KEY

< ... CHARACTER >

Key

KEY reads one character from the input device. Note that KEY waits for a character. It is therefore possible to hang up when executing KEY, if no character is available at the uart.

L

< ... >

L

List the screen whose number is stored in the USER variable SCN. Also set the CONTEXT to EDITOR. This is similar to the EDITOR word L, but because it is a FORTH word, it can be found from any vocabulary.

L/P

< ... VALUE >

Lines Per Page

L/P is a CONSTANT whose value is equal to the number of printed lines per page. This constant can be compared with OUTL when printing, to determine when to issue form feeds, print headers, footers, page numbers, etc. L/P is analogous to C/L (characters per line) and is normally equal to 60(d).

LATEST

< ... NFA >

Latest

LATEST places the Name Field Address (NFA) of the most recently defined word in the CURRENT vocabulary on the stack.

LEAVE

< ... >

Leave

LEAVE is used to prematurely exit a DO-LOOP. It does not immediately force termination of the loop, but rather sets the limit equal to the current index, so that when LOOP or +LOOP is encountered, the loop will be terminated in the normal fashion.

LFA

< PARAMETER.FIELD.ADDRESS...LINK.FIELD.ADDRESS >

LFA

LFA converts a Parameter Field Address (PFA) of a dictionary definition to its Link Field Address (LFA).

LIMIT

< ... VALUE >

Limit

LIMIT is a CONSTANT whose value is equal to the last available byte in the disk buffer area. The disk buffer area is bounded by FIRST and LIMIT.

LINE

< LINE.NUMBER ... ADDRESS >

Line

LINE leaves the ADDRESS of LINE.NUMBER of the current editing screen. This word is used by the EDITOR.

LIST

< SCREEN.NUMBER ... >

List

This word lists SCREEN.NUMBER to the selected UART as 16 rows of 64 columns (1024 characters) of ASCII text. Woods Hole's FORTH system is inflexible with regard to screen size and format.

LIT

< ... NUMBER >

LIT

LIT is compiled into a dictionary definition by LITERAL and DLITERAL. It is the run time procedure for these words. LIT places the 16 bit contents of the next dictionary location on the stack.

LITERAL

< N ... >

Literal

LITERAL compiles a number from the stack as a literal into a colon definition.

LOAD

< SCREEN.NUMBER ... >

Load

LOAD interprets source text from SCREEN.NUMBER. Only NULL or ;S will terminate loading. Attempting to LOAD screen zero will cause a system crash. LOAD prints the screen number, the value of HERE when the screen is loaded, and the index line (line 0) of SCREEN.NUMBER.

LOADTHRU

< FIRST.SCREEN LAST.SCREEN ... >

Load through

Load through will load a consecutive group of screens starting with FIRST.SCREEN, and ending with LAST.SCREEN.

LOOP

< ... >

Loop

Loop is used to terminate a DO LOOP structure. The index is incremented by 1. If the index equals the limit, the loop is exited and the word following LOOP is executed. If the index is less than the limit, the loop is repeated.

M*

< N1 N2 ... D2 >

M Star

M* multiplies two single numbers and replaces them with their signed double product.

M/

< DOUBLE.DIVIDEND DIVISOR ... REMAINDER
QUOTIENT >

M Slash

M Slash divides a 32 bit signed DOUBLE.DIVIDEND by a 16 bit signed DIVISOR and leaves a signed REMAINDER and QUOTIENT. The remainder takes its sign from the dividend.

M/MOD

< DOUBLE.DIVIDEND DIVISOR ... REMAINDER DOUBLE.
QUOTIENT >

M Slash Mod

M/MOD divides a DOUBLE.DIVIDEND by a single DIVISOR and returns a single REMAINDER and DOUBLE.QUOTIENT. All operations are unsigned.

MATCH

< CUR.ADDRESS LENGTH STRING.ADDRESS STRING.COUNT
... FLAG MOVEMENT >

Match

MATCH is a very useful string comparison word. It will search an area starting at CUR.ADDRESS for LENGTH bytes for a match with the string at STRING.ADDRESS of length STRING.COUNT. It returns a true flag (non-zero) if a match is found, and MOVEMENT is the length between CUR.ADDRESS and the start of the found string. MATCH returns a false flag (0) if no match was found, and MOVEMENT is then equal to LENGTH.

MAX < N1 N2... NMAX > Max

MAX examines two signed single numbers and leaves the larger. Notice that 32000 -32000 MAX works correctly.

MEMORY-MAP < ... > Memory Map

This is a teaching word which shows allocation of memory. It is useful when changing the origin table for ROM applications.

MESSAGE < MESSAGE.NUMBER ... > Message

MESSAGE merely prints "Message N" where N is MESSAGE.NUMBER. Its action does not depend on the value of WARNING and it does not interrupt execution in any way.

MIN < VALUE VALUE ... MINIMUM.VALUE > Minimum

MIN compares the top two stack entries, saves the smaller and discards the larger. Notice that 32000 - 32000 MIN returns -32000, unlike the FIG model.

MINUS < NUMBER ... NEGATIVE.NUMBER > Minus

MINUS negates the top stack number by replacing it with its 2's complement.

MOD < DIVIDEND DIVISOR ... REMAINDER > Modulo

MOD performs a 16 bit signed division and leaves a 16 bit signed REMAINDER on the stack. The sign of the remainder is set to equal the sign of the dividend.

MODEM < ... > Modem

This word selects the group number contained in the USER variable MODEM.GRP. This is group F0(h) for normal operation.

MODEM.GRP < ... ADDRESS > Modem Group

This USER variable contains the value of the group number for the modem uart. This is usually F0(h) for the CDP 18S653-VI modem card.

MON < ... > Monitor

This word is an unconditional branch to UT71 at 87F0(h). The status of SUBMIT in the operating system is not altered. To defeat SUBMIT from UT71, type:
P8000(cr)
to cause a cold restart of the utility program.

MONABORT

< ... >

Monitor Abort

This is a primitive called by a ?MONITOR. It selects the terminal group, prints the message "NO MONITOR" and executes QUIT.

MSEC

< TIME ... >

Milliseconds

This word generates a delay of approximately TIME in milliseconds. The delay is based upon a 2.45 mHz Cpu clock.

Match

Match

This is the primitive form of the word MATCH.

N.

< NUMBER ... >

Number Print

This word prints a number twice; once as a 5 column right justified signed decimal number, and once as an unsigned 4 digit hex number enclosed in parentheses.

NEW-FENCE

< ... >

New Fence

This word protects all current entries in the dictionary. It moves the fence to HERE, and updates +ORIGIN (parameter table) items 12, 28, 30 and 32 (decimal).

NEWLSN

< NEW.LOGICAL.SECTOR.NUMBER ... BUFFER.ADDRESS >

This is the random access word for files generated by the operating system. It works in a similar fashion to GETSEC, except that the next sector number is taken from the stack. The VARIABLE IOBC is changed. After NEWLSN, GETSEC will sequentially access the file.

NEWSDW

This is a primitive used by GETSEC.

NEXTUSER

< ... >

Next user

Example: NEXTUSER TEST.WORD

In the following example, next user automatically builds a USER variable named TEST.WORD in the next available USER variable cell, pointed to by Nextu, for the word TEST.WORD. This is a convenient alternative to the fig-FORTH method of defining USER variables.

NEXTUSER TEST.WORD (cr)

Nextu

< ... ADDRESS >

Next User Pointer

Nextu is a USER variable which contains the address of the next unassigned USER variable.

NFA < PARAMETER.FIELD.ADDRESS...NAME.FIELD.ADDRESS >
NFA
 NFA converts a Parameter Field Address (PFA) of a dictionary definition to its Name Field Address (NFA).

NODISK < ... > No Disk
 NODISK patches the word ABORT so that disks are not required in WFORTH.

NOEDIT < ... > No Edit
 Disable the terminal for editing. This is a primitive used by EDIT. It is written for a Televideo 910+ terminal and may require change or elimination for other terminals.

NOPRINT < ... > No Printer
 Disables the system printer.

NOT < Flag ... Not.flag > Not
 NOT inverts the Flag on the stack. NOT is a FORTH 79 standard word. It is equivalent to the word 0=.

NUMBER < STRING.ADDRESS ... D > Number
 Number uses the current BASE to convert a character string into a signed double precision number. The position of the last decimal point will be left in DPL.

OF < NUMBER KEY ... > Of
 This is used in the CASE statement construct. If NUMBER equals KEY, then the words between OF and ENDOF are executed and the case is terminated. OF is an immediate word. See CASE for a complete discussion.

OFFHOOK < ... > Off Hook
 This word sets the 18S653V1 modem to the OFFHOOK state. This is a primitive used by DIAL.

OFFSET < ... ADDRESS > Offset
 OFFSET is a USER variable which contains the block offset to mass storage devices. If OFFSET equals zero, screens 0 through 314 are located on drive 0, and screens 315 through 629 are located on drive 1.

OK < ... > OK
 This word prints the message " OK".

ONHOOK

< ... >

On Hook

This word sets the modem to the disconnected or ONHOOK state. Sometimes, due to an untimely exit from ORIGINATE or ANSWER, this word must be used to disconnect the modem from the telephone line.

OPEN

< STARTING.SECTOR.NUMBER ... >

Open

Usage: OPEN FILESPEC. Open sets up the I/O control block, stored in the VARIABLE IOCB, for sequential reads of an existing file. OPEN selects the proper drive, finds the starting sector number, and calls Open, which is the primitive version of OPEN. It sets up the I/O Control Block. Once a file is opened, GETSEC will return the address of the next sector. If GETSEC returns 0000, it signifies the end of file. Notice that OPEN, and any words which use open, such as SAVE, DOWNLOAD, and SEND will change the default drive number if the specified file is located on another drive.

OR

< N1 N2 ... N3 >

Or

OR performs a logical OR of the top two 16 bit numbers on the stack and replaces them with the logical result.

ORIGIN

< ... ORIGIN.ADDRESS >

Origin

ORIGIN is a CONSTANT which points to the first item in the parameter table. Each item in the parameter table is 2 bytes long, and offsets refer to bytes, not variables. Refer to chapter 7 for details on the parameter table.

ORIGINATE

< ... >

Originate

This word sets the 18S653-V1 modem at MODEM.GRP to originate mode. 5 seconds after ORIGINATE is called, it checks for incoming carrier and executes QUIT if there is no carrier. It then executes the word RE-ENTER. The escape key terminates ORIGINATE mode.

OUT

< ... ADDRESS >

Out

OUT is a USER variable which is incremented by EMIT. The user is responsible for initializing and referencing OUT. VLIST is an example of a word which uses OUT to perform output formatting.

OUTL

< ... ADDRESS >

Output Lines

OUTL is a USER variable which is incremented by the word CR (Carriage Return). OUTL is intended for line printer page formatting. The behavior of OUTL and CR is analogous to the behavior of OUT and EMIT.

OUTPUT

< CHARACTER PORT.NUMBER ... >

Output

OUTPUT writes CHARACTER to PORT.NUMBER. A two level group select must be performed first, and the terminal group should be restored by executing the word TERM after the I/O operation. See chapter 2 for details on the two level group convention.

OVER

< N1 N2 ... N1 N2 N1 >

Over

OVER copies the second stack item to the top of the stack.

PAD

< ... ADDRESS >

Pad

PAD places the address of the text output buffer on the stack. PAD is always located 68(d) bytes past the end of the dictionary. PAD is generally used in two ways. The ASCII type words <# # #> etc., build the output string at PAD -1, working backwards. The EDITOR words use PAD as a text buffer, with the first character stored at PAD.

PAGE

< ... >

Page

This word sends a top of form command to the line printer. FLD, the page counter is incremented by 1.

PARPRINTER

< ... >

Parallel printer

Parallel printer selects the parallel printer as the list device. Once this is done, it is merely necessary to execute PRINTER to enable the printer, and NOPRINT to disable the printer. When the printer is enabled, all output is still directed to the terminal also.

PARPTR

< CHARACTER ... >

Parallel printer output

This word sends 1 character to the parallel printer. The character is not sent to the terminal.

PDOTQ.DSP

< ... >

Parentheses Dot Quote Display

This is a primitive used by the decompiler to display the the behaviour of words using the FORTH word dot-quote.

PFA

< NAME.FIELD.ADDRESS...PARAMETER.FIELD.ADDRESS >

PFA

PFA converts a Name Field Address (NFA) of a dictionary definition to its Parameter Field Address (PFA).

PREV

< ... ADDRESS >

Previous

PREV is a USER variable which contains the address of the most recently (previous) referenced disk block.

PRINTER

< ... >

Printer

PRINTER enables the system printer. This word, and NOPRINT, have different behaviors for serial or parallel printers. For serial printers attached to the terminal, an escape sequence is sent to the terminal to enable an attached serial printer. With a parallel printer using an 18S646 printer card, or a serial printer connected to an 18S641 uart card, a dynamic patch of EMIT is made, to branch to code contained in the word parptr. This code duplicates every character sent through EMIT and sends it to both the terminal and the printer. Placing this code outside of the assembly code makes it easy to change. Placing it before ASMBR allows you to enable a printer during the process of recompiling the system. Because of the patch to EMIT, PRINTER only works in RAM systems. NOPRINT disables the printer by restoring the word EMIT.

parptr

< ... >

Print Patch

This word functions as a NOP. It contains the code which duplicates the stack number and sends it to the parallel printer through the CDP 18S646 card or to the serial printer through the CDP 18S641 card.

QUERY

< ... >

Query

QUERY inputs up to 128(d) characters from the terminal. Input is terminated by a carriage return. The text is placed in the terminal input buffer (TIB) and IN is set equal to 0. The carriage return is not stored, but NULL (0) and SPACE (20 h) are appended to the input string. QUERY uses EXPECT.

QUIT

< ... >

Quit

QUIT stops compilation, resets the return stack pointer, and starts interpretation from the terminal input stream. QUIT is an endless loop which calls the interpreter repeatedly.

QUIT.FLAG

< ... ADDRESS >

Quit Flag

This USER variable is used by the decompiler to signify to the CASE statement that decompilation is complete.

QUOTE

< ... >

Quote

Print a " , (22h). This cannot be done directly with the ." (dot quote) format, since the quotation mark is the string terminator.

R#

< ... ADDRESS >

R Sharp

R# is a USER variable which is used by the editors.

RETO < ... > Reset Q Line

This word resets the Q line of the 1806 CPU to the 0 state (0 volts).

ROMIT < ... > Rom It

ROMIT moves the dictionary pointer to the next 8 page boundary and executes NODISK and NEW-FENCE in preparation for saving a file to be burned in EPROM.

ROT < N1 N2 N3 ... N2 N3 N1 > Rotate

ROT rotates the top three items on the stack. The third item comes to the top of the stack.

RP! < ... > Return Stack
Pointer Store

RP! initializes the return stack pointer to the value contained in the USER variable RO.

RSTBRK Reset break

This is a primitive used by UART.

S->D < N ... D > Single to Double

S->D converts a single number on the stack to a double number. S to D works simply by duplicating the sign bit of the previous top number in all positions of the new top number.

S.ERASE < ... > Screen Erase

This is a primitive used by EDIT.

S0 < ... ADDRESS > S zero

S0 is a USER variable which contains the initial address of the bottom of the computation stack.

SAVE < ... > Save

SAVE will save the current FORTH environment into the specified file. The file must already exist, and be long enough to to save from 0 to HERE. If not, SAVE issues Message 26(d) and executes QUIT. Remember to call NEW-FENCE first, to protect any newly defined words, and call ROMIT if the file will be burned in EPROM.

Usage: SAVE FILESPEC (cr)

Example: SAVE WFORTH.CM:1 (cr)

SCR

< ... ADDRESS >

SCR

SCR is a USER variable that contains the screen number most recently referenced by LIST. This value can then be referenced by other words, so that the screen number need not be explicitly stated. The words L and EDITL reference SCR.

SCR/DSK

< ... ADDRESS >

Screens per Disk

SCR/DSK is a USER variable which is used by the word DRL to compute OFFSET. SCR/DSK is not a standard Fig-FORTH word.

SCREEN-DUMP

< SCREEN.NUMBER ... >

Screen Dump

This word dumps the contents of the desired screen buffer to the terminal, in Hex and ASCII, 16 lines at one time. The operator is prompted to continue the dump.

SEC

< TIME ... >

Seconds

This word generates a delay for approximately TIME seconds. The delay is based upon a 2.45 mHz CPU clock.

SECTOR

< SECTOR.NUMBER ... BUFFER.ADDRESS >

Sector

Sector will retrieve any sector on the selected drive from 0 to 629 and return the buffer address. This is a very useful random access word for disk data.

SEND

< ... >

Send

SEND will search the disk directory for the file named in FILESPEC and transmit the file in ASCII-HEX format through the uart at COMM.GRP. The operation of SEND is to similar XMIT and DOWNLOAD, except that SEND does not assume the presence of a monitor program at the receiving end. Therefore, the receiving system is responsible for capturing the file. The file is transmitted in ASCII-HEX in blocks of 512 (d) bytes (1 sector). The blocks are broken up as 16 lines of 64 characters. Each line is followed by CR-LF. After a block is sent, a reply is required from the receiving system. There are 3 valid replies. Y or y signifies that the block was successfully received and that the next block should be sent. Break indicates that the procedure should be terminated (ABORT is then executed). Any other character will cause retransmission of the previous block. No end of file mark is sent at any time, a delay should be interpreted as the end of file.

Usage: SEND Filespec (cr)

Example: SEND ALV00:1 (cr)

SIGN < SIGN.FLAG DOUBLE.NUMBER ... DOUBLE.NUMBER > Sign

Sign is used in pictured numeric output <# #> to place an ASCII sign symbol in the output stream. If SIGN.FLAG is negative, a minus sign is inserted into the output stream. Refer to <#, #, #S, and #>.

SMUDGE < ... > Smudge

SMUDGE will toggle the smudge bit (the third most significant bit) of the length byte of the name field. CREATE and : (which calls CREATE), smudge a word when first named so that it cannot be found until the definition is completed; A word defined using CREATE must be smudged when the word is finished. The FORTH word ; does this automatically for colon definitions.

SP! < ... > Stack Pointer Store

SP! initializes the computation stack pointer to the value contained in the USER variable SO.

SP@ < ... STACK.POINTER > Stack Pointer Fetch

SP@ returns the present computation stack pointer address to the top of the stack.

SPACE < ... > Space

SPACE transmits an ASCII space (20h) to the output device. The space character is the universal delimiter for FORTH words and numbers.

SPACES < NUMBER ... > Spaces

Spaces sends the specified NUMBER of spaces to the output device.

SPREADSCREEN < SCREEN.NUMBER ... > Spreadscreen

This word makes a blank screen within a group of screens. It uses the word ?SCREEN to find the first non-screen above SCREEN.NUMBER. It then moves all intervening screens up 1 screen and clears SCREEN.NUMBER. CAUTION. ?SCREEN assumes that any control character makes a SCREEN a non-screen. Therefore, if SPREADSCREEN finds a screen which has a control character, it will destroy that screen. Notice that neither the FIG editor nor the full screen editor allows the user to place a control character within a screen.

STATE < ... ADDRESS > State

STATE is a USER variable which shows whether the system is in the compiling (00h), or interpreting (C0h) state.

STATUS < ... STATUS.WORD > Status Read

This word puts the contents of the status register of the selected uart on the stack. The status is for a CDP1854A uart. This is a primitive used by UART.

SWAP < N1 N2 ... N2 N1 > Swap

SWAP interchanges the top two 16 bit numbers on the stack.

T < LINE.NUMBER ... > T

List LINE.NUMBER of the screen whose number is stored in the USER variable SCN. Also, set the CONTEXT vocabulary to EDITOR. This word is similar to the FIG-EDITOR word T, but it is a FORTH word and can be found from any vocabulary. Note that this word does not leave LINE.NUMBER on the stack, which is a Fig-EDITOR bug.

TASK < ... > TASK

TASK is a Nop word that marks the end of WFORTH. FORGET TASK is a convenient way to reset the dictionary after compiling new words that are no longer required.

TEAR < ... > Tear

This word readies the printer for tearing the listing. It issues one form feed and turns the printer off.

TERM < ... > Terminal

This word selects the group number contained in the VARIABLE TERM.GRP This is group 1 for normal operation. This word should be executed after all I/O to restore group numbers.

TERM.CTL < ... ADDRESS > Terminal Control

This is a VARIABLE which holds the value of the terminal uart control byte. This is usually 1D(h).

TERM.GRP < ... ADDRESS > Terminal Group

This USER variable contains the I/O group number for the terminal UART. This is usually 01(h).

TEXT

< DELIMITER ... >

Text

Usage: DECIMAL 32 TEXT THIS.IS.A.TEST XXXX. TEXT will store the string following TEXT until XXXX at PAD. The string is stored until a character equal to DELIMITER is found in the string, or until a carriage return is encountered. In this example, the delimiter is the space character.

THEN

< ... >

Then

THEN is used to terminate an IF THEN or IF ELSE THEN conditional structure. THEN is used by the compiler as a label for conditional branching.

TIB

< ... ADDRESS >

Terminal Input
Buffer

TIB is a USER variable which points to the terminal input buffer (TIB). The buffer is 128(d) bytes. This length is set by a literal in QUERY. TIB is initialized by COLD or WARM from item +22(d) in the parameter table.

TOGGLE

< ADDRESS 8.BIT.MASK ... > Toggle

TOGGLE exclusive or's the byte at ADDRESS with 8.BIT.MASK, and leaves it at ADDRESS.

TONE

< CHAR ... >

Tone

This word takes a character from the stack and sends it over the modem. This is a primitive word for DIAL. Any invalid characters are ignored. See DIAL for the list of valid characters.

TRAVERSE

< BEGINNING.ADDRESS DIRECTION...ENDING.ADDRESS >
Traverse

TRAVERSE calculates the address of the opposite end of a name field. If direction equals 1, movement is from low to high, and BEGINNING.ADDRESS must contain the addresses of the length byte of the name field. If DIRECTION equals -1, movement is from high to low and BEGINNING.ADDRESS must point to the last letter of the name.

TRC

< ... >

Transmit Character

This word examines the character at the terminal group uart. If it is an escape character, a flag is set to terminate the UART BEGIN-UNTIL loop, otherwise the character is transmitted to the uart at COMM.GRP. This is a primitive for UART.

TS < NUMBER ... > Tone Send

This word uses a NUMBER from TONE which has been converted from a character. NUMBER is the actual value sent to the modem, not the character being sent. This is a primitive for DIAL.

TYPE < STRING.ADDRESS LENGTH ... > Type

TYPE outputs a string starting at STRING.ADDRESS to the output device for LENGTH bytes. If LENGTH equals zero, nothing happens.

U < ... > Uart

U is a pseudonym for UART.

U* < U1 U2 ... UNSIGNED.DOUBLE > U Star

U* multiplies two unsigned single numbers and leaves an unsigned double product.

U. < U ... > Unsigned Print

The number on top of the stack is printed as a positive number in the present number BASE. This is not the same as printing the absolute value of the number.

U.. < NUMBER ... > U Dot Dot

U.. prints an unsigned NUMBER with no trailing space. The current number BASE is used.

U.R < U L ... > Unsigned Print
Right Justified

U.R will print the unsigned number U, right justified in L columns followed by one space. The current number BASE is used.

U.RLZ < NUMBER L ... > Print unsigned
number right
justified with
leading zeroes

This word prints NUMBER with leading zeroes. L is the number of total columns. If the number needs more than L columns to be printed, then it is printed in full.

U/ < UNSIGNED.DOUBLE.DIVIDEND UNSIGNED.DIVISOR
... UNSIGNED.REMAINDER UNSIGNED.QUOTIENT >
U Slash

U/ divides an unsigned double dividend by an unsigned divisor and leaves an unsigned remainder and unsigned quotient.

UART

< ... >

Uart

UART initiates terminal emulation mode between the device at the terminal group (TERM.GRP) and the device at COMM.GRP. Normally this means a terminal and operator at group 1 (TERM.GRP) communicating with a target computer through the uart at group E0(h) (COMM.GRP). Note, however, a modem at group F0(h) is possible for either COMM.GRP or TERM.GRP. U is a pseudonym for UART.

UNTIL

< FLAG ... >

Until

UNTIL terminates the BEGIN UNTIL loop structure. UNTIL examines the flag, if true, the loop is exited, and the word following UNTIL is executed. If the flag is false, UNTIL causes a branch to the word following BEGIN.

UPDATE

< ... >

Update

Update sets the update byte of the most recently referenced screen so that the screen will be written to disk when the buffer is re-allocated or the word FLUSH is executed. FLUSH can be executed by the user to force an updated screen to be rewritten to disk.

USE

< ... ADDRESS >

Use

USE is a USER variable which contains the address of the next disk buffer to "use". USE is controlled by +BUF.

USER

< OFFSET ... >

User

USER is used in the form NN USER (Name) to define USER variables. NN is the offset into the user table and must be less than D4(h) and greater than 50(h). More than 1 name can point to the same USER variable. USER variables can be used in EPROM systems whereas plain variables cannot. This is because USER variables contain an offset into the Ram user table, which does not change as the variable changes. Variables, however, store their value directly into the dictionary, which means that they cannot be changed in a PROM system. Invoking the name of a USER variable leaves the address of the variable on the stack. USER variable 0 thru 4F(h) are considered system variables. USER variables can also be defined sequentially by the sequence: NEXTUSER ANY.NAME (cr)
This method will automatically allocate USER variable space.

USER-IOCB

< ... ADDRESS >

USER I-O Control
Block

USER-IOCB is a USER variable that is 10(d) bytes long. It is used by R/W and is the IOCB used by BLOCK-READ and BLOCK-WRITE to access the disk via the monitor program UT71.

USERV.DSP

< ... >

User Variable
Display

Display the USER variable at WORD.PTR. This is a primitive for the decompiler.

V

< TARGET.ADDRESS LENGTH HOST.ADDRESS ... >

Receive

This is a block move from a target computer to the host. BASE must be HEX. Communication is through a uart at COMM.GRP (normally E0h) to the RCA utility program of the target. The target computer transmits the data block using the utility D (dump) command.

V

< TARGET.ADDRESS LENGTH HOST.ADDRESS ... >

Receive

This is the low level version of V. Base need not be Hex. v performs a simple check to see if it is communicating with a utility program in the target computer via the COMM.GRP uart. It receives LENGTH bytes from TARGET.ADDR and stores them at HOST.ADDR in the host computer.

VAR.DSP

< ... >

Variable Display

Display the VARIABLE at WORD.PTR. This is a primitive for the decompiler.

VARIABLE

< N ... >

Variable

VARIABLE is used to define variables in the form:

N VARIABLE ANY.NAME (cr)

where N is the initial value of the named VARIABLE. Whenever the name is invoked, the address of the VARIABLE is left on the stack. @ (fetch) will replace the address with the value. ! (store) will store the second item on the stack at address, thereby updating the VARIABLE. Note that variables cannot be used in Eprom systems because the value of a VARIABLE is stored in the dictionary. Use USER variables for Eprom systems.

VCOPY

< PAGE.NUMBER ... >

Video Ram Copy

This word sets the address of the video ram to PAGE.NUMBER and then reads and writes 1024(d) bytes. Thus, the video ram will display 4 pages starting at PAGE.NUMBER. This requires the WHOI video ram. See the section on special hardware.

VLIST

< ... >

Vocabulary List

This word will list the name field address (NFA) and name (ID) for all words in the CONTEXT vocabulary. VLIST starts at the top word in the CONTEXT vocabulary and follows the link field addresses through the CONTEXT vocabulary to the FORTH VOCABULARY to the word COLD, the bottom-most word. The break key prematurely terminates VLIST.

VMOVE

< PAGE.NUMBER ... >

Video Ram Move

This word moves the address of the video ram to PAGE.NUMBER. The video ram is not cleared or updated. This word is a primitive for VCOPY and VSHADOW. It requires the WHOI video ram. See the section on special hardware.

VOC-LINK

< ... ADDRESS >

Vocabulary Link

VOC-LINK is a USER variable which points to the VOC-LINK field in the vocabulary most recently defined. This is initialized to point to the VOC-LINK field in the word FORTH by COLD. VOC-LINK is unwittingly used by the word VOCABULARY to extend the dictionary in an Eprom implementation of FORTH. The technique is as follows. Operator keyboard input is underlined.

```
VOCABULARY FIFTH IMMEDIATE OK
HERE 4 - DUP CURRENT ! CONTEXT ! OK
: TEST ." HELLO" ; OK
TEST HELLO OK
VLIST
TEST etc.
```

The vocabulary FIFTH is created without any problem as part of FORTH, but it cannot be used because FORTH's link is frozen in Eprom. Storing the value of FIFTH's VOC-LINK field in CURRENT and CONTEXT explicitly selects and utilizes the FIFTH vocabulary. QUIT will retain all new definitions but COLD or ABORT will forget new definitions.

VOCAB.DSP

< ... >

Vocabulary Display

Display the vocabulary at WORD.PTR. This word is a primitive for the decompiler.

VOCAB?

< ... >

Vocabulary Question

This is a teaching word which displays the name of the CURRENT vocabulary and the name of the CONTEXT vocabulary.

VOCABULARY

< ... >

Vocabulary

VOCABULARY is used to define new vocabularies in the form: VOCABULARY NAME IMMEDIATE. By using vocabularies, it is possible to have many definitions of the same name, and yet find the different words easily. It is also possible to obscure words which are not particularly valuable to the user, but rather are used to define higher level words. Refer to the FORTH Encyclopedia for complete details.

VSHADOW

< PAGE.NUMBER ... >

Video Ram Shadow

This word first clears the video ram at port 2 and then sets the video ram address to PAGE.NUMBER. VSHADOW will then display data as it is written. This word requires the WHOI video ram. See the section on special hardware.

W1

< ... >

Wait for External Flag 1

W1 waits for external flag 1 to be true (0 volts).

W2

< ... >

Wait for External Flag 2

W2 waits for external flag 2 to be true (0 volts).

W3

< ... >

Wait for External Flag 3

W3 waits for external flag 3 to be true (0 volts).

W4

< ... >

Wait for External Flag 4

W4 waits for external flag 4 to be true (0 volts).

WARM

< ALL.VALUES ... >

Warm

WARM initializes USER variables 0 through 0E(h) and registers 2, 4, 5, 6, 7, and 8 from the information contained in the parameter table. WARM then executes ABORT. FORTH can be re-entered at location 0003(h) for a WARM start.

WARNING

< ... ADDRESS >

Warning

WARNING is a USER variable which holds a flag. If WARNING is negative, (ABORT) is executed. If warning is 0 or positive, only the message number will be printed. Note that in Woods Hole FORTH, a positive value in warning has no special significance, because error messages are not stored on the screens.

WHERE `< BLOCK.OFFSET BLOCK.NUMBER ... >` Where

WHERE is a word which may be called after a screen load error. BLOCK.NUMBER and BLOCK.OFFSET, which are placed on the stack by the word ERROR, point to the word which caused the error, and WHERE uses the values to explain the error.

WHILE < FLAG ... > While

While is used within a BEGIN WHILE REPEAT loop. The flag is examined, and if true the words between WHILE and REPEAT are executed, returning to BEGIN. If the flag is false, the loop is terminated, and the word following REPEAT is executed.

WIDTH < ... ADDRESS > Width

WIDTH is a USER variable which contains the maximum number of characters allowed in the name field of a dictionary definition. WIDTH is 31(d) in Woods Hole FORTH.

WN1 < ... > Wait Not 4

This word waits until external flag 1 is not true (5 volts).

WN2 < ... > Wait not 4

This word waits until external flag 2 is not true (5 volts).

WN3 < ... > Wait Not 4

This word waits until external flag 3 is not true (5 volts).

WN4 < . . . > Wait Not 4

This word waits until external flag 4 is not true (5 volts).

WORD	< DELIMITER ... >	Word
1		
2		
3		
4		
5		
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93		
94		
95		
96		
97		
98		
99		
100		

WORD parses one word from the input stream. Characters are transferred from the input stream to memory starting at HERE, the next available dictionary location. WORD leaves the character count of the string in the first byte of the string and terminates the string with one or more blanks. Leading delimiters are not transferred. HERE points to the first byte of the string, the byte count. This definition of WORD is the fig-FORTH definition; the FORTH-79 standard version is called WORD-79 in Woods Hole FORTH.

WORD-79 < DELIMITER ... HERE > Word 79

WORD-79 is the FORTH-79 standard word for "WORD". It is defined in fig-FORTH as

```
: WORD-79 WORD HERE ;
```


WORD.DSP

< ... >

Word Display

Display the NFA, CFA, and ID of the word at WORD.PTR. This is a primitive used by the decompiler.

WORD.PTR

< ... ADDRESS >

Word Pointer

This USER variable is used by the decompiler to point to the CFA of the word being decompiled.

XMIT

< HOST.SOURCE.ADDRESS LENGTH TARGET.ADDRESS ... >

Transmit

This word facilitates block moves between computers. It is similar to V but the direction of the transfer is from host to target. The target must be running an RCA monitor program that supports the I (insert) command. XMIT requires that the base be HEX. It selects the COMM.GRP uart to communicate with the target.

Xmit

< HOST.SOURCE.ADDRESS LENGTH
TARGET.ADDRESS ... > Transmit

This is the low level form of XMIT .It checks for a target monitor and uses the Insert command to move the number of bytes specified in LENGTH from HOST.ADDRESS to the target computer at TARGET.ADDRESS. The target computer is the one connected to the uart at COMM.GRP.

XOR

< N1 N2 ... N3 > Exclusive Or

XOR performs an exclusive-or of the two 16 bit numbers on top of the stack and replaces them with the logical result.

Y?

< ... > Yes Question

Wait for a key from the present group's uart. If it does not equal Y or y, execute QUIT, otherwise continue.

ZEROES

< NUMBER.OF.ZEROES ... > Zeroes

This word works just like spaces. It prints number of zeroes. It is a primitive for U.RLZ and D.RLZ.

[

< ... > Left Bracket

[is used to suspend compilation while in a colon definition. The words which follow [are executed rather than compiled. Compilation is resumed by executing] .

[COMPILE]

< ... > Bracket Compile

[COMPILE] causes the next word in the input stream to be compiled into the dictionary even if it is an immediate word. For instance, [COMPILE] FORTH within a definition will cause FORTH to be the CONTEXT vocabulary when the word is executed, rather than at compile time.

]

< ... > Right Bracket

RIGHT BRACKET places the system into compilation state, usually after compilation was suspended using [. [COMPILE] ANY.WORD is the same as [ANY.WORD] .

ERROR MESSAGES

The word MESSAGE prints all message numbers in decimal.

- Message 0 This word is undefined (it cannot be found in the dictionary).
The stack now contains 2 numbers. The top number is the screen number which caused the error. The second number contains the offset, in bytes, from the beginning of the screen to the end of the word which caused the error. Message 0 is always followed by QUIT. Message 0 is issued by NUMBER.
- Message 1 The stack is empty. This message is issued by ?STACK and followed by QUIT.
- Message 2 The dictionary is full. Message 2 is issued by CREATE and is always followed by QUIT.
- Message 4 A word with this name already exists. Compilation is not interrupted. This message is issued by CREATE.
- Message 7 The stack is full. This message is issued by ?STACK and followed by QUIT.
- Message 8 This message is issued by R/W. It indicates that there was a disk I/O error. Execution is not interrupted.
- Message 17 This message is issued by ?COMP when the system is not in compile STATE. The USER variable STATE is non-zero (COh) if the system is in compile STATE. This is part of the compiler security.
- Message 18 This message is issued by ?EXEC when the USER variable STATE is not equal to zero. This indicates that the system is not in EXECUTE STATE.
- Message 19 This message is issued by ?PAIRS. If the top two numbers

on the stack are not equal when ?PAIRS is executed, Message 19 is issued followed by QUIT.

Message 20 This message is issued by ?CSP when ?CSP finds that the current stack pointer is not equal to the user variable CSP. Message 20 is followed by QUIT.

Message 21 This message is issued by FORGET when an attempt is made to forget a word that is protected by the FENCE. QUIT is executed after this message. Change the value of FENCE to fix this error.

Message 22 This message is issued by ?LOADING if the system is not loading from disk when ?LOADING is executed. The test is to see if the USER variable BLK is non-zero. Message 22 is followed by QUIT.

Message 23 This message is issued by LINE in Fig-EDITOR, and does not interrupt execution. It occurs when LINE is asked to find a line number greater than 15(d). This message will usually appear when L is executed before any editing has occurred, and therefore the USER variable R# is not yet initialized. In this case, the message is unimportant.

Message 24 This message is issued by FORGET and followed by QUIT. It means that the CURRENT and CONTEXT vocabularies are not the same. FORGET will not forget any words unless CURRENT and CONTEXT are the same.

Message 25 No USER variable space is available. In Woods Hole FORTH, USER variables 50(h) thru D4(h) are available, a total of 66(d) USER variables. This message is issued by NEXTUSER.

Message 26 This message is issued by SAVE. The file specified is not large enough to store from 0 to HERE. Message 26 is followed by QUIT.

Message 27 This message is issued by SEND. It means that a break condition was detected by SEND, the transfer is stopped and QUIT is executed.

TEXT MESSAGES

No blank screens There are no blank screens between SCREEN.NUMBER and 249(d). This message is issued by SPREADSCREEN. No screens are moved, and QUIT is executed.

Break received A break condition exists at the uart in COMM.GRP. This message is issued by UART. Execution is not interrupted.

No dial tone There is no dial tone available to the modem at MODEM.GRP. This message is issued by DIAL. QUIT is executed after this message.

RE-ENTER This message is issued by RE-ENTER, when the escape key (esc) is pressed at the terminal. Reply with Y if you want to maintain the modem connection, or any other key if you want to hang up. RE-ENTER prompts the user with the message "Type RE-ENTER when ready."

Not found This message is issued by OPEN when the desired file is not found in the disk directory. This message is followed by QUIT.

No Monitor

This message is issued by V, XMIT, and DOWNLOAD via ?MONITOR, when there is no monitor program (UT71 or UT62) running in the computer connected to the uart at COMM.GRP. It means that FORTH is unable to send or receive information from this computer via the utility program.

Declare HEX

This message is issued by XMIT, V, and DOWNLOAD. The base must be hexadecimal when sending or receiving data from remote computers.

<p>Downloading is complete</p>	<p>This message is issued by DOWNLOAD. It means that a block was successfully sent by DOWNLOAD. Execution is not interrupted.</p>
<p>PSN Too Large</p>	<p>This message is issued by SECTOR when the desired sector is larger than 629(d). This message is followed by QUIT.</p>
<p>End of File</p>	<p>This message is issued by OPEN and NEWLSN when the end of file mark is read in a file. This message is followed by QUIT.</p>
<p>On Screen (num) (name) caused a short branch off page</p>	<p>This message is issued by the ASSEMBLER. It means that a short branch was detected across a page boundary. Execution is not interrupted, but the assembled code is probably incorrect.</p>

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