

MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

12

ESD-TR-82-396

MTR-8689

ADA 123671

AFSATCOM - COMPATIBLE 75 B/S VOICE SYSTEM  
HARDWARE AND SOFTWARE

By  
J. HANDWERKER

DECEMBER 1982

Prepared for  
DEPUTY FOR STRATEGIC SYSTEMS  
ELECTRONIC SYSTEMS DIVISION  
AIR FORCE SYSTEMS COMMAND  
UNITED STATES AIR FORCE  
Hanscom Air Force Base, Massachusetts



DTIC  
ELECTR  
S JAN 24 1983 D  
E

DTIC FILE COPY

Approved for public release;  
distribution unlimited.

Project No. 6340  
Prepared by  
THE MITRE CORPORATION  
Bedford, Massachusetts  
Contract No. F19628-82-C-0001

When U.S. Government drawings, specifications, or other data are used for any purpose other than a definitely related government procurement operation, the government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Do not return this copy. Retain or destroy.

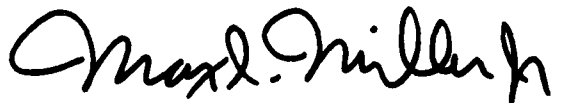
REVIEW AND APPROVAL

This technical report has been reviewed and is approved for publication.



JOSEPH E. MARDO, GS-13  
MILSTAR Chief Engineer

FOR THE COMMANDER



MAX I. MILLER JR., COL, USAF  
MILSTAR System Program Director

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER ESD-TR-82-396	2. GOVT ACCESSION NO. <b>ADA223672</b>	3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) AFSATCOM - COMPATIBLE 75 B/S VOICE SYSTEM HARDWARE AND SOFTWARE		5. TYPE OF REPORT & PERIOD COVERED	
7. AUTHOR(s) J. HANDWERKER		6. PERFORMING ORG. REPORT NUMBER MTR-8689	
9. PERFORMING ORGANIZATION NAME AND ADDRESS The MITRE Corporation P. O. Box 208 Bedford, MA 01730		8. CONTRACT OR GRANT NUMBER(s) F19628-82-C-0001	
11. CONTROLLING OFFICE NAME AND ADDRESS Deputy for Strategic Systems Electronic Systems Division, AFSC Hanscom AFB, MA 01731		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. 6340	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE DECEMBER 1982	
		13. NUMBER OF PAGES 146	
		15. SECURITY CLASS. (of this report) UNCLASSIFIED	
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.			
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)			
18. SUPPLEMENTARY NOTES			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) AFSATCOM                                      SOFTWARE MICROPROCESSORS                              SYNTHETIC VOICE NARROW BAND VOICE PHONEME SYNTHESIZER			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Synthetic voice response can be added to hard-copy teletype output over a limited-capacity satellite communications channel without modifying existing terminal hardware and software. This report describes and documents the hardware and software used to demonstrate such a voice system on an Air Force Satellite Communications (AFSATCOM) terminal, over a 75 b/s channel. Included are detailed flowcharts of the major voice mode sub-programs, and listings of vocabulary source code, assembly code, a cross-reference index for source-to-assembly code, a symbol table, and voice message formats.			

### ACKNOWLEDGMENTS

Grateful acknowledgment is made to F. L. Merkwitz who contributed to the success of this project, particularly in the area of developing and testing the fixed vocabulary table. Also many thanks to Virginia Gumbris for her word processing skills and stamina needed for the many changes incurred in preparing this report, to Anthony Knight for producing the many flowcharts required, to Douglas Alwine for his assistance in testing the voice system, and to Ruth Wales for her many helpful editorial suggestions.

This document has been prepared by The MITRE Corporation under Project No. 6340, Contract F19628-82-C-0001. The contract is sponsored by the Electronic Systems Division, Air Force Systems Command, Hanscom Air Force Base, Massachusetts.

<b>Accession For</b>	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
<b>Availability Codes</b>	
<b>Dist</b>	<b>Avail and/or Special</b>
<b>A</b>	



## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
LIST OF ILLUSTRATIONS	vii
LIST OF TABLES	viii
1 INTRODUCTION	1
2 AFSATCOM SYSTEM	2
3 VOICE SYSTEM CONFIGURATION	4
3.1 TALK MODE	4
3.2 VERIFY MODE	6
3.3 WORD STORE MODE	6
4 HOST MICROCOMPUTER	7
5 VOICE SYNTHESIZER	9
6 VOICE SYSTEM SOFTWARE	11
6.1 VOICE MODE INITIALIZATION	15
6.2 VOICE MODE TEST	15
6.3 STORE ALGORITHM	15
6.4 WORD COUNTER	15
6.5 TABLE LOOKUP	22
6.6 WORD BUFFER	22
7 RESULTS AND CONCLUSIONS	29
LIST OF REFERENCES	31

TABLE OF CONTENTS (concluded)

<u>Section</u>	<u>Page</u>
APPENDIX A: HOST MICROCOMPUTER PRESTORED VOCABULARY	33
APPENDIX B: VOTRAX VERSATILE SPEECH MODULE (VSM/1) PRODUCT DATA	43
APPENDIX C: VOICE PROGRAM PLM-80 SOURCE CODE	49
APPENDIX D: VOICE PROGRAM 8080A ASSEMBLY CODE INSTRUCTION LISTING	63
APPENDIX E: VOICE PROGRAM SOURCE-TO-ASSEMBLY CODE CROSS-REFERENCE MAP	87
APPENDIX F: VOICE PROGRAM SYMBOL TABLE MEMORY MAP	91
APPENDIX G: VOICE PROGRAM VOCABULARY TABLE ROM LISTING	95
APPENDIX H: VOICE MESSAGE FORMATS	127
GLOSSARY	137



## LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
1	Type 12 Ground CP Terminal Block Diagram with Voice System	3
2	Voice Response System Showing AFSATCOM Interface	5
3	Memory Organization for Polling/Voice Program	8
4	Overall Polling/Voice System Functional Flow Diagram	13
5	Voice Mode Initialization Flowchart	16
6	Voice Mode Test Flowchart	17
7	Store Algorithm Flowchart	18
8a	Word Counter: Beginning-of-Word Tests	19
8b	Word Counter: End-of-Word Tests	20
8c	Word Counter: Invalid Word Character Tests	21
9a	Table Lookup: Overall	23
9b	Table Lookup: Spelling	24
9c	Table Lookup: ROM Word	25
9d	Table Lookup: RAM Word	26
9e	Table Lookup: Prefix/Suffix	27
10	Word Buffer Flowchart	28

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	VOTRAX PHONEME CODES	10
2	MEMORY LOCATION SUMMARY FOR MAJOR MODULES OF THE POLLING/VOICE PROGRAM	12

## SECTION 1

### INTRODUCTION

This report describes and documents the hardware and software for a flexible, cost effective, interactive Voice System utilizing an Intel Single Board Computer SBC 80/20 and a Votrax Versatile Speech Module VSM/1.

When added to an Air Force Satellite Communication (AFSATCOM) system terminal, the Voice System can provide on-line, text-to-speech voice response, in real-time, over a 75 bits-per-second (b/s) teletype (TTY) channel.

This demonstration Voice System can be used to show users of AFSATCOM (and the subsequent MILSTAR system) the feasibility of providing intelligible speech as an adjunct to hard copy TTY output without modifying any existing AFSATCOM hardware or software.

## SECTION 2

### AFSATCOM SYSTEM

AFSATCOM is a worldwide command, control, and communications system operating in the 225 to 400 MHz ultra high frequency (UHF) spectrum. It provides 75 b/s TTY service with frequency shift keying (FSK) modulation in both clear and encrypted (secure) modes of operation for designated high priority users. The space segment consists of Navy Fleet Satellite Communications (FLTSATCOM) satellites as well as Air Force transponders carried on other vehicles. The terminal segment consists of various ground and airborne equipment configurations designed to meet both force and command operational requirements.

A typical AFSATCOM command post (CP) terminal is represented by the Type 12 Ground Command Post Terminal block diagram of figure 1. This diagram also shows the add-on Voice System. The CP terminal ensures orderly management of daily operation as part of the overall AFSATCOM system control structure. CP terminals can send, receive, and monitor messages; establish synchronization for time division multiplex modes, TDM-1 (normal) and TDM-2 (stressed, antijam); provide satellite UHF commands; and operate in a network control system using random and polled-access techniques in conjunction with an orderwire (OW) channel. Currently, AFSATCOM Type 12 CP terminals use only 75 b/s TTY operation on narrowband (NB) 5 kHz and wideband (WB) 500 kHz channels (ref. 1). In the stressed mode, narrowband channels are pseudorandomly frequency hopped to provide antijam protection.

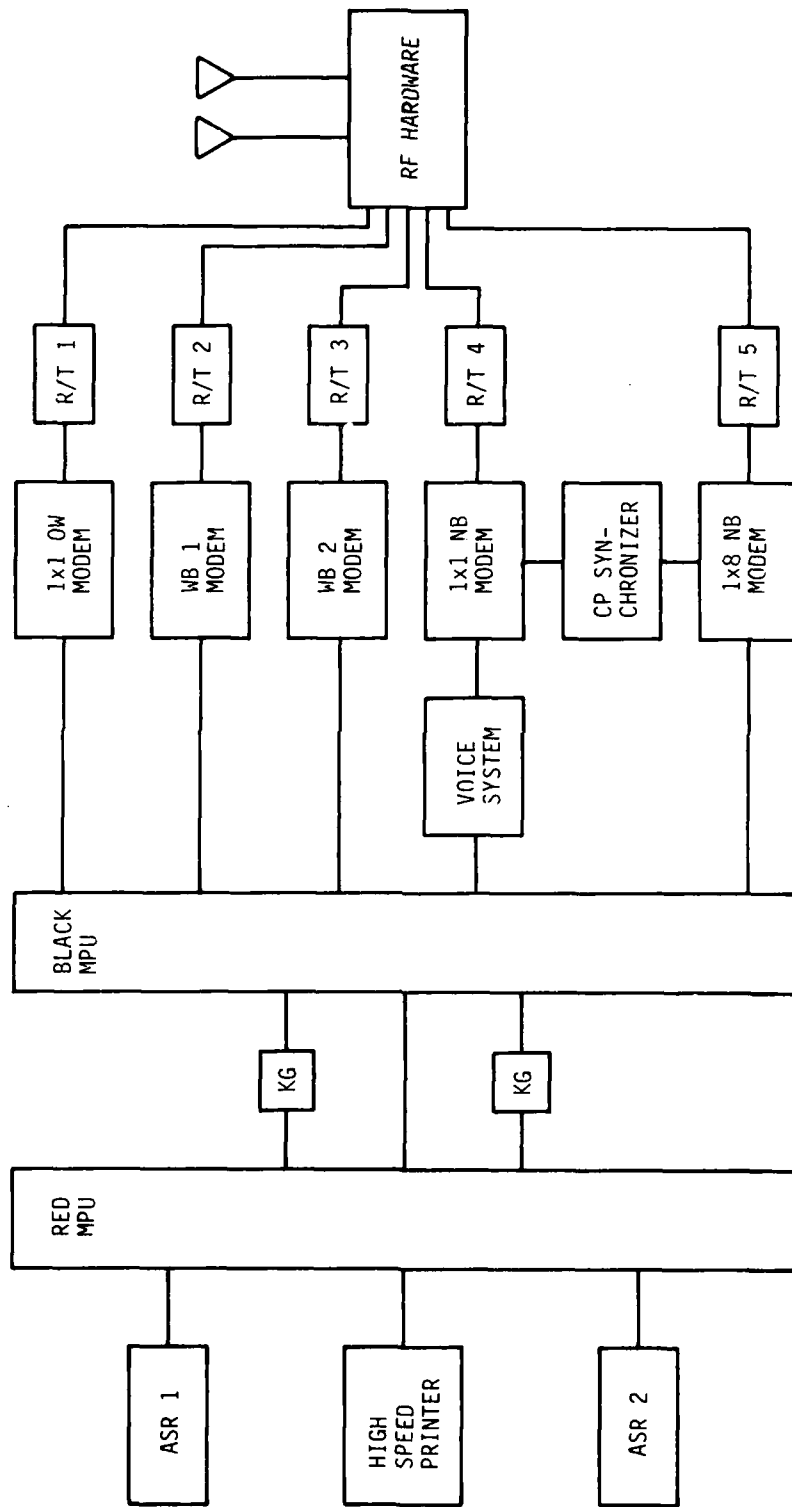


Figure 1. Type 12 Ground CP Terminal Block Diagram With Voice System

## SECTION 3

### VOICE SYSTEM CONFIGURATION

The Voice System shown in the block diagram of figure 2 can demonstrate flexible synthetic voice techniques over the limited capacity of an AFSATCOM 75 b/s TTY channel. The major elements of the Voice System are: a Host Microcomputer, a phoneme-based Voice Synthesizer, and an optional Digital Message Device. The Host Microcomputer provides all of the interfacing functions to the AFSATCOM terminal hardware, while also providing algorithmic text-to-speech conversion for use with an unmodified, off-the-shelf Voice Synthesizer. The Digital Message Device, using an RS-232 protocol, enables the Host Microcomputer to process both local and remote messages, and emulate functions related to the AFSATCOM system. As shown, the Voice System can interface directly with the AFSATCOM Type 12 terminal so that the terminal architecture will support three new modes related to voice operation: TALK, VERIFY, and WORD STORE.

#### 3.1 TALK MODE

The major mode of operation available in the Voice System is the TALK mode, since it actually produces spoken output from the TTY message text received. Except for formatting details, the TALK and VERIFY modes execute identical algorithms in the Voice System software. The TALK mode can directly output any of the prestored words, prestored spelling words, and prefixes and suffixes of the Host Microcomputer prestored vocabulary shown in appendix A. In addition, the TALK mode can concatenate any of this vocabulary with itself, with prestored user-defined random access memory (RAM) vocabulary in the Host Microcomputer, or with phoneme sequences. Thus, a virtually unlimited vocabulary is supported by a combination of fixed and variable word data-base structures, and direct phonetic sequences.

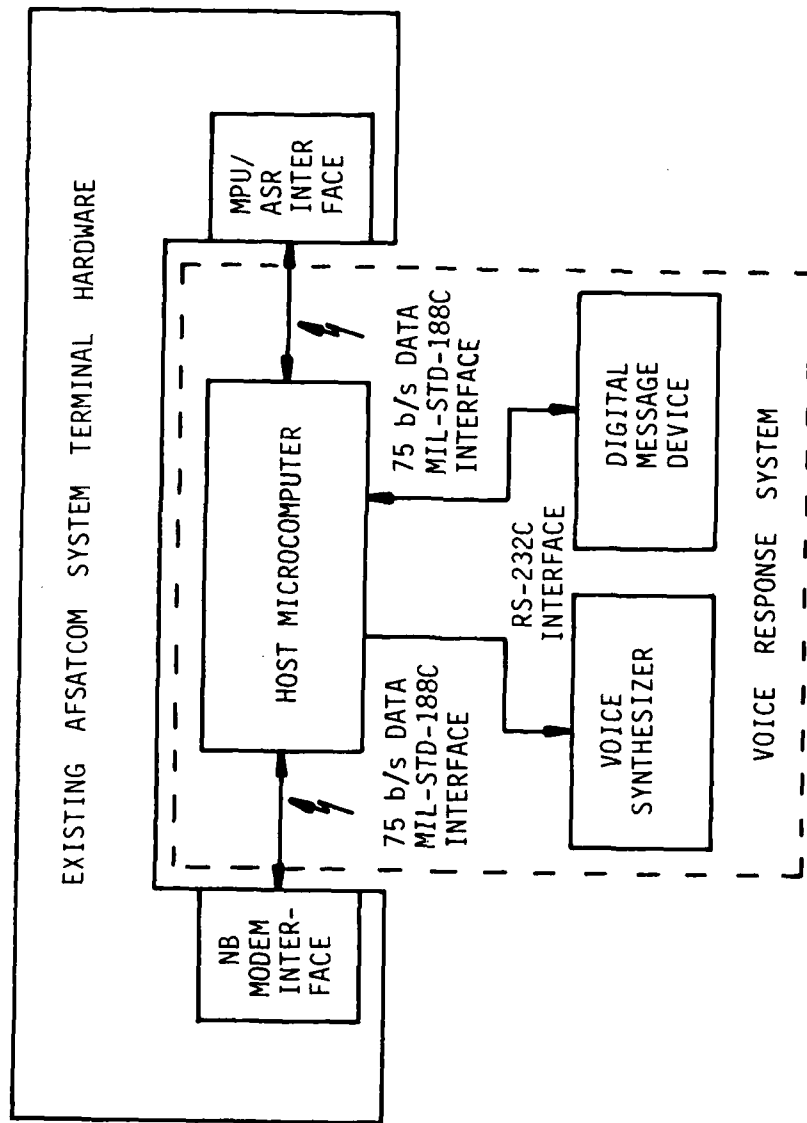


Figure 2. Voice Response System Showing AFSATCOM Interface

### 3.2 VERIFY MODE

The VERIFY mode is used at the discretion of a sender to verify message content, either locally or over a satellite to a remote Host Microcomputer terminal, before it is voiced at its destination. This permits a user to determine, via feedback from the Host-Microcomputer terminal, the extent to which his message can be voiced directly without having to manually consult a dictionary of currently defined vocabulary. After verifying a message, a user could recompose and reverify his message, or simply send it in the TALK mode where any undefined vocabulary would be voiced in a SPELLING submode. Such distributed processing could assist AFSATCOM terminals not equipped with their own computers in formatting their voice message traffic.

### 3.3 WORD STORE MODE

The WORD STORE mode can be used to add new user-defined vocabulary to the Voice System's prestored fixed vocabulary in real-time. This enhanced, volatile vocabulary can then be accessed by all users of the Voice System in either the TALK or VERIFY modes.



## SECTION 4

### HOST MICROCOMPUTER

The Host Microcomputer, originally developed for demonstrating AFSATCOM polling improvements (refs. 2, 3), has been upgraded to accommodate the speech techniques described. It now consists of an Intel 8080A microprocessor-based SBC 80/20 Single Board Computer, two National Semiconductor BLC-416 16K byte electronically programmable read-only memory (EPROM) boards, an Intel Model 450 16K byte RAM board, a power supply subsystem, and interface/display logic circuitry.

A small table-top, 19-inch modular rack, housing an Intel SBC 604 Modular Cardcage/Backplane, provides mounting space for the various boards, power supplies, display circuits, test points, and rear cable terminations that interconnect to the AFSATCOM Type 12 terminal. In addition, two multipole bypass switches, mounted on the front of the microcomputer assembly, can physically disengage the entire Polling/Voice System from the AFSATCOM terminal interfaces without physically removing connectors.

Figure 3 shows the Host Microcomputer EPROM/RAM memory organization for the Polling/Voice System.

#BYTES	MEMORY BLOCK	START/FINISH ADR (HEX)
16 K	JUMP TO VOICE MODE INITIALIZATION	0000
	POLLING PROGRAM INITIALIZATION	0004
	POLLING PROGRAM - EPROM	04BE
		3FFF
16 K	POLLING PROGRAM - RAM	4000
	VOICE MODE - RAM	7400
		7FFF
12 K	VOICE MODE INITIALIZATION	8000
	VOICE MODE - EPROM	819A
	SPARE	9B9F
		AFFF
16 K	VOICE MODE VOCABULARY - EPROM	B000
		EFFF
4 K	RESERVED ADDRESSES FOR MEMORY-MAPPED I/O IN POLLING PROGRAM	F000
		FFFF

Figure 3. Memory Organization For Polling/Voice Program

## SECTION 5

### VOICE SYNTHESIZER

The Voice Synthesizer, shown in appendix B, consists of a Votrax Versatile Speech Module VSM/1 single-board computer featuring a Motorola MC6808P microprocessor and a Votrax SC-01 phoneme speech synthesizer integrated circuit. This board accommodates 3K bytes of RAM, a 2K byte operating system with a byte-oriented editor, 8K bytes of prestored vocabulary in read-only memory (ROM) (expandable to 24K bytes), variable clocks for speech rate and pitch control, and an on-board audio amplifier (with volume control) that can deliver 1 W output into an 8 ohm load. Serial (RS-232) and parallel interfaces are also provided with selectable baud rates from 75 to 9600 b/s.

A lexicon of over 1300 industrial/engineering words, prefixes, and suffixes is stored in the vocabulary ROM. The board also supports speech synthesis using either of two phoneme modes (fixed or transitional inflection), thereby providing a virtually unlimited vocabulary from a set of 64 different phoneme code symbols. The SC-01 synthesizer requires a data rate of about 70 b/s for continuous speech production, thus making it suitable for applications such as AFSATCOM or MILSTAR where channel rates may be limited to 75 b/s.

Table 1 summarizes the basic Votrax SC-01 phoneme codes accepted by the VSM/1. Phonemes, prestored speech (stored as phoneme sequences), prestored and user-defined sound effects, inflection levels, pause durations, and instantaneous/transitioned trim controls for continuous dynamic manipulation of audio parameters can all be intermixed in any of the on-board audio-sequence memories. Finally, a half-memory plane expansion connector provides 32K bytes of off-board memory access via the microprocessor data/address/control bus. Reference 4 fully describes the capabilities of the Votrax VSM/1 voice synthesizer.

Table 1  
Votrax Phoneme Codes

Phonetic Group	Phoneme Symbol	Code	Example	Duration (ms)	
A	A	20	DAY	185	
	A1	06	MADE	103	
	A2	05	DAD	71	
	AE	2E	AFTER	185	
	AE1	2F	MOP	103	
	AH	24	FATHER	250	
	AH1	15	HONEST	146	
	AH2	08	CALL	71	
	AW	3D	LAWFULL	250	
	AW1	13	SALTY	146	
	AW2	30	DAY	90	
	AY	21		65	
	B	0E	BAG	71	
	CH	T-CH	2A-71	CHIP	71
D		1E	PAID	55	
D	DT	04	BUTTER	47	
	E	E	2C	MEET	185
		E1	3C	BE	121
		EH	3B	GET	185
		EH1	02	HEAVY	121
		EH2	01	ENLIST	71
		EH3	00	JACKET	59
		ER	3A	BIRD	146
		F	1D	FAST	103
		G	1C	GET	71
H		1B	HELLO	71	
I	I	27	PIN	185	
	I1	0B	INHIBIT	121	
	I2	0A	INHIBIT	80	
	I3	09	INHIBIT	55	
	I4	36	YOU	59	
	J	D-J	1E-1A	JUDGE	47
K	K	19	TRICK	80	

Phonetic Group	Phoneme Symbol	Code	Example	Duration (ms)
L	L	18	LAND	103
M	M	0C	MAT	103
	N	0D	SUN	80
O	NG	14	THING	121
	O	26	COLD	185
	O1	35	ABOARD	121
	O2	34	FOR	80
P	O0	17	BOOK	185
	O01	16	LOOKING	103
	P	25	PAST	103
R	R	2B	RED	90
S	S	1F	PASS	90
	SH	11	SHOP	121
T	T	2A	TAP	71
	THV	38	THE	80
	TH	39	THIN	71
U	U	28	MOVE	185
	U1	37	YOU	90
	UH	33	CUP	185
	UH1	32	UNCLE	103
	UH2	31	ABOUT	71
	UH3	23	MISSION	47
V	V	0F	VAN	71
W	W	2D	WIN	80
Y	Y	29	ANY	103
	Y1	22	YARD	80
Z	Z	12	ZOO	71
	ZH	07	AZURE	90
PAUSES & STOPS	PAØ	03	-PAUSE-	47
	PAI	3E	-PAUSE-	185
	STOP	3F	-STOP-	47

## SECTION 6

### VOICE SYSTEM SOFTWARE

The Host Microcomputer demonstration software was written in Intel PL/M-80 high-level language on the MITRE Corporation in-house time sharing (TSO) system. The Voice Program PL/M-80 Source Code, shown in appendix C, employs structured programming techniques that are modular, interrupt-free, and self-documenting. Source code was compiled, debugged, and downloaded from TSO to a Tektronix 8002A microprocessor development system. Voice Mode executable code occupying approximately 7K bytes of ROM, along with 16K bytes of ROM vocabulary, was then generated and installed on the Host Microcomputer. Appendix D shows the Voice Program 8080A Assembly Code Instruction Listing; appendix E shows the Voice Program Source-to-Assembly Code Cross-Reference Map; appendix F shows the Voice Program Symbol Table Memory Map; and appendix G shows the Voice Program Vocabulary Table ROM Listing.

Table 2 summarizes the Host Microcomputer memory locations for the major modules of the Polling/Voice program software. The overall Polling/Voice system software is represented functionally by the flow diagram in figure 4. Shown are the significant processing functions of each major module of the Voice Mode along with the logical flow of this imbedded software. The Host Microcomputer operating system provides all of the Improved Polling and input/output (I/O) functions for the AFSATCOM Type 12 terminal. Note that both Voice Mode and Improved Polling are available simultaneously.

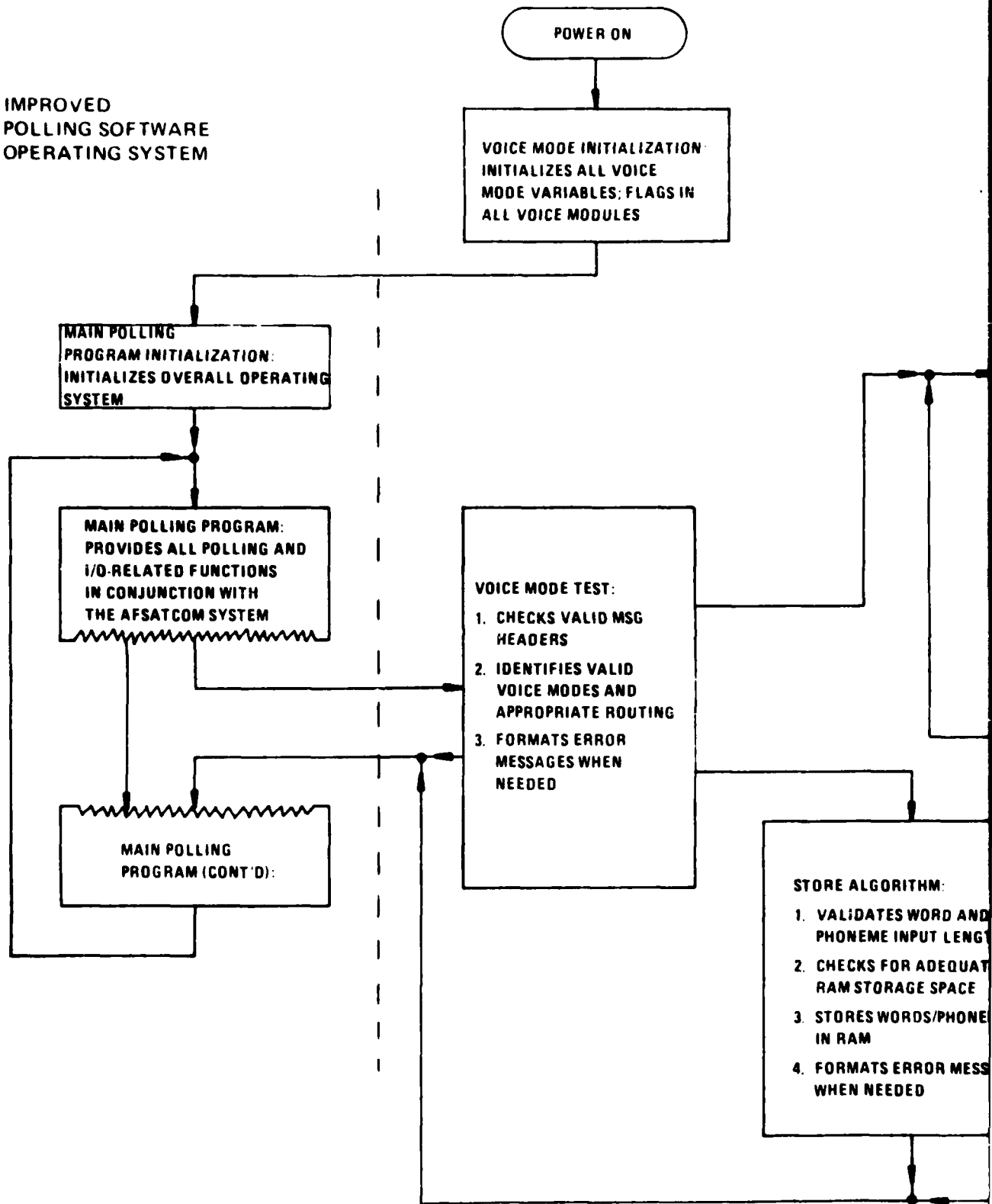
The Voice System derives input from the main polling program major loop on a message-by-message basis only. For each message, however, internal processing functions are broken down on a word-by-word basis for the VERIFY, TALK, and WORD STORE modes in accordance with the individual message formatting requirements summarized in appendix H. When Voice Mode processing is complete, control is returned to the main program.

Table 2

Memory Location Summary For Major  
Modules of the Polling/Voice Program

<u>Module Name</u>	<u>Start Address (Hex)</u>	<u>Finish Address (Hex)</u>
Power On	0000	0003
Polling Program Initialization	0004	04BE
Polling Program	04BF	3FFF
Voice Mode Initialization	8000	8190
Voice Mode Test	819A	8374
Store Algorithm	8375	852F
Word Counter	8530	88DA
Table Lookup	88DB	9133
Word Buffer	9134	9B31
Polling Program - RAM	4000	73FF
Voice Mode - RAM	7400	7FFF

IMPROVED  
POLLING SOFTWARE  
OPERATING SYSTEM



VOICE SYSTEM SOFTWARE

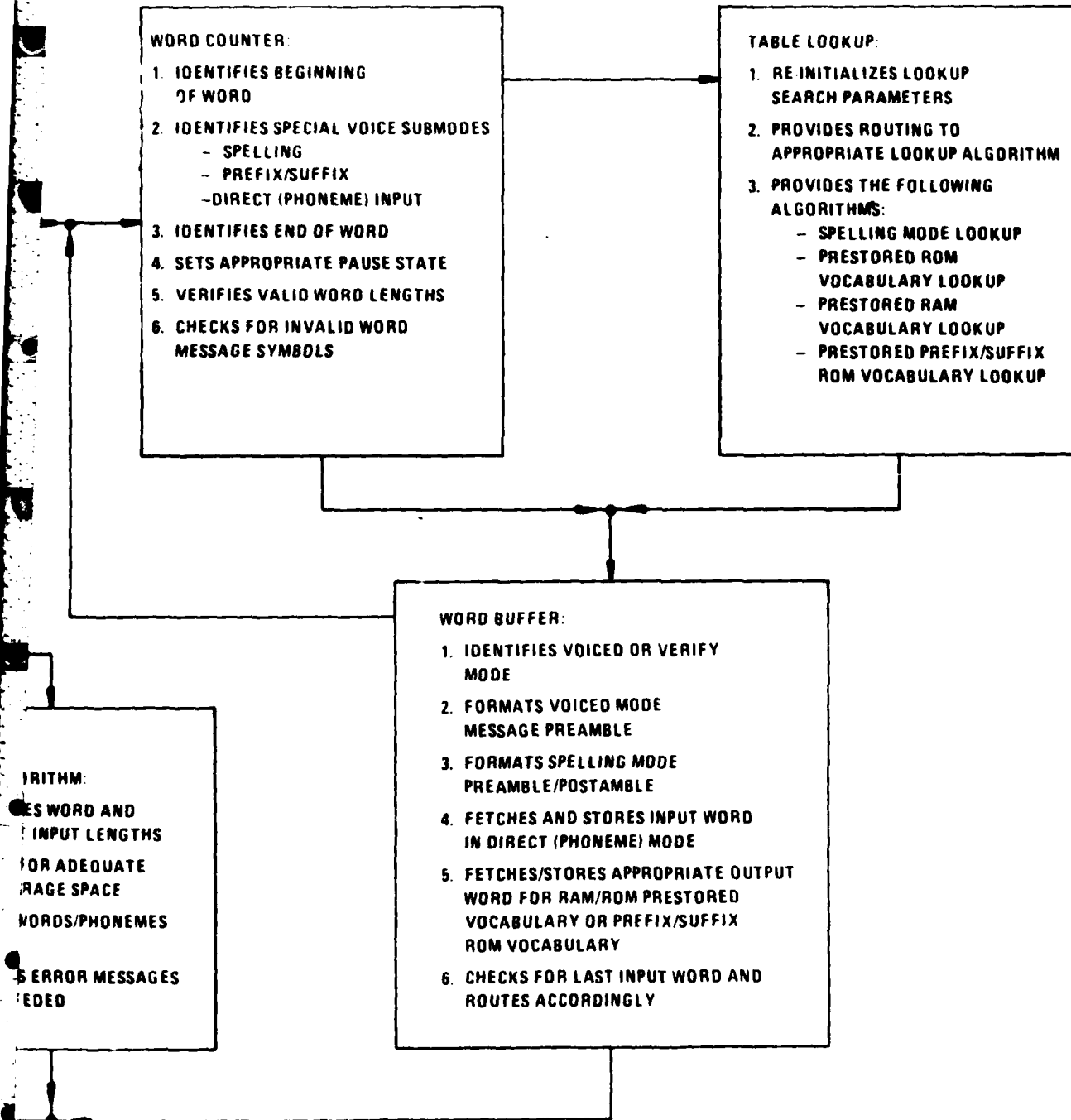


Figure 4. Overall Pollina/Voice System Software Functional Flow Diagram



## 6.1 VOICE MODE INITIALIZATION

Figure 5 shows the flowchart of Voice Mode Initialization. This module is accessed from a Power-On reset control on the Host Microcomputer and initializes all variables and flag settings in the subsequent major modules of the Voice Mode. Initialization for the Store Algorithm takes place within the Voice Mode Test module initialization.

## 6.2 VOICE MODE TEST

Access to the Voice Mode Test module is obtained from the Mode Test and Formatting sub-module within the main polling program Receive Input Algorithm (from Modem). Figure 6 shows the flowchart of the Voice Mode Test module. This module checks for valid message character counts and header formats, and determines appropriate routing to either the Store Algorithm or the Word Counter module. If header checks fail, an error message is formatted and sent to the sender via the appropriate output algorithm of the main polling program.

## 6.3 STORE ALGORITHM

Figure 7 shows the flowchart of the Store Algorithm. This module checks for valid word and phoneme lengths corresponding to the formatted WORD STORE message. It then checks for adequate WORD STORE RAM space and stores the word (along with its length vector), and the phoneme string (and its length vector), into the next available RAM location. Control is then returned to the main polling program. If any of the checks fail, an error message is formatted and sent to the sender via the appropriate output algorithm of the main polling program.

## 6.4 WORD COUNTER

Figures 8a, 8b, and 8c show the flowcharts for the Word Counter module. This module is subdivided into Beginning-of-Word Tests, End-of-Word Tests, and Invalid Word Character Tests. Besides identifying the beginning and end of words, it flags the special voice sub-modes (Spelling; Prefix/Suffix; Direct) available with the voice program. Word Counter also sets appropriate pause states based on a word termination character; verifies valid word lengths; and checks for invalid word message symbols within the formatted input message.

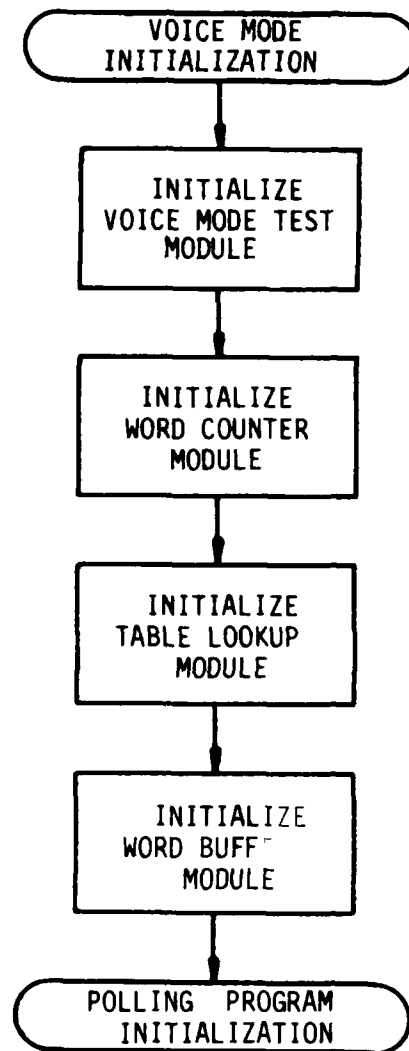


Figure 5. Voice Mode Initialization Flowchart

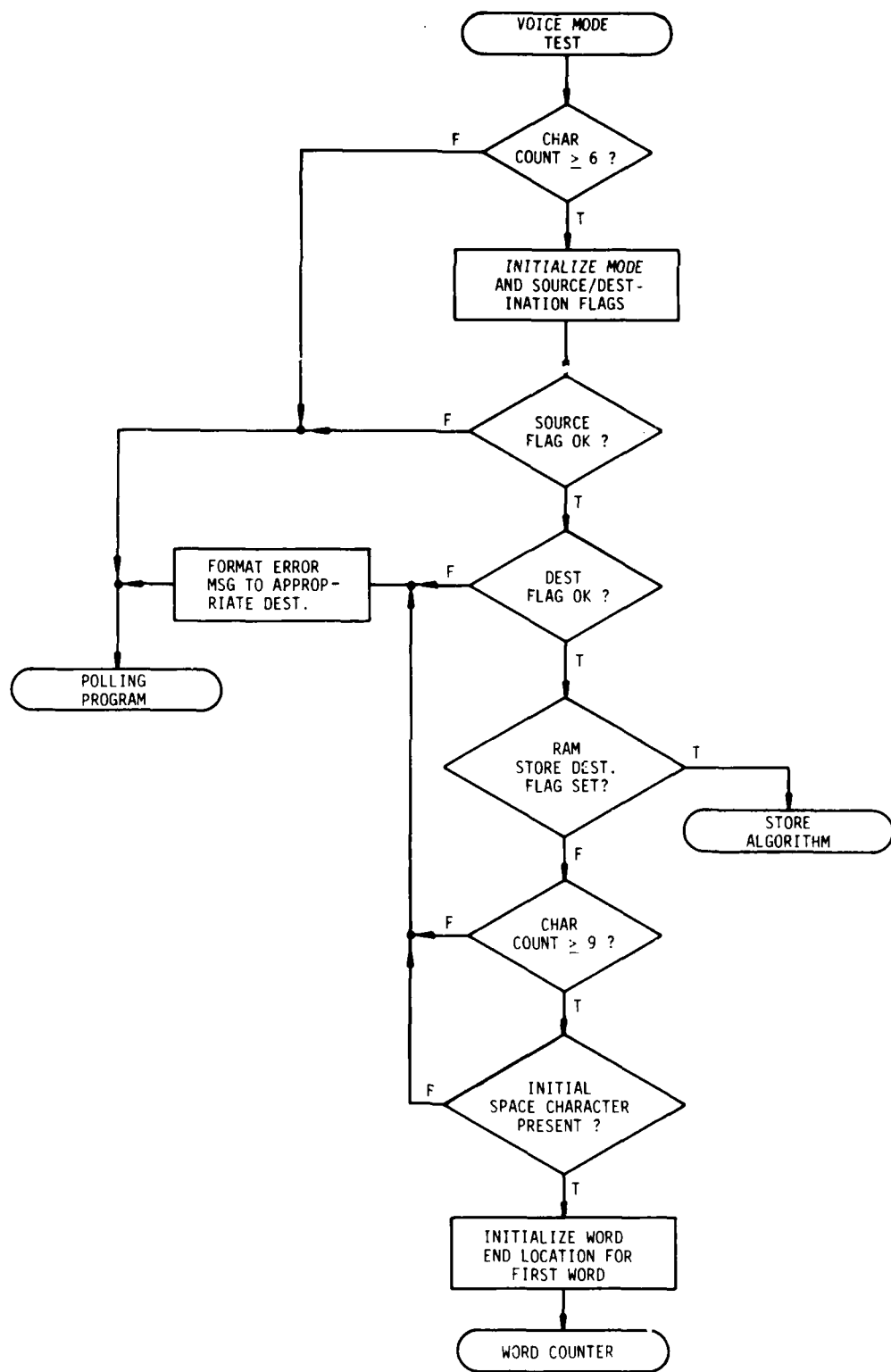


Figure 6. Voice Mode Test Flowchart

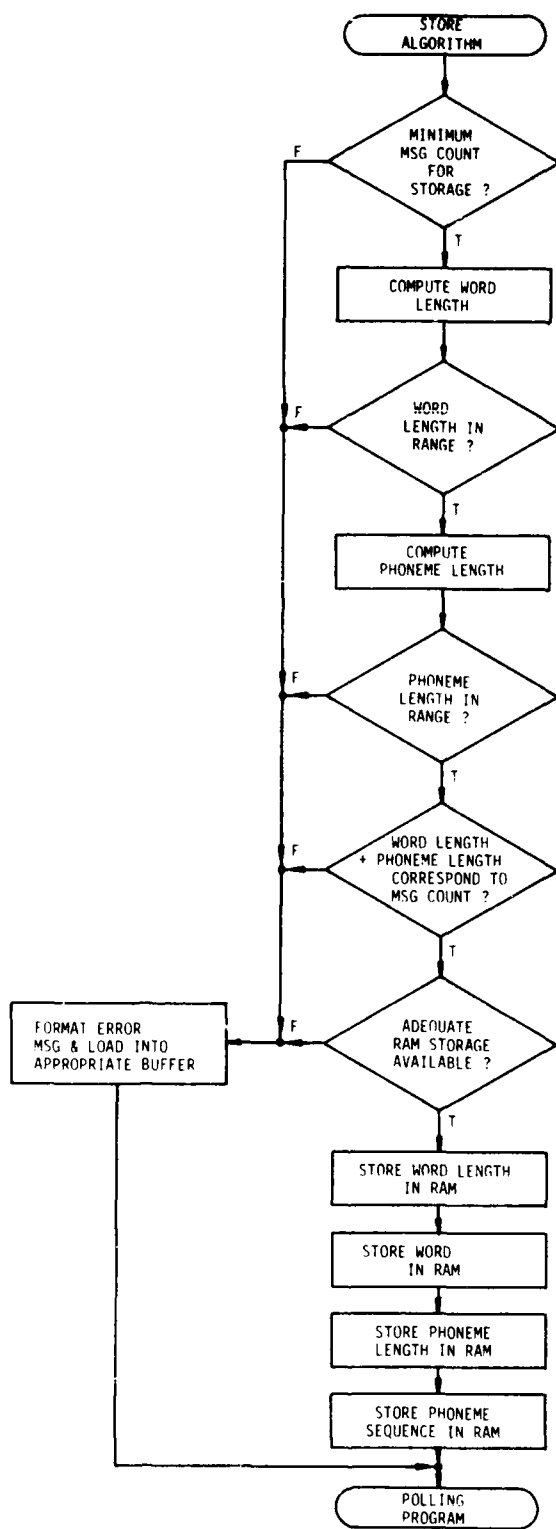


Figure 7. Store Algorithm Flowchart

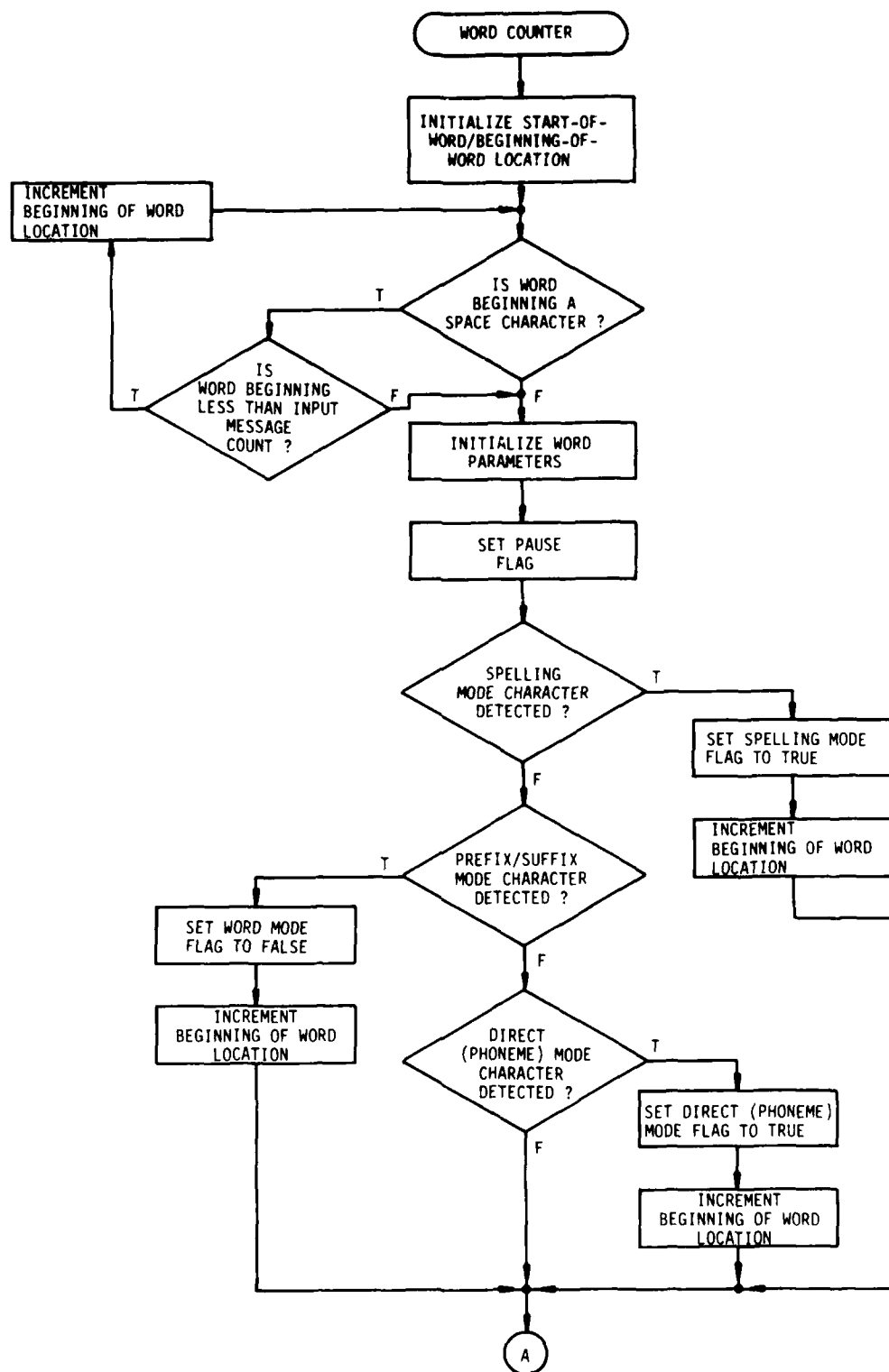


Figure 8(a). Word Counter: Beginning-of-Word Tests

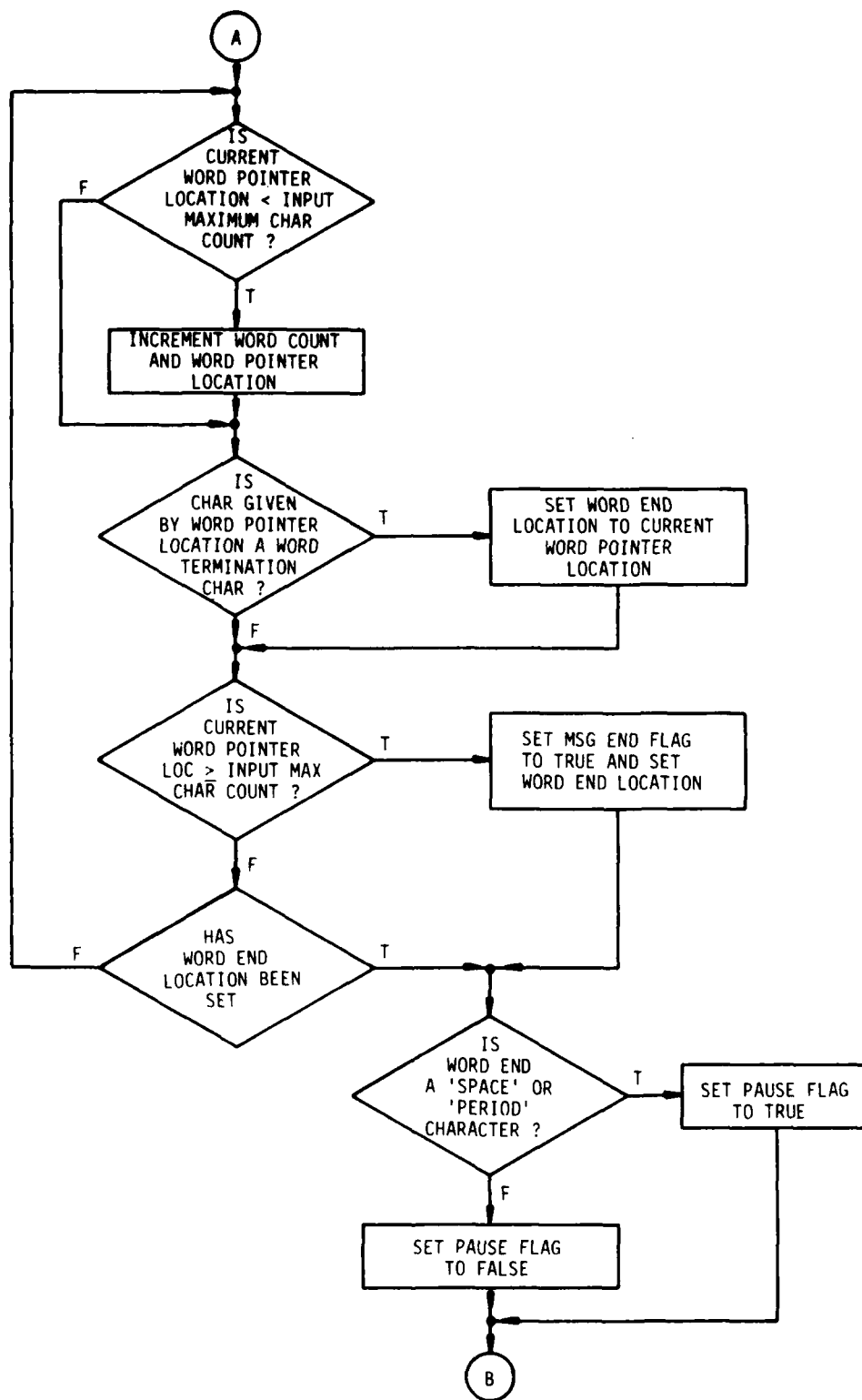


Figure 8(b). Word Counter: End-of-Word Tests

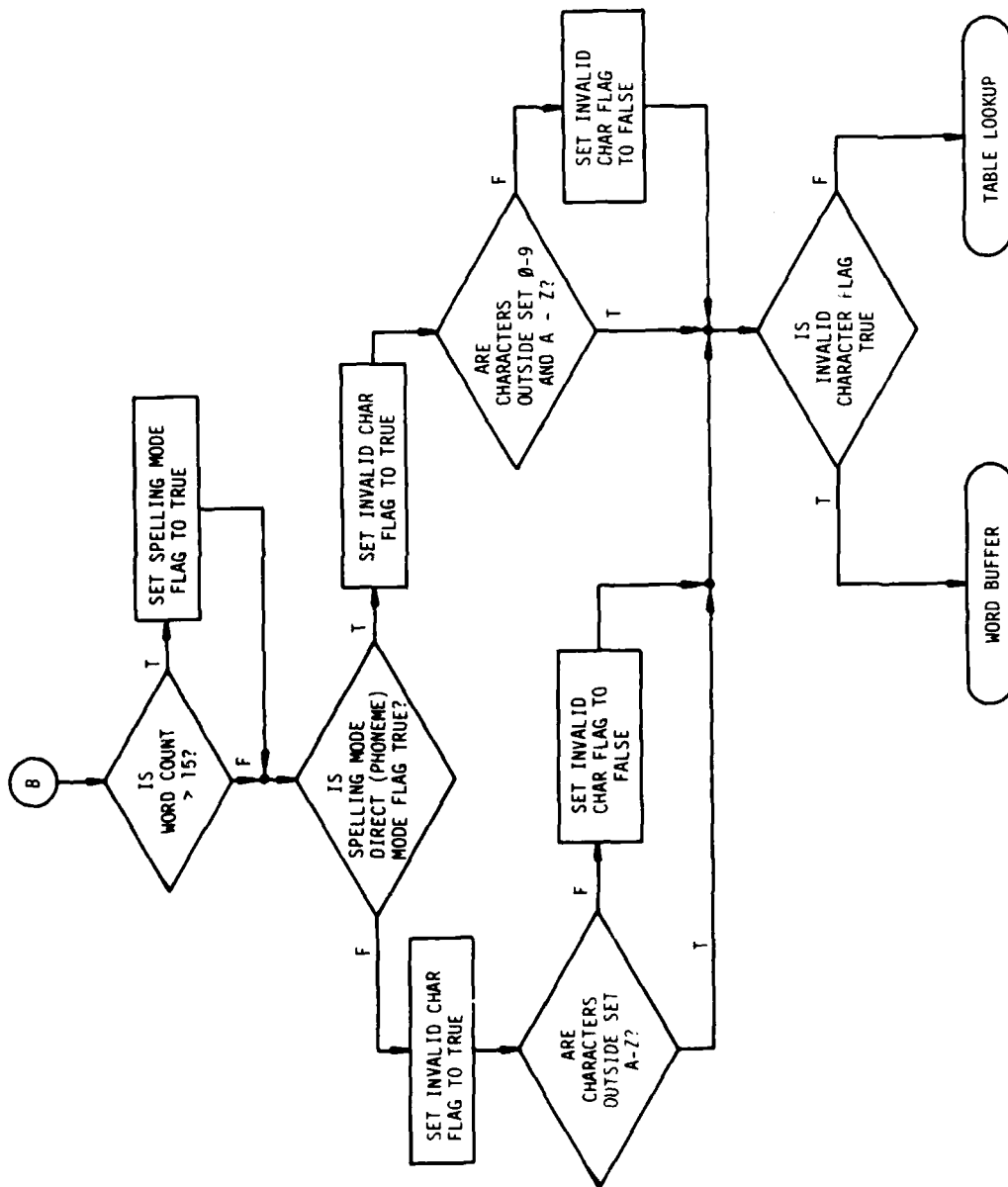


Figure 8(c). Word Counter: Invalid Word Character Tests

## 6.5 TABLE LOOKUP

Figures 9a, 9b, 9c, 9d, and 9e show flowcharts for the Table Lookup module. This module is subdivided into lookup algorithms for Spelling, ROM, RAM, and Prefix/Suffix. Also shown is an overall flowchart depicting the routing to these various lookup algorithms. After initialization of search parameters and appropriate selection of the algorithm to be executed, a previously identified word is translated into either Votrax prestored speech memory address locations on the VSM/1 voice synthesizer or VSM/1 phoneme-mode sequences for later output message formatting in the Word Buffer module. Phoneme mode output sequences are either derived from a lookup match with prestored RAM vocabulary or from direct (phoneme) sequences input in the TTY message text.

## 6.6 WORD BUFFER

Figure 10 shows the flowchart for the Word Buffer module. Functionally, this module first identifies the need to output messages in either a TALK mode or a VERIFY mode. TALK mode output message formats include a preamble (an escape sequence) to reset the VSM/1 synthesizer to a known state, followed by the Votrax prestored speech memory address locations or phoneme mode sequences described previously. Word Buffer appends a sound effect preamble and postamble to any words output via the Spelling mode in order to differentiate them from a prestored vocabulary match. Finally, this module determines if the current processed word being formatted into an output message is the last word to be handled in the incoming message. If so, control is returned to the main polling program; otherwise execution returns to the Word Counter module.



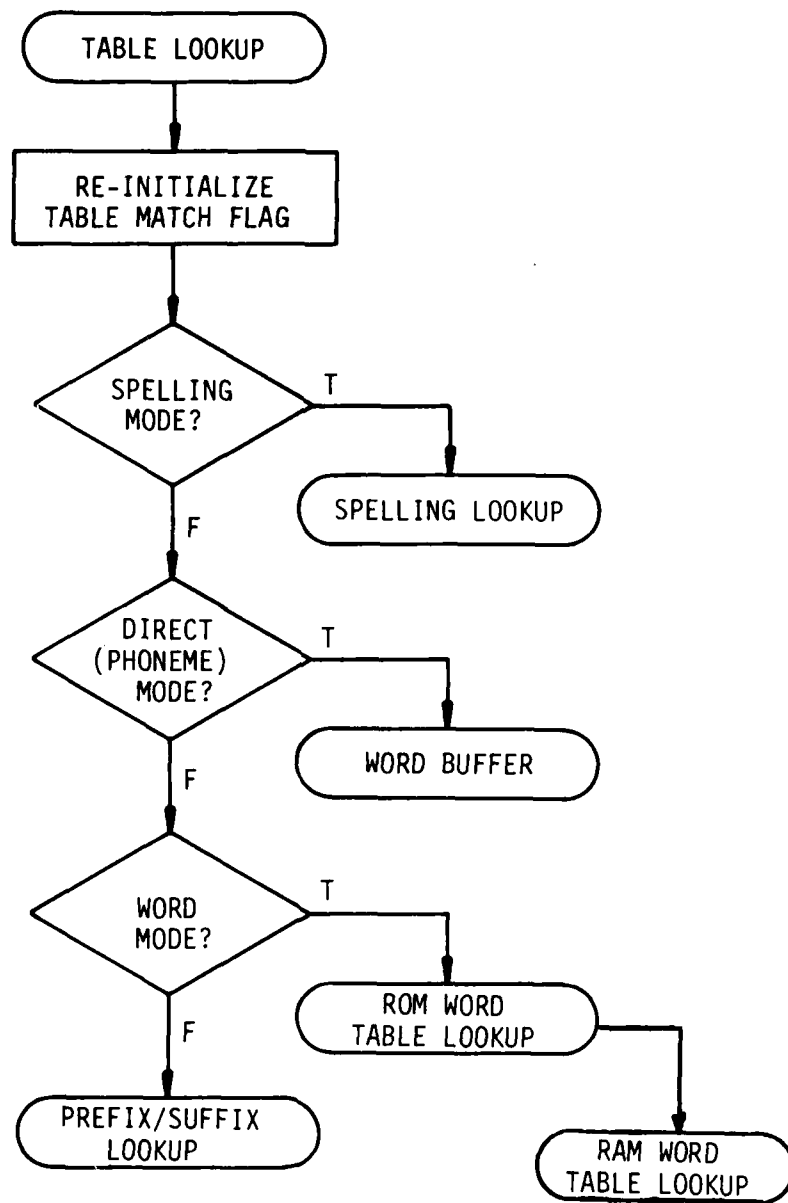


Figure 9(a). Table Lookup: Overall

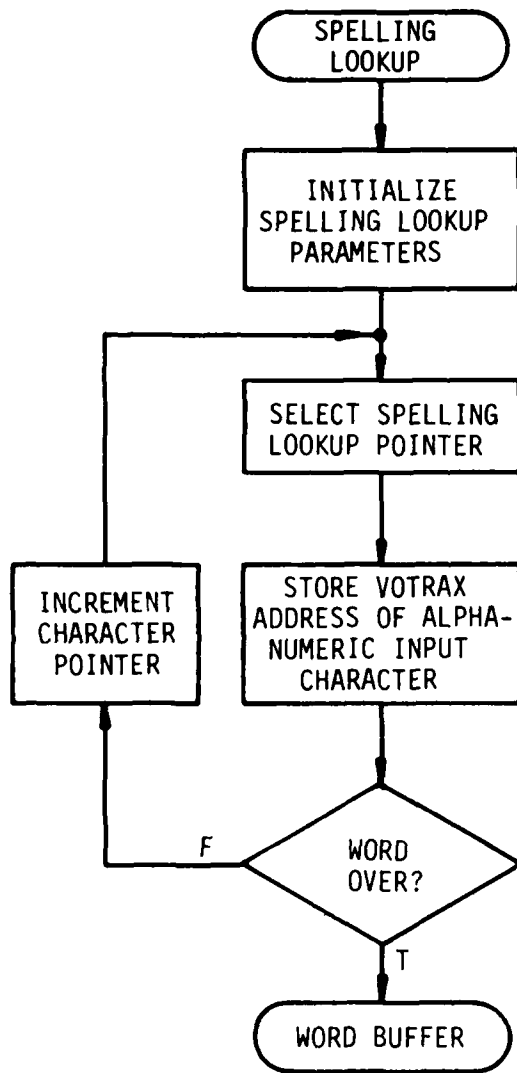


Figure 9(b). Table Lookup: Spelling

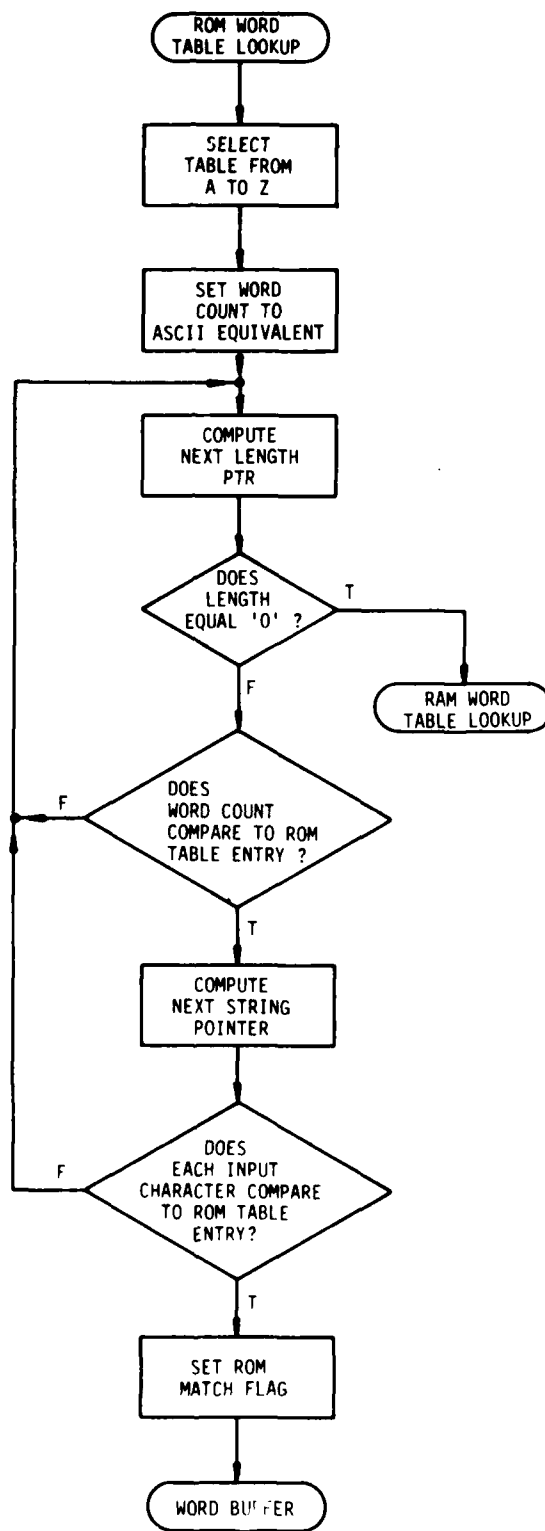


Figure 9(c). Table Lookup: ROM Word

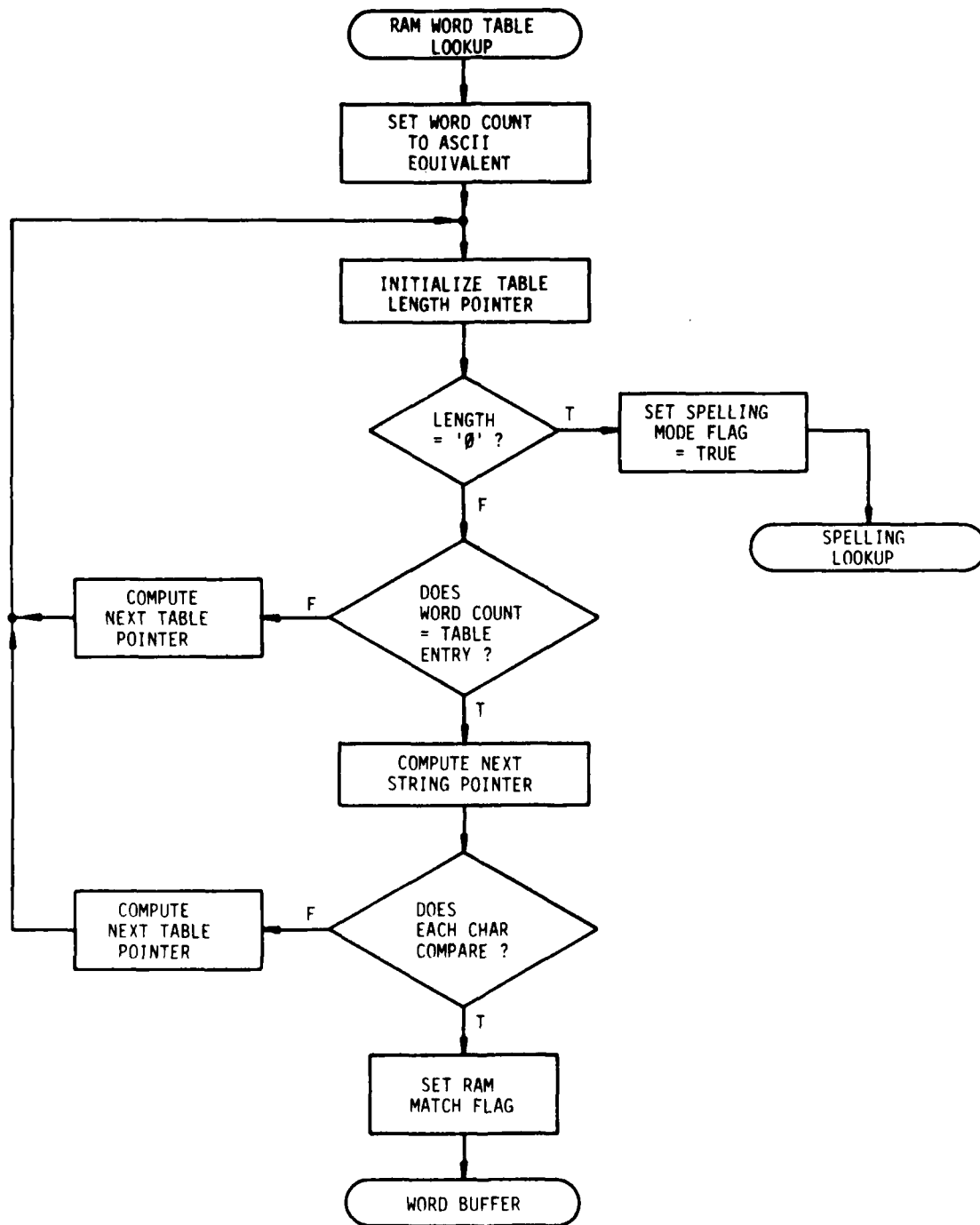


Figure 9(d). Table Lookup: RAM Word

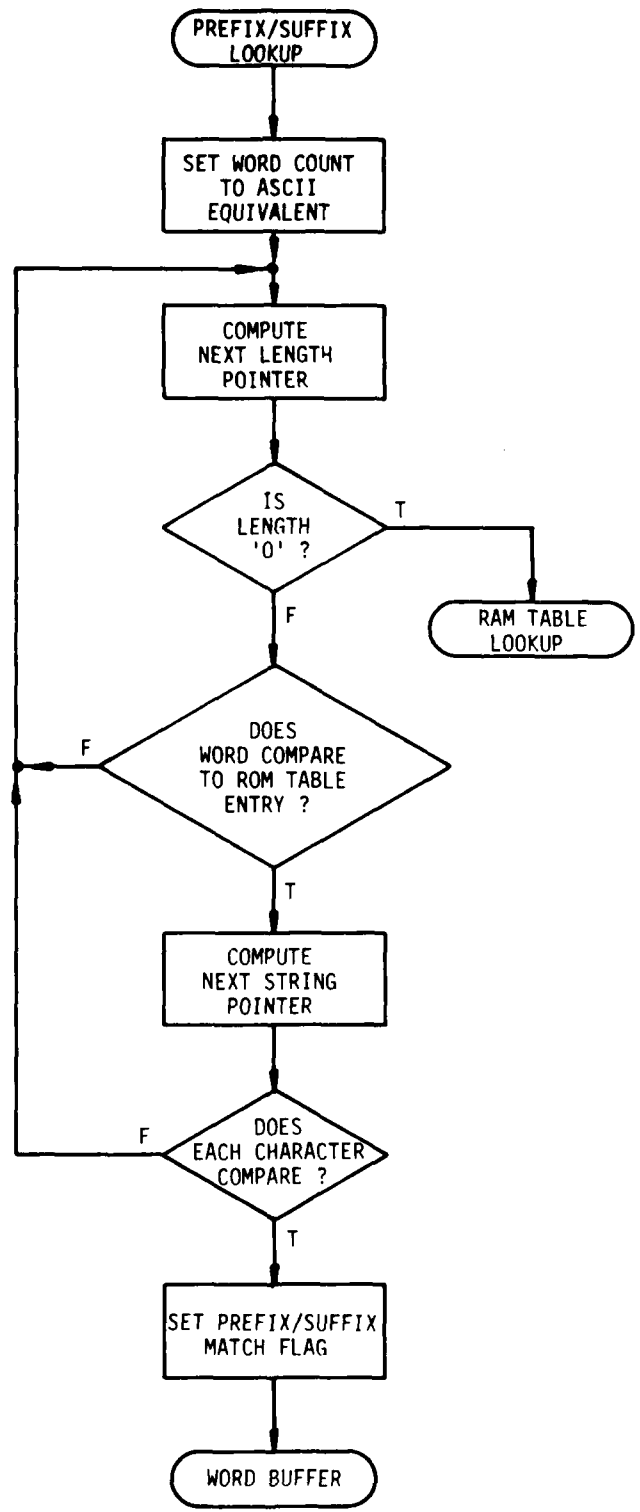


Figure 9(e). Table Lookup: Prefix/Suffix

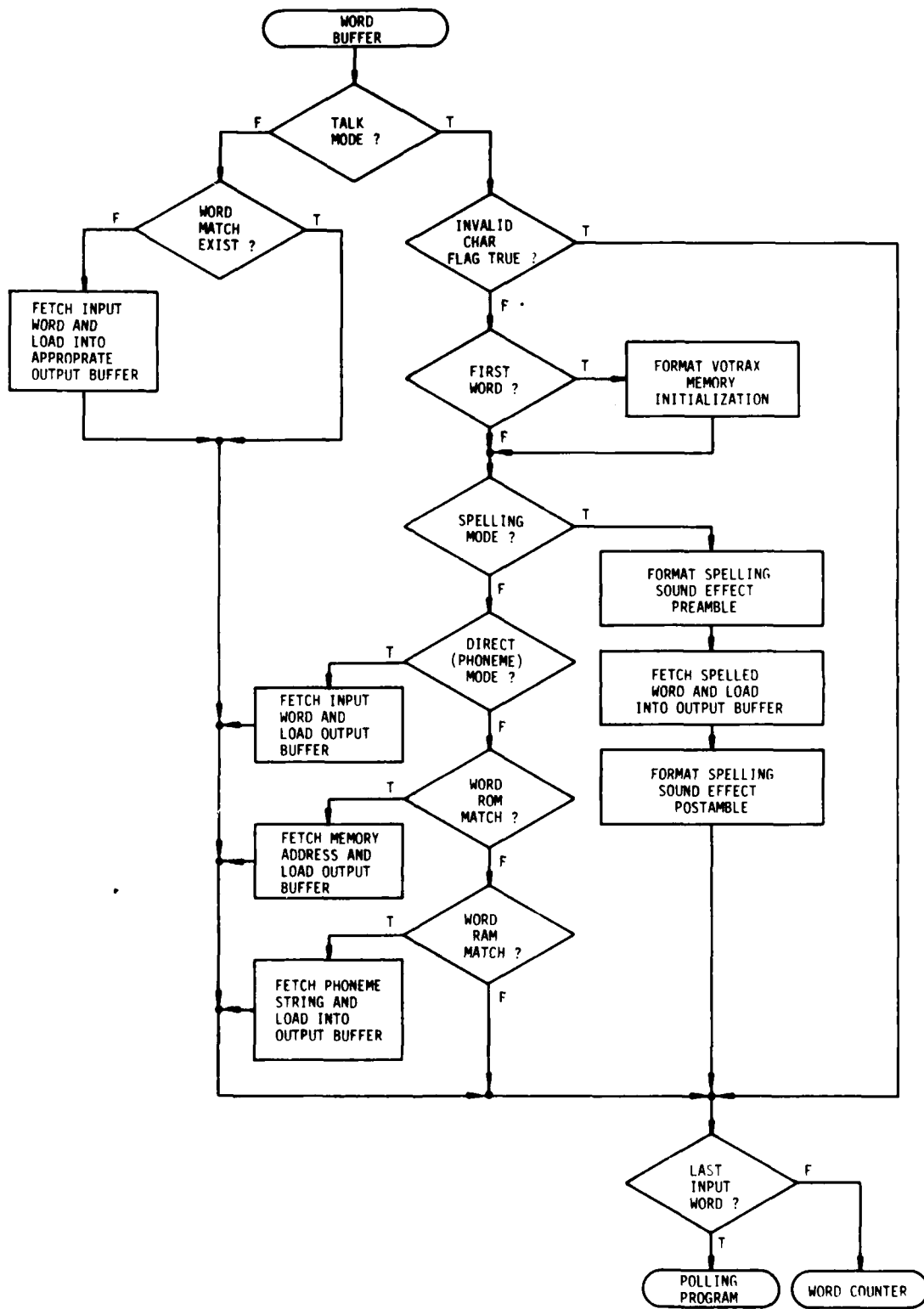


Figure 10. Word Buffer Flowchart

## SECTION 7

### RESULTS AND CONCLUSIONS

Following the completion of bench testing and terminal integration, the Voice System was successfully demonstrated using an AFSATCOM NB channel. This demonstration included the exercise of the TALK, VERIFY, and WORD STORE modes. No attempt was made to optimize or quantify the voice quality achieved with the VSM/1 standard lexicon. The Voice System was shown to be both intelligible and extremely versatile in accommodating voice traffic normally associated with these TTY channels, while operating within the constraints of the AFSATCOM system.

This initial demonstration test indicates that the addition of Synthetic-voice response capability is feasible for a limited capacity channel as an adjunct to existing hard-copy teletype. Implementation need not involve modifying existing AFSATCOM hardware or software since such real-time voice communications can be supported at 75 b/s using present system interface constraints. This type of voice capability may be attractive for MILSTAR and other applications where channel capacity for certain users limits operation to low data rate teletype communications.

Finally, the Voice System does not preclude use of currently available voice entry devices which can be configured to provide the interface and message formats needed to achieve an end-to-end voice input/voice output capability.

#### LIST OF REFERENCES

1. M. F. Connolly, R. A. Culpon, C. H. Sylvester, W. J. Taylor, "AFSATCOM AN/TSC-88 Type 12 Terminal Installation, Operation and Checkout Handbook," ESD-TR-79-129, Electronic Systems Division, AFSC, Hanscom AFB, MA (January 1979) (AD B038680L).
2. J. Handwerker, "Microcomputer Polling Improvements for AFSATCOM," ESD-TR-81-118, Electronic Systems Division, AFSC, Hanscom AFB, MA (April 1981) (AD A102294).
3. J. Handwerker, "Microcomputer-based Improvements to the AFSATCOM System," National Telecommunications Conference (NTC) Record-1981, Vol. 2, pp. C4.4.1-C4.4.4.
4. "Versatile Speech Module/1 Operators Manual," Troy, MI: Votrax Division of Federal Screw Works, 1981.



APPENDIX A  
HOST MICROCOMPUTER PRESTORED VOCABULARY

Table A-1

## Prestored Word Vocabulary Table

A	AND	BAG	BOARD
ABLE	ANGLE	BALANCE	BOLT
ABORT	ANOTHER	BALL	BOND
ABOUT	ANSWER	BAND	BOOK
ABOVE	ANY	BANK	BORED
ACCEPT	APOSTROPHE	BAR	BOSS
ACCESS	APPROACH	BASE	BOTHER
ACCOUNT	APPROVE	BASIC	BOTTOM
ACID	APPROXIMATE	BAT	BOUGHT
ACT	APRIL	BATCH	BOX
ACTIVE	ARCHITECT	BATH	BRACE
ACTUAL	ARE	BATTERY	BRAIN
ADD	AREA	BE	BRAKE
ADDRESS	ARRIVE	BED	BRANCH
ADJACENT	ARROW	BEEN	BRAVO
ADJUST	ARTICLE	BEEP	BREAK
ADVANCE	AS	BEFORE	BRIDGE
ADVISE	ASCII	BEGIN	BRIEF
AFFECT	ASK	BELL	BRIGHT
AFTER	ASSEMBLE	BELOW	BRING
AGAIN	ASSET	BEND	BROKE
AGE	ASSIGN	BEST	BROUGHT
AGENT	ASSIST	BETA	BROWN
AHEAD	ASSOCIATE	BETTER	BUBBLE
AID	ASSUME	BETWEEN	BUDGET
AIR	AT	BID	BUG
ALARM	ATE	BIG	BUILD
ALERT	ATTACHE	BILL	BUS
ALL	ATTEMPT	BILLION	BUSINESS
ALLOCATE	ATTEND	BIN	BUSY
ALLOW	AUDIO	BINARY	BUT
ALPHA	AUGUST	BIRTHDAY	BUTTON
ALREADY	AUTHORIZE	BIT	BUY
ALSO	AUTOMATIC	BITE	BY
ALTITUDE	AVAILABLE	BLACK	BYE
ALUMINUM	AVERAGE	BLANK	BYTE
AM	AVOID	BLEW	
AMERICA		BLIND	C
AMOUNT	B	BLOCK	CABLE
AMP	BACK	BLOWN	CALENDAR
AMPLIFY	BAD	BLUE	CALIBRATE
AN	BADGE	BLUR	CALL

CAME	COLLECT	CRANE	DEFER
CANCEL	COLON	CRASH	DEFICIT
CAPABLE	COLOR	CREASE	DEGREE
CAPACITOR	COLUMN	CREATE	DELAY
CAPACITY	COMBINE	CREATION	DELETE
CAR	COMMA	CREDIT	DELIVER
CARD	COMMAND	CREW	DELTA
CARE	COMMERCE	CRITICAL	DEMAND
CARPENTER	COMMERCIAL	CROSS	DEMONSTRATE
CARRIAGE	COMMUNICATE	CROWD	DENY
CARRY	COMPANY	CRY	DESTROY
CARTON	COMPARE	CUE	DETAIL
CASE	COMPILE	CUP	DETERMINE
CASH	COMPLETE	CURIOUS	DEVICE
CASSETTE	COMPLY	CURRENCY	DEW
CATALOG	COMPONENT	CURRENT	DIAGNOSTIC
CATEGORY	COMPUTER	CURVE	DIAL
CAUTION	CONCEAL	CUSTOMER	DICTIONARY
CENT	CONDENSE	CUT	DID
CENTER	CONDITION	CYCLE	DIE
CENTI	CONFIRM		DIET
CENTIGRADE	CONFUSE	D	DIFFER
CERTIFY	CONFUSION	DAILY	DIFFERENCE
CHANGE	CONGRATULATIONS	DAMAGE	DIFFERENT
CHARACTER	CONNECT	DANGER	DIGIT
CHARGE	CONSOLE	DARK	DIGITAL
CHARLIE	CONSULT	DASH	DIME
CHART	CONSUME	DATA	DIODE
CHECK	CONTAIN	DATE	DIRECT
CHEER	CONTINUE	DAY	DIRECTORY
CHIP	CONTRACT	DEAD	DIRT
CHOICE	CONTRAST	DEAF	DISAGREE
CIRCLE	CONTROL	DEALER	DISAPPEAR
CIRCUIT	CONVENIENT	DEAR	DISCONNECT
CITY	COPPER	DEBIT	DISCUSS
CLAIM	COPY	DEBT	DISK
CLASS	CORRECT	DECEMBER	DISPLAY
CLEAN	CORRESPOND	DECIDE	DISTANCE
CLEAR	COSINE	DECIMAL	DIVIDE
CLERK	COST	DECISION	DIVIDEND
CLIP	COULD	DECLINE	DIVISION
CLOCK	COUNT	DECREASE	DO
CLOSE	COUNTRY	DEDUCT	DOCK
CLOUD	COUPLE	DEEP	DOCTOR
COARSE	COURAGE	DEER	DOCUMENT
CODE	COURSE	DEFEAT	DOES
COIN	COURT	DEFEND	DOLLAR
COLLAR	COVER	DEFENSIVE	DONE

DOOR	ENABLE	FEAT	FOUR
DOUBLE	ENCLOSE	FEATURE	FOURTH
DOUBT	END	FEBRUARY	FOXTROT
DOWN	ENDORSE	FEDERAL	FRAME
DRAFT	ENGINE	FEE	FRAUD
DRAW	ENGINEER	FEED	FREE
DRILL	ENGLISH	FEET	FRENCH
DRINK	ENTER	FEMALE	FREQUENCY
DRIVE	ENTRY	FIELD	FREQUENT
DROP	EPSILON	FIFTEEN	FRIDAY
DRUM	EQUAL	FIFTH	FRIGHT
DRY	EQUIPMENT	FIFTY	FROM
DUE	ERASE	FILE	FRONT
DUMP	ERROR	FILL	FRUIT
DURATION	ESCAPE	FINAL	FUEL
DURING	ESCROW	FINANCE	FULL
DUTY	ESTABLISH	FIND	FUNCTION
DWELL	ESTATE	FINGER	FUND
	ESTIMATE	FINISH	FURNACE
E	EXACT	FIRE	FURTHER
EACH	EXAMINE	FIRST	FUTURE
EAR	EXCEED	FIT	
EARLY	EXCEPT	FIVE	G
EARN	EXCHANGE	FIX	GAGE
EAST	EXECUTE	FIXTURE	GAIN
EASY	EXEMPT	FLASH	GAIT
ECHO	EXIT	FLAT	GALLON
EDGE	EXPECT	FLIGHT	GAME
EDIT	EXPEDITE	FLIP	GAMMA
EDUCATE	EXPEND	FLOOR	GAP
EFFECT	EXPERIMENT	FLOP	GARAGE
EFFICIENT	EXPONENT	FLOW	GAS
EFFORT	EXPRESS	FLY	GATE
EIGHT	EXTENSION	FOLD	GAUGE
EIGHTH		FOLLOW	GENERAL
EIGHTY	F	FOOD	GENERATE
EITHER	FACE	FOOT	GENTLEMEN
ELECTRIC	FACILITY	FOR	GERMAN
ELECTRICIAN	FACT	FORCE	GET
ELECTRONIC	FAHRENHEIT	FORE	GIRL
ELEVATOR	FAIL	FOREMAN	GIVE
ELEVEN	FALL	FORGET	GLASS
ELIGIBLE	FALSE	FORGIVE	GLITCH
ELIMINATE	FAMILIAR	FORM	GLOBE
ELSE	FAR	FORMAT	GO
EMIT	FARAD	FORTY	GOLF
EMPLOY	FAST	FORWARD	GOOD
EMPTY	FAULT	FOUND	GOVERN

GRADE  
GRAM  
GRAND  
GRAPH  
GRATE  
GRAY  
GREAT  
GREEN  
GREET  
GREY  
GRIND  
GROCERY  
GROUND  
GROUP  
GROW  
GUARANTEE  
GUARD  
GUESS

H  
HAD  
HALF  
HALT  
HAMMER  
HAND  
HANDLE  
HANG  
HAPPY  
HARD  
HAS  
HAVE  
HE  
HEAD  
HEAR  
HEART  
HEAT  
HEAVY  
HEIGHT  
HELD  
HELLO  
HELP  
HENRY  
HER  
HERE  
HERTZ  
HEX  
HIGH  
HIS

HOLD  
HOLE  
HOME  
HOOK  
HOST  
HOT  
HOTEL  
HOUR  
HOUSE  
HOW  
HUMAN  
HUNDRED  
HUNGRY  
  
I  
IDLE  
IDOL  
IF  
IMMEDIATE  
IMPORTANT  
IMPROPER  
IMPROVE  
IN  
INCH  
INCLUDE  
INCOME  
INDEPENDENT  
INDEX  
INDIA  
INDICATE  
INDUSTRIAL  
INFORM  
INITIAL  
INN  
INPUT  
INQUIRE  
INSERT  
INSPECT  
INSTALL  
INSTEAD  
INSTRUCT  
INSTRUMENT  
INSUFFICIENT  
INSURANCE  
INTEREST  
INTERFACE  
INTERPRET  
INTERRUPT

INTRUDE  
INVALID  
INVENT  
INVENTORY  
INVEST  
INVOICE  
IRREGULAR  
IS  
IT  
ITEM

J  
JACK  
JANUARY  
JOB  
JOIN  
JOLT  
JOY  
JUDGE  
JULIET  
JULY  
JUMP  
JUNE

K  
KEEP  
KEY  
KEYBOARD  
KILL  
KILO  
KNEW  
KNOT  
KNOW  
KNOWLEDGE

L  
LAB  
LABOR  
LANGUAGE  
LAPSE  
LARGE  
LAST  
LATE  
LAW  
LEAD  
LED  
LEFT  
LEG

LEGAL  
LEND  
LENGTH  
LESS  
LET  
LETTER  
LEVEL  
LIFE  
LIGHT  
LIKE  
LIMA  
LIMIT  
LINE  
LINEAR  
LINK  
LIP  
LIQUID  
LIST  
LISTEN  
LITTLE  
LOAD  
LOAN  
LOCAL  
LOCK  
LOG  
LONG  
LOOK  
LOSS  
LOST  
LOT  
LOW  
  
M  
MACHINE  
MAIL  
MAINTENANCE  
MAKE  
MALE  
MAN  
MANAGE  
MANUAL  
MANUFACTURE  
MANY  
MAP  
MARCH  
MARGIN  
MARK  
MARKET

MATCH	MS	OCTOBER	PARTIAL
MATURE	MUCH	ODD	PASS
MAXIMUM	MULTI	OF	PASSED
MAY	MULTIPLE	OFF	PAST
ME	MULTIPLY	OFFICE	PAT
MEASURE		OFFICIAL	PATTERN
MEAT	N	OFTEN	PAUSE
MECHANICAL	NAME	OHM	PAY
MEDIA	NANO	OIL	PEA
MEDICINE	NATIONAL	OLD	PEACE
MEDIUM	NATIVE	OMEGA	PEAK
MEET	NEAR	OMIT	PEEK
MEGA	NEAT	ON	PERCENT
MEMBER	NECK	ONCE	PERIOD
MEMORY	NEED	ONE	PERMANENT
MEN	NEGATIVE	ONLY	PERSON
MERCHANDISE	NET	OPEN	PERSONAL
MERGE	NEUTRAL	OPERABLE	PERSONALITY
MESSAGE	NEW	OPERATE	PHASE
METAL	NEXT	OPERATOR	PHONE
METER	NICE	OPTION	PICK
MICRO	NICKEL	OR	PICO
MIDDLE	NIGHT	ORANGE	PIECE
MIKE	NINE	ORDER	PINT
MILE	NINETY	ORE	PIPE
MILL	NINTH	ORIGINAL	PLACE
MILLI	NO	OSCAR	PLAIN
MILLION	NOISE	OTHER	PLAN
MINI	NONE	OUNCE	PLANE
MINUS	NOON	OUT	PLANT
MINUTE	NORMAL	OVEN	PLAY
MISCELLANEOUS	NORTH	OVER	PLEASE
MISS	NOT	OWN	PLOT
MISTAKE	NOTE	OXYGEN	PLUS
MODE	NOTHING		POCKET
MODEL	NOTICE	P	POINT
MODULE	NOTIFY	PACK	POKE
MONDAY	NOVEMBER	PACKAGE	POLICE
MONEY	NOW	PAGE	POLICY
MONTH	NUMBER	PAID	POOR
MORE	NURSE	PAIN	POP
MORNING	NUT	PANE	PORT
MOST		PANEL	POSITION
MOTOR	O	PAPA	POSITIVE
MOUNT	OAR	PAPER	POSSIBLE
MOVE	OBJECT	PARCEL	POST
MR	OBLIGATION	PAREN	POTENTIAL
MRS	OBSOLETE	PART	POUND

POUR	QUICK	RESET	SECURITY
POWER	QUIET	RESISTOR	SEE
PRACTICE	QUIT	RESPECT	SEIZE
PREMIUM	QUIZ	RESPOND	SELECT
PREPARE	QUOTA	RESPONSIBLE	SELL
PRESS	QUOTE	REST	SEMI
PRESSURE		RESTRICT	SEND
PREVENT	R	RESULT	SENT
PREVIOUS	RADIO	RESUME	SENTENCE
PRICE	RAIL	RETAIL	SEPARATE
PRINCIPAL	RAIN	RETAIN	SEPTEMBER
PRINCIPLE	RAISE	RETURN	SEQUENCE
PRINT	RANGE	REVISION	SERIAL
PRIOR	RATE	REVOLVE	SERIES
PRIORITY	RATIO	RIBBON	SERVICE
PRIVATE	REACH	RIGHT	SET
PROBE	READ	ROMEO	SEVEN
PROBLEM	READY	ROOM	SEVENTH
PROCEDURE	REAL	ROOT	SEVENTY
PROCEED	REASON	ROUND	SEVERAL
PROCESS	REBATE	ROUTE	SEW
PRODUCE	RECALL	ROW	SHARE
PRODUCT	RECEIPT	RUN	SHARP
PROFESSION	RECEIVE	RUSH	SHIFT
PROFIT	RECORD		SHIP
PROGRAM	RED	S	SHOP
PROGRESS	REEL	SAFE	SHORT
PROJECT	REFER	SAIL	SHOULD
PROM	REFUND	SALARY	SHUNT
PROMOTE	REFUSE	SALE	SHUT
PROPOSE	REGISTER	SAME	SIDE
PROTECT	REGULAR	SATURDAY	SIERRA
PUBLIC	REIN	SAVE	SIGNAL
PULL	REJECT	SAY	SILVER
PULSE	RELAY	SCAN	SINGLE
PURCHASE	RELEASE	SCENT	SIX
PURE	REMAIN	SCHEDULE	SIXTH
PURPOSE	REMOVE	SCHOOL	SIXTY
PUSH	REPAIR	SCIENCE	SIZE
PUT	REPEAT	SCORE	SKIN
	REPLACE	SCRAP	SKY
Q	REPORT	SCREW	SLANG
QUALIFY	REPRESENT	SEA	SLASH
QUANTITY	REQUEST	SEARCH	SLAVE
QUART	REQUIRE	SEAT	SLIP
QUARTER	REQUISITION	SECOND	SLOW
QUEBEC	RESCUE	SECRET	SMALL
QUESTION	RESEMBLE	SECTION	SMELL

SMILE	STRUCTURE	THIN	TWENTY	WENT
SMOKE	STYLE	THING	TWO	WEST
SNOW	SUBJECT	THINK	TYPE	WET
SO	SUBSTITUTE	THIRD		WHAT
SOFT	SUBTRACT	THIRTEEN	U	WHEEL
SOLD	SUFFICIENT	THIRTY	ULTRA	WHEN
SOLID	SUGGEST	THOUSAND	UNDER	WHERE
SOME	SUIT	THREE	UNIFORM	WHICH
SON	SUITE	THREW	UNTIL	WHILE
SORRY	SUM	THROUGH	UP	WHISKEY
SORT	SUMMARY	THURSDAY	URGENT	WHITE
SOUND	SUMMER	TICKET	US	WHO
SOURCE	SUN	TILL	USE	WHOLE
SOUTH	SUNDAY	TIME		WHY
SPACE	SUPER	TIRE	V	WILL
SPARK	SUPPLY	TITLE	VACANT	WINDOW
SPEAK	SURFACE	TO	VALID	WINTER
SPECIAL	SURGE	TODAY	VALUE	WIRE
SPEECH	SURGERY	TOILET	VARY	WITH
SPEED	SURGICAL	TOLL	VENDOR	WITHDRAW
SPELL	SURPLUS	TOMORROW	VENT	WITHOUT
SPEND	SUSPEND	TON	VERIFY	WON
SPLIT	SWEEP	STONE	VERY	WORD
SPOON	SWEET	TOO	VIA	WORK
SPRING	SWITCH	TOOL	VICTOR	WRITE
SQUARE	SYNTAX	TOTAL	VOICE	WRONG
STACK	SYSTEM	TOUCH	VOID	
STAIR		TOWEL	VOLT	X
STAND	T	TRACE	VOLUME	X-RAY
STANDARD	TABLE	TRADE		
STAR	TAIL	TRAIN	W	Y
STARE	TALE	TRANSACT	WAGE	YANKEE
START	TALK	TRANSFER	WAIT	YARD
STATE	TANGENT	TRANSISTOR	WANT	YEAR
STATION	TANGO	TRANSMIT	WAS	YELLOW
STATUS	TARGET	TRANSPORT	WASH	YES
STEAL	TEA	TRANSPORTATION	WATER	YESTERDAY
STEEL	TEAM	TRAVEL	WATT	YET
STEP	TECHNICAL	TRIANGLE	WAVE	YOU
STICK	TEE	TROUBLE	WAY	YOUR
STOCK	TEMPERATURE	TRUCK	WE	
STOP	TEN	TRUE	WEAK	Z
STORE	TERMINAL	TRUST	WEAPON	ZAP
STRAIGHT	TEST	TRY	WEAR	ZERO
STRAIT	THAN	TUESDAY	WEDNESDAY	ZONE
STREET	THE	TUNE	WEEK	ZULU
STRESS	THEN	TURN	WEIGH	
STRING	THEORY	TWELVE	WEIGHT	



Table A-2

Prestored Prefix/Suffix Vocabulary

CON	ING
CIS	LESS
EN	LY
IN	MENT
NON	NESS
PRE	S
RE	T
UN	TION
ED	SION
ER	TEEN
ES	WARD
FUL	Y
	Z

Table A-3

Prestored Spelling Word Vocabulary

A = ALPHA	N = NOVEMBER	0 = ZERO
B = BRAVO	O = OSCAR	1 = ONE
C = CHARLIE	P = PAPA	2 = TWO
D = DELTA	Q = QUEBEC	3 = THREE
E = ECHO	R = ROMEO	4 = FOUR
F = FOXTROT	S = SIERRA	5 = FIVE
G = GOLF	T = TANGO	6 = SIX
H = HOTEL	U = UNIFORM	7 = SEVEN
I = INDIA	V = VICTOR	8 = EIGHT
J = JULIET	W = WHISKEY	9 = NINE
K = KILO	X = X-RAY	
L = LIMA	Y = YANKEE	
M = MIKE	Z = ZULU	

APPENDIX B

VOTRAX VERSATILE SPEECH MODULE  
(VSM/1) PRODUCT DATA

## VERSATILE SPEECH MODULE<sup>T.M.</sup> (VSM/1)

# Votrax<sup>®</sup> PRODUCT DATA

### FEATURES

- **True synthetic speech technology** and a built in microcomputer eliminate the constraints of a small fixed vocabulary speech module
- **Ultra low bit rate** of the SC-01 maximizes ROM word storage capabilities
- **Large lexicon** of commonly used words with industrial engineering base stored in EPROM
- **Built in prefix/suffix table** for prestored words
- **Additional vocabulary** can be created and permanently stored
- **Phoneme accessing capability** for unlimited vocabulary
- **Speech rate and pitch dynamic programming** for stress patterns and simulation of multi-voice environments
- **Sound effects**, from gunfire to musical sequences can be easily created from prestored sound macros. Additional sound macros can be user defined and EPROM stored for even greater flexibility.
- **Expandable** via interface ports
- **Parallel and RS232 compatible serial interfacing** with selectable baud rates and terminal modes
- **Foreground and background** simultaneous operation for speech and voxOS (voice operating system)
- **Built in microcomputer** can also simultaneously perform monitoring activities and execute speech commands

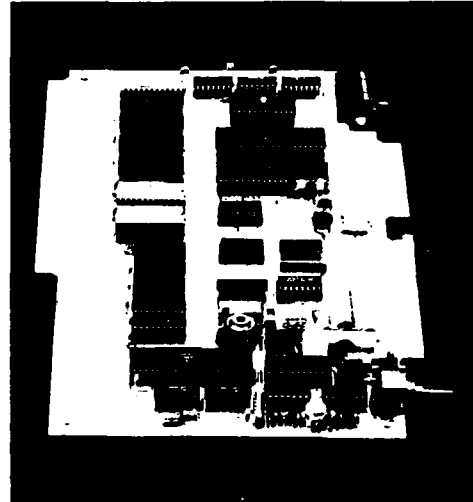


Figure 1. Votrax VSM/1<sup>T.M.</sup>  
(Versatile Speech Module)

### APPLICATIONS

- The VSM/1<sup>T.M.</sup> can be used as a **microcomputer** to simulate or develop talking products, such as a talking calculator or talking games. It can also be used for unlimited real time speech synthesis while simultaneously executing commands and performing monitoring activities.
- The VSM/1<sup>T.M.</sup> can plug directly into the card cage of an industrial control computer to provide **prompting for operating personnel** (instructions for a real time situation). Typical applications are chemical processing plants, nuclear power stations, aircraft systems, seismic monitoring stations and automated warehousing.

*Votrax*<sup>®</sup>

Division of Federal Screw Works  
500 Stephenson Highway, Troy, Michigan 48084  
Phone (313) 588-2050

© 1980 Votrax (FSW)

**APPLICATIONS (continued)**

- The VSM/1™ can operate in a computer-to-computer mode for **task downloading** in addition to voice synthesis. It is a smart peripheral which can be used in a distributed processing mode. Instructions and activities can be dynamically supplied from another computer or from a user ROM.

**DESCRIPTION**

The Votrax VSM/1™ introduces a new level of computer speech module performance and flexibility. It removes the constraints imposed by small fixed vocabulary speech modules typically used by designers. The VSM/1™ is based on the truly synthetic speech technology of the SC-01.

The SC-01 is a completely self-contained solid state device which phonetically synthesizes speech from low data rate inputs. Over 1,300 industrial/engineering based words can be stored in as little as 8K bytes of ROM. By using the built in prefix/suffix table, a repertoire of several thousand words can be created. Additional vocabulary, tailored to the user's specific needs can be permanently configured on up to 8K bytes of EPROM via on board sockets.

Using the phoneme capabilities of the SC-01, along with the prestored words, the VSM/1™ can produce an unlimited vocabulary. Speech rate, pitch and pause controls can be dynamically programmed, via control codes, to produce stress patterns. By altering the master clock controls, many human voice effects can be programmed to simulate a multi-voice environment.

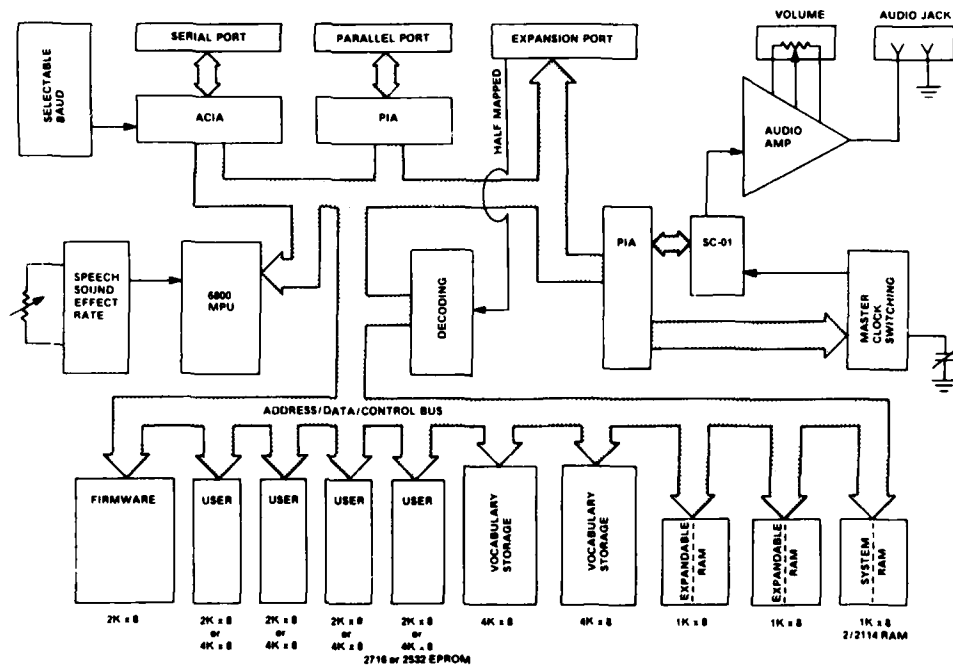


Figure 2. VSM/1™ Flow Diagram

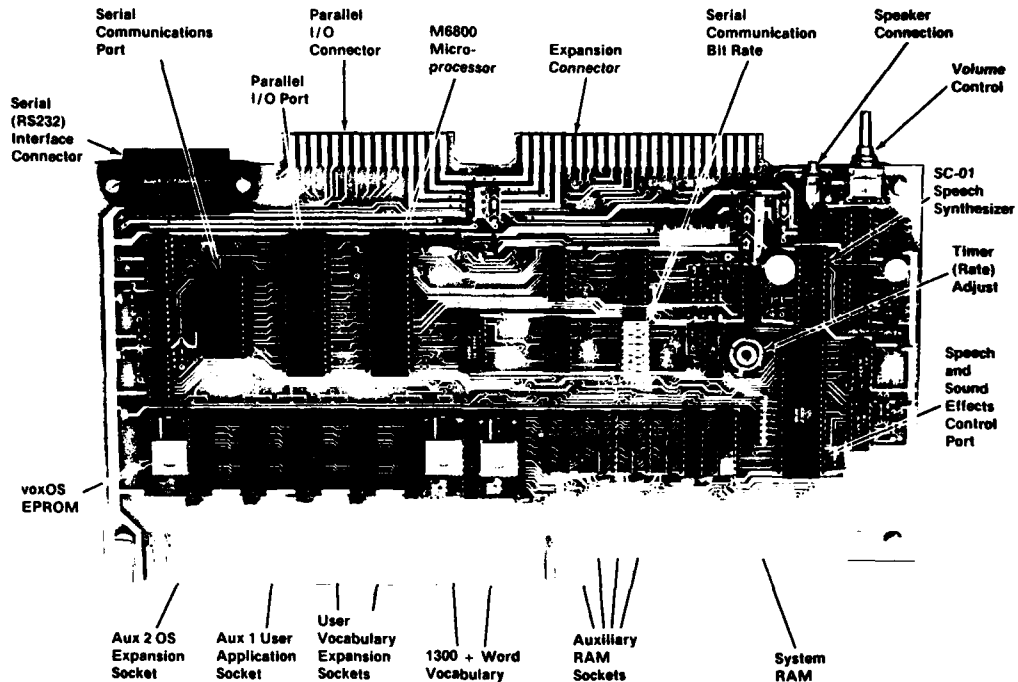


Figure 3. Versatile Speech Module™ Circuit Card

The VSM/1™ can produce a multitude of sound effects from prestored sound macros. Space sounds, gunfire, explosions, race cars and even musical sequences can be easily created. For additional flexibility, additional sound macros can be user defined and stored in the EPROM's.

The voice operating system (voxOS) may be user bypassed. The user can supply the necessary firmware to change the system function. This change, for example, can be from an experimental system to an actual application.

The VSM/1™ has four audio sequence memories for loading speech callout codes, system controls, prestored speech and/or sound effects. System changes can be accomplished by placing a user supplied EPROM in one of the vacant card sockets on the VSM/1™.

The VSM/1™ can be used as a microcomputer to talk and execute commands, or as a smart peripheral that is expandable by interface ports. System functions can be changed by downloading a 6800 compatible code segment.

*Votrax*

# VERSATILE SPEECH MODULE<sup>T.M.</sup> - VSM/1

---

## SPECIFICATIONS

### General

- 1,300 + prestored vocabulary
- Prefix/suffix modifiers
- Phoneme mode
- Sound effects
- Speech stress
- Usable as a general purpose controller/simulator

### Hardware

- SC-01 phoneme synthesizer
- Powerful 6800 MPU (microprocessor unit) based design
- Parallel and serial (RS232) interface (selectable baud rate of 75 - 9600 bits per second)
- 1K byte RAM (sockets for additional 2K bytes)
- 2K byte voxOS operating system
- 8K byte prestored vocabulary ROM
- Expansion sockets for an additional 8K bytes (2716) to 16K bytes (2532) of jumper selectable EPROM's
- On board audio amplifier, 8 ohm, 1 watt, with volume control
- Half memory plane expansion connector (32K locations out of 64K. Customer access to 32K locations via the microcomputer data address bus.)
- Form compatible with a popular microcomputer board
- Variable speech rate clock
- Variable master clock frequency circuitry for pitch control

### voxOS

- Full feature byte oriented editor (insert, delete change and move data pointer)
- Computer and terminal prompting modes
- Phonemes, sound effects, controls and prestored speech may be intermixed in any audio sequence memory
- 4 audio sequence memories + 1 sound effects control memory (16 blocks of 8 parameters each)
- Memory dump
- Execute 6800 operating code sequence (for downloading or overriding operating system)
- 12 prestored sound macros (to provide basic waveshapes for user selection of features)
- 4 user definable sound macros (to reside in user supplied ROM firmware)
- 48 programmable MCRC (master clock resistor capacitor) settings for continuous dynamic manipulation of audio parameters (instantaneous course controls)
- 4 MCRC transitioned trim controls (slowly step toward target)
- voxOS bypass (to jump into user supplied firmware)

### Audio Sequence Commands

- Prestored speech callout (16K byte direct access range)
- Two phoneme execution modes (fixed inflection and transitioned inflection)
- 4 fixed inflection levels (instant)
- 4 transitioned inflection levels (step)
- 16 sound effect (commands) control blocks (load control memory and pick 1 of the 16)
- 8 speech rates (will not affect sound effects)
- 8 pause durations
- 8 prompting sounds (canned sound effects)
- Prestored prefix/suffix word modifiers

---

**Votrax**<sup>®</sup>

Division of Federal Screw Works  
500 Stephenson Highway, Troy, Michigan 48064  
Phone (313) 588-2050

Votrax<sup>®</sup> reserves the right to alter its product line at any time or change specifications or design without notice and without obligation.

APPENDIX C  
VOICE PROGRAM PLM-80 SOURCE CODE

```

/* VOICE.DATA 11 DECEMBER 1981 REV 0 */
/* 8000H=ORIGIN OF PGM ROM; 4000H= ORIGIN OF PGM RAM; B000H= VOCAB */
/* */
/* DECLARATIONS FOR VOICE MODE TEST */
/* */
DECLARE ( INIT1, INIT2, INIT3, INIT4, INIT5, INIT6,
          INIT7, INIT8, INIT9 ) LABEL;
DECLARE LIT LITERALLY 'LITERALLY';
DECLARE( V$MODE$PTR, DEST$PTR, DEST$FLAG$PTR, SOURCE$FLAG$PTR,
         WORD$LENGTH$PTR, PHONEME$LENGTH$PTR, WI$PTR,
         W$TABLE$COUNT$PTR ) ADDRESS;
INIT1: V$MODE$PTR = 7435H;
      DEST$PTR = 7436H;
      DEST$FLAG$PTR = 7437H;
      SOURCE$FLAG$PTR = 7438H;
      WORD$LENGTH$PTR = 7439H;
      PHONEME$LENGTH$PTR = 743AH;
      WI$PTR = 743CH;
      W$TABLE$COUNT$PTR = 743DH;
DECLARE( V$MODE BASED V$MODE$PTR, DEST BASED DEST$PTR,
         DEST$FLAG BASED DEST$FLAG$PTR, SOURCE$FLAG BASED SOURCE$FLAG$PTR,
         WORD$LENGTH BASED WORD$LENGTH$PTR, PHONEME$LENGTH BASED
         PHONEME$LENGTH$PTR,
         WI BASED WI$PTR, W$TABLE$COUNT BASED W$TABLE$COUNT$PTR ) BYTE;
      W$TABLE$COUNT = 0;
DECLARE ( VI$PTR, WORD$START$LOC$PTR, WORD$END$LOC$PTR ) ADDRESS;
INIT2: VI$PTR = 743EH;
      WORD$START$LOC$PTR = 7440H;
      WORD$END$LOC$PTR = 7442H;
DECLARE ( VI BASED VI$PTR, WORD$START$LOC BASED WORD$START$LOC$PTR,
         WORD$END$LOC BASED WORD$END$LOC$PTR ) ADDRESS;
DECLARE ( VOICE$MODE$TEST, SOURCE$FLAG$STORE, WORD$COUNTER,
         DESTINATION$FLAG$STORE, V$MODE$ERROR, STORE$MODE$TEST,
         V$MIN$CHAR$TEST, V$SPACE$CHAR$TEST, RAM$STORE,
         PHONEME$LENGTH$TEST, W$STORE ) LABEL;
/* */
DECLARE V$ERROR$HDR DATA ('** VOICE MODE FORMAT ERROR **');
/* */
DECLARE W$TABLE$PTR ADDRESS;
INIT3: W$TABLE$PTR = 7444H;
DECLARE ( W$TABLE BASED W$TABLE$PTR)(200) BYTE;
      W$TABLE(0) = '0';
/* */
DECLARE MP$TABLE$BUILD LIT 'OE58H';
DECLARE SPACE$CHAR LITERALLY '20H';
DECLARE TRUE LITERALLY 'OFFH', FALSE LITERALLY 'OH';
/* */
DECLARE CC$PTR ADDRESS;
INIT4: CC$PTR = 6668H;
DECLARE CC BASED CC$PTR ADDRESS;
DECLARE CHAR$STORE$PTR ADDRESS;
      CHAR$STORE$PTR = 5D64H;

```



```

DECLARE (CHAR$STORE BASED CHAR$STORE$PTR)(2000) BYTE;
DECLARE OUTTABLE1$PTR ADDRESS;
    OUTTABLE1$PTR = 4F8AH;
DECLARE (OUTTABLE1 BASED OUTTABLE1$PTR)(2000) BYTE;
DECLARE TC1$PTR ADDRESS;
    TC1$PTR = 575CH;
DECLARE TC1 BASED TC1$PTR ADDRESS;
DECLARE MSGCOUNT1$PTR ADDRESS;
    MSGCOUNT1$PTR = 4E5EH;
DECLARE (MSGCOUNT1 BASED MSGCOUNT1$PTR)(150) ADDRESS;
    DO VI = 0 TO 149;
        MSGCOUNT1( VI ) = 0;
    END;
DECLARE WAITING1$PTR ADDRESS;
INIT5: WAITING1$PTR = 468BH;
DECLARE WAITING1 BASED WAITING1$PTR BYTE;
DECLARE OUT$TABLE$PTR ADDRESS;
    OUT$TABLE$PTR = 666BH;
DECLARE (OUT$TABLE BASED OUT$TABLE$PTR)(2000) BYTE;
DECLARE TC$PTR ADDRESS;
    TC$PTR = 6664H;
DECLARE TC BASED TC$PTR ADDRESS;
DECLARE MSG$COUNT$PTR ADDRESS;
    MSG$COUNT$PTR = 6534H;
DECLARE (MSG$COUNT BASED MSG$COUNT$PTR)(150) ADDRESS;
DECLARE WAITING$PTR ADDRESS;
    WAITING$PTR = 577AH;
DECLARE WAITING BASED WAITING$PTR BYTE;
/* */
/*  DECLARATIONS FOR WORD COUNTER  */
/* */
DECLARE ( SPELLING$MODE$FLAG$PTR,
    MSG$END$FLAG$PTR, WORD$MODE$FLAG$PTR, PHONEME$MODE$FLAG$PTR,
    PAUSE$FLAG$PTR, INV$CHAR$FLAG$PTR ) ADDRESS;
    SPELLING$MODE$FLAG$PTR = 7523H;
    MSG$END$FLAG$PTR = 7525H;
    WORD$MODE$FLAG$PTR = 7526H;
    PHONEME$MODE$FLAG$PTR = 7527H;
    PAUSE$FLAG$PTR = 7528H;
    INV$CHAR$FLAG$PTR = 7529H;
DECLARE ( SPELLING$MODE$FLAG BASED SPELLING$MODE$FLAG$PTR,
    MSG$END$FLAG BASED MSG$END$FLAG$PTR, WORD$MODE$FLAG BASED
    WORD$MODE$FLAG$PTR, PHONEME$MODE$FLAG BASED PHONEME$MODE$FLAG$PTR,
    PAUSE$FLAG BASED PAUSE$FLAG$PTR, INV$CHAR$FLAG BASED
    INV$CHAR$FLAG$PTR ) BYTE;
DECLARE ( WORD$BEGIN$LOC$PTR, WORD$COUNT$PTR,
    WORD$POINTER$LOC$PTR ) ADDRESS;
    WORD$BEGIN$LOC$PTR = 752AH;
    WORD$COUNT$PTR = 752CH;
    WORD$POINTER$LOC$PTR = 752EH;
DECLARE ( WORD$BEGIN$LOC BASED WORD$BEGIN$LOC$PTR,
    WORD$COUNT BASED WORD$COUNT$PTR, WORD$POINTER$LOC BASED

```

```

WORD$POINTERS$LOC$PTR ) ADDRESS;
DECLARE ( SPELLING$MODE$TEST, INC$WORD$COUNT, WORD$TERM$TEST,
WORD$OVER$TEST, TABLE$LOOKUP, PAUSE$FLAG$END$SET,
SPACE$OVER$TEST, WORD$COUNT$TEST, WORD$BUFFER, INV$CHAR$FLAG$CHECK,
PREFIX$SUFFIX$MODE$TEST, PHONEME$MODE$TEST, WORD$INIT ) LABEL;
/* */
DECLARE ETX$CHAR LITERALLY '03H';
DECLARE STAR$CHAR LITERALLY '2AH';
DECLARE DOLLAR$CHAR LITERALLY '24H';
DECLARE SLASH$CHAR LITERALLY '2FH';
DECLARE PERIOD$CHAR LITERALLY '2EH';
DECLARE HYPHEN$CHAR LITERALLY '2DH';
DECLARE POUND$CHAR LITERALLY '23H';
/* */
/* */
/* DECLARATIONS FOR TABLE LOOKUP */
/* */
DECLARE ( WORD$TABLE$SELECT, PREFIX$SUFFIX$LOOKUP, TAB$INIT,
COMPUTE$LENGTH$PTR, WORD$COUNT$MATCH, WORD$CHAR$MATCH,
RAM$COUNT$MATCH, RAM$CHAR$MATCH, COMPUTE$RAM$LENGTH$PTR,
RAM$TABLE$LOOKUP, SPELLING$LOOKUP, COMPUTE$PS$LENGTH$PTR,
PS$WORD$COUNT$MATCH, PS$WORD$CHAR$MATCH ) LABEL;
DECLARE TAB$MATCH$FLAG$PTR ADDRESS;
INIT6: TAB$MATCH$FLAG$PTR = 7531H;
DECLARE TAB$MATCH$FLAG BASED TAB$MATCH$FLAG$PTR BYTE;
DECLARE ( TAB$PTR$PTR, PS$TAB$PTR$PTR,
TAB$LENGTH$PTR$PTR, TAB$STRING$PTR$PTR ) ADDRESS;
INIT7: TAB$PTR$PTR = 7532H;
PS$TAB$PTR$PTR = 7534H;
TAB$LENGTH$PTR$PTR = 756AH;
TAB$STRING$PTR$PTR = 756CH;
DECLARE TAB$PTR BASED TAB$PTR$PTR ADDRESS;
DECLARE TAB$LOC ADDRESS;
TAB$INIT: TAB$LOC = 0B000H;
DECLARE ( TAB$LENGTH$PTR BASED TAB$LENGTH$PTR$PTR,
PS$TAB$PTR BASED PS$TAB$PTR$PTR,
TAB$STRING$PTR BASED TAB$STRING$PTR$PTR ) ADDRESS;
PS$TAB$PTR = 3EBAH;
DECLARE (TAB BASED TAB$LOC)(4000) BYTE;
/* */
/* DECLARATIONS FOR SPELLING LOOKUP */
/* */
/* */
DECLARE SPELLING$WORD$BUFFER$PTR ADDRESS;
SPELLING$WORD$BUFFER$PTR = 756EH;
DECLARE ( SPELLING$WORD$BUFFER BASED
SPELLING$WORD$BUFFER$PTR)(100) BYTE;
DECLARE SPELLING$PTR$SELECT LABEL;
DECLARE ( SI$PTR, TI$PTR, INPUT$WORD$COUNT$PTR,
SPELLING$TAB$PTR$PTR ) ADDRESS;
SI$PTR = 75F6H;
TI$PTR = 75F7H;

```

```

        INPUT$WORD$COUNT$PTR = 75F8H;
        SPELLING$TAB$PTR$PTR = 75F9H;
DECLARE ( SI BASED SI$PTR, TI BASED TI$PTR, INPUT$WORD$COUNT BASED
        INPUT$WORD$COUNT$PTR, SPELLING$TAB$PTR BASED
        SPELLING$TAB$PTR$PTR ) BYTE;
DECLARE SPELLING$TAB$LOC ADDRESS;
        SPELLING$TAB$LOC = 0EF70H;
DECLARE (SPELLING$TAB BASED SPELLING$TAB$LOC)(144) BYTE;
/* */
/* */
/*  DECLARATIONS FOR WORD BUFFER  */
/* */
DECLARE( VERIFY$MSG$STORE, VERIFY$MSG$OVER$TEST, WORD$ROM$FORMATTER,
        SPELLING$FORMATTER, PHONEME$FORMATTER, LOOKUP$MSG$STORE,
        LOOKUP$MSG$OVER$TEST, PS$FORMATTER, RAM$FORMATTER ) LABEL;
DECLARE UI$PTR ADDRESS;
INIT8: UI$PTR = 75FDH;
DECLARE UI BASED UI$PTR BYTE;
DECLARE PAUSE$CHAR LIT '32H';
DECLARE OPOLL1 LIT '13BBH';
DECLARE RAM$PHONEME$LENGTH$PTR ADDRESS;
INIT9: RAM$PHONEME$LENGTH$PTR = 75FEH;
DECLARE RAM$PHONEME$LENGTH BASED RAM$PHONEME$LENGTH$PTR ADDRESS;
/* */
/* */
/* */
        GO TO 0004; /*  START OF POLLING PROGRAM  */
/* */
/*  MODULE NAME:  VOICE MODE TEST  */
/* */
VOICE$MODE$TEST: IF CC < 6 THEN GO TO MPU$TABLE$BUILD;
        V$MODE = CHAR$STORE(2);
        DEST = CHAR$STORE(6);
        DEST$FLAG = 0H;
        SOURCE$FLAG = 0H;
SOURCE$FLAG$STORE: IF V$MODE = 'V' OR V$MODE='W' THEN
        SOURCE$FLAG = V$MODE;
        ELSE GO TO MPU$TABLE$BUILD;
        IF V$MODE <> SOURCE$FLAG THEN GO TO MPU$TABLE$BUILD;
DESTINATION$FLAG$STORE: IF DEST = 'T' OR DEST = 'V' OR DEST = 'W'
        THEN DEST$FLAG = DEST;
        IF DEST = DEST$FLAG THEN GO TO STORE$MODE$TEST;
        ELSE GO TO V$MODE$ERROR;
V$MODE$ERROR: IF SOURCE$FLAG = 'V' THEN
DO;
        DO VI = 1 TO 29;
                OUTTABLE1( TC1 + VI ) = V$ERRORHDR( VI - 1 );
        END;
        WAITING1 = WAITING1 + 1;
        TC1 = TC1 + 29;
        MSGCOUNT1( WAITING1 ) = 29;
END;

```

```

ELSE DO;
    DO VI = 1 TO 29;
        OUT$TABLE( TC + VI ) = V$ERROR$HDR( VI - 1 );
    END;
    WAITING = WAITING + 1;
    TC = TC + 29;
    MSG$COUNT( WAITING ) = 29;
END;
GO TO MPU$TABLE$BUILD;
STORE$MODE$TEST: IF DEST$FLAG = 'W' THEN GO TO RAM$STORE;
V$MIN$CHAR$TEST: IF CC < 9 THEN GO TO V$MODE$ERROR;
V$SPACE$CHAR$TEST: IF CHAR$STORE(7) <> SPACE$CHAR THEN
    GO TO V$MODE$ERROR;
    WORD$END$LOC = 7;
    GO TO WORD$COUNTER;

/* */
/*   STORE ALGORITHM   */
/* */
RAM$STORE: IF CC < 16 THEN GO TO V$MODE$ERROR;
    WORD$LENGTH = (CHAR$STORE(7) - 30H)*10 + (CHAR$STORE(8) - 30H);
    IF WORD$LENGTH <= 0 THEN GO TO V$MODE$ERROR;
    IF WORD$LENGTH > 15 THEN GO TO V$MODE$ERROR;
PHONEME$LENGTH$TEST:
    PHONEME$LENGTH = (CHAR$STORE(9) - 30H)*10
        + (CHAR$STORE(10) - 30H);
    IF PHONEME$LENGTH <= 0 THEN GO TO V$MODE$ERROR;
    IF PHONEME$LENGTH > 30 THEN GO TO V$MODE$ERROR;
    IF CC < WORD$LENGTH + PHONEME$LENGTH + 10 THEN
        GO TO V$MODE$ERROR;
    IF WORD$LENGTH + PHONEME$LENGTH + 2 > ( 199 - W$TABLE$COUNT)
        THEN GO TO V$MODE$ERROR;
W$STORE: W$TABLE( W$TABLE$COUNT ) = WORD$LENGTH;
    W$TABLE$COUNT = W$TABLE$COUNT + 1;
    DO WI = 1 TO WORD$LENGTH;
        W$TABLE( W$TABLE$COUNT + WI - 1 ) = CHAR$STORE( WI + 10 );
    END;
    W$TABLE$COUNT = W$TABLE$COUNT + WORD$LENGTH;
    W$TABLE( W$TABLE$COUNT ) = PHONEME$LENGTH;
    W$TABLE$COUNT = W$TABLE$COUNT + 1;
    DO WI = 1 TO PHONEME$LENGTH;
        W$TABLE( W$TABLE$COUNT + WI - 1 ) =
            CHAR$STORE( WI + WORD$LENGTH + 10 );
    END;
    W$TABLE$COUNT = W$TABLE$COUNT + PHONEME$LENGTH;
    W$TABLE(W$TABLE$COUNT) = '0';
    GO TO MPU$TABLE$BUILD;

/* */
/*   END OF VOICE MODE TEST   */
/* */
/* */
/* */
/*   MODULE NAME:   WORD COUNTER   */

```

```

/* */
/* */
WORD$COUNTER: WORD$START$LOC = WORD$END$LOC;
                WORD$BEGIN$LOC = WORD$START$LOC + 1 ;
/* */
SPACE$OVER$TEST: DO WHILE CHAR$STORE(WORD$BEGIN$LOC) = SPACE$CHAR;
                IF WORD$BEGIN$LOC < CC THEN WORD$BEGIN$LOC=WORD$BEGIN$LOC + 1;
                ELSE GO TO WORD$INIT;
                END;
/* */
WORD$INIT: WORD$COUNT = 0;
                SPELLING$MODE$FLAG = FALSE;
                WORD$MODE$FLAG = TRUE;
                PHONEME$MODE$FLAG = FALSE;
                WORD$POINTER$LOC = WORD$BEGIN$LOC;
                WORD$END$LOC = 0;
                MSG$END$FLAG = FALSE;
                TAB$PTR = 0H;
SPELLING$MODE$TEST: IF CHAR$STORE( WORD$BEGIN$LOC ) = DOLLAR$CHAR THEN
                DO;
                SPELLING$MODE$FLAG = TRUE;
                WORD$BEGIN$LOC = WORD$BEGIN$LOC + 1;
                WORD$POINTER$LOC = WORD$BEGIN$LOC;
                GO TO INC$WORD$COUNT;
                END;
PREFIX$SUFFIX$MODE$TEST: IF CHAR$STORE(WORD$BEGIN$LOC) = STAR$CHAR
                THEN DO;
                WORD$MODE$FLAG = FALSE;
                WORD$BEGIN$LOC = WORD$BEGIN$LOC + 1;
                WORD$POINTER$LOC = WORD$BEGIN$LOC;
                GO TO INC$WORD$COUNT;
                END;
PHONEME$MODE$TEST: IF CHAR$STORE(WORD$BEGIN$LOC) = POUND$CHAR THEN
                DO;
                PHONEME$MODE$FLAG = TRUE;
                WORD$BEGIN$LOC = WORD$BEGIN$LOC + 1;
                WORD$POINTER$LOC = WORD$BEGIN$LOC;
                END;
INC$WORD$COUNT: IF WORD$POINTER$LOC < CC THEN
                WORD$COUNT = WORD$COUNT + 1;
                WORD$POINTER$LOC = WORD$POINTER$LOC + 1;
WORD$TERM$TEST: IF CHAR$STORE( WORD$POINTER$LOC ) = SPACE$CHAR THEN
                WORD$END$LOC = WORD$POINTER$LOC;
                IF CHAR$STORE( WORD$POINTER$LOC ) = PERIOD$CHAR THEN
                WORD$END$LOC = WORD$POINTER$LOC;
                IF CHAR$STORE( WORD$POINTER$LOC ) = SLASH$CHAR THEN
                WORD$END$LOC = WORD$POINTER$LOC;
                IF CHAR$STORE( WORD$POINTER$LOC ) = HYPHEN$CHAR THEN
                WORD$END$LOC = WORD$POINTER$LOC;
                IF CHAR$STORE( WORD$POINTER$LOC ) = ETX$CHAR THEN
                WORD$END$LOC = WORD$POINTER$LOC;
WORD$OVER$TEST:

```

```

IF WORD$POINTER$LOC >= CC THEN
DO;
WORD$END$LOC = CC;
MSG$END$FLAG = TRUE;
GO TO PAUSE$FLAG$END$SET;
END;
IF WORD$END$LOC <> 0 THEN GO TO PAUSE$FLAG$END$SET;
GO TO INC$WORD$COUNT;
PAUSE$FLAG$END$SET: IF CHAR$STORE(WORD$END$LOC) = SPACE$CHAR
THEN PAUSE$FLAG = TRUE;
ELSE PAUSE$FLAG = FALSE;
IF CHAR$STORE(WORD$END$LOC) = PERIOD$CHAR THEN
PAUSE$FLAG = TRUE;
WORD$COUNT$TEST: IF WORD$COUNT > 15 THEN SPELLING$MODE$FLAG = TRUE;
INV$CHAR$TEST: VI = WORD$BEGIN$LOC;
IF SPELLING$MODE$FLAG = TRUE OR PHONEME$MODE$FLAG = TRUE THEN
DO WHILE VI < WORD$END$LOC;
INV$CHAR$FLAG = TRUE;
IF CHAR$STORE(VI) >= 30H AND CHAR$STORE(VI) <= 39H THEN
INV$CHAR$FLAG = FALSE;
IF CHAR$STORE(VI) >= 41H AND CHAR$STORE(VI) <= 5AH THEN
INV$CHAR$FLAG = FALSE;
IF INV$CHAR$FLAG = TRUE THEN GO TO INV$CHAR$FLAG$CHECK;
VI = VI + 1;
END;
ELSE DO WHILE VI < WORD$END$LOC;
INV$CHAR$FLAG = TRUE;
IF CHAR$STORE(VI) >= 41H AND CHAR$STORE(VI) <= 5AH THEN
INV$CHAR$FLAG = FALSE;
IF INV$CHAR$FLAG = TRUE THEN GO TO INV$CHAR$FLAG$CHECK;
VI = VI + 1;
END;
INV$CHAR$FLAG$CHECK: IF INV$CHAR$FLAG = FALSE THEN GO TO TABLE$LOOKUP;
ELSE GO TO WORD$BUFFER;
/* END OF WORD COUNTER */
/* */
TABLE$LOOKUP: TAB$MATCH$FLAG = 0H;
IF SPELLING$MODE$FLAG = TRUE THEN
GO TO SPELLING$LOOKUP;
IF PHONEME$MODE$FLAG = TRUE THEN GO TO WORD$BUFFER;
IF WORD$MODE$FLAG = FALSE THEN GO TO PREFIX$SUFFIX$LOOKUP;
/* WORD ROM TABLE LOOKUP */
/* */
WORD$TABLE$SELECT: WI = CHAR$STORE(WORD$BEGIN$LOC) - 41H;
DO CASE WI;
TAB$PTR = TAB$PTR + 0000H;
TAB$PTR = TAB$PTR + 03C8H;
TAB$PTR = TAB$PTR + 0754H;
TAB$PTR = TAB$PTR + 0D51H;
TAB$PTR = TAB$PTR + 11AAH;
TAB$PTR = TAB$PTR + 14BDH;
TAB$PTR = TAB$PTR + 1868H;

```

```

TAB$PTR = TAB$PTR + 1A70H;
TAB$PTR = TAB$PTR + 1C51H;
TAB$PTR = TAB$PTR + 1E8BH;
TAB$PTR = TAB$PTR + 1F18H;
TAB$PTR = TAB$PTR + 1F97H;
TAB$PTR = TAB$PTR + 2171H;
TAB$PTR = TAB$PTR + 24BFH;
TAB$PTR = TAB$PTR + 2651H;
TAB$PTR = TAB$PTR + 2857H;
TAB$PTR = TAB$PTR + 2DOAH;
TAB$PTR = TAB$PTR + 2DA8H;
TAB$PTR = TAB$PTR + 30B9H;
TAB$PTR = TAB$PTR + 3754H;
TAB$PTR = TAB$PTR + 3AAFH;
TAB$PTR = TAB$PTR + 3B22H;
TAB$PTR = TAB$PTR + 3BDBH;
TAB$PTR = TAB$PTR + 3DBBH;
TAB$PTR = TAB$PTR + 3DEAH;
TAB$PTR = TAB$PTR + 3E71H;
END;
INPUT$WORD$COUNT = WORD$COUNT + 30H;
COMPUTE$LENGTH$PTR: TAB$LENGTH$PTR = TAB$PTR;
IF TAB( TAB$LENGTH$PTR ) = '0' THEN GO TO RAM$TABLE$LOOKUP;
WORD$COUNT$MATCH: IF INPUT$WORD$COUNT <> TAB( TAB$LENGTH$PTR ) THEN
DO;
    TAB$PTR = TAB$PTR + 5 + (TAB(TAB$LENGTH$PTR)-30H);
    GO TO COMPUTE$LENGTH$PTR;
END;
TAB$STRING$PTR = TAB$LENGTH$PTR + 1;
WORD$CHAR$MATCH: VI = WORD$BEGIN$LOC;
DO WHILE VI < WORD$END$LOC;
    IF CHAR$STORE( VI ) <> TAB(TAB$STRING$PTR) THEN
    DO;
        TAB$PTR = TAB$PTR + 5 + (TAB(TAB$LENGTH$PTR)-30H);
        GO TO COMPUTE$LENGTH$PTR;
    END;
    TAB$STRING$PTR = TAB$STRING$PTR + 1;
    VI = VI + 1;
END;
TAB$MATCH$FLAG = 01H;
GO TO WORD$BUFFER;
/* END OF WORD ROM TABLE LOOKUP */
/* */
/* PREFIX-SUFFIX TABLE LOOKUP */
/* */
PREFIX$SUFFIX$LOOKUP: INPUT$WORD$COUNT = WORD$COUNT + 30H;
    TAB$PTR = TAB$PTR + PS$TAB$PTR;
COMPUTE$PS$LENGTH$PTR: TAB$LENGTH$PTR = TAB$PTR;
    IF TAB( TAB$LENGTH$PTR ) = '0' THEN GO TO RAM$TABLE$LOOKUP;
PS$WORD$COUNT$MATCH: IF INPUT$WORD$COUNT <> TAB(TAB$LENGTH$PTR) THEN
DO;
    TAB$PTR = TAB$PTR + 3 + (TAB(TAB$LENGTH$PTR)-30H);

```

```

        GO TO COMPUTE$PSS$LENGTH$PTR;
    END;
    TAB$STRING$PTR = TAB$LENGTH$PTR + 1;
    PS$WORD$CHAR$MATCH: VI = WORD$BEGIN$LOC;
    DO WHILE VI < WORD$END$LOC;
        IF CHAR$STORE(VI) <> TAB( TAB$STRING$PTR ) THEN
            DO;
                TAB$PTR = TAB$PTR + 3 + (TAB(TAB$LENGTH$PTR)-30H);
                GO TO COMPUTE$PSS$LENGTH$PTR;
            END;
            TAB$STRING$PTR = TAB$STRING$PTR + 1;
            VI = VI + 1;
        END;
    TAB$MATCH$FLAG = 02H;
    GO TO WORD$BUFFER;
/* END OF PREFIX-SUFFIX TABLE LOOKUP */
/* */
/* RAM TABLE LOOKUP */
/* */
RAM$TABLE$LOOKUP: INPUT$WORD$COUNT = WORD$COUNT;
                    TAB$PTR = 0;
    COMPUTE$RAM$LENGTH$PTR: TAB$LENGTH$PTR = TAB$PTR;
        IF W$TABLE( TAB$LENGTH$PTR ) = '0' THEN
            DO;
                SPELLING$MODE$FLAG = TRUE;
                GO TO SPELLING$LOOKUP;
            END;
    RAM$COUNT$MATCH: IF INPUT$WORD$COUNT <> W$TABLE(TAB$LENGTH$PTR) THEN
        DO;
            TAB$PTR = TAB$PTR + W$TABLE(TAB$LENGTH$PTR) + 1;
            TAB$PTR = TAB$PTR + W$TABLE(TAB$PTR) + 1;
            GO TO COMPUTE$RAM$LENGTH$PTR;
        END;
        TAB$STRING$PTR = TAB$LENGTH$PTR + 1;
    RAM$CHAR$MATCH: VI = WORD$BEGIN$LOC;
    DO WHILE VI < WORD$END$LOC;
        IF CHAR$STORE(VI) <> W$TABLE(TAB$STRING$PTR) THEN
            DO;
                TAB$PTR = TAB$PTR + W$TABLE(TAB$LENGTH$PTR) + 1;
                TAB$PTR = TAB$PTR + W$TABLE(TAB$PTR) + 1;
                GO TO COMPUTE$RAM$LENGTH$PTR;
            END;
            TAB$STRING$PTR = TAB$STRING$PTR + 1;
            VI = VI + 1;
        END;
    TAB$MATCH$FLAG = 03H;
    GO TO WORD$BUFFER;
/* END OF RAM TABLE LOOKUP */
/* */
/* */
/* SPELLING LOOKUP */
/* */

```



```

SPELLING$LOOKUP: TI = 1;
                  VI = WORD$BEGIN$LOC;
SPELLING$PTR$SELECT:
  DO WHILE VI < WORD$END$LOC;
    IF CHAR$STORE(VI) >= 41H THEN
      DO;
        DO CASE CHAR$STORE(VI)-41H;
          SPELLING$TAB$PTR = 00H;
          SPELLING$TAB$PTR = 04H;
          SPELLING$TAB$PTR = 08H;
          SPELLING$TAB$PTR = 0CH;
          SPELLING$TAB$PTR = 10H;
          SPELLING$TAB$PTR = 14H;
          SPELLING$TAB$PTR = 18H;
          SPELLING$TAB$PTR = 1CH;
          SPELLING$TAB$PTR = 20H;
          SPELLING$TAB$PTR = 24H;
          SPELLING$TAB$PTR = 28H;
          SPELLING$TAB$PTR = 2CH;
          SPELLING$TAB$PTR = 30H;
          SPELLING$TAB$PTR = 34H;
          SPELLING$TAB$PTR = 38H;
          SPELLING$TAB$PTR = 3CH;
          SPELLING$TAB$PTR = 40H;
          SPELLING$TAB$PTR = 44H;
          SPELLING$TAB$PTR = 48H;
          SPELLING$TAB$PTR = 4CH;
          SPELLING$TAB$PTR = 50H;
          SPELLING$TAB$PTR = 54H;
          SPELLING$TAB$PTR = 58H;
          SPELLING$TAB$PTR = 5CH;
          SPELLING$TAB$PTR = 60H;
          SPELLING$TAB$PTR = 64H;
        END;
      END;
    ELSE
      DO;
        DO CASE CHAR$STORE(VI) - 30H;
          SPELLING$TAB$PTR = 68H;
          SPELLING$TAB$PTR = 6CH;
          SPELLING$TAB$PTR = 70H;
          SPELLING$TAB$PTR = 74H;
          SPELLING$TAB$PTR = 78H;
          SPELLING$TAB$PTR = 7CH;
          SPELLING$TAB$PTR = 80H;
          SPELLING$TAB$PTR = 84H;
          SPELLING$TAB$PTR = 88H;
          SPELLING$TAB$PTR = 8CH;
        END;
      END;
    DO SI = TI TO TI + 4;
    SPELLING$WORD$BUFFER( SI ) = SPELLING$TAB(SPELLING$TAB$PTR);
  
```

```

        SPELLING$TAB$PTR = SPELLING$TAB$PTR + 1;
            END;
            TI = TI + 4;
            VI = VI + 1;
        END;
        GO TO WORD$BUFFER;
    /* */
    /* END OF SPELLING LOOKUP */
    /* */
    /* MODULE NAME: WORD BUFFER */
    /* */
    WORD$BUFFER: IF DEST$FLAG <> 'T' THEN GO TO VERIFY$MSG$STORE;
                ELSE GO TO LOOKUP$MSG$STORE;
    VERIFY$MSG$STORE: IF SOURCE$FLAG = 'V' AND TAB$MATCH$FLAG = 0H THEN
    DO;
        DO VI = 1 TO WORD$COUNT;
            OUTTABLE1(TC1 + VI) = CHAR$STORE(WORD$BEGIN$LOC + VI - 1);
        END;
        OUTTABLE1(TC1 + WORD$COUNT + 1) = SPACE$CHAR;
        TC1 = TC1 + WORD$COUNT + 1;
        MSGCOUNT1(WAITING1+1) = MSGCOUNT1(WAITING1+1) + WORD$COUNT+1;
        IF MSG$END$FLAG = TRUE THEN WAITING1 = WAITING1 + 1;
    END;
    ELSE
    DO;
        IF SOURCE$FLAG = 'W' AND TAB$MATCH$FLAG = 0H THEN
        DO;
            DO VI = 1 TO WORD$COUNT;
                OUTTABLE(TC+VI) = CHAR$STORE(WORD$BEGIN$LOC + VI - 1);
            END;
            OUTTABLE(TC + WORD$COUNT + 1) = SPACE$CHAR;
            TC = TC + WORD$COUNT + 1;
            MSG$COUNT(WAITING+1) = MSG$COUNT(WAITING+1)
                + WORD$COUNT + 1;
            IF MSG$END$FLAG = TRUE THEN WAITING = WAITING + 1;
        END;
    END;
    VERIFY$MSG$OVER$TEST: IF MSG$END$FLAG = FALSE THEN GO TO WORD$COUNTER;
                        ELSE GO TO MPU$TABLE$BUILD; /* MAIN PROGRAM */
    LOOKUP$MSG$STORE: IF INV$CHAR$FLAG = TRUE THEN
        GO TO LOOKUP$MSG$OVER$TEST;
    IF WORD$START$LOC = 7 THEN
    DO;
        OUTTABLE( TC+1 ) = 1BH; /* ASCII 'ESC' CHARACTER */
        OUTTABLE( TC+2 ) = 1BH;
        OUTTABLE( TC+3 ) = 'T';
        OUTTABLE( TC+4 ) = 'K';
        TC = TC + 4;
        MSG$COUNT( WAITING+1 ) = MSG$COUNT( WAITING+1 ) + 4;
    END;
    /* SPELLING LOOKUP FORMATTER */
    SPELLING$FORMATTER: IF SPELLING$MODE$FLAG = TRUE THEN

```

```

DO;
  OUTTABLE( TC+1 ) = 'A';
  OUTTABLE( TC+2 ) = 'E';
  OUTTABLE( TC+3 ) = 'A';
  OUTTABLE( TC+4 ) = 'E';
  OUTTABLE( TC+5 ) = 'A';
  OUTTABLE( TC+6 ) = '2';
  TC = TC + 6;
  MSG$COUNT( WAITING+1 ) = MSG$COUNT( WAITING+1 ) + 6;
  DO UI = 1 TO TI-4 BY 4;
    DO SI = 1 TO 4;
      OUTTABLE( TC+SI ) = SPELLING$WORD$BUFFER( UI+SI-1 );
    END;
    OUTTABLE( TC+5 ) = 'A';
    OUTTABLE( TC+6 ) = PAUSE$CHAR;
    TC = TC + 6;
    MSG$COUNT( WAITING+1 ) = MSG$COUNT( WAITING+1 ) + 6;
  END;
  OUTTABLE( TC+1 ) = 'A';
  OUTTABLE( TC+2 ) = '2';
  OUTTABLE( TC+3 ) = 'A';
  OUTTABLE( TC+4 ) = 'F';
  OUTTABLE( TC+5 ) = 'A';
  OUTTABLE( TC+6 ) = PAUSE$CHAR;
  TC = TC + 6;
  MSG$COUNT( WAITING + 1 ) = MSG$COUNT( WAITING + 1 ) + 6;
  GO TO LOOKUP$MSG$OVER$TEST;
END;
/* PHONEME FORMATTER */
/* */
PHONEME$FORMATTER: IF PHONEME$MODE$FLAG = TRUE THEN
DO;
  DO VI = 1 TO WORD$COUNT;
    OUTTABLE( TC+VI ) = CHAR$STORE( WORD$BEGIN$LOC + VI - 1 );
  END;
  TC = TC + WORD$COUNT;
  OUTTABLE( TC+1 ) = 'D';
  OUTTABLE( TC+2 ) = 'F';
  OUTTABLE( TC+3 ) = 'A';
  IF PAUSE$FLAG = FALSE THEN OUTTABLE( TC+4 ) = '0';
  ELSE OUTTABLE( TC+4 ) = PAUSE$CHAR;
  TC = TC + 4;
  MSG$COUNT( WAITING+1 ) = MSG$COUNT( WAITING+1 ) + WORD$COUNT + 4;
  GO TO LOOKUP$MSG$OVER$TEST;
END;
/* WORD ROM LOOKUP FORMATTER */
WORD$ROM$FORMATTER: IF TAB$MATCH$FLAG = 01H THEN
DO;
  DO VI = 1 TO 4;
    OUTTABLE( TC+VI ) = TAB( TAB$STRING$PTR + VI - 1 );
  END;
  OUTTABLE( TC+5 ) = 'A';

```

```

IF PAUSE$FLAG = FALSE THEN OUTTABLE( TC+6 ) = '0';
ELSE OUTTABLE( TC+6 ) = PAUSE$CHAR;
TC = TC + 6;
MSG$COUNT( WAITING+1 ) = MSG$COUNT( WAITING+1 ) + 6;
GO TO LOOKUP$MSG$OVER$TEST;
END;
/* PREFIX/SUFFIX ROM LOOKUP FORMATTER */
PS$FORMATTER: IF TAB$MATCH$FLAG = 02H THEN
DO;
DO VI = 1 TO 2;
OUTTABLE( TC+VI ) = TAB(TAB$STRING$PTR + VI -1);
END;
OUTTABLE( TC+3 ) = 'A';
IF PAUSE$FLAG = FALSE THEN OUTTABLE( TC+4 ) = '0';
ELSE OUTTABLE( TC+4 ) = PAUSE$CHAR;
TC = TC + 4;
MSG$COUNT( WAITING+1 ) = MSG$COUNT( WAITING+1 ) + 4;
GO TO LOOKUP$MSG$OVER$TEST;
END;
/* WORD RAM LOOKUP FORMATTER */
RAM$FORMATTER: IF TAB$MATCH$FLAG = 03H THEN
DO;
RAM$PHONEME$LENGTH = W$TABLE(TAB$STRING$PTR);
OUTTABLE( TC+1 ) = '9';
OUTTABLE( TC+2 ) = 'A';
TC = TC + 2;
DO VI = 1 TO RAM$PHONEME$LENGTH;
OUTTABLE( TC+VI ) = W$TABLE( TAB$STRING$PTR+VI );
END;
TC = TC + RAM$PHONEME$LENGTH;
OUTTABLE( TC+1 ) = 'F';
OUTTABLE( TC+2 ) = 'F';
OUTTABLE( TC+3 ) = 'A';
IF PAUSE$FLAG = FALSE THEN OUTTABLE( TC+4 ) = '0';
ELSE OUTTABLE( TC+4 ) = PAUSE$CHAR;
TC = TC + 4;
MSG$COUNT( WAITING+1 ) = MSG$COUNT( WAITING+1 )
+ RAM$PHONEME$LENGTH + 6;
END;
LOOKUP$MSG$OVER$TEST: IF MSG$END$FLAG = TRUE THEN
DO;
OUTTABLE( TC+1 ) = 0DH; /* CR */
OUTTABLE( TC+2 ) = 0AH; /* LF */
TC = TC + 2;
WAITING = WAITING + 1;
MSG$COUNT( WAITING ) = MSG$COUNT( WAITING ) + 2;
CC = 0;
OUTPUT(233) = 10H;
GO TO OPOLL1; /* MAIN PROGRAM */
END;
ELSE GO TO WORD$COUNTER;

```

EOF

APPENDIX D  
VOICE PROGRAM  
8080A ASSEMBLY CODE INSTRUCTION LISTING

8000H LXI SP A6H 9BH L LXI H A6H 9BH H 9BH MOV MI 35H INX H  
8009H MOV MI 74H INR L MOV MI 36H INX H 9BH INX L 35H INX L  
8012H MOV MI 37H INX H MOV MI 37H INR L MOV MI 36H INX L 35H INX L  
801BH MOV MI 74H INR L MOV MI 39H INX H MOV MI 38H INR L 35H INX L  
8024H MOV MI 3AH INX H MOV MI 74H INR L MOV MI 39H INX L 35H INX L  
802DH MOV MI 74H INR L MOV MI 3AH INX H MOV MI 3CH INX H  
8036H B4H 9BH MOV MI 9BH MOV MI 3DH LXI H B6H 9BH MOV MI 74H LHL D  
803FH INX H MOV MI 74H MOV MI 42H INR L MOV MI 40H INX H MOV MI 3EH 3EH  
8048H INR L MOV MI 42H MOV MI 42H INX H MOV MI 40H INX H MOV MI 74H 74H  
8051H 2AH 2AH 20H 56H 4FH 49H 43H 45H 20H 4DH 4FH 44H 45H 20H 6EH 80H  
8061H 52H 4DH 41H 54H 20H 45H 52H 4FH 49H 43H 45H 20H 4FH 52H 20H 4AH 46H 4FH  
806EH LXI H BCH 9BH MOV MI 9BH MOV MI 44H INX H MOV MI 74H LHL D  
8077H BCH 9BH MOV MI 66H MOV MI 30H LXI H BEH 9BH MOV MI 68H  
8080H INX H MOV MI 66H MOV MI 66H INR L MOV MI 64H BEH 9BH MOV MI 5DH  
8089H INR L MOV MI 8AH MOV MI 8AH INX H MOV MI 4FH INR L MOV MI 5CH  
8092H INX H MOV MI 57H MOV MI 57H INR L MOV MI 5EH INX H MOV MI 4EH  
809BH LHL D 9BH MOV MI 57H MOV MI 00H MOV MI 00H INX H MOV MI 00H LHL D  
80A4H B6H 9BH MOV MI 9BH MOV MI 00H MOV MI 00H INX H MOV MI 00H LHL D  
80ADH MOV EA MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H SUB C  
80B6H INX H MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H MOV AM  
80BFH 00H MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H MOV MI  
80C8H MOV BM MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H MOV AM  
80D1H 9BH MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H MOV AM  
80DAH C8H 9BH MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H LXI H  
80E3H 6BH INX H MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H INR L  
80ECH 66H INR L MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H INR H  
80F5H 7AH INX H MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H INR L  
80FEH 75H INR L MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H INR L  
8107H 26H INX H MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H INR L  
8110H 75H INR L MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H INR H  
8119H 29H INX H MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H INR L  
8122H 75H INR L MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H INX H  
812BH 2EH INX H MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H MOV MI  
8134H INX H MOV MI 9BH MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 00H MOV MI 31H INX H

813DH	MOV	MI	75H	INR	L	MOV	MI	34H	INX	H	MOV	MI	75H	MOV	MI	75H	INR	L	MOV	MI	75H	INR	L				
8146H	MOV	MI	6AH	INX	H	MOV	MI	75H	INR	L	MOV	MI	6CH	MOV	MI	6CH	INX	H	MOV	MI	6CH	INX	H				
814FH	MOV	MI	75H	LXI	H	EEH		9BH	MOV	MI	00H	INX	H	MOV	MI	00H	INX	H	MOV	MI	00H	INX	H				
8158H	MOV	MI	LHLD	E8H		9BH		MOV	MI	BAH	INX	H	MOV	MI	BAH	INX	H	MOV	MI	BAH	INX	H	MOV	MI			
8161H	LXI	4	F0H	9BH		MOV	MI	6EH	INX	H	MOV	MI	6EH	INX	H	MOV	MI	6EH	INX	H	MOV	MI	6EH	INX	H		
816AH	MOV	MI	F6H	INX	H	MOV	MI	75H	INR	L	MOV	MI	75H	INR	L	MOV	MI	75H	INR	L	MOV	MI	75H	INR	L		
8173H	MOV	MI	75H	INR	L	MOV	MI	F8H	INX	H	MOV	MI	F8H	INX	H	MOV	MI	F8H	INX	H	MOV	MI	F8H	INX	H		
817CH	MOV	MI	F9H	INX	H	MOV	MI	75H	INR	L	MOV	MI	75H	INR	L	MOV	MI	75H	INR	L	MOV	MI	75H	INR	L		
8185H	MOV	MI	EFH	LXI	H	FCH		9BH	MOV	MI	FDH	INX	H	MOV	MI	FDH	INX	H	MOV	MI	FDH	INX	H	MOV	MI		
818EH	75H		LXI	FEH		9BH		MOV	MI	FEH	INX	H	MOV	MI	FEH	INX	H	MOV	MI	FEH	INX	H	MOV	MI	75H		
8197H	JMP		04H	00H		LHLD		BEH	9BH		MOV	AM	INX	H	MOV	AM	INX	H	MOV	AM	INX	H	MOV	AM	INX	H	
81A0H	SUB	I	06H	MOV	CA	MOV	AB	SBC	I	00H	JNC		ACH	81H		ACH	81H		ACH	81H		ACH	81H		ACH	81H	
81A9H	JMP		58H	0EH		LXI	B	02H	00H		LHLD		C0H	9BH		C0H	9BH		C0H	9BH		C0H	9BH		C0H	9BH	
81B2H	DAD	B	MOV	AM	LHLD	A6H		9BH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		06H	00H		06H	00H	
81BBH	LHLD		COH	9BH		DAD	B	MOV	AM	LHLD	A8H		9BH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
81C4H	LHLD		AAH	9BH		MOV	MI	00H	LHLD		ACH		9BH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
81CDH	00H		LHLD	A6H		LHLD		MOV	AM	LHLD	ACH		9BH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
81D6H	SBC	A	MOV	CA	MOV	AM	AM	SUB	I	57H	MOV	AM	57H	MOV	AM	LHLD											
81DFH	RRC		JNC	EBH		81H		MOV	AM	LHLD	ACH		9BH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
81E8H	JMP		EEH	81H		JMP		58H	MOV	CA	MOV	AM	58H	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
81F1H	MOV	AM	LHLD	ACH		9BH		MOV	CA	MOV	AM	SUB	C	MOV	AM	LHLD											
81FAH	81H		JMP	58H		0EH		LHLD		A8H		9BH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		06H	00H
8203H	54H		SUB	I	01H	SBC	A	MOV	EA	MOV	AM	SUB	I	MOV	AM	LHLD											
820CH	01H		SBC	A	ORA	C	MOV	EA	MOV	AM	SUB	I	MOV	AM	LHLD												
8215H	SBC	A	ORA	E	RRC	JNC		20H	82H		MOV	AM	LHLD														
821EH	9BH		MOV	MA	LHLD	A8H		9BH	MOV	AM	LHLD		9BH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
8227H	MOV	CA	MOV	AM	SUB	C	JZ	45H	83H		JMP		30H	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
8230H	LHLD		ACH	9BH		MOV	AM	SUB	I	56H	JNZ		BFH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
8239H	LHLD		B6H	9BH		MOV	MI	01H	INX	H	MOV	MI	01H	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
8242H	B6H		9BH	MOV	AM	INX	H	MOV	BM	MOV	CA	MOV	AI	1DH													
824BH	MOV	EA	MOV	AI	00H	SBC	B	JC	91H		LHLD		82H	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
8254H	9BH		MOV	AM	INX	H	MOV	BM	LHLD		B6H		9BH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
825DH	INX	H	MOV	DM	MOV	EA	XCHG	DAD	B	XCHG	LHLD		9BH	MOV	MA	LXI	B	06H	00H		06H	00H		06H	00H		
8266H	DAD	D	XCHG	LHLD		B6H		9BH	MOV	AM	INX	H	MOV	BM	MOV	CA	MOV	AM	INX	H	MOV	BM	MOV	CA	MOV	AM	

826FH PUSH D MOV LC MOV HB DCX H XCHG LXI H 51H MOV AM 80H DAD D  
 8278H MOV AM POP H MOV MA LHL D B6H 9BH INX H MOV BM  
 8281H MOV CA LXI H 01H 00H DAD B XCHG 9BH INX H 9BH 9BH  
 828AH MOV ME INX H MOV MI 00H JMP DAD B XCHG B6H 9BH 9BH  
 8293H 9BH MOV AM INR A MOV MA LHL D JMP 41H LHL D C8H C8H  
 829CH MOV BM MOV CA LXI D 1DH MOV MA LHL D MOV LC MOV HB DAD D XCHG  
 82A5H LHL D C4H MOV CA 9BH MOV ME INX H 00H C8H 9BH 9BH  
 82AEH MOV AM MOV CA MOV BI 00H LHL L INX H 00H DAD B DAD B  
 82B7H MOV MI 1DH INX H MOV MI 00H JMP 42H 83H LHL D LHL D  
 82C0H B6H 9BH MOV MI 01H MOV MI 00H LHL D B6H 9BH 9BH  
 82C9H 9BH MOV AM INX H MOV BM 17H MOV MI 00H SUB C MOV EA  
 82D2H MOV AI 00H SBC B JC 17H LHL D CCH 9BH 9BH  
 82DBH MOV AM INX H MOV BM LHL D B6H 9BH MOV CA MOV AM INX H  
 82E4H MOV DM MOV EA XCHG DAD B XCHG 9BH LHL D CAH 9BH DAD D  
 82EDH XCHG LHL D B6H 9BH MOV AM INX H XCHG LXI H 51H MOV CA PUSH D  
 82F6H MOV LC MOV HB DCX H XCHG LXI H 51H MOV BM MOV CA MOV AM  
 82FFH POP H MOV MA LHL D B6H 9BH MOV AM INX H 80H DAD D MOV AM  
 8303H LXI H 01H 00H DAD B XCHG 9BH LHL D B6H 9BH MOV ME  
 8311H INX H MOV MI 00H JMP C7H 82H LHL D DOH 9BH 9BH  
 831AH MOV AM INR A MOV MA LHL D CCH 9BH MOV AM INX H MOV BM  
 8323H MOV CA LXI D 1DH MOV MA LHL D MOV LC MOV HB DAD D XCHG LHL D  
 832CH CCH 9BH MOV ME INX H 00H MOV MD LHL D DOH 9BH MOV AM  
 8335H MOV CA MOV BI 00H LHL D CEH 9BH DAD B DAD B MOV MI  
 833EH 1DH INX H MOV MI 00H JMP 58H 9BH LHL D AAH AAH  
 8347H 9BH MOV AM SUB I 57H JZ 75H 83H LHL D BEH BEH  
 8350H 9BH MOV AM INX H MOV BM SUB I 09H MOV CA MOV AB SBC I  
 8359H 00H JC 30H 82H LXI B 07H 00H LHL D COH COH  
 8362H 9BH DAD B MOV AM SUB I 20H JNZ 30H 82H LHL D LHL D  
 836BH BAH 9BH MOV MI 07H INX H MOV MI 00H JMP 30H 30H  
 8374H 85H LHL D BEH 9BH MOV AM INX H MOV BM SUB I 10H LHL D  
 837DH MOV CA MOV AB SBC I 00H JC 30H LXI B 07H 07H  
 8386H 00H LHL D COH 9BH DAD B MOV AM SUB I 30H MOV CA  
 838FH MOV EI OAH MOV DI 00H MOV BI 00H JMP BBH 83H  
 8398H MOV AC SUB E MOV AB SBC D JP A4H 83H MOV HB MOV LC



83A1H XCHG MOV BH MOV CL LXI H 00H 00H XCHG MOV AB ORA C  
83AAH RZ XCHG MOV AB RAR AC RAR MOV CA JNC  
83B3H B6H 83H DAD D XCHG DAD H JMP A8H 83H CALL  
83BCH 98H 83H PUSH D LXI B 00H 00H LHL D COH 9BH  
83C5H DAD B MOV AM SUB I 30H 9BH MOV CA MOV BI 00H POP H DAD B  
83CEH XCHG LHL D AEH SUB I 9BH ME MOV AM MOV CA XRA A SUB C  
83D7H JNC 30H 82H JC LHL D 82H AEH MOV AM MOV CA MOV AI  
83E0H OFH SUB C 9BH JC 30H 82H LHL D 00H MOV CA MOV AI  
83E9H COH 9BH DAD B MOV AM SUB I 30H 00H MOV CA MOV EI 0AH LHL D  
83F2H MOV DI 00H MOV BI 00H CALL 98H 98H PUSH D LXI B  
83FBH OAH 00H LHL D COH 9BH DAD B MOV AM SUB I 30H  
8404H MOV CA MOV BI 00H POP H DAD B XCHG LHL D BOH 9BH  
840DH MOV ME MOV AM MOV CA XRA A SUB C JNC 30H LHL D  
8416H BOH 9BH MOV AM MOV CA MOV AI 1EH SUB C JC 30H  
841FH 82H LHL D BEH MOV AM INX H MOV BM LHL D AEH  
8428H 9BH MOV CA MOV AM PUSH B LHL D BOH 9BH MOV EA MOV AM  
8431H ADD E ADD I 0AH JC 30H 82H LHL D LHL D MOV EA MOV AD  
843AH SBC I 00H B0H 9BH MOV CA MOV AM ADD C ADD I 02H LHL D  
8443H LHL D 9BH MOV EA MOV AM PUSH D MOV CA MOV AI C7H SUB C  
844CH B4H 9BH SUB C JC 30H 82H LHL D B4H 9BH MOV AM  
8455H POP B SUB C 9BH MOV BI 00H LHL D B4H XCHG LHL D  
845EH MOV CA MOV BI 00H LHL D B4H DAD B 9BH LHL D  
8467H AEH 9BH MOV AM STAX D LHL D B4H 9BH MOV AM INR A  
8470H MOV MA LHL D B2H B2H MOV MI 01H LHL D B2H 9BH  
8479H MOV AM LHL D AEH B4H MOV CA MOV AM SUB C JC BOH  
8482H 84H LHL D B4H MOV AM LHL D B2H 9BH MOV CA  
848BH MOV AM ADD C DCR A MOV EA MOV DI 00H LHL D B2H 9BH  
8494H DAD D XCHG LHL D B2H B2H MOV AM ADD I 0AH MOV CA  
849DH PUSH D MOV BI 00H LHL D B2H COH 9BH DAD B MOV AM POP H  
84A6H MOV MA LHL D B2H B2H MOV AM INR A MOV MA JNZ 76H  
84AFH 84H LHL D B4H MOV AM LHL D AEH 9BH MOV CA  
84B8H MOV AM ADD C LHL D B4H 9BH MOV MA MOV CA MOV BI 00H  
84C1H LHL D BCH 9BH DAD B XCHG LHL D BOH 9BH MOV AM  
84CAH STAX D LHL D B4H MOV AM INR A MOV MA LHL D B2H

84D3H 9BH MOV MI 01H LHL D B2H 9BH MOV AM 85H MOV AM LHL D B0H  
84DCH 9BH MOV CA MOV AM SUB C JC 16H MOV CA MOV AM ADD C DCR A B4H  
84E5H 9BH MOV AM LHL D B2H 9BH MOV AM LHL D B4H MOV AM XCHG LHL D  
84EEH MOV EA MOV DI 00H MOV AM LHL D BCH 9BH MOV AM LHL D LHL D  
84F7H B2H 9BH MOV AM PUSH D LHL D AEH 9BH MOV CA MOV AM LHL D  
8500H ADD C ADD I OAH MOV EA MOV DI 00H B2H MOV AM LHL D B4H MOV AM LHL D  
8509H DAD D MOV AM POP H MOV MA LHL D B2H MOV AM LHL D B4H MOV AM LHL D  
8512H MOV MA JNZ MOV CA MOV AM LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
851BH BOH MOV CA MOV BI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
8524H MOV CA MOV BI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
852DH JMP 58H OEH MOV MA LHL D BCH 9BH MOV AM LHL D B4H MOV AM LHL D  
8536H LHL D B8H 9BH MOV MA LHL D BAH 9BH MOV AM LHL D B4H MOV AM LHL D  
853FH MOV BM MOV CA MOV LC MOV HB INX H MOV MB DCX H MOV AM INX H  
8548H MOV ME INX H MOV MD LHL D DEH 9BH MOV AM LHL D B4H MOV AM LHL D  
8551H MOV CA LHL D COH MOV CA MOV AM INX H MOV AM SUB I 20H JNZ  
855AH 89H LHL D LHL D DEH 9BH MOV AM LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
8563H BEH 9BH MOV CA MOV AM INX H MOV AM LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
856CH MOV CA MOV AB SBC D JNC 86H MOV LC MOV EA MOV AC SUB E 9BH  
8575H MOV AM INX H MOV BM MOV CA MOV LC MOV HB INX H MOV AM LHL D B4H MOV AM LHL D  
857EH DEH 9BH MOV ME INX H MOV MD JMP 4BH INX H XCHG LHL D  
8587H 89H 85H LHL D EOH 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
8590H 00H LHL D D2H 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
8599H MOV MI FFH LHL D LHL D D8H 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85A2H 9BH MOV AM INX H MOV BM LHL D 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85ABH MOV MB LHL D BAH 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85B4H LHL D D4H 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85BDH 00H INX H MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85C6H MOV BM MOV CA LHL D COH 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85CFH JNZ F5H 85H MOV AM LHL D D2H 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85D8H DEH 9BH MOV AM INX H MOV BM LHL D 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85E1H XCHG LHL D LHL D DEH 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85EAH INX H MOV BM LHL D E2H 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85F3H 5AH 86H LHL D LHL D DEH 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D  
85FCH LHL D COH 9BH MOV MI 00H LHL D B4H MOV AM LHL D B4H MOV AM LHL D

8605H 86H LHL D6H 9BH MOV MI OOH LHL D DEH 9BH LHL 9BH  
860EH MOV AM INX H MOV BM MOV CA MOV LC MOV DCX H HB INX H XCHG LHL  
8617H DEH 9BH MOV ME INX H MOV CA MOV MA INX H MOV MD DCX H H XCHG LHL  
8620H LHL E2H 9BH MOV CA MOV MA INX H MOV MD DCX H H XCHG LHL  
8629H LHL DEH 9BH MOV CA MOV MA INX H MOV MD DCX H H XCHG LHL  
8632H 9BH DAD B MOV AM SUB I 23H LHL DEH JNZ 5AH MOV AM INX H LHL  
863BH D8H 9BH MOV MI FFH MOV LC MOV HB INX H XCHG LHL 9BH AM INX H  
8644H MOV BM CA MOV CA MOV MD DCX H H XCHG LHL DEH 9BH AM INX H  
864DH MOV ME INX H MOV MA INX H MOV MD DCX H H XCHG LHL E2H  
8656H 9BH MOV MA INX H MOV MA INX H MOV MD DCX H H XCHG LHL E2H  
865FH MOV BM LHL MOV CA MOV MA INX H MOV MD DCX H H XCHG LHL E2H  
8668H MOV AC SUB E 9BH MOV CA MOV MA INX H MOV MD DCX H H XCHG LHL  
8671H EOH 9BH MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
867AH XCHG LHL MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
8683H 9BH E2H MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
868CH LHL E2H MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
8695H MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
869EH SUB I 20H JNZ AFH MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86A7H INX H MOV BM LHL MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86B0H E2H 9BH MOV AM SUB I 2EH MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86B9H DAD B MOV AM SUB I 2EH MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86C2H 9BH MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86CBH MOV MB LHL MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86D4H COH 9BH DAD B MOV AM SUB I 2EH MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86DDH LHL E2H MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86E6H MOV MA INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86EFH MOV CA LHL MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
86F8H 06H 87H LHL MOV MA INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
8701H BAH 9BH MOV MA INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
870AH INX H MOV BM MOV CA LHL MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
8713H 03H JNZ 23H LHL MOV MA INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
871CH MOV BM LHL BAH 9BH MOV MA INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
8725H 9BH MOV AM INX H MOV MA INX H MOV MD DCX H H XCHG LHL  
872EH INX H MOV DM MOV EA MOV AC SUB E MOV CA MOV AB SBC D JC

8737H 4BH 87H MA 87H INX H DCX H MOV H 87H MOV AM INX H MOV BM LHL LHL BAH 9BH 9BH MOV MI LHL 9BH JMP 9BH  
8740H MOV MA INX H MOV MB LHL MOV D4H D4H 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8749H 5EH 87H CA 87H MOV AB LHL LHL BAH SBC I 00H 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8752H 00H MOV 5AH LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
875BH JMP CA LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8764H MOV CA LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
876DH 77H 87H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8776H 87H 87H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
877FH MOV AM INX H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8788H SUB I 2EH INX H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8791H FFH LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
879AH 0FH LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87A3H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87ACH INX H MOV BM LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87B5H D2H 9BH 9BH LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87BEH D8H 9BH 9BH LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87C7H ORA C RRC LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87D0H INX H MOV BM LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87D9H MOV EA MOV AC LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87E2H LHL LHL LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87EBH INX H MOV BM LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87F4H 30H SBC A CMA LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
87FDH MOV DM MOV EA LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8806H MOV AI 39H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
880FH 16H 88H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8818H 9BH MOV AM SUB I 41H INX H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8821H MOV AM SUB I 41H INX H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
882AH MOV AM INX H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8833H PUSH B MOV EA LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
883CH RRC JNC LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8845H LHL DCH 9BH LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
884EH LHL B6H 9BH LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8857H INX H XCHG LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH  
8860H CCH 87H LHL LHL 9BH DAD B DAD B 9BH MOV AM INX H MOV MI LHL 9BH JMP 9BH

8869H	BAH	9BH	MOV	CA	MOV	CA	MOV	AM	INX	H	MOV	DM	MOV	EA	MOV	AC	SUB	E
8872H	MOV	CA	MOV	AB	JNC	SBC	D	JNC	C9H	9BH	88H	LHLD	LHLD	DCH	DCH	9BH		
887BH	MOV	MI	FFH	B6H	B6H	LHLD		B6H	9BH	MOV	AM	INX	H	MOV	BM	MOV	CA	
8884H	LHLD	COH	COH	DAD	DAD	9BH		DAD	MOV	AM	SUB	I	4IH	SBC	A	CMA		
888DH	LHLD	B6H	9BH	MOV	CA	MOV	AM	MOV	CA	MOV	AM	INX	H	MOV	DM	MOV	EA	LHLD
8896H	COH	9BH	DAD	D	MOV	AM	PUSH	B	MOV	AM	INX	H	MOV	AI	5AH	SUB	E	
889FH	POP	D	SBC	A	ANA	E	RRC		JNC		ACH		88H	LHLD				
88A8H	DCH	9BH	MOV	MI	00H	LHLD		LHLD	DCH		9BH	MOV	AM	SUB	I			
88B1H	FFH	JZ	C9H	88H	88H	LHLD		LHLD	B6H	9BH	MOV	AM	INX	H				
88BAH	MOV	BM	CA	MOV	LC	MOV	HB	INX	H	XCHG		LHLD	B6H	9BH				
88C3H	MOV	ME	INX	H	MOV	MD	JMP	62H	88H	LHLD		LHLD	DCH	9BH				
88CCH	MOV	AM	SUB	I	JNZ	00H	JNZ	D8H	88H	JMP		LHLD	DBH	88H				
88D5H	JMP	DBH	88H	JMP	88H	88H	JMP	34H	91H	LHLD		LHLD	E4H	9BH				
88DEH	MOV	MI	00H	LHLD	D2H	9BH	MOV	AM	SUB	I	FFH		FFH	JZ				
88E7H	F9H	8EH	LHLD	LHLD	D8H	9BH	MOV	AM	SUB	I	FFH		FFH	JZ				
88F0H	34H	91H	LHLD	LHLD	D6H	9BH	MOV	AM	SUB	I	00H		00H	JZ				
88F9H	82H	8CH	LHLD	LHLD	DEH	9BH	MOV	AM	INX	H	MOV	AM	INX	H	MOV	BM	MOV	CA
8902H	LHLD	COH	MOV	MA	DAD	B	MOV	AM	SUB	I	4IH	LHLD		B2H				
890BH	9BH	MOV	LA	MOV	LA	MOV	HI	00H	JMP		2DH	8BH	LHLD					
8914H	E6H	9BH	MOV	AM	MOV	AM	INX	H	MOV	BM	DCX	H	MOV	MA	INX	H	MOV	MB
891DH	JMP	6BH	8BH	LHLD	LHLD	03H	E6H	DAD	B	XCHG		LHLD	E6H	9BH				
8926H	MOV	CA	LXI	H	MOV	MD	MOV	CA	LXI	H	MOV	AM	INX	H	MOV	BM		
892FH	MOV	ME	INX	H	MOV	BM	MOV	ME	INX	H	MOV	MD	JMP	6BH				
8938H	MOV	AM	INX	H	MOV	BM	MOV	AM	INX	H	MOV	MD	JMP	6BH				
8941H	LHLD	E6H	9BH	MOV	AM	INX	H	MOV	AM	INX	H	MOV	CA	LXI	H	MOV	MD	
894AH	LHLD	E6H	DAD	B	MOV	CA	LXI	H	MOV	ME	INX	H	MOV	AM	INX	H	MOV	BM
8953H	ODH	6BH	8BH	XCHG	LHLD	LHLD	E6H	DAD	B	XCHG		LHLD	E6H	9BH				
895CH	JMP	6BH	8BH	AAH	11H	DAD	B	XCHG		LHLD	E6H	DAD	B	XCHG				
8965H	MOV	CA	LXI	H	MOV	MD	MOV	CA	LXI	H	MOV	MD	JMP	6BH				
896EH	MOV	ME	INX	H	MOV	BM	MOV	ME	INX	H	MOV	MD	JMP	6BH				
8977H	MOV	AM	INX	H	MOV	BM	MOV	ME	INX	H	MOV	MD	JMP	6BH				
8980H	LHLD	E6H	9BH	MOV	AM	INX	H	MOV	AM	INX	H	MOV	CA	LXI	H	MOV	MD	
8989H	LHLD	E6H	9BH	MOV	AM	INX	H	MOV	AM	INX	H	MOV	CA	LXI	H	MOV	MD	
8992H	18H	DAD	B	XCHG	LHLD	E6H												

899BH	JMP	6BH	LXI	H	8BH	70H	LHLD	E6H	9BH	XCHG	MOV	AM	INX	H	MOV	BM	
89A4H	MOV	CA	LXI	H	70H	MOV	IAH	DAD	XCHG	LHLD	E6H	INX	H	9BH	MOV	BM	
89ADH	MOV	ME	INX	H	MOV	MD	JMP	6BH	8BH	LHLD	E6H	INX	H	9BH	MOV	BM	
89B6H	MOV	AM	INX	H	MOV	BM	MOV	CA	LXI	H	51H	ICH	DAD	B	XCHG		
89BFH	LHLD	E6H	MOV	ME	9BH	MOV	MOV	INX	H	MOV	MD	JMP	6BH	H	8BH		
89C8H	LHLD	E6H	MOV	AM	9BH	MOV	MOV	INX	H	MOV	BM	MOV	CA	LXI	H	MOV	MD
89D1H	ICH	DAD	B	6BH	XCHG	8BH	LHLD	E6H	9BH	MOV	ME	INX	H	MOV	MD		
89DAH	JMP	6BH	LXI	H	8BH	MOV	LHLD	E6H	9BH	MOV	AM	INX	H	MOV	BM		
89E3H	MOV	CA	LXI	H	18H	MOV	IFH	DAD	B	XCHG	LHLD	E6H	INX	H	9BH	MOV	BM
89ECH	MOV	ME	INX	H	MOV	MD	JMP	6BH	8BH	LHLD	E6H	INX	H	9BH	MOV	BM	
89F5H	MOV	AM	INX	H	MOV	BM	MOV	CA	LXI	H	97H	IFH	DAD	B	XCHG		
89FEH	LHLD	E6H	MOV	ME	9BH	MOV	MOV	INX	H	MOV	MD	JMP	6BH	H	8BH	XCHG	
8A07H	LHLD	E6H	MOV	AM	9BH	MOV	MOV	INX	H	MOV	BM	MOV	CA	LXI	H	MOV	MD
8A10H	21H	DAD	B	6BH	XCHG	8BH	LHLD	E6H	9BH	MOV	ME	INX	H	MOV	BM		
8A19H	JMP	6BH	LXI	H	8BH	MOV	LHLD	E6H	9BH	MOV	ME	INX	H	MOV	BM		
8A22H	MOV	CA	LXI	H	BFH	MOV	24H	DAD	B	XCHG	LHLD	E6H	INX	H	MOV	BM	
8A2BH	MOV	ME	INX	H	MOV	MD	JMP	6BH	8BH	LHLD	E6H	INX	H	MOV	BM		
8A34H	MOV	AM	INX	H	MOV	BM	MOV	CA	LXI	H	51H	26H	DAD	B	XCHG		
8A3DH	LHLD	E6H	MOV	ME	9BH	MOV	MOV	INX	H	MOV	MD	JMP	6BH	H	8BH	XCHG	
8A46H	LHLD	E6H	MOV	AM	9BH	MOV	MOV	INX	H	MOV	BM	MOV	CA	LXI	H	MOV	MD
8A4FH	28H	DAD	B	6BH	XCHG	8BH	LHLD	E6H	9BH	MOV	ME	INX	H	MOV	BM		
8A58H	JMP	6BH	LXI	H	8BH	MOV	LHLD	E6H	9BH	MOV	ME	INX	H	MOV	BM		
8A61H	MOV	CA	LXI	H	0AH	MOV	2DH	DAD	B	XCHG	LHLD	E6H	INX	H	MOV	BM	
8A6AH	MOV	ME	INX	H	MOV	MD	JMP	6BH	8BH	LHLD	E6H	INX	H	MOV	BM		
8A73H	MOV	AM	INX	H	MOV	BM	MOV	CA	LXI	H	A8H	2DH	DAD	B	XCHG		
8A7CH	LHLD	E6H	MOV	ME	9BH	MOV	MOV	INX	H	MOV	MD	JMP	6BH	H	8BH	XCHG	
8A85H	LHLD	E6H	MOV	AM	9BH	MOV	MOV	INX	H	MOV	BM	MOV	CA	LXI	H	MOV	MD
8A8EH	30H	DAD	B	6BH	XCHG	8BH	LHLD	E6H	9BH	MOV	ME	INX	H	MOV	BM		
8A97H	JMP	6BH	LXI	H	8BH	MOV	LHLD	E6H	9BH	MOV	AM	INX	H	MOV	BM		
8AA0H	MOV	CA	LXI	H	54H	MOV	37H	DAD	B	XCHG	LHLD	E6H	INX	H	MOV	BM	
8AA9H	MOV	ME	INX	H	MOV	MD	JMP	6BH	8BH	LHLD	E6H	INX	H	MOV	BM		
8AB2H	MOV	AM	INX	H	MOV	BM	MOV	CA	LXI	H	AFH	3AH	DAD	B	XCHG		
8ABBH	LHLD	E6H	MOV	ME	9BH	MOV	MOV	INX	H	MOV	MD	JMP	6BH	H	8BH	XCHG	
8AC4H	LHLD	E6H	MOV	AM	9BH	MOV	MOV	INX	H	MOV	BM	MOV	CA	LXI	H	MOV	MD
8ACDH	3BH	DAD	B	6BH	XCHG	8BH	LHLD	E6H	9BH	MOV	ME	INX	H	MOV	BM		

8AD6H JMP 6BH 8BH LHL D E6H 9BH MOV AM INX H MOV BM  
8ADFH MOV CA LXI H DBH 3BH LHL D DAD B XCHG LHL D E6H 9BH  
8AE8H MOV ME INX H MOV MD JMP 3BH LHL D 6BH 8BH LHL D E6H 9BH  
8AF1H MOV AM INX H MOV BM MOV CA LXI H BBH 3DH DAD B XCHG  
8AFAH LHL D E6H 9BH MOV ME INX H MOV MD JMP 6BH 8BH  
8B03H LHL D E6H 9BH MOV AM INX H MOV BM MOV CA LXI H EAH  
8B0CH 3DH DAD B XCHG LHL D E6H 9BH MOV ME INX H MOV MD  
8B15H JMP 6BH 8BH LHL D 3EH DAD B XCHG LHL D E6H 9BH  
8B1EH MOV CA LXI H 71H MOV MD JMP 6BH 8BH LHL D E6H 9BH  
8B27H MOV ME INX H MOV MD JMP 6BH 8BH LHL D E6H 9BH  
8B30H 8BH DAD B MOV EM INX H MOV DM XCHG PCHL  
8B37H 13H 89H 20H 89H 35H 89H 4AH 89H 5FH 89H 74H 89H 89H 9EH 89H  
8B47H B3H 89H C8H 89H DDH 89H F2H 89H 07H 8AH 1CH 8AH 31H 8AH 46H 8AH  
8B57H 5BH 8AH 70H 8AH 85H 8AH 9AH 8AH AFH 8AH C4H 8AH D9H 8AH EEH 8AH  
8B67H 03H 8BH 18H 8BH EOH 9BH MOV AM INX H MOV BM MOV CA LXI D 30H  
8B6BH LHL D MOV LC MOV HB DAD D XCHG LHL D F6H 9BH MOV ME  
8B74H 00H MOV LC MOV HB DAD D XCHG LHL D F6H 9BH MOV ME  
8B7DH LHL D E6H 9BH MOV AM INX H MOV BM MOV CA LXI D 30H  
8B86H MOV MA INX H MOV MB DCX H MOV AM SUB I 30H B0H MOV CA MOV AM  
8B8FH EEH 9BH DAD B MOV AM SUB I 30H EAH MOV CA MOV AM  
8B98H LHL D F6H 9BH MOV DM MOV EA LHL D EEH 9BH DAD D MOV AM SUB C  
8BA1H INX H MOV DM MOV EA LHL D E6H 9BH MOV AM INX H MOV BM  
8BAAH JZ D9H D LXI D 05H 8BH LHL D 00H MOV AM INX H MOV BM  
8BB3H MOV CA LXI D 9BH LHL D 00H MOV AM INX H MOV BM  
8BBCH EAH 9BH DAD B MOV AM SUB I 30H MOV LC MOV HB DAD D XCHG  
8BC5H 9BH DAD B MOV AM SUB I 30H MOV CA MOV BI 00H POP H  
8BCEH DAD B XCHG LHL D E6H 9BH MOV ME INX H MOV MD JMP  
8BD7H 7DH 8BH LHL D EAH 9BH MOV AM INX H MOV BM MOV CA  
8BE0H MOV LC MOV HB INX H XCHG LHL D ECH 9BH MOV ME INX H  
8BE9H MOV MD LHL D DEH 9BH MOV AM INX H MOV BM LHL D B6H  
8BF2H 9BH MOV MA INX H MOV MB LHL D B6H 9BH MOV AM INX H  
8BFBH MOV BM LHL D BAH 9BH MOV CA MOV AM INX H MOV DM MOV EA  
8C04H MOV AC SUB E MOV CA MOV AB SBC D JNC 7AH 8CH LHL D  
8C0DH B6H 9BH MOV AM INX H MOV BM MOV CA LHL D COH 9BH

8C16H DAD B MOV AM LHL D ECH 9BH DAD D MOV AM INX H MOV CA MOV AM INX H MOV DM  
8C1FH MOV EA LHL D EEH 9BH DAD D MOV AM SUB C JZ INX H MOV CA 55H  
8C28H 8CH LHL D E6H 9BH MOV AM INX H MOV BM MOV CA LXI D 9BH  
8C31H 05H 00H LC MOV HB DAD D XCHG LHL D EEH 9BH DAD B XCHG  
8C3AH MOV AM INX H MOV BM MOV CA PUSH D LHL D POP H 7DH 8BH HB  
8C43H MOV AM SUB I 30H 9BH MOV ME INX H MOV MD JMP CA MOV LC MOV HB  
8C4CH LHL D E6H 9BH MOV AM INX H MOV BM MOV CA MOV MD LHL D 8BH  
8C55H LHL D ECH 9BH MOV AM INX H MOV ME INX H MOV MD LHL D 8BH  
8C5EH INX H XCHG LHL D ECH 9BH MOV AM INX H MOV ME INX H MOV MD LHL D  
8C67H B6H 9BH MOV AM INX H MOV BM MOV CA MOV MD LHL D 8BH  
8C70H XCHG LHL D B6H 9BH MOV ME INX H MOV MD LHL D 8BH  
8C79H 8BH LHL D E4H 9BH MOV MI 01H JMP H 34H 91H  
8C82H LHL D EOH 9BH MOV AM INX H MOV BM MOV CA LXI D 30H  
8C8BH 00H MOV LC MOV HB DAD D XCHG LHL D F6H 9BH MOV ME  
8C94H LHL D E6H 9BH MOV AM INX H MOV BM MOV CA LXI D 30H  
8C9DH MOV CA MOV AM INX H MOV DM MOV EA XCHG LHL D 9BH  
8CA6H E6H 9BH MOV ME INX H MOV MD LHL D E6H 9BH MOV AM  
8CAFH INX H MOV BM LHL D EAH 9BH MOV MA INX H MOV MB DCX H  
8CB8H MOV AM INX H MOV BM MOV CA LHL D EEH 9BH DAD B MOV AM  
8CC1H SUB I 30H JZ BOH MOV CA MOV AM INX H MOV DM MOV EA LHL D  
8CCAH LHL D EAH 9BH DAD D MOV AM SUB C JZ 8DH 8DH LHL D  
8CD3H EEH 9BH DAD D MOV AM INX H MOV BM MOV CA LXI D 03H 00H  
8CDCH E6H 9BH MOV AM INX H MOV BM MOV CA LXI D 03H 00H  
8CE5H MOV LC MOV HB DAD D XCHG LHL D EAH 9BH DAD B MOV AM INX H  
8CEEH MOV BM MOV CA PUSH D LHL D EEH 9BH DAD B MOV AM SUB I  
8CF7H 30H MOV CA MOV BI 00H POP H DAD B XCHG LHL D E6H  
8D00H 9BH MOV ME INX H MOV MD JMP ABH 8CH LHL D EAH  
8D09H 9BH MOV AM INX H MOV BM MOV CA MOV LC MOV HB INX H XCHG  
8D12H LHL D ECH 9BH MOV AM INX H MOV MD LHL D DEH 9BH  
8D1BH MOV AM INX H MOV BM LHL D B6H 9BH MOV MA INX H MOV MB  
8D24H LHL D B6H 9BH MOV AM INX H MOV BM LHL D BAH 9BH  
8D2DH MOV CA MOV AM INX H MOV DM MOV EA XCHG LHL D BAH 9BH  
8D36H SBC D JNC A8H 8DH MOV DM MOV EA XCHG LHL D BAH 9BH  
8D3FH MOV BM MOV CA LHL D COH 9BH DAD B MOV AM INX H ECH



8D48H 9BH MOV CA MOV AM INX H MOV DM MOV EA LHL D EEH 9BH  
8D51H DAD D MOV AM SUB C JZ INX H MOV 83H 8DH LHL D E6H 9BH  
8D5AH MOV AM INX H MOV BM MOV CA CA LXI D 03H 00H LHL D MOV LC MOV HB  
8D63H DAD D XCHG LHL D EAH 9BH DAD B MOV AM SUB I 30H MOV BM MOV CA  
8D6CH PUSH D LHL D EEH POP H DAD B XCHG LHL D E6H 9BH MOV ME  
8D75H MOV BI 00H MOV MD JMP ABH 8CH 8CH LHL D ECH 9BH MOV AM  
8D7EH INX H MOV BM MOV CA MOV LC MOV MD LHL D ECH 9BH MOV AM  
8D87H INX H MOV ME INX H MOV LC MOV MD LHL D ECH 9BH MOV AM  
8D90H 9BH BM MOV CA MOV LC MOV MD LHL D ECH 9BH MOV AM  
8D99H MOV BM MOV CA MOV LC MOV MD LHL D ECH 9BH MOV AM  
8DA2H MOV ME INX H MOV MD JMP 34H F6H 9BH DAD B XCHG LHL D ECH 9BH  
8DABH MOV MI 02H MOV BM LHL D INX H MOV MI 00H 91H 9BH MOV ME  
8DB4H INX H MOV BM LHL D INX H MOV MI 00H 91H 9BH MOV ME  
8DBDH MOV MI 00H MOV BM LHL D INX H MOV MI 00H 91H 9BH MOV ME  
8DC6H INX H MOV BM LHL D INX H MOV MI 00H 91H 9BH MOV ME  
8DCFH MOV AM INX H MOV BM LHL D INX H MOV MI 00H 91H 9BH MOV ME  
8DD8H SUB I 30H JMP F9H JNZ F9H LHL D INX H MOV MI 00H 91H 9BH MOV ME  
8DE1H FFH 9BH MOV CA MOV AM SUB C JZ INX H MOV MI 00H 91H 9BH MOV ME  
8DEAH EAH 9BH DAD D MOV AM SUB C JZ INX H MOV MI 00H 91H 9BH MOV ME  
8DF3H 9BH MOV AM INX H MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8DFCH 9BH MOV AM INX H MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E05H INX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E0EH MOV DI 00H MOV ME INX H MOV LC MOV HB DAD D BCH 9BH DAD B XCHG LHL D ECH 9BH  
8E17H 9BH MOV ME INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E20H MOV CA MOV AM INX H MOV DI 00H MOV ME INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E29H MOV AM MOV EA MOV DI 00H MOV ME INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E32H LHL D E6H 9BH MOV ME INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E3BH LHL D EAH 9BH MOV ME INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E44H INX H XCHG LHL D ECH 9BH MOV ME INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E4DH DEH 9BH MOV AM INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E56H INX H MOV MB LHL D B6H 9BH MOV ME INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E5FH BAH 9BH MOV CA MOV AM INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E68H MOV CA MOV AB SBC D JNC F1H 8EH 8EH MOV ME INX H MOV MD DCX H MOV DM MOV EA LHL D EAH 9BH DAD B XCHG LHL D ECH 9BH  
8E71H MOV AM INX H MOV BM MOV CA LHL D COH 9BH DAD B MOV AM

8E7AH LHL D ECH 9BH DAD D 9BH MOV CA MOV AM INX H MOV DM MOV EA LHL D  
8E83H BCH 9BH MOV AM SUB C JZ CCH 8EH 8EH LHL D LHL D  
8E8CH E6H 9BH MOV AM DM MOV EA LHL D LHL D MOV CA  
8E95H MOV AM INX H MOV DM MOV EA LHL D B6H DAD D MOV AM  
8E9EH MOV EA MOV DI 00H MOV LC MOV HB DAD D INX H XCHG LHL D  
8EA7H E6H 9BH MOV CA MOV AM MOV ME INX H MOV MD DCX H MOV AM INX H MOV BM  
8EB0H DCX H MOV CA MOV AM MOV ME INX H MOV MD DCX H MOV AM INX H MOV BM  
8EB9H DAD D MOV AM MOV EA LHL D ECH 9BH MOV ME INX H MOV MD DCX H MOV AM  
8EC2H XCHG LHL D LHL D ECH 9BH MOV ME INX H MOV MD DCX H MOV AM  
8ECBH 8DH LHL D LHL D ECH 9BH MOV ME INX H MOV MD DCX H MOV AM  
8ED4H MOV HB INX H XCHG LHL D ECH 9BH MOV ME INX H MOV MD DCX H MOV AM  
8EDDH LHL D B6H XCHG 9BH MOV ME INX H MOV MD DCX H MOV AM  
8EE6H INX H XCHG 9BH MOV ME INX H MOV MD DCX H MOV AM  
8EEFH 58H 8EH LHL D LHL D ECH 9BH MOV ME INX H MOV MD DCX H MOV AM  
8EF8H 91H LHL D LHL D F4H 9BH MOV ME INX H MOV MD DCX H MOV AM  
8F01H MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F0AH LHL D B6H INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F13H MOV CA MOV AM MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F1CH SBC D JNC 31H MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F25H MOV BM MOV CA LHL D COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F2EH JC 53H MOV CA LHL D COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F37H MOV CA LHL D COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F40H MOV HI 00H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F49H 00H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F52H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F5BH D5H 90H LHL D LHL D F8H MOV MI 10H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F64H 90H LHL D LHL D F8H MOV MI 10H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F6DH LHL D F8H MOV MI 10H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F76H F8H 9BH MOV MI 10H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F76H F8H 9BH MOV MI 10H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F88H MOV MI 20H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F91H 24H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8F9AH JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB  
8FA3H D5H 90H LHL D LHL D F8H MOV MI 30H JMP D5H COH 9BH MOV AM INX H MOV BM LHL D B6H MOV MI 01H LHL D MOV MA INX H MOV MB

8FACH 90H LHL D F8H 9BH MOV MI 34H JMP 90H D5H 90H  
8FB5H LHL D F8H 9BH MOV MI 38H JMP 90H D5H 90H LHL D  
8FBEH F8H 9BH MOV MI 3CH JMP 90H D5H 90H LHL D F8H  
8FC7H 9BH MOV MI 40H JMP 90H D5H 90H LHL D F8H 9BH  
8FDOH MOV MI 44H JMP 90H D5H 90H LHL D F8H 9BH MOV MI  
8FD9H 48H JMP 90H D5H 90H LHL D F8H 9BH MOV MI 4CH  
8FE2H JMP 90H D5H 90H LHL D F8H 9BH MOV MI 50H JMP  
8FEBH D5H 90H LHL D F8H 9BH MOV MI 54H JMP 90H D5H  
8FF4H 90H LHL D F8H 9BH MOV MI 58H JMP 90H D5H 90H  
8FFDH LHL D F8H 9BH MOV MI 5CH JMP 90H D5H 90H LHL D  
9006H F8H 9BH MOV MI 60H JMP 90H D5H 90H LHL D F8H  
900FH 9BH MOV MI 64H JMP 90H D5H 90H LHL D F8H  
9018H 90H DAD B MOV EM INX H MOV DM XCHG PCHL  
901FH 45H 8FH 4DH 8FH 55H 8FH 5DH 8FH 6DH 8FH 75H 8FH 7DH 8FH  
902FH 85H 8FH 8DH 8FH 95H 8FH 9DH 8FH ADH 8FH B5H 8FH BDH 8FH  
903FH C5H 8FH CDH 8FH D5H 8FH DDH 8FH EDH 8FH F5H 8FH FDH 8FH  
904FH 05H 90H ODH 90H  
9053H LHL D B6H 9BH MOV AM INX H MOV BM MOV CA LHL D COH  
905CH 9BH DAD B MOV AM SUB I 30H MOV LA MOV HI 00H JMP  
9065H B7H 90H LHL D F8H 9BH MOV MI 68H JMP 90H D5H  
906EH 90H LHL D F8H 9BH MOV MI 6CH JMP 90H D5H 90H  
9077H LHL D F8H 9BH MOV MI 70H JMP 90H D5H 90H LHL D  
9080H F8H 9BH MOV MI 74H JMP 90H D5H 90H LHL D F8H  
9089H 9BH MOV MI 78H JMP 90H D5H 90H LHL D F8H 9BH  
9092H MOV MI 7CH JMP 90H D5H 90H LHL D F8H 9BH MOV MI  
909BH 80H JMP 90H D5H 90H LHL D F8H 9BH MOV MI 84H  
90A4H JMP 90H D5H 90H LHL D F8H 9BH MOV MI 88H JMP  
90ADH D5H 90H LHL D F8H 9BH MOV MI 8CH JMP 90H D5H  
90B6H 90H DAD H LXI B C1H 90H DAD B MOV EM INX H MOV DM  
90BFH XCHG PCHL  
90C1H 67H 90H 6FH 90H 77H 90H 7FH 90H 87H 90H 8FH 90H 97H 90H 9FH 90H  
90D1H A7H 90H AFH 90H 9BH MOV AM LHL D F2H 9BH MOV MA LHL D  
90D5H LHL D F4H 9BH MOV AM LHL D F4H 9BH MOV CA MOV AM ADD I  
90DEH F2H 9BH MOV AM LHL D F4H 9BH MOV CA MOV AM ADD I

90E7H 04H JC SUB C 16H 91H LHL D F2H 9BH MOV AM  
 90F0H MOV CA MOV BI 00H LHL D MOV CA PUSH D MOV BI 00H DAD B XCHG LHL D MOV AM  
 90F9H F8H MOV AM MOV AM POP H F2H F4H MOV AM ADD I 04H MOV MA JNZ MOV MA  
 9102H 9BH DAD B MOV MA LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 910BH INR A LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9114H DDH LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 911DH LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9126H INX H XCHG LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 912FH OAH 8FH JMP LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9138H SUB I 54H JZ LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9141H 46H 91H JMP LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 914AH SUB I 56H SUB I 01H SBC A LHL D E4H MOV MA JNZ MOV MA  
 9153H MOV AM SUB I 00H SUB I 01H SBC A LHL D E4H MOV MA JNZ MOV MA  
 915CH 31H LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9165H 00H LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 916EH 9BH MOV CA MOV AM INX H MOV DM SUB C MOV EA MOV AD SBC B  
 9177H JC COH 91H LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9180H LHL D LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9189H DAD B XCHG LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9192H 9BH MOV AM INX H MOV DM SUB C MOV EA MOV AD SBC B  
 919BH MOV AM INX H MOV DM SUB C MOV EA MOV AD SBC B  
 91A4H COH 9BH DAD D MOV DM SUB C MOV EA MOV AD SBC B  
 91ADH MOV AM INX H MOV DM SUB C MOV EA MOV AD SBC B  
 91B6H LHL D LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 91BFH 91H LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 91C8H 9BH MOV CA MOV AM INX H MOV DM SUB C MOV EA MOV AD SBC B  
 91D1H XCHG LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 91DAH 9BH MOV AM INX H MOV DM SUB C MOV EA MOV AD SBC B  
 91E3H INX H MOV DM SUB C MOV EA MOV AD SBC B  
 91ECH 9BH MOV ME INX H MOV DM SUB C MOV EA MOV AD SBC B  
 91F5H MOV CA MOV BI 00H LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 91FEH LHL D LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9207H LHL D LHL D LHL D MOV AM INR A MOV MA MA JNZ MOV MA  
 9210H EOH 9BH MOV CA MOV AM INX H MOV DM SUB C MOV EA MOV AD SBC B

9219H INX H XCHG POP H MOV ME INX H MOV MD LHL D 9BH  
 9222H MOV AM SUB I FFH JNZ MOV 19H INX 19H LHL D C8H 9BH  
 922BH MOV AM INR A MOV MA JMP 19H LHL D ACH 9BH  
 9234H MOV AM SUB I 57H SUB I 01H SUB I 01H SBC A LHL D E4H 9BH  
 923DH MOV CA MOV AM SUB I 00H LHL D MOV MI 01H ANA C RRC INX H  
 9246H JNC MI 00H LHL D B6H MOV AM INX H MOV BM LHL D  
 924FH MOV MI 00H LHL D MOV CA MOV AM INX H MOV EA MOV AD  
 9258H EOH 9BH JC MOV AM INX H LHL D CCH MOV AM INX H  
 9261H SBC B JC LHL D MOV CA MOV AM INX H MOV DM MOV EA  
 926AH MOV BM LHL D DAD B MOV AM INX H MOV MI 01H MOV DM MOV EA  
 9273H XCHG DEH 9BH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 927CH DEH 9BH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 9285H MOV CA MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 928EH LHL D COH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 9297H 9BH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 92A0H XCHG LHL D B6H MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 92A9H 51H 92H LHL D CCH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 92B2H EOH 9BH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 92BBH INX H XCHG LHL D MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 92C4H CCH 9BH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 92CDH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 92D6H CCH 9BH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 92DFH INR A MOV CA MOV BI 00H LHL D CEH MOV MD LHL D MOV AM  
 92E8H XCHG LHL D DOH MOV BI 00H LHL D CEH MOV MD LHL D MOV AM  
 92F1H 00H LHL D CEH MOV BI 00H LHL D CEH MOV MD LHL D MOV AM  
 92FAH LHL D EOH MOV AM INX H MOV DM MOV EA MOV MI 01H LHL D  
 9303H DAD B INX H XCHG POP H MOV CA MOV AM INX H MOV MD LHL D  
 930CH 9BH MOV AM SUB I FFH JNZ MOV MA LHL D D4H DOH  
 9315H 9BH MOV AM INR A MOV AM INR A MOV CA PUSH D MOV BI  
 931EH 00H JNZ 28H MOV AM INR A MOV CA PUSH D MOV BI  
 9327H 93H JMP 58H MOV AM INR A MOV CA PUSH D MOV BI  
 9330H FFH B0H MOV AM INR A MOV CA PUSH D MOV BI  
 9339H MOV BM SUB I 07H MOV CA MOV AB SBC I 00H ORA C JNZ  
 9342H DOH LHL D CCH MOV AM INR A MOV CA PUSH D MOV BI

934BH MOV LC MOV HB INX H XCHG LHL D MOV AM CAH 9BH MOV BM DAD D MOV MI  
 9354H 1BH LHL D CCH MOV LC MOV HB INX H XCHG LHL D MOV AM CAH 9BH MOV BM DAD D MOV MI  
 935DH 02H 00H MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 9366H DAD D MOV MI 1BH MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 936FH MOV CA LXI D 03H 00H MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 9378H CAH 9BH DAD D MOV MI 54H LHL D MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 9381H INX H MOV BM MOV CA LXI D 04H 00H MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 938AH XCHG LHL D CAH MOV CA LXI D 04H 00H MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 9393H 9BH MOV AM INX H MOV BM MOV CA LXI D 04H 00H MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 939CH MOV HB DAD D XCHG LHL D MOV AM INR A MOV CA MOV BI 00H LHL D MOV MD LHL D  
 93A5H LHL D DOH 9BH DAD B XCHG LHL D MOV AM INR A MOV CA MOV BI 00H LHL D MOV MD LHL D  
 93AEH CEH 9BH DAD B XCHG LHL D MOV AM INR A MOV CA MOV BI 00H LHL D MOV MD LHL D  
 93B7H INR A MOV CA PUSH D MOV BI 00H LHL D MOV AM INR A MOV CA MOV BI 00H LHL D MOV MD LHL D  
 93C0H DAD B MOV AM INX H MOV BM MOV CA LXI D 04H 00H MOV LC MOV MD LHL D MOV MD LHL D  
 93C9H MOV HB DAD D XCHG POP H MOV ME INX H MOV MD LHL D MOV MD LHL D  
 93D2H 9BH MOV AM SUB I FPH JNZ 15H 96H CCH LHL D MOV MD LHL D  
 93DBH 9BH MOV AM INX H MOV BM MOV CA LXI D 04H 00H MOV LC MOV MD LHL D MOV MD LHL D  
 93E4H LHL D CAH 9BH DAD D MOV MI 41H LHL D MOV MD LHL D  
 93EDH MOV AM INX H MOV BM MOV CA LXI D 02H 00H MOV LC MOV MD LHL D MOV MD LHL D  
 93F6H DAD D XCHG LHL D CAH MOV AM INX H MOV BM MOV CA LXI D 03H 00H MOV MD LHL D  
 93FFH CCH 9BH MOV AM INX H MOV BM MOV CA LXI D 03H 00H MOV MD LHL D  
 9408H MOV LC MOV HB DAD D XCHG LHL D MOV AM INX H MOV BM MOV CA LXI D 03H 00H MOV MD LHL D  
 9411H 41H LHL D CCH MOV LC MOV HB DAD D XCHG LHL D MOV AM INX H MOV BM MOV CA LXI D 03H 00H MOV MD LHL D  
 941AH 04H 00H MOV MI 45H DAD D MOV MI 45H LHL D MOV AM INX H MOV BM MOV CA LXI D 03H 00H MOV MD LHL D  
 9423H DAD D MOV MI 45H DAD D MOV MI 45H LHL D MOV AM INX H MOV BM MOV CA LXI D 03H 00H MOV MD LHL D  
 942CH MOV CA LXI D 05H 00H MOV LC MOV HB DAD D XCHG LHL D MOV AM INX H MOV BM MOV CA LXI D 03H 00H MOV MD LHL D  
 9435H CAH 9BH DAD D MOV MI 41H LHL D MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 943EH INX H MOV BM MOV CA LXI D 06H 00H MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 9447H XCHG LHL D CAH MOV CA LXI D 06H 00H MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 9450H 9BH MOV AM INX H MOV BM MOV CA LXI D 06H 00H MOV LC MOV HB DAD D CCH MOV AM CAH 9BH MOV BM DAD D MOV MI  
 9459H MOV HB DAD D XCHG LHL D MOV AM INR A MOV CA MOV BI 00H LHL D MOV MD LHL D  
 9462H LHL D DOH 9BH MOV AM INR A MOV CA MOV BI 00H LHL D MOV MD LHL D  
 946BH CEH 9BH DAD B XCHG LHL D MOV AM INR A MOV CA MOV BI 00H LHL D MOV MD LHL D  
 9474H INR A MOV CA PUSH D MOV BI 00H LHL D MOV AM INR A MOV CA MOV BI 00H LHL D MOV MD LHL D

947DH DAD B MOV AM INX H MOV BM MOV CA LXI D 06H 00H MOV LC  
 9486H MOV HB DAD D XCHG POP H MOV ME INX H MOV MD LHL D FCH  
 948FH 9BH MOV MI 01H LHL D FCH MOV AM LHL D F4H  
 9498H 9BH MOV CA MOV AM SUB I 04H JC JC 5EH 95H  
 94A1H JMP AEH 94H LHL D FCH MOV AM ADD I 04H  
 94AAH MOV MA JMP 92H 94H LHL D F2H 9BH MOV MI 01H  
 94B3H LHL D F2H 9BH MOV AM MOV CA MOV AI 04H SUB C JC  
 94BCH F4H 94H LHL D CCH 9BH MOV AM INX H MOV BM LHL D  
 94C5H F2H 9BH MOV CA MOV AM MOV EA MOV DI 00H MOV LC MOV HB  
 94CEH DAD D XCHG LHL D CAH 9BH DAD D XCHG LHL D FCH  
 94D7H 9BH MOV AM PUSH D LHL D F2H 9BH MOV CA MOV AM ADD C  
 94E0H DCR A MOV EA MOV DI 00H LHL D F0H 9BH DAD D MOV AM  
 94E9H POP H MOV MA LHL D F2H 9BH MOV AM INR A MOV MA JNZ AM  
 94F2H B3H 94H LHL D CCH 9BH MOV AM INX H MOV BM MOV CA  
 94FBH LXI D 05H 00H MOV LC MOV HB DAD D XCHG LHL D CAH  
 9504H 9BH DAD D MOV MI 41H LHL D CCH 9BH MOV AM INX H  
 950DH MOV BM MOV CA LXI D 06H 00H MOV LC MOV HB DAD D XCHG  
 9516H LHL D CAH 9BH DAD D MOV MI 32H LHL D CCH 9BH  
 951FH MOV AM INX H MOV BM MOV CA LXI D 06H 00H MOV LC MOV HB  
 9528H DAD D XCHG LHL D CCH 9BH MOV ME INX H MOV MD LHL D  
 9531H D0H 9BH MOV AM INR A MOV CA MOV BI 00H LHL D CEH  
 953AH 9BH DAD B XCHG LHL D D0H 9BH MOV AM INR A  
 9543H MOV CA PUSH D MOV BI 00H LHL D CEH 9BH DAD B DAD B  
 954CH MOV AM INX H MOV BM MOV CA LXI D 06H 00H MOV LC MOV HB  
 9555H DAD D XCHG POP H MOV ME INX H MOV MD JMP A4H 94H  
 955EH LHL D CCH 9BH MOV AM INX H MOV BM MOV CA MOV LC MOV HB  
 9567H INX H XCHG LHL D CAH 9BH DAD D MOV MI 41H LHL D  
 9570H CCH 9BH MOV AM INX H MOV BM MOV CA LXI D 02H 00H  
 9579H MOV LC MOV HB DAD D XCHG LHL D CAH 9BH DAD D MOV MI  
 9582H 32H LHL D CCH 9BH MOV AM INX H MOV BM MOV CA LXI D  
 958BH 03H 00H MOV LC MOV HB DAD D XCHG LHL D CAH 9BH  
 9594H DAD D MOV MI 41H LHL D CCH 9BH MOV AM INX H MOV BM  
 959DH MOV CA LXI D 04H 00H MOV LC MOV HB DAD D XCHG LHL D  
 95A6H CAH 9BH DAD D MOV MI 46H CCH 9BH MOV AM

95AFH INX H MOV BM MOV CA LXI D 05H 00H MOV MI 41H MOV LC MOV HB DAD D  
95B8H XCHG LHL D CAH INX H MOV AM INX H MOV BM MOV CA LXI D 06H 00H LHL D CCH MOV LC  
95C1H 9BH MOV DAD D XCHG 9BH MOV AM INX H MOV AM INX H MOV BM MOV CA LXI D 06H 00H MOV MI 32H  
95CAH MOV HB LHL D CCH 9BH MOV LC MOV MD LHL D CEH 9BH MOV AM INR A MOV CA MOV ME  
95D3H LHL D MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
95DCH 00H INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
95E5H INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
95EEH 00H LHL D CEH INR A MOV AM INR A MOV AM INR A MOV AM INR A MOV AM INR A  
95F7H 9BH MOV AM INR A MOV AM INR A MOV AM INR A MOV AM INR A MOV AM INR A  
9600H 9BH DAD B DAD B DAD B DAD B DAD B DAD B DAD B DAD B DAD B DAD B  
9609H 00H MOV LC MOV LC MOV LC MOV LC MOV LC MOV LC MOV LC MOV LC MOV LC MOV LC  
9612H JMP BOH 4DH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
961BH JNZ 4DH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
9624H MOV MI 00H LHL D B6H 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
962DH EOH 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
9636H SBC B JC 80H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
963FH MOV BM LHL D B6H 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
9648H XCHG DAD B DAD B DAD B DAD B DAD B DAD B DAD B DAD B DAD B  
9651H DEH CA MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
965AH MOV CA COH 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
9663H LHL D MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
966CH 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
9675H XCHG LHL D B6H 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
967EH 26H 96H LHL D CCH 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
9687H EOH 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
9690H XCHG LHL D CCH 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
9699H INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
96A2H 9BH DAD D MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
96ABH MOV BM MOV CA LXI D 02H 00H MOV LC MOV HB DAD D XCHG 9BH MOV AM INX H  
96B4H LHL D CAH 9BH DAD D MOV MI 46H LHL D CCH MOV HB DAD D XCHG 9BH MOV AM INX H  
96BDH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H  
96C6H DAD D XCHG LHL D CAH 9BH DAD D MOV MI 41H LHL D CCH MOV HB DAD D XCHG 9BH MOV AM INX H  
96CFH DAH 9BH MOV AM SUB I 00H JNZ EEH 96H LHL D CCH MOV HB DAD D XCHG 9BH MOV AM INX H  
96D8H CCH 9BH MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H MOV AM INX H



96E1H MOV LC MOV HB DAD D XCHG LHL D CAH 9BH DAD D MOV MI  
 96E2H MOV LC MOV HB DAD D XCHG LHL D CCH MOV AM INX H  
 96E3H MOV BM MOV CA LXI D 04H DAD D 04H MOV AM INX H  
 96F3H MOV BM MOV CA LXI D 04H DAD D 04H MOV AM INX H  
 96F4H LHL D CAH INX H MOV BM MOV CA LXI D 04H DAD D 04H MOV AM INX H  
 96F5H MOV AM INX H MOV BM MOV CA LXI D 04H DAD D 04H MOV AM INX H  
 96F6H LHL D XCHG LHL D MOV AM INR A MOV CA MOV BI 00H LHL D CEH  
 96F7H MOV AM INR A MOV CA MOV BI 00H LHL D CEH  
 96F8H MOV CA PUSH D MOV BI 00H LHL D CEH  
 96F9H MOV AM INX H MOV BM MOV CA LXI D 04H DAD D 04H MOV AM INX H  
 96FAH MOV DM MOV EA XCHG POP H MOV ME INX H XCHG LXI B 04H MOV AM INX H  
 96FBH MOV DM MOV EA XCHG POP H MOV ME INX H XCHG LXI B 04H MOV AM INX H  
 96FCH MOV DM MOV EA XCHG POP H MOV ME INX H XCHG LXI B 04H MOV AM INX H  
 96FDH MOV DM MOV EA XCHG POP H MOV ME INX H XCHG LXI B 04H MOV AM INX H  
 96FEH MOV DM MOV EA XCHG POP H MOV ME INX H XCHG LXI B 04H MOV AM INX H  
 96FFH MOV DM MOV EA XCHG POP H MOV ME INX H XCHG LXI B 04H MOV AM INX H  
 96G0H MOV AI 00H SBC B JC B4H MOV CA MOV AI 04H LHL D CCH MOV AM INX H  
 96G1H MOV AM INX H MOV BM LHL D B6H MOV CA MOV AI 04H LHL D CCH MOV AM INX H  
 96G2H MOV DM MOV EA XCHG ECH MOV CA MOV AM INX H MOV BM PUSH D LHL D  
 96G3H XCHG LHL D 9BH MOV CA MOV AM INX H MOV BM PUSH D LHL D  
 96G4H B6H XCHG LHL D 9BH MOV CA MOV AM INX H MOV BM PUSH D LHL D  
 96G5H DCX H XCHG LHL D 9BH MOV CA MOV AM INX H MOV BM PUSH D LHL D  
 96G6H LHL D B6H XCHG LHL D 9BH MOV CA MOV AM INX H MOV BM PUSH D LHL D  
 96G7H 00H DAD B XCHG LHL D 9BH MOV CA MOV AM INX H MOV BM PUSH D LHL D  
 96G8H 00H JMP 5DH 97H LHL D CCH MOV AM INX H  
 96G9H MOV BM MOV CA LXI D 05H DAD D 05H MOV LC MOV HB DAD D XCHG  
 96G0H LHL D CAH 9BH DAD D 05H MOV LC MOV HB DAD D XCHG  
 96G1H MOV AM SUB I 00H DAD D 05H MOV LC MOV HB DAD D XCHG  
 96G2H MOV AM INX H MOV BM MOV CA LXI D 06H DAD D 06H MOV LC MOV HB  
 96G3H DAD D XCHG LHL D CAH 9BH DAD D 06H MOV LC MOV HB  
 96G4H FCH 97H LHL D CCH MOV LC MOV HB DAD D XCHG CAH  
 96G5H LXI D 06H 00H MOV LC MOV HB DAD D XCHG CAH  
 96G6H 9BH DAD D MOV MI 32H LHL D CCH 9BH MOV AM INX H  
 96G7H MOV BM MOV CA LXI D 06H 00H MOV LC MOV HB DAD D XCHG  
 96G8H LHL D CCH 9BH MOV ME INX H MOV MD LHL D DOH 9BH

9813H MOV AM INR A MOV CA MOV BI 00H LHLD CEH 9BH CA PUSH D  
981CH DAD B XCHG LHLD DOH 9BH MOV AM INR A MOV CA PUSH D  
9825H MOV BI 00H XCHG LHLD CEH 9BH MOV AM INR A MOV CA PUSH D  
982EH MOV BM MOV CA LXI D 06H 00H DAD B DAD B MOV AM INR H  
9837H POP H MOV ME INX H MOV MD JMP B0H 9AH LHLD E4H XCHG  
9840H 9BH MOV AM SUB I 02H JNZ 30H 99H LHLD B6H  
9849H 9BH MOV MI 01H INX H MOV MI JNZ 30H 99H LHLD B6H  
9852H MOV AM INX H MOV BM MOV CA MOV AI 02H SUB C MOV EA MOV AI  
985BH 00H SBC B JC LHLD CCH 9BH MOV AM MOV AM  
9864H INX H MOV BM LHLD A6H 98H LHLD MOV CA MOV AM MOV DM  
986DH MOV EA XCHG DAD B LHLD B6H 9BH MOV CA MOV AM MOV DM  
9876H LHLD ECH 9BH XCHG DAD B LHLD CAH MOV CA MOV AM XCHG  
987FH 9BH MOV CA MOV AM INX H MOV AM INX H MOV DM LHLD B6H  
9888H XCHG LHLD EEH MOV CA MOV AM INX H MOV DM XCHG H  
9891H B6H 9BH XCHG LHLD EEH MOV CA MOV AM INX H MOV MA LHLD  
989AH DAD B XCHG 4FH 98H LHLD B6H 9BH MOV CA LXI H 01H 00H  
98A3H JMP XCHG LHLD EEH MOV CA MOV AM INX H MOV MI 00H  
98ACH MOV CA LXI D 03H 00H LHLD CCH 9BH MOV AM INX H MOV BM  
98B5H CAH 9BH DAD D MOV MI 41H MOV LC MOV HB DAD D LHLD  
98BEH SUB I 00H JNZ DAD D MOV MI 41H LHLD DAH 9BH MOV AM  
98C7H INX H MOV BM MOV CA LXI D 04H 00H MOV LC MOV HB DAL D  
98DOH XCHG LHLD CAH MOV CA MOV MI 30H JMP EEH  
98D9H 98H LHLD CCH 9BH MOV AM INX H MOV CA LXI D  
98E2H 04H 00H MOV LC MOV HB DAD D XCHG LHLD CAH 9BH MOV AM  
98EBH DAD D MOV MI 32H LHLD CCH 9BH MOV AM INX H MOV BM  
98F4H MOV CA LXI D 04H 00H MOV LC MOV HB DAD D XCHG LHLD  
98FDH CCH 9BH MOV ME INX H MOV MD LHLD DOH 9BH MOV AM  
9906H INR A MOV CA MOV BI 00H LHLD CEH 9BH DAD B DAD B  
990FH XCHG LHLD DOH 9BH MOV AM INR A MOV CA PUSH D MOV BI  
9918H 00H LHLD CEH 9BH DAD B MOV AM INX H MOV BM  
9921H MOV CA LXI D 04H 00H MOV LC MOV HB DAD D XCHG POP H  
992AH MOV ME INX H MOV MD JMP B0H 9AH LHLD E4H 9BH  
9933H MOV AM SUB I 03H JNZ B0H 9AH LHLD ECH 9BH  
993CH MOV AM INX H MOV BM MOV CA LHLD BCH 9BH DAD B MOV AM

9945H LHL D FEH 9BH MA INX H MOV MI 00H LHL D CCH  
 994EH 9BH MOV AM INX H MOV BM CA MOV LC MOV HB INX H XCHG  
 9957H LHL D CAH 9BH DAD D MOV MI 39H LHL D CCH 9BH  
 9960H MOV AM INX H MOV BM CA LXI D 02H 00H MOV LC MOV HB  
 9969H DAD D XCHG LHL D MOV AM INX H MOV BM CA LXI D 02H 00H LHL D  
 9972H CCH MOV LC MOV HB DAD D 9BH MOV CA LXI D 02H 00H  
 997BH MOV LC MOV MD LHL D 9BH MOV AM INX H MOV BM CA LXI D 02H 00H  
 9984H MOV MD LHL D B6H 9BH MOV AM INX H MOV BM CA LXI D 02H 00H  
 998DH LHL D B6H 9BH MOV AM INX H MOV BM CA LXI D 02H 00H  
 9996H MOV CA MOV AM INX H MOV DM SUB C MOV EA MOV AD SBC B JC  
 999FH E6H 99H 9BH MOV CA MOV AM INX H MOV DM MOV EA XCHG LHL D  
 99A8H B6H 9BH LHL D CAH MOV CA MOV AM INX H MOV DM MOV EA XCHG LHL D  
 99B1H XCHG LHL D CAH MOV BM PUSH D LHL D B6H XCHG LHL D  
 99BAH MOV AM INX H MOV DM MOV EA XCHG LHL D B6H XCHG LHL D  
 99C3H INX H MOV DM MOV AM POP H MOV MA LHL D DAD B XCHG LHL D  
 99CCH DAD D MOV AM POP H MOV MA LHL D DAD B XCHG LHL D  
 99D5H MOV BM MOV CA LXI H 01H 00H DAD B XCHG LHL D B6H  
 99DEH 9BH MOV ME INX H MOV MI 00H JMP 8DH LHL D  
 99E7H CCH 9BH MOV AM INX H MOV BM LHL D FEH 9BH MOV CA  
 99F0H MOV AM INX H MOV DM MOV EA XCHG LHL D DAD B XCHG LHL D  
 99F9H 9BH MOV ME INX H MOV MD DCX H MOV AM INX H MOV BM MOV CA  
 9A02H MOV LC MOV HB INX H XCHG LHL D CAH 9BH DAD D MOV MI  
 9A0BH 46H LHL D CCH MOV LC MOV HB DAD D XCHG LHL D CAH 9BH LXI D  
 9A14H 02H 00H MOV MI 46H LHL D CCH MOV LC MOV HB DAD D XCHG LHL D  
 9A1DH DAD D MOV MI LXI D 03H DAD D CCH MOV LC MOV HB DAD D XCHG LHL D  
 9A26H MOV CA LXI D 03H DAD D CCH MOV LC MOV HB DAD D XCHG LHL D  
 9A2FH CAH 9BH DAD D 00H MOV MI 41H LHL D DAH 9BH MOV AM  
 9A38H SUB I 00H JNZ 54H LHL D LHL D CCH 9BH MOV AM  
 9A41H INX H MOV BM MOV CA LXI D 04H 00H MOV LC MOV HB DAD D  
 9A4AH XCHG LHL D CAH 9BH DAD D MOV MI 30H JMP 68H  
 9A53H 9AH LHL D CCH 9BH MOV AM INX H MOV BM MOV CA LXI D  
 9A5CH 04H 00H MOV LC MOV HB DAD D XCHG LHL D CAH 9BH  
 9A65H DAD D MOV MI 32H LHL D CCH 9BH MOV AM INX H MOV BM  
 9A6EH MOV CA LXI D 04H 00H MOV LC MOV HB DAD D XCHG LHL D

9A77H CCH 9BH MOV ME INX H MOV MD LHL D DOH 9BH MOV AM 9BH DAD B DAD B MOV AM  
 9A80H INR A MOV CA MOV BI 00H LHL D MOV AM INR A CEH 9BH MOV CA PUSH D MOV BI  
 9A89H XCHG LHL D DOH CEH 9BH MOV AM INR A MOV CA PUSH D MOV BI  
 9A92H 00H LHL D FEH 9BH MOV CA MOV AM INX H MOV DM MOV EA XCHG  
 9A9BH LHL D DAD B XCHG LXI B 06H MOV CA MOV AM INX H MOV DM MOV EA XCHG  
 9AA4H DAD B XCHG LXI B 06H MOV CA MOV AM INX H MOV DM MOV EA XCHG  
 9AADH MOV ME INX H MOV MD LHL D D4H 9BH MOV AM SUB I FFH POP H  
 9AB6H JNZ 2FH 9BH MOV MD LHL D LHL D CCH 9BH MOV AM INX H MOV BM  
 9ABFH MOV CA MOV LC MOV HB INX H XCHG LHL D CAH 9BH MOV AM INX H MOV BM  
 9AC8H MOV MI ODH LHL D MOV LC MOV HB INX H MOV AM INX H MOV BM MOV CA  
 9AD1H LXI D 02H DAD D 00H MOV MI OAH MOV LC MOV HB DAD D XCHG LHL D CAH  
 9ADAH 9BH DAD D MOV CA LXI D 02H MOV ME INX H MOV MD LHL D DOH 9BH MOV AM INX H  
 9AE3H MOV BM MOV CA LXI D 02H MOV ME INX H MOV MD LHL D DOH 9BH MOV AM INX H  
 9AECH LHL D CCH 9BH MOV MA MOV CA MOV BI 00H LHL D CEH 9BH MOV AM INX H  
 9AF5H MOV AM INR A MOV MA MOV CA MOV BI 00H LHL D CEH 9BH MOV AM INX H  
 9AFEH DAD B DAD B XCHG LHL D LHL D MOV AM MOV CA PUSH D  
 9B07H MOV BI 00H LHL D CEH 9BH DAD B DAD B MOV AM INX H  
 9B10H MOV BM MOV CA LXI D 02H 00H MOV LC MOV HB DAD D XCHG  
 9B19H POP H MOV ME INX H MOV MD LHL D BEH 9BH MOV MI 00H  
 9B22H INX H MOV MI 00H MOV AI 10H OUT E9H JMP BBH  
 9B2BH 13H JMP 32H 9BH JMP 85H EI HLT

APPENDIX E

VOICE PROGRAM SOURCE-TO-ASSEMBLY  
CODE CROSS-REFERENCE MAP

1=8003H  
18=8029H  
30=804EH  
53=8089H  
65=80BFH  
80=80F9H  
93=811DH  
134=8145H  
156=816FH  
179=8197H  
191=81C4H  
197=8211H  
203=8252H  
209=82BCH  
215=832BH  
221=8367H  
229=83CFH  
235=8418H  
241=846AH  
247=84CAH  
253=8520H  
266=854BH  
274=859BH  
280=85CFH  
286=85FBH  
292=8629H  
298=8654H  
304=86A9H  
310=8700H  
316=873DH  
322=876AH  
328=87AEH  
334=883CH  
340=887DH  
13=800BH  
19=802FH  
37=8051H  
56=808FH  
66=80D9H  
88=80FFH  
101=8123H  
135=814BH  
157=8175H  
183=819AH  
192=81C9H  
198=821CH  
204=8279H  
210=82BFH  
216=833EH  
222=836DH  
230=83DDH  
236=8423H  
242=8470H  
248=84D0H  
254=852CH  
267=855CH  
275=85A0H  
281=85D2H  
287=8601H  
293=862FH  
299=865AH  
305=86BDH  
311=8714H  
317=8743H  
323=876FH  
329=87C8H  
335=8840H  
341=88A3H  
14=8011H  
20=8035H  
38=806EH  
59=8095H  
68=80E1H  
89=8105H  
102=8129H  
136=8151H  
158=817BH  
187=81A0H  
193=81DFH  
199=8230H  
205=8291H  
211=82D8H  
217=8342H  
223=836AH  
231=83E8H  
237=843CH  
243=8483H  
249=84E3H  
255=8530H  
268=857DH  
276=85A6H  
282=85D7H  
288=8606H  
294=8637H  
300=866DH  
306=86C6H  
312=871DH  
318=874BH  
324=8777H  
330=87E2H  
336=8851H  
342=88A7H  
15=8017H  
26=803AH  
41=8076H  
62=809BH  
71=80E7H  
90=810BH  
103=812FH  
139=8159H  
159=8181H  
188=81ACH  
194=81E4H  
200=8234H  
206=8296H  
212=82FFH  
218=8345H  
224=8375H  
232=83E5H  
238=8442H  
244=84A5H  
250=84F6H  
263=8536H  
269=8589H  
277=85ACH  
283=85E2H  
289=860BH  
295=863AH  
301=867BH  
307=86DAH  
313=8723H  
319=8751H  
325=878AH  
331=87E7H  
337=8859H  
343=88B8H  
16=801DH  
28=8042H  
44=807BH  
63=80A3H  
74=80EDH  
91=8111H  
129=8137H  
143=8161H  
164=8187H  
189=81B4H  
195=81EEH  
201=8236H  
207=82A5H  
213=8317H  
219=8351H  
227=837BH  
233=83EFH  
239=8455H  
245=84B0H  
251=850BH  
264=853CH  
272=8591H  
278=85B4H  
284=85ECH  
290=8616H  
296=863FH  
302=868CH  
308=86E3H  
314=8736H  
320=875EH  
326=878DH  
332=880DH  
338=8862H  
344=88C0H  
17=8023H  
29=8048H  
50=8083H  
64=80B4H  
77=80F3H  
92=8117H  
133=813FH  
150=8169H  
174=818FH  
190=81C0H  
196=81FEH  
202=8239H  
208=82B8H  
214=831CH  
220=8360H  
228=8387H  
234=840AH  
240=845DH  
246=84BAH  
252=8516H  
265=8545H  
273=8596H  
279=85B9H  
285=85F5H  
291=8620H  
297=864AH  
303=86A0H  
309=86F7H  
315=8739H  
321=8764H  
327=87A3H  
333=8811H  
339=8878H  
345=88C9H

346=88D5H 347=88DBH 350=88E0H 351=88E6H 352=88ECH 353=88F5H  
354=88FEH 356=88FBH 357=8909H 358=890DH 359=8919H 360=892CH  
361=8941H 362=8956H 363=896BH 364=8980H 365=8995H 366=89AAH  
367=89BFH 368=89D4H 369=89E9H 370=89FEH 371=8A13H 372=8A28H  
373=8A3DH 374=8A52H 375=8A67H 376=8A7CH 377=8A91H 378=8AA6H  
379=8ABBH 380=8AD0H 381=8AE5H 382=8AFAH 383=8B0FH 384=8B24H  
385=8B6BH 386=8B79H 387=8B83H 388=8B9BH 389=8BAAH 390=8BADH  
391=8BD0H 392=8BD9H 393=8BDFH 394=8BE4H 395=8BF0H 396=8C0CH  
397=8C26H 398=8C29H 399=8C4CH 400=8C5BH 401=8C5BH 402=8C60H  
403=8C71H 404=8C7AH 405=8C7FH 406=8C82H 410=8C88H 411=8C90H  
412=8CA5H 413=8CB1H 414=8CC9H 415=8CD8H 416=8CDBH 417=8CFEH  
418=8D07H 419=8D0DH 420=8D12H 421=8D1EH 422=8D3AH 423=8D54H  
424=8D57H 425=8D7AH 426=8D83H 427=8D89H 428=8D8EH 429=8D9FH  
430=8DA8H 431=8DADH 432=8DB0H 436=8DB6H 437=8DBAH 438=8DC2H  
439=8DC8H 440=8DDAH 441=8DDDH 442=8DE2H 443=8DE5H 444=8DE9H  
445=8DF7H 446=8DFAH 447=8E15H 448=8E32H 449=8E3BH 450=8E41H  
451=8E46H 452=8E52H 453=8E6EH 454=8E88H 455=8E8BH 456=8EA6H  
457=8EC3H 458=8ECCH 459=8ED2H 460=8ED7H 461=8EE8H 462=8EF1H  
463=8EF6H 464=8EF9H 470=8EFEH 471=8F04H 472=8F0AH 473=8F20H  
474=8F2EH 475=8F31H 476=8F3FH 477=8F45H 478=8F4DH 479=8F55H  
480=8F5DH 481=8F65H 482=8F6DH 483=8F75H 484=8F7DH 485=8F85H  
486=8F8DH 487=8F95H 488=8F9DH 489=8FA5H 490=8FADH 491=8FB5H  
492=8FBDH 493=8FC5H 494=8FCDH 495=8FD5H 496=8FDDH 497=8FE5H  
498=8FEDH 499=8FF5H 500=8FFDH 501=9005H 502=900DH 503=9053H  
506=9059H 507=9061H 508=9067H 509=906FH 510=9077H 511=907FH  
512=9087H 513=908FH 514=9097H 515=909FH 516=90A7H 517=90AFH  
518=90D5H 519=90D9H 520=90ECH 521=9105H 522=910CH 523=9116H  
524=911CH 525=9128H 526=9131H 527=9134H 532=9138H 533=9140H  
534=9146H 535=915AH 536=915EH 537=917AH 538=91A8H 539=91C0H  
540=91D7H 541=91EAH 542=921BH 543=922DH 544=922EH 545=9231H  
546=9235H 547=9245H 548=9249H 549=9265H 550=9293H 551=92ABH  
552=92C2H 553=92D5H 554=92EEH 555=9306H 556=9318H 557=9319H  
558=931DH 559=9325H 560=932BH 561=9331H 562=9337H 563=9341H  
564=9344H 565=9354H 566=9368H 567=937CH 568=9390H 569=939FH

570=93CCH 571=93D0H 572=93D4H 573=93D6H 574=93D9H 575=93E9H  
576=93FDH 577=9411H 578=9425H 579=9439H 580=944DH 581=945CH  
582=9489H 583=94AEH 584=94BEH 585=94E9H 586=94F4H 587=9507H  
588=951BH 589=952AH 590=9557H 591=955EH 592=956EH 593=9582H  
594=9596H 595=95AAH 596=95BEH 597=95D2H 598=95E1H 599=960EH  
600=9615H 603=9619H 604=961BH 605=961EH 606=963AH 607=9668H  
608=9680H 609=9691H 610=96A5H 611=96B9H 612=96CDH 613=96EAH  
614=9701H 615=9710H 616=9746H 617=974DH 619=9751H 620=9752H  
621=9755H 622=976EH 623=979CH 624=97B4H 625=97C7H 626=97E4H  
627=97FBH 628=980AH 629=9837H 630=983EH 632=9842H 633=9844H  
634=9847H 635=9860H 636=988EH 637=98A6H 638=98B9H 639=98D6H  
640=98EDH 641=98FCH 642=9929H 643=9930H 645=9934H 646=9936H  
647=9939H 648=9945H 649=995CH 650=9970H 651=997FH 652=99A1H  
653=99CEH 654=99E6H 655=99F7H 656=9A0BH 657=9A1FH 658=9A33H  
659=9A50H 660=9A67H 661=9A76H 662=9A8FH 663=9AACH 664=9AB0H  
665=9AB6H 666=9AB9H 667=9AC9H 668=9ADDH 669=9AECH 670=9AF7H  
671=9B19H 672=9B1DH 673=9B25H 674=9B2CH 675=9B2FH 676=9B32H



APPENDIX F  
VOICE PROGRAM SYMBOL TABLE  
MEMORY MAP

STACK SIZE = 4 BYTES	
MEMORY.....	9C00H
INIT1.....	8003H
INIT2.....	803AH
INIT3.....	806EH
INIT4.....	807BH
INIT5.....	80D9H
INIT6.....	812FH
INIT7.....	8137H
INIT8.....	8187H
INIT9.....	818FH
VMODEPTR.....	9BA6H
DESTEPTR.....	9B88H
DESTFLAGPTR.....	9BAAH
SOURCEFLAGPTR.....	9BACH
WORDLENGTHPTR.....	9BAEH
PHONEMELENGTHPTR.....	9BBOH
WIPTR.....	9BB2H
WTABLECOUNTPTR.....	9BB4H
VIPTR.....	9BB6H
WORDSTARTLOCPTR.....	9BB8H
WORDENDLOCPTR.....	9BAH
VOICEMODETEST.....	819AH
SOURCEFLAGSTORE.....	81CEH
WORDCOUNTER.....	8530H
DESTINATIONFLAGSTORE.....	81FEH
VMODEERROR.....	8230H
STOREMODETEST.....	8345H
VMINCHARTEST.....	834EH
VSPACECHARTEST.....	835DH
RAMSTORE.....	8375H
PHONEMELENGHTTEST.....	83E5H
WSTORE.....	845AH
VERRORHDR.....	8051H
WTABLEPTR.....	9BBCH
CCPTR.....	9BBEH
CHARSTOREPTR.....	9BC0H
OUTTABLEIPTR.....	9BC2H
TCIPTR.....	9BC4H
MSGCOUNTPTR.....	9BC6H
WAITINGIPTR.....	9BC8H
OUTTABLEPTR.....	9BCAH
TCPTR.....	9BCCH
MSGCOUNTPTR.....	9BCEH
WAITINGPTR.....	9BD0H
SPELLINGMODEFLAGPTR.....	9BD2H
MSGENDFLAGPTR.....	9BD4H
WORDMODEFLAGPTR.....	9BD6H
PHONEMEMODEFLAGPTR.....	9BD8H
PAUSEFLAGPTR.....	9BDAH
INVCHARFLAGPTR.....	9BDCH
WORDBEGINLOCPTR.....	9BDEH
WORDCOUNTPTR.....	9BE0H
WORDPOINTERLOCPTR.....	9BE2H
SPELLINGMODETEST.....	85C1H
INCWORDCOUNT.....	865AH
WORDTERMTEST.....	8692H
WORDOVERTEST.....	8723H
TABLELOOKUP.....	88DBH
PAUSEFLAGENDSET.....	875EH
SPACEOVERTEST.....	854BH
WORDCOUNTTTEST.....	8792H

AD-A123 671

AFSATCOM - COMPATIBLE 75 B/S VOICE SYSTEM HARDWARE AND  
SOFTWARE(U) NITRE CORP BEDFORD MA J HANDWERKER DEC 82  
NTR-8689 ESD-TR-82-396 F19628-82-C-0001

2/2

UNCLASSIFIED

F/G 17/2

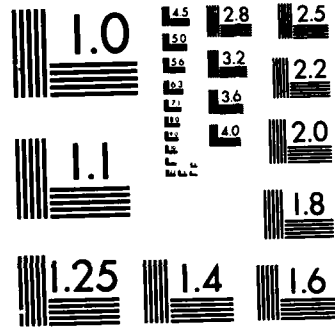
NL

END

FORMED

DATE

BY



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

WORDBUFFER.....9134H  
 INVCHARFLAGCHECK.....88C9H  
 PREFIXUFFIXMODETEST.....85F5H  
 PHONEMEMODETEST.....8629H  
 WORDINIT.....8589H  
 WORDTABLESELECT.....88FBH  
 PREFIXSUFFIXLOOKUP.....8C82H  
 TABINIT.....8151H  
 COMPUTELENGTHPTR.....8B7DH  
 WORDCOUNTMATCH.....8B98H  
 WORDCHARMATCH.....8BEAH  
 RAMCOUNTMATCH.....8DE5H  
 RAMCHARMATCH.....8E4CH  
 COMPUTERAMLENGTHPTR.....8DC2H  
 RAMTABLELOOKUP.....8DB0H  
 SPELLINGLOOKUP.....8EF9H  
 COMPUTEPSLENGTHPTR.....8CABH  
 PSWORDCOUNTMATCH.....8CC6H  
 PSWORDCHARMATCH.....8D18H  
 TABMATCHFLAGPTR.....9BE4H  
 TABPTRPTR.....9BE6H  
 PSTABPTRPTR.....9BE8H  
 TABLENGTHPTRPTR.....9BEAH  
 TABSTRINGPTRPTR.....9BECH  
 TABLOC.....9BEEH  
 SPELLINGWORDBUFFERPTR.....9BFOH  
 SPELLINGPTRSELECT.....8FOAH  
 SIPTR.....9BF2H  
 TIPTR.....9BF4H  
 INPUTWORDCOUNTPTR.....9BF6H  
 SPELLINGTABPTRPTR.....9BF8H

SPELLINGTABLOC.....9BFAH  
 VERIFYMSGSTORE.....9146H  
 VERIFYMSGOVERTEST.....9319H  
 WORDROMFORMATTER.....974DH  
 SPELLINGFORMATTER.....93DOH  
 PHONEMEFORMATTER.....9615H  
 LOOKUPMSGSTORE.....932BH  
 LOOKUPMSGOVERTEST.....9AB0H  
 PSFORMATTER.....983EH  
 RAMFORMATTER.....9930H  
 UIPTR.....9BFCH  
 RAMPHONEMELENGTHPTR.....9BFEH  
 INVCHARTEST.....87A8H

APPENDIX G  
VOICE PROGRAM VOCABULARY TABLE  
ROM LISTING

B000=31	41	31	30	36	34	34	41	42	4C	45	31	30	36	39	35
B010=41	42	4F	52	54	31	30	36	45	35	41	42	4F	55	54	31
B020=30	37	34	35	41	42	4F	56	45	31	30	37	41	36	41	43
B030=43	45	50	54	31	30	37	46	36	41	43	43	45	53	53	31
B040=30	38	37	37	41	43	43	4F	55	4E	54	31	30	38	46	34
B050=41	43	49	44	31	30	39	36	33	41	43	54	31	30	39	42
B060=36	41	43	54	49	56	45	31	30	39	46	36	41	43	54	55
B070=41	4C	31	30	41	35	33	41	44	44	31	30	41	44	37	41
B080=44	44	52	45	53	31	30	42	30	38	41	44	4A	41	43	43
B090=45	4E	54	31	30	42	45	36	41	44	4A	55	53	54	31	30
B0A0=42	37	37	41	44	56	41	4E	43	45	31	30	43	37	36	41
B0B0=44	56	49	53	45	31	30	44	30	36	41	46	46	45	43	54
B0C0=31	30	44	38	35	41	46	54	45	52	31	30	44	45	35	41
B0D0=47	41	49	4E	31	30	45	33	33	41	47	45	31	30	45	38
B0E0=35	41	47	45	4E	54	31	30	45	44	35	41	48	45	41	44
B0F0=31	30	46	34	33	41	49	44	31	30	46	39	33	41	49	52
B100=31	30	46	44	35	41	4C	41	52	4D	31	31	30	30	35	41
B110=4C	45	52	54	31	31	30	35	33	41	4C	4C	31	31	30	41
B120=38	41	4C	4C	4F	43	41	54	45	31	31	30	43	35	41	4C
B130=4C	4F	57	31	31	31	34	35	41	4C	50	48	41	31	31	31
B140=39	37	41	4C	52	45	41	44	59	31	31	31	45	34	41	4C
B150=53	4F	31	31	32	35	38	41	4C	54	49	54	55	44	45	31
B160=31	32	41	38	41	4C	55	4D	49	4E	55	4D	31	31	33	34
B170=32	41	4D	31	31	33	44	37	41	4D	45	52	49	43	41	31
B180=31	34	30	36	41	4D	4F	55	4E	54	31	31	34	38	33	41
B190=4D	50	31	31	34	46	37	41	4D	50	4C	49	46	59	31	31
B1A0=35	33	32	41	4E	31	31	35	44	33	41	4E	44	31	31	36
B1B0=30	35	41	4E	47	4C	45	31	31	36	34	37	41	4E	4F	54
B1C0=48	45	52	31	31	36	41	36	41	4E	53	57	45	52	31	31
B1D0=37	30	33	41	4E	59	31	31	37	35	3A	41	50	4F	53	54
B1E0=52	4F	50	48	45	31	31	37	39	38	41	50	50	52	4F	41
B1F0=43	48	31	31	38	33	37	41	50	50	52	4F	56	45	31	31
B200=38	41	3B	41	50	50	52	4F	58	49	4D	41	54	45	31	31
B210=39	43	35	41	50	52	49	4C	31	31	41	38	39	41	52	43

1A10644ABLE10695  
 ABORT106E5ABOUT1  
 0745ABOVE107A6AC  
 CEPT107F6ACCESSI  
 0877ACCOUNT108F4  
 ACID10963ACT109B  
 6ACTIVE109F6ACTU  
 AL10A53ADD10AD7A  
 DDRESS10B08ADJAC  
 ENT10BE6ADJUST10  
 B77ADVANCE10C76A  
 DWISE10D06AFFECT  
 10D85AFTER10DE5A  
 GAIN10E33AGE10E8  
 SAGENT10ED5AHEAD  
 10F43AID10F93AIR  
 10FD5ALARMI1005A  
 LERT11053ALLI10A  
 8ALLOCATE110C5AL  
 LOW11145ALPHA111  
 97ALREADY11IE4AL  
 SO11258ALTTUDE1  
 12A8ALUMINUM1134  
 2AM113D7AMERICA1  
 1406AMOUNT11483A  
 MP114F7AMPLIFY11  
 532AN115D3AND116  
 05ANGLE11647ANOT  
 HER116A6ANSWER11  
 703ANY1175:APOST  
 ROPHE11798APPROA  
 CH11837APPROVE11  
 8A;APPROXIMATE11  
 9C5APRIL11A89ARC

B220=48	49	54	45	43	54	31	31	41	45	33	41	52	45	32	36
B230=43	39	34	41	52	45	41	31	31	42	37	36	41	52	52	49
B240=56	45	31	31	42	43	35	41	52	52	4F	57	31	31	43	32
B250=37	41	52	54	49	43	4C	45	31	31	43	37	32	41	53	31
B260=31	43	45	35	41	53	43	49	49	31	31	44	31	33	41	53
B270=4B	31	31	44	36	38	41	53	53	45	4D	42	4C	45	31	31
B280=44	41	35	41	53	53	45	54	31	31	45	32	36	41	53	53
B290=49	47	4E	31	31	45	37	36	41	53	53	49	53	54	31	31
B2A0=45	44	39	41	53	53	4F	43	49	41	54	45	31	31	46	33
B2B0=36	41	53	53	55	4D	45	31	32	30	32	32	41	54	31	32
B2C0=30	38	33	41	54	45	31	39	38	33	36	41	54	54	41	43
B2D0=48	31	32	30	42	37	41	54	54	45	4D	50	54	31	32	31
B2E0=31	35	41	55	44	49	4F	31	32	31	45	36	41	55	47	55
B2F0=53	54	31	32	32	33	39	41	55	54	48	4F	52	49	5A	45
B300=31	32	32	39	39	41	55	54	4F	4D	41	54	49	43	31	32
B310=33	30	39	41	56	41	49	4C	41	42	4C	45	31	32	33	41
B320=37	41	56	45	52	41	47	45	31	32	34	33	35	41	56	4F
B330=49	44	31	32	34	41	36	41	54	54	45	4E	44	31	32	31
B340=38	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
B350=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
B360=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
B370=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
B380=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
B390=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
B3A0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
B3B0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
B3C0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
B3D0=41	43	4B	31	32	35	34	33	42	41	44	31	32	35	38	35
B3E0=42	41	44	47	45	31	32	35	43	33	42	41	47	31	32	36
B3F0=31	37	42	41	4C	41	4E	43	45	31	32	36	35	34	42	41
B400=4C	4C	31	32	36	44	34	42	41	4E	44	31	32	37	31	34
B410=42	41	4E	4B	31	32	37	36	33	42	41	52	31	32	37	42
B420=34	42	41	53	45	31	32	37	46	35	42	41	53	49	43	31
B430=32	38	34	33	42	41	54	31	32	38	41	35	42	41	54	43

HITECT11AE3ARE26  
 C94AREAI1B76ARRI  
 VEI1BC5ARROW11C2  
 7ARTICLE11C72ASI  
 ICE5ASCI111D13AS  
 K11D68ASSEMBLE11  
 DA5ASSET11E26ASS  
 ICN11E76ASSIST11  
 ED9ASSOCIATE11F3  
 6ASSUME12022AT12  
 083ATE19836ATTAC  
 H12OB7ATTEMPT121  
 15AUDIO121E6AUGU  
 ST12239AUTHORIZE  
 12299AUTOMATIC12  
 309AVAILABLE123A  
 7AVERAGE12435AVO  
 ID124A6ATTEND121  
 80000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 000000001B12514B  
 ACK12543BAD12585  
 BADGE125C3BAG126  
 17BALANCE12654BA  
 LL126D4BAND12714  
 BANK12763EAR127E  
 4BASE127F5BASICI  
 2843BAT128A5BATC



B440=48	31	32	38	45	34	42	41	54	48	31	32	39	33	37	42	H128E4BATH12937B
B450=41	54	54	45	52	59	31	32	39	38	32	42	45	31	32	35	ATTERY12982BE125
B460=31	33	42	45	44	31	32	39	45	34	42	45	45	4E	31	32	13BED129E4BEEN12
B470=41	32	34	42	45	45	50	31	32	41	36	36	42	45	46	4F	A24BEEP12A66BEFO
B480=52	45	31	32	41	41	35	42	45	47	49	4E	31	32	42	30	RE12AA5BEGIN12B0
B490=34	42	45	4C	4C	31	32	42	36	35	42	45	4C	4F	57	31	4BELL12B65BELOW1
B4A0=32	42	41	34	42	45	4E	44	31	32	43	30	34	42	45	53	2BA4BEND12C04BES
B4B0=54	31	32	43	35	34	42	45	54	41	31	32	43	41	36	42	T12C54BETA12CA6B
B4C0=45	54	54	45	52	31	32	44	30	37	42	45	54	57	45	45	ETTER12D07BETWEE
B4D0=4E	31	32	44	35	33	42	49	44	31	32	44	43	33	42	49	N12D53BID12DC3BI
B4E0=47	31	32	45	30	34	42	49	4C	4C	31	32	45	34	37	42	G12E04BILLL12E47B
B4F0=49	4C	4C	49	4F	4E	31	32	45	38	33	42	49	4E	31	32	ILLION12E83BIN12
B500=45	46	36	42	49	4E	41	52	59	31	32	46	33	38	42	49	EF6BINARY12F38BI
B510=52	54	48	44	41	59	31	32	46	42	33	42	49	54	31	33	RTHDAY12FB3BIT13
B520=30	33	34	42	49	54	45	31	33	30	37	35	42	4C	41	43	034BITE13075BLAC
B530=4B	31	33	30	43	35	42	4C	41	4E	4B	31	33	31	31	34	K130C5BLANK13114
B540=42	4C	45	57	31	33	32	38	35	42	4C	49	4E	44	31	33	BLEW13285BLIND13
B550=31	37	35	42	4C	4F	43	4B	31	33	31	45	35	42	4C	4F	175BLOCK131E5BLO
B560=57	4E	31	33	32	33	34	42	4C	55	45	31	33	32	38	34	WNI3234BLUE13284
B570=42	4C	55	52	31	33	32	44	35	42	4F	41	52	44	31	33	BLUR132D5BOARD13
B580=33	31	34	42	4F	4C	54	31	33	33	36	34	42	4F	4E	44	314BOLT13364BOND
B590=31	33	33	42	34	42	4F	4F	4B	31	33	34	30	35	42	4F	133B4BOOK13405BO
B5A0=52	45	44	31	33	33	31	34	42	4F	53	53	31	33	34	34	RED13314BOSS1344
B5B0=36	42	4F	54	48	45	52	31	33	34	38	36	42	4F	54	54	6BOTHER13486BOTT
B5C0=4F	4D	31	33	34	44	36	42	4F	55	47	48	54	31	33	35	OM134D6BOUGHT135
B5D0=33	33	42	4F	58	31	33	35	37	35	42	52	41	43	45	31	33BOX13575BRACE1
B5E0=33	35	44	35	42	52	41	49	4E	31	33	36	32	35	42	52	35D5BRAIN13625BR
B5F0=41	4B	45	31	33	37	35	36	42	52	41	4E	43	48	31	33	AKE13756BRANCH13
B600=36	37	35	42	52	41	56	4F	31	33	36	45	35	42	52	45	675BRAVO136E5BRE
B610=41	4B	31	33	37	35	36	42	52	49	44	47	45	31	33	37	AK13756BRIDGE137
B620=41	35	42	52	49	45	46	31	33	38	30	36	42	52	49	47	A5BRIEF13806BRIG
B630=48	54	31	33	38	35	35	42	52	49	4E	47	31	33	38	42	HT13855BRING138B
B640=35	42	52	4F	4B	45	31	33	39	30	37	42	52	4F	55	47	5BROKE13907BROUG
B650=48	54	31	33	39	35	35	42	52	4F	57	4E	31	33	39	39	HT13955BROWN1399



B880=44	45	31	34	38	33	37	43	45	52	54	49	46	59	31	34
B890=38	44	36	43	48	41	4E	47	45	31	34	39	35	39	43	48
B8A0=41	52	41	43	54	45	52	31	34	39	44	36	43	48	41	52
B8B0=47	45	31	34	41	34	37	43	48	41	52	4C	49	45	31	34
B8C0=41	41	35	43	48	41	52	54	31	34	42	30	35	43	48	45
B8D0=43	4B	31	34	42	35	35	43	48	45	45	52	31	34	42	41
B8E0=34	43	48	49	50	31	34	42	46	36	43	48	4F	49	43	45
B8F0=31	34	43	34	36	43	49	52	43	4C	45	31	34	43	42	37
B900=43	49	52	43	55	49	54	31	34	44	31	34	43	49	54	59
B910=31	34	44	37	35	43	4C	41	49	4D	31	34	44	42	35	43
B920=4C	41	53	53	31	34	45	31	35	43	4C	45	41	4E	31	34
B930=45	36	35	43	4C	45	41	52	31	34	45	42	35	43	4C	45
B940=52	4B	31	34	46	30	34	43	4C	49	50	31	34	46	34	35
B950=43	4C	4F	43	4B	31	34	46	39	35	43	4C	4F	53	45	31
B960=34	46	45	35	43	4C	4F	55	44	31	35	30	41	36	43	4F
B970=41	52	53	45	31	36	39	33	34	43	4F	44	45	31	35	31
B980=30	34	43	4F	49	4E	31	35	31	35	36	43	4F	4C	4C	41
B990=52	31	35	31	42	37	43	4F	4C	4C	45	43	54	31	35	32
B9A0=30	35	43	4F	4C	4F	4E	31	35	32	36	35	43	4F	4C	4F
B9B0=52	31	35	32	44	36	43	4F	4C	55	4D	4E	31	35	33	32
B9C0=37	43	4F	4D	42	49	4E	45	31	35	33	38	35	43	4F	4D
B9D0=4D	41	31	35	34	30	37	43	4F	4D	4D	41	4E	44	31	35
B9E0=34	35	38	43	4F	4D	4D	45	52	43	45	31	35	34	43	3A
B9F0=43	4F	4D	4D	45	52	43	49	41	4C	31	35	35	32	3B	43
BA00=4F	4D	4D	55	4E	49	43	41	54	45	31	35	35	41	37	43
BA10=4F	4D	50	41	4E	59	31	35	36	36	37	43	4F	4D	50	41
BA20=52	45	31	35	36	45	37	43	4F	4D	50	49	4C	45	31	35
BA30=37	36	38	43	4F	4D	50	4C	45	54	45	31	35	38	30	36
BA40=43	4F	4D	50	4C	59	31	35	38	39	39	43	4F	4D	50	4F
BA50=4E	45	4E	54	31	35	39	32	38	43	4F	4D	50	55	54	45
BA60=52	31	35	39	43	37	43	4F	4E	43	45	41	4C	31	35	41
BA70=35	38	43	4F	4E	44	45	4E	53	45	31	35	41	43	39	43
BA80=4F	4E	44	49	54	49	4F	4E	31	35	42	34	37	43	4F	4E
BA90=46	49	52	4D	31	35	42	44	37	43	4F	4E	46	55	53	45
DE14837	CERTIFY14														
8D6	CHANGE14959CH														
ARAC	TER149D6CHAR														
GE14	A47CHARLIE14														
AA5	CHART14B05CHE														
CK14	B55CHEER14BA														
4CHIP	14BF6CHOICE														
14C4	6CIRCLE14CB7														
CIRCUIT	14D14CITY														
14D7	5CLAIM14DB5C														
LASSI	4E15CLEAN14														
E65	CLEAR14EB5CLE														
RK14	F04CLIP14F45														
CLOCK	14F95CLOSE1														
4FE5	CLOUDD150A6CO														
ARSE	16934CODE151														
04CO	IN15156COLLA														
R151	B7COLLECT152														
05CO	LON15265COLO														
R152	D6COLUMN1532														
7COM	BINE15385COM														
MA1	5407COMMAND15														
458	COMMERCE154C:														
COMM	ERCIAL1552;C														
OMMU	NICATE155A7C														
OMPA	NY15667COMPA														
RE1	56E7COMPILE15														
768	COMPLETE15806														
COMPL	Y15899COMPO														
NENT	15928COMPUTE														
R15	9C7CONCEAL15A														
58CON	DENSE15AC9C														
ONDI	TION15B47CON														
FIRM	15BD7CONFUSE														

BAA0=31	35	43	34	39	43	4F	4E	46	55	53	49	4F	4E	31	35
BAB0=43	44	3F	43	4F	4E	47	52	41	54	55	4C	41	54	49	4F
BAC0=4E	53	31	35	44	38	37	43	4F	4E	4E	45	43	54	31	35
BAD0=45	38	37	43	4F	4E	53	4F	4C	45	31	35	45	46	37	43
BAE0=4F	4E	53	55	4C	54	31	35	46	45	37	43	4F	4E	53	55
BAF0=4D	45	31	36	30	36	37	43	4F	4E	54	41	49	4E	31	36
BB00=30	45	38	43	4F	4E	54	49	4E	55	45	31	36	31	37	38
BB10=43	4F	4E	54	52	41	43	54	31	36	32	31	38	43	4F	4E
BB20=54	52	41	53	54	31	36	32	42	37	43	4F	4E	54	52	4F
BB30=4C	31	36	33	35	3A	43	4F	4E	56	45	4E	49	45	4E	54
BB40=31	36	33	44	36	43	4F	4E	56	45	59	31	36	34	37	36
BB50=43	4F	50	50	45	52	31	36	34	45	34	43	4F	50	59	31
BB60=36	35	33	37	43	4F	52	52	45	43	54	31	36	35	38	3A
BB70=43	4F	52	52	45	53	50	4F	4E	44	31	36	36	30	36	43
BB80=4F	53	49	4E	45	31	36	36	41	34	43	4F	53	54	31	36
BB90=37	31	35	43	4F	55	4C	44	31	36	37	36	35	43	4F	55
BBA0=4E	54	31	36	37	42	37	43	4F	55	4E	54	52	59	31	36
BBB0=38	31	36	43	4F	55	50	4C	45	31	36	38	37	43	4F	4E
BBC0=55	52	41	47	45	31	36	38	44	36	43	4F	55	52	53	45
BBD0=31	36	39	33	35	43	4F	55	52	54	31	36	39	38	35	43
BBE0=4F	56	45	52	31	36	39	44	35	43	52	41	4E	45	31	36
BBF0=41	32	35	43	52	41	53	48	31	36	41	38	36	43	52	45
BC00=41	53	45	31	36	41	44	36	43	52	45	41	54	45	31	36
BC10=42	32	38	43	52	45	41	54	49	4F	4E	31	36	42	38	36
BC20=43	52	45	44	49	54	31	36	43	30	34	43	52	45	57	31
BC30=36	43	37	38	43	52	49	54	49	43	41	4C	31	36	43	43
BC40=35	43	52	4F	53	53	31	36	44	34	35	43	52	4F	57	44
BC50=31	36	44	38	33	43	52	59	31	36	44	45	33	43	55	45
BC60=32	36	37	37	33	43	55	50	31	36	45	34	37	43	55	52
BC70=49	4F	55	53	31	36	45	38	38	43	55	52	52	45	4E	43
BC80=59	31	36	45	46	37	43	55	52	45	4E	54	31	36	46	46
BC90=37	35	43	55	52	56	45	31	36	46	44	38	43	55	53	54
BCA0=4F	4D	45	52	31	37	30	31	33	43	55	54	31	37	30	39
BCB0=35	43	59	43	4C	45	31	37	30	44	30	30	30	30	30	30

15C49CONFUSION15  
 CD?CONGRATULATIO  
 NS15D87CONNECT15  
 E87CONSOLE15EF7C  
 ONSULT15FE7CONSU  
 ME16067CONTAIN16  
 OE8CONTINUE16178  
 CONTRACT16218CON  
 TRAST162B7CONTR  
 L1635:CONVENIENT  
 163D6CONVEY16476  
 COPPER164E4COPY1  
 6537CORRECT1658:  
 CORRESPOND16606C  
 OSINE166A4COST16  
 715COULD16765COU  
 NT167B7COUNTRY16  
 816COUPLE16877CO  
 URAGE168D6COURSE  
 16935COURT16985C  
 OVER169D5CRANE16  
 A25CRASH16A86CRE  
 ASE16AD6CREATE16  
 B28CREATION16B86  
 CREDIT16C04CREWI  
 6C78CRITICAL16CC  
 5CROSS16D45CROWD  
 16D83CRY16DF3GUE  
 26773CUP16E47CUR  
 IOUS16E88CURRENC  
 Y16EF7CURRENT16F  
 75CURVE16FD8CUST  
 OMER17013CUT1709  
 5CYCLE170D000000



BEE0=37	45	42	36	44	45	54	41	49	4C	31	37	46	34	39	44	7EB6DETAIL17F49D
BEF0=45	54	45	52	4D	49	4E	45	31	37	46	43	36	44	45	56	ETERMINE17FC6DEV
BF00=49	43	45	31	38	30	33	33	44	45	57	31	38	43	34	3A	ICE18033DEW18C4:
BF10=44	49	41	47	4E	4F	53	54	49	43	31	38	30	41	34	44	DIAGNOSTIC180A4D
BF20=49	41	4C	31	38	31	36	3A	44	49	43	54	49	4F	4E	41	IAl1816:DICTIONA
BF30=52	59	31	38	31	43	33	44	49	44	31	38	32	37	33	44	RY181C3DID18273D
BF40=49	45	31	38	32	42	34	44	49	45	54	31	38	32	46	36	IE182B4DIET182F6
BF50=44	49	46	46	45	52	31	38	33	35	3A	44	49	46	46	45	DIFFER1835:DIFFE
BF60=52	45	4E	43	45	31	38	33	41	39	44	49	46	46	45	52	RENCE183A9DIFFER
BF70=45	4E	54	31	38	34	32	35	44	49	47	49	54	31	38	34	ENT18425DIGIT184
BF80=39	37	44	49	47	49	54	41	4C	31	38	34	46	34	44	49	97DIGITAL184F4DI
BF90=4D	45	31	38	35	37	35	44	49	4F	44	45	31	38	35	43	ME18575DIODE185C
BFA0=36	44	49	52	45	43	54	31	38	36	33	39	44	49	52	45	6DIRECT18639DIRE
BFB0=43	54	4F	52	59	31	38	36	39	34	44	49	52	54	31	38	CTORY18694DIRT18
BFC0=37	31	38	44	49	53	41	47	52	45	45	31	38	37	35	39	718DISAGREE18759
BFD0=44	49	53	41	50	50	45	41	52	31	38	37	44	3A	44	49	DISAPPEAR187D:DI
BFE0=53	43	4F	4E	4E	45	43	54	31	38	38	35	34	44	49	53	SCONNECT18854DIS
BFF0=4B	31	38	39	37	37	44	49	53	50	4C	41	59	31	38	39	KI18977DISPLAY189
C000=43	38	44	49	53	54	41	4E	43	45	31	38	41	35	36	44	C8DISTANCE18A56D
C010=49	56	49	44	45	31	38	41	44	38	44	49	56	49	44	45	IVIDE18AD8DIVIDE
C020=4E	44	31	38	42	34	38	44	49	56	49	53	49	4F	4E	31	ND18B48DIVISION1
C030=38	42	44	32	44	4F	31	38	43	34	34	44	4F	43	4B	31	8BD2D018C44DOCK1
C040=38	43	38	36	44	4F	43	54	4F	52	31	38	43	43	38	44	8C86DOCTOR18CC8D
C050=4F	43	55	4D	45	4E	54	31	38	44	32	34	44	4F	45	53	OCUMENT18D24DOES
C060=31	30	44	42	36	44	4F	4C	4C	41	52	31	38	44	46	34	10DB6DOLLAR18DF4
C070=44	4F	4E	45	31	38	45	34	34	44	4F	4F	52	31	38	45	DONE18E44DOOR18E
C080=38	36	44	4F	55	42	4C	45	31	38	45	43	35	44	4F	55	86DOUBLE18EC5DOU
C090=42	54	31	38	46	32	34	44	4F	57	4E	31	38	46	37	35	BT18F24DOWN18F75
C0A0=44	52	41	46	54	31	38	46	43	34	44	52	41	57	31	39	DRAFT18FC4DRAW19
C0B0=30	32	35	44	52	49	4C	4C	31	39	30	35	35	44	52	49	025DRILL19055DRI
C0C0=4E	4B	31	39	30	41	35	44	52	49	56	45	31	39	31	30	NK190A5DRIVE1910
C0D0=34	44	52	4F	50	31	39	31	36	34	44	52	55	4D	31	39	4DROP19164DRUM19
C0E0=31	42	33	44	52	59	31	39	32	30	33	44	55	45	31	38	1B3DRY19203DUE18
C0F0=43	34	34	44	55	4D	50	31	39	32	36	38	44	55	52	41	C44DUMP19268DURA

C100=54	49	4F	4E	31	39	32	42	36	44	55	52	49	4E	47	31	TION192B6DURING1
C110=39	33	33	34	44	55	54	59	31	39	33	38	35	44	57	45	9334DUTY19385DWE
C120=4C	4C	31	39	33	45	37	44	49	53	43	55	53	53	31	38	LL193E7DISCUSS18
C130=38	46	30	30	30	30	30	30	30	30	30	30	30	30	30	30	8F00000000000000
C140=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C150=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C160=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C170=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C180=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C190=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C1A0=30	30	30	30	30	30	30	30	30	30	31	45	31	39	34	33	00000000001E1943
C1B0=34	45	41	43	48	31	39	34	35	33	45	41	52	31	39	34	4EACH19453EAR194
C1C0=39	35	45	41	52	4C	59	31	39	34	43	34	45	41	52	4E	95EARLY194C4EARN
C1D0=31	39	35	30	34	45	41	53	54	31	39	35	33	34	45	41	19504EAST19534EA
C1E0=53	59	31	39	35	37	34	45	43	48	4F	31	39	35	42	34	SY19574ECHO195B4
C1F0=45	44	47	45	31	39	36	30	34	45	44	49	54	31	39	36	EDGE19604EDIT196
C200=34	37	45	44	55	43	41	54	45	31	39	36	39	36	45	46	47EDUCATE19696EF
C210=46	45	43	54	31	39	37	31	39	45	46	46	49	43	49	45	FECT19719EFFFICIE
C220=4E	54	31	39	37	37	36	45	46	46	4F	52	54	31	39	37	NT19776EFFFORT197
C230=45	35	45	49	47	48	54	31	39	38	33	36	45	49	47	48	E5EIGHT19836EIGH
C240=54	48	31	39	38	37	36	45	49	47	48	54	59	31	39	38	TH19876EIGHTY198
C250=44	36	45	49	54	48	45	52	31	39	39	32	3B	45	4C	45	D6EITHER1992;ELE
C260=43	54	52	49	43	49	41	4E	31	39	39	45	3A	45	4C	45	CTRICIAN199E:ELE
C270=43	54	52	4F	4E	49	43	31	39	41	39	38	45	4C	45	56	CTRONIC19A98ELEV
C280=41	54	4F	52	31	39	42	33	36	45	4C	45	56	45	4E	31	ATOR19B36ELEVEN1
C290=39	42	42	38	45	4C	49	47	49	42	4C	45	31	39	43	32	9BBELIGIBLE19C2
C2A0=39	45	4C	49	4D	49	4E	41	54	45	31	39	43	42	34	45	9ELIMINATE19CB4E
C2B0=4C	53	45	31	39	44	34	34	45	4D	49	54	31	39	44	38	LSE19D44EMIT19D8
C2C0=36	45	4D	50	4C	4F	59	31	39	44	44	35	45	4D	50	54	6EMPLOY19DD5EMPT
C2D0=59	31	39	45	36	36	45	4E	41	42	4C	45	31	39	45	43	Y19E66ENABLE19EC
C2E0=37	45	4E	43	4C	4F	53	45	31	39	46	33	33	45	4E	44	7ENCLOSE19F33END
C2F0=31	39	46	42	37	45	4E	44	4F	52	53	45	31	39	46	46	19FB7ENDORSE19FF
C300=36	45	4E	47	49	4E	45	31	41	30	37	38	45	4E	47	49	6ENGINE1A078ENGI
C310=4E	45	45	52	31	41	30	45	37	45	4E	47	4C	49	53	48	NEER1A0E7ENGLISH

C320=31	41	31	37	35	45	4E	54	45	54	45	52	31	41	31	44	35	45	1A175ENTER1A1D5E
C330=4E	54	52	59	31	41	32	32	37	45	50	53	49	4C	4F	4E	4E	4E	NTRY1A227EPSILON
C340=31	41	32	38	35	45	51	55	41	4C	31	41	33	30	39	45	45	45	IA285EQUAL1A309E
C350=51	55	49	50	4D	45	4E	54	31	41	33	35	35	45	52	41	41	41	QUIPMENT1A355ERA
C360=53	45	31	41	33	45	35	45	52	52	4F	52	31	41	34	33	33	33	SE1A3E5ERROR1A43
C370=36	45	53	43	41	50	45	31	41	34	38	36	45	53	43	52	52	52	6ESCAPE1A486ESCR
C380=4F	57	31	41	35	30	39	45	53	54	41	42	4C	49	53	48	48	48	OW1A509ESTABLISH
C390=31	41	35	37	36	45	53	54	41	54	45	31	41	36	30	38	38	38	IA576ESTATE1A608
C3A0=45	53	54	49	4D	41	54	45	31	41	36	38	35	45	58	41	41	41	ESTIMATE1A685EXA
C3B0=43	54	31	41	36	46	37	45	58	41	4D	49	4E	45	31	41	41	41	CT1A6F7EXAMINE1A
C3C0=37	38	36	45	58	43	45	45	44	31	41	38	32	36	45	58	58	58	786EXCEED1A826EX
C3D0=43	45	50	54	31	41	38	41	38	45	58	43	48	41	4E	47	47	47	CEPT1A8A8EXCHANG
C3E0=45	31	41	39	33	37	45	58	45	43	55	54	45	31	41	41	41	41	E1A937EXECUTE1AA
C3F0=30	36	45	58	45	4D	50	54	31	41	41	42	34	45	58	49	49	49	O6EXEMPT1AAB4EXI
C400=54	31	41	42	35	36	45	58	50	45	43	54	31	41	42	44	44	44	TIAB56EXPECT1ABD
C410=38	45	58	50	45	44	49	54	45	31	41	43	37	36	45	58	58	58	8EXPEDITE1AC76EX
C420=50	45	4E	44	31	41	44	34	3A	45	58	50	45	52	49	4D	4D	4D	PEND1AD4:EXPERIM
C430=45	4E	54	31	41	44	45	38	45	58	50	4F	4E	45	4E	54	54	54	ENT1ADE8EXPONENT
C440=31	41	45	41	37	45	58	50	52	45	53	53	31	41	46	35	35	35	IAEA7EXPRESSIAF5
C450=39	45	58	54	45	4E	53	49	4F	4E	31	41	46	45	38	45	45	45	9EXTENSIONIAFE8E
C460=4C	45	43	54	52	49	43	31	39	39	36	30	30	30	30	30	30	30	LECTRIC199600000
C470=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C480=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C490=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C4A0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C4B0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
C4C0=42	30	41	34	46	41	43	45	31	42	30	44	38	46	41	43	43	43	BOA4FACE1B0D8FAC
C4D0=49	4C	49	54	59	31	42	31	32	34	46	41	43	54	31	42	42	42	ILITY1B124FACT1B
C4E0=31	41	3A	46	41	48	52	45	4E	48	45	49	54	31	42	31	31	31	IA:FAHRENHEIT1B1
C4F0=46	34	46	41	49	4C	31	42	32	39	34	46	41	4C	4C	31	31	31	F4FAIL1B294FALL1
C500=42	32	46	35	46	41	4C	53	45	31	42	33	32	38	46	41	41	41	B2F5FALSE1B328FA
C510=4D	49	4C	49	41	52	31	42	33	36	33	46	41	52	31	42	42	42	MILIAR1B363FAR1B
C520=33	44	35	46	41	52	41	44	31	42	34	31	34	46	41	53	53	53	3D5FARAD1B414FAS
C530=54	31	42	34	38	35	46	41	55	4C	54	31	42	34	44	34	34	34	T1B485FAULT1B4D4



C540=46	45	41	54	31	42	36	45	37	46	45	41	54	55	52	45	FEAT1B6E7FEATURE
C550=31	42	35	31	38	46	45	42	52	55	41	52	59	31	42	35	1B518FEBRUARY1B5
C560=37	37	46	45	44	45	52	41	4C	31	42	36	30	33	46	45	77FEDERAL1B603FE
C570=45	31	42	36	37	34	46	45	45	44	31	42	36	41	34	46	E1B674FEED1B6A4F
C580=45	45	54	31	42	36	45	36	46	45	4D	41	4C	45	31	42	EET1B6E6FEMALE1B
C590=37	32	35	46	49	45	4C	44	31	42	37	41	37	46	49	46	725FIELD1B7A7FIF
C5A0=54	45	45	4E	31	42	38	30	35	46	49	46	54	48	31	42	TEEN1B805FIFTH1B
C5B0=38	38	35	46	49	46	54	59	31	42	38	44	34	46	49	4C	885FIFTY1B8D4FIL
C5C0=45	31	42	39	33	34	46	49	4C	4C	31	42	39	39	35	46	E1B934FILL1B995F
C5D0=49	4E	41	4C	31	42	39	44	37	46	49	4E	41	4E	43	45	INAL1B9D7FINANCE
C5E0=31	42	41	33	34	46	49	4E	44	31	42	41	43	36	46	49	1BA34FIND1BAC6FI
C5F0=4E	47	45	52	31	42	42	32	36	46	49	4E	49	53	48	31	NGER1BB26FINISH1
C600=42	42	38	34	46	49	52	45	31	42	42	44	35	46	49	52	BB84FIRE1BBD5FIR
C610=53	54	31	42	43	32	33	46	49	54	31	42	43	37	34	46	ST1BC23FIT1BC74F
C620=49	56	45	31	42	43	42	33	46	49	58	31	42	44	30	37	IVE1BCB3FIX1BD07
C630=46	49	58	54	55	52	45	31	42	44	36	35	46	4C	41	53	FIXTURE1BD65FLAS
C640=48	31	42	44	46	34	46	4C	41	54	31	42	45	34	36	46	H1BDF4FLAT1BE46F
C650=4C	49	47	48	54	31	42	45	39	34	46	4C	49	50	31	42	LIGHT1BE94FLIP1B
C660=45	46	35	46	4C	4F	4F	52	31	42	46	34	34	46	4C	4F	EF5FLOOR1BF44FLO
C670=50	31	42	46	39	34	46	4C	4F	57	31	42	46	45	33	46	P1BF94FLOW1BFE3F
C680=4C	59	31	43	30	32	34	46	4F	4C	44	31	43	30	37	36	LY1C024FOLD1C076
C690=46	4F	4C	4C	4F	57	31	43	30	44	34	46	4F	4F	44	31	FOLLOW1C0D4FOOD1
C6A0=43	31	33	34	46	4F	4F	54	31	43	31	37	33	46	4F	52	C134FOOT1C173FOR
C6B0=31	43	35	37	35	46	4F	52	43	45	31	43	31	42	34	46	1C575FORCE1C1B4F
C6C0=4F	52	45	31	43	35	37	37	46	4F	52	45	4D	41	4E	31	ORE1C577FOREMAN1
C6D0=43	32	30	36	46	4F	52	47	45	54	31	43	32	37	37	46	C206FORGET1C277F
C6E0=4F	52	47	49	56	45	31	43	32	46	34	46	4F	52	4D	31	ORGIVE1C2F4FORM1
C6F0=43	33	37	36	46	4F	52	4D	41	54	31	43	33	43	35	46	C376FORMAT1C3C5F
C700=4F	52	54	59	31	43	34	34	37	46	4F	52	57	41	52	44	ORTY1C447FORWARD
C710=31	43	34	41	35	46	4F	55	4E	44	31	43	35	31	34	46	1C4A5FOUND1C514F
C720=4F	55	52	31	43	35	37	36	46	4F	55	52	54	48	31	43	OUR1C576FOURTH1C
C730=35	42	37	46	4F	58	54	52	4F	54	31	43	36	30	35	46	5B7FOXTR0T1C605F
C740=52	41	4D	45	31	43	36	42	35	46	52	41	55	44	31	43	RAME1C6B5FRAUD1C
C750=37	31	34	46	52	45	45	31	43	37	35	36	46	52	45	4E	714FREE1C756FREN

C760=43	48	31	43	37	39	39	46	52	45	51	55	45	4E	43	59	CH1C799FREQUENCY
C770=31	43	38	30	38	46	52	45	51	55	45	4E	54	31	43	38	1C808FREQUENT1C8
C780=41	36	46	52	49	44	41	59	31	43	39	32	36	46	52	49	A6FRIDAY1C926FRI
C790=47	48	54	31	43	39	42	34	46	52	4F	4D	31	43	41	31	GHT1C9B4FROMICAL
C7A0=35	46	52	4F	4E	54	31	43	41	36	35	46	52	55	49	54	5FRONT1CA65FRUIT
C7B0=31	43	41	43	34	46	55	45	4C	31	43	42	31	34	46	55	1CAC4FUEL1CB14FU
C7C0=4C	4C	31	43	42	37	38	46	55	4E	43	54	49	4F	4E	31	LL1CB78FUNCTION1
C7D0=43	42	41	34	46	55	4E	44	31	43	43	32	37	46	55	52	CBA4FUND1CC27FUR
C7E0=4E	41	43	45	31	43	43	37	37	46	55	52	54	48	45	52	NACEICC77FURTHER
C7F0=31	43	43	44	36	46	55	54	55	52	45	31	43	44	32	30	1CCD6FUTUREICD20
C800=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
C810=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
C820=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
C830=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
C840=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
C850=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
C860=30	30	30	30	30	30	30	30	31	47	31	43	44	39	34	47	000000001G1CD94G
C870=41	47	45	31	44	30	36	34	47	41	49	4E	31	43	44	44	AGE1D064GAINICDD
C880=34	47	41	49	54	31	44	30	31	36	47	41	4C	4C	4F	4E	4G4AITID016GALLON
C890=31	43	45	32	34	47	41	4D	45	31	43	45	38	35	47	41	ICE24GAME1CE85GA
C8A0=4D	4D	41	31	43	45	44	33	47	41	50	31	43	46	33	36	MMAICED3GAPICF36
C8B0=47	41	52	41	47	45	31	43	46	37	33	47	41	53	31	43	GARAGE1CF73GAS1C
C8C0=46	44	34	47	41	54	45	31	44	30	31	35	47	41	55	47	FD4GATE1D015GAUG
C8D0=45	31	44	30	36	37	47	45	4E	45	52	41	4C	31	44	30	E1D067GENERAL1D0
C8E0=43	38	47	45	4E	45	52	41	54	45	31	44	31	34	39	47	C8GENERATE1D149G
C8F0=45	4E	54	4C	45	4D	45	4E	31	44	31	43	36	47	45	52	ENTLEMEN1DIC6GER
C900=4D	41	4E	31	44	32	36	33	47	45	54	31	44	32	44	34	MAN1D263GET1D2D4
C910=47	49	52	4C	31	44	33	31	34	47	49	56	45	31	44	33	GIRL1D314GIVE1D3
C920=35	35	47	4C	41	53	53	31	44	33	39	36	47	4C	49	54	55GLASS1D396GLIT
C930=43	48	31	44	33	45	35	47	4C	4F	42	45	31	44	34	34	CH1D3E5GLOBE1D44
C940=32	47	4F	31	44	34	39	34	47	4F	4C	46	31	44	34	44	2G01D494GOLF1D4D
C950=34	47	4F	4F	44	31	44	35	33	36	47	4F	56	45	52	4E	4G00D1D536GOVERN
C960=31	44	35	37	35	47	52	41	44	45	31	44	35	44	34	47	1D575GRADE1D5D4G
C970=52	41	4D	31	44	36	33	35	47	52	41	4E	44	31	44	36	RAM1D635GRAND1D6

C980=38	35	47	52	41	50	48	31	44	36	45	35	47	52	41	54
C990=45	31	44	37	33	34	47	52	41	59	31	44	38	32	35	47
C9A0=52	45	41	54	31	44	37	33	35	47	52	45	45	4E	31	44
C9B0=37	38	35	47	52	45	45	54	31	44	37	44	34	47	52	45
C9C0=59	31	44	38	32	35	47	52	49	4E	44	31	44	38	37	37
C9D0=47	52	4F	43	45	52	59	31	44	38	45	36	47	52	4F	55
C9E0=4E	44	31	44	39	35	35	47	52	4F	55	50	31	44	39	43
C9F0=34	47	52	4F	57	31	44	41	31	39	47	55	41	52	41	4E
CA00=54	45	45	31	44	41	39	35	47	55	41	52	44	31	44	41
CA10=35	35	47	55	45	53	53	31	44	42	31	30	30	30	30	30
CA20=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CA30=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CA40=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CA50=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CA60=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CA70=31	48	31	44	42	35	33	48	41	44	31	44	42	41	34	48
CA80=41	4C	46	31	44	42	45	34	48	41	4C	54	31	44	43	32
CA90=36	48	41	4D	4D	45	52	31	44	43	36	34	48	41	4E	44
CAA0=31	44	43	42	36	48	41	4E	44	4C	45	31	44	44	30	34
CAB0=48	41	4E	47	31	44	44	44	37	35	48	41	50	59	31	44
CAC0=44	42	34	48	41	52	44	31	44	45	30	33	48	41	53	31
CAD0=44	45	34	34	48	41	56	45	31	44	45	38	32	48	45	31
CAE0=44	45	43	34	48	45	41	44	31	44	45	46	34	48	45	41
CAF0=52	31	44	46	33	35	48	45	41	52	54	31	44	46	37	34
CB00=48	45	41	54	31	44	46	43	35	48	45	41	56	59	31	45
CB10=30	30	36	48	45	49	47	48	54	31	45	30	34	34	48	45
CB20=4C	44	31	45	30	39	35	48	45	4C	4C	4F	31	45	30	45
CB30=34	48	45	4C	50	31	45	31	35	35	48	45	4E	52	59	31
CB40=45	31	41	33	48	45	52	31	45	32	30	34	48	45	52	45
CB50=31	44	46	33	35	48	45	52	54	5A	31	45	32	32	33	48
CB60=45	58	31	45	32	37	34	48	49	47	48	31	45	32	44	33
CB70=48	49	53	31	45	33	31	34	48	4F	4C	44	31	45	33	35
CB80=34	48	4F	4C	45	31	45	33	42	34	48	4F	4D	45	31	45
CB90=33	46	34	48	4F	4F	4B	31	45	34	33	34	48	4F	53	54

85GRAPH1D6E5GRAI  
 E1D734GRAY1D825G  
 REAT1D735GREEN1D  
 785GREET1D7D4GRE  
 Y1D825GRIND1D877  
 GROCERY1D8E6GROU  
 ND1D955GROUFP1D9C  
 4GROW1DA19GUARAN  
 TEE1DA95GUARD1DA  
 55GUESS1DB100000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 1H1DB53HAD1DBA4H  
 ALF1DBE4HALT1DC2  
 6HAMMER1DC64HAND  
 1DCB6HANDLE1DD04  
 HANG1DD75HAPPY1D  
 DB4HARD1DE03HAS1  
 DE44HAVE1DE82HE1  
 DEC4HEAD1DEF4HEA  
 R1DF35HEART1DF74  
 HEAT1DFC5HEAVY1E  
 006HEI1GHT1E044HE  
 LD1E095HELLO1E0E  
 4HELP1E155HENRY1  
 E1A3HER1E204HERE  
 1DF35HERTZ1E223H  
 EX1E274HIGH1E2D3  
 HIS1E314HOLD1E35  
 4HOLE1E3B4HOME1E  
 3F4HOOK1E434HOST

CBA0=31	45	34	37	33	48	4F	54	31	45	34	43	35	48	4F	54
CBB0=45	4C	31	45	35	30	34	48	4F	55	52	31	45	35	37	35
CBC0=48	4F	55	53	45	31	45	35	42	33	48	4F	57	31	45	36
CBD0=30	35	48	55	4D	41	4E	31	45	36	34	37	48	55	4E	44
CBE0=52	45	44	31	45	36	43	36	48	55	4E	47	52	59	31	45
CBF0=37	34	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CC00=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CC10=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CC20=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CC30=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CC40=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
CC50=30	31	49	31	45	37	42	34	49	44	4C	45	31	45	37	46
CC60=34	49	44	4F	4C	31	45	37	46	32	49	46	31	45	38	34
CC70=39	49	4D	4D	45	44	49	41	54	45	31	45	38	37	39	49
CC80=4D	50	4F	52	54	41	4E	54	31	45	38	46	38	49	4D	50
CC90=52	4F	50	45	52	31	45	39	41	37	49	4D	50	52	4F	56
CCA0=45	31	45	41	33	32	49	4E	31	45	41	43	34	49	4E	43
CCB0=48	31	45	41	46	37	49	4E	43	4C	55	44	45	31	45	42
CCC0=34	36	49	4E	43	4F	4D	45	31	45	42	44	3B	49	4E	44
CCD0=45	50	45	4E	44	45	4E	54	31	45	42	34	35	49	4E	44
CCE0=45	58	31	45	44	44	30	35	49	4E	44	49	41	31	45	44
CCF0=38	49	4E	44	49	43	41	54	45	31	45	44	46	3A	49	4E
CCD0=44	55	53	54	52	49	41	4C	31	45	45	37	36	49	4E	46
CD10=4F	52	4D	31	45	46	33	37	49	4E	49	54	49	41	4C	31
CD20=45	46	42	33	49	4E	4E	31	45	41	43	35	49	4E	50	55
CD30=54	31	46	30	32	37	49	4E	51	55	49	52	45	31	46	30
CD40=39	36	49	4E	53	45	52	54	31	46	31	32	37	49	4E	53
CD50=50	45	43	54	31	46	31	38	37	49	4E	53	54	41	4C	4C
CD60=31	46	32	31	37	49	4E	53	54	45	41	44	31	46	32	38
CD70=38	49	4E	53	54	52	55	43	54	31	46	33	30	3A	49	4E
CD80=53	54	52	55	4D	45	4E	54	31	46	33	41	3C	49	4E	53
CD90=55	46	46	49	43	49	45	4E	54	31	46	34	36	39	49	4E
CDA0=53	55	52	41	4E	43	45	31	46	35	30	38	49	4E	54	45
CDB0=52	45	53	54	31	46	35	41	39	49	4E	54	45	52	46	41

1E473HOTIE4C5HOT  
 EL1E504HOURIE575  
 HOUSE1E5B3HOWIE6  
 O5HUMANIE647HUND  
 REDIE6C6HUNGRYIE  
 7400000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 0000000000000000  
 011E7B4IDLEIE7F  
 4IDOLIE7F2IF1E84  
 9IMMEDIATEIE879I  
 MPORTANTIE8F8IMP  
 ROPERIE9A7IMPROV  
 E1EA32INIEAC4INC  
 HIEAF7INCLUDEIEB  
 46INCOMEIEBD;IND  
 EPENDENTIEC45IND  
 EX1ED05INDIAIED9  
 8INDICATEIEDF:IN  
 DUSTRIALIEE76INF  
 ORMIEF37INITIALI  
 EFB3INNIEAC5INPU  
 TIF027INQUIREIFO  
 96INSERTIF127INS  
 PECTIF187INSTALL  
 1F217INSTHEADIF28  
 8INSTRUCTIF30:IN  
 STRUMENTIF3A<INS  
 UFFICIENTIF469IN  
 SURANCEIF508INTE  
 RESTIF5A9INTERFA

CDC0=43	45	31	46	36	31	39	49	4E	54	45	52	52	55	50	54	CE1F619INTERRUPT
CDD0=31	46	37	34	37	49	4E	54	52	55	44	45	31	46	37	43	IF747INTRUDEIF7C
CDE0=37	49	4E	56	41	4C	49	44	31	46	38	35	36	49	4E	56	7INVALID1F856INV
CDF0=45	4E	54	31	46	38	45	39	49	4E	56	45	4E	54	4F	52	ENT1F8E9INVENTOR
CE00=59	31	46	39	36	36	49	4E	56	45	53	54	31	46	39	46	Y1F966INVESTIF9F
CE10=37	49	4E	56	4F	49	43	45	31	46	41	37	39	49	52	52	7INVOICE1FA79IRR
CE20=45	47	55	4C	41	52	31	46	42	30	32	49	53	31	46	42	EGULAR1FB02IS1FB
CE30=38	32	49	54	31	46	42	42	34	49	54	45	4D	31	46	42	82IT1FBB4ITEM1FB
CE40=45	39	49	4E	54	45	52	50	52	45	54	31	46	36	42	30	E9INTERPRET1F6B0
CE50=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
CE60=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
CE70=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
CE80=30	30	30	30	30	30	30	30	30	30	30	31	4A	31	46	43	000000000001J1FC
CE90=34	34	4A	41	43	4B	31	46	43	41	37	4A	41	4E	55	41	44JACK1FCA7JANUA
CEA0=52	59	31	46	43	46	33	4A	4F	42	31	46	44	41	34	4A	RY1FCF3JOB1FDA4J
CEB0=4F	49	4E	31	46	44	46	34	4A	4F	4C	54	31	46	45	36	OIN1FDF4JOLT1FE6
CEC0=33	4A	4F	59	31	46	45	43	35	4A	55	44	47	45	31	46	3JOY1FEC5JUDGE1F
CED0=46	32	36	4A	55	4C	49	45	54	31	46	46	38	34	4A	55	F26JULIET1FF84JU
CEE0=4C	59	32	30	30	31	34	4A	55	4D	50	32	30	30	38	34	LY20014JUMP20084
CEF0=4A	55	4E	45	32	30	30	45	30	30	30	30	30	30	30	30	JUNE200E000000000
CF00=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
CF10=30	30	30	30	30	30	30	30	31	4B	32	30	31	34	34	4B	000000001K20144K
CF20=45	45	50	32	30	31	39	33	4B	45	59	32	30	31	44	38	EEP20193KEY201D8
CF30=4B	45	59	42	4F	41	52	44	32	30	32	30	34	4B	49	4C	KEYBOARD20204KIL
CF40=4C	32	30	32	38	34	4B	49	4C	4F	32	30	32	43	34	4B	L20284KIL0202C4K
CF50=4E	45	57	32	32	45	33	34	4B	4E	4F	54	32	33	32	46	NEW2E34KNOT232F
CF60=34	4B	4E	4F	57	32	33	31	30	39	4B	4E	4F	57	4C	45	4KNOW23109KNOWLE
CF70=44	47	45	32	30	33	33	30	30	30	30	30	30	30	30	30	DGE2033000000000
CF80=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	000000000000000
CF90=30	30	30	30	30	30	30	31	4C	32	30	33	41	33	4C	41	00000001L203A3LA
CFA0=42	32	30	33	45	35	4C	41	42	4F	52	32	30	34	32	38	B203E5LABOR20428
CFB0=4C	41	4E	47	55	41	47	45	32	30	34	37	35	4C	41	50	LANGUAGE20475LAP
CFC0=53	45	32	30	35	30	34	4C	41	53	54	32	30	35	41	34	SE20504LAST205A4
CFD0=4C	41	54	45	32	30	35	46	33	4C	41	57	32	30	36	34	LATE205F3LAW2064

CFE0=34	4C	45	41	44	32	30	36	36	33	4C	45	44	32	30	36
CFF0=41	34	4C	45	46	54	32	30	36	45	33	4C	45	47	32	30
D000=37	33	35	4C	45	47	41	4C	32	30	37	37	34	4C	45	4E
D010=44	32	30	37	43	36	4C	45	4E	47	54	48	32	30	38	31
D020=34	4C	45	53	53	32	30	38	36	33	4C	45	54	32	30	38
D030=41	36	4C	45	54	54	45	52	32	30	38	45	35	4C	45	56
D040=45	4C	32	30	39	33	34	4C	49	46	45	32	30	39	39	35
D050=4C	49	47	48	54	32	30	39	45	34	4C	49	48	45	32	30
D060=41	33	34	4C	49	4D	41	32	30	41	38	35	4C	49	4D	49
D070=54	32	30	41	44	34	4C	49	4E	45	32	30	42	32	36	4C
D080=49	4E	45	41	52	32	30	42	37	34	4C	49	4E	4B	32	30
D090=42	45	33	4C	49	50	32	30	43	33	36	4C	49	51	55	49
D0A0=44	32	30	43	37	34	4C	49	53	54	32	30	43	44	36	4C
D0B0=49	53	54	45	4E	32	30	44	32	36	4C	49	54	54	4C	45
D0C0=32	30	44	38	34	4C	4F	41	44	32	30	44	45	34	4C	4F
D0D0=41	4E	32	30	45	33	35	4C	4F	43	41	4C	32	30	45	38
D0E0=34	4C	4F	43	4B	32	30	45	45	33	4C	4F	47	32	30	46
D0F0=32	34	4C	4F	4E	47	32	30	46	35	34	4C	4F	4F	4B	32
D100=30	46	38	34	4C	4F	53	53	32	30	46	43	34	4C	4F	53
D110=54	32	30	46	46	33	4C	4F	54	32	31	30	33	33	4C	4F
D120=57	32	31	30	37	35	4C	41	52	47	45	32	30	35	35	30
D130=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D140=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D150=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D160=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D170=30	31	4D	32	31	30	41	37	4D	41	43	48	49	4E	45	32
D180=31	30	44	34	4D	41	49	4C	32	31	32	33	3B	4D	41	45
D190=4E	54	45	4E	41	4E	43	45	32	31	31	33	34	4D	41	4B
D1A0=45	32	31	31	45	34	4D	41	4C	45	32	31	32	33	33	4D
D1B0=41	4E	32	31	32	39	36	4D	41	4E	41	47	45	32	31	32
D1C0=44	36	4D	41	4E	55	41	4C	32	31	33	34	3B	4D	41	4E
D1D0=55	46	41	43	54	55	52	45	32	31	33	43	34	4D	41	4E
D1E0=59	32	31	34	39	33	4D	41	50	32	31	34	45	35	4D	41
D1F0=52	43	48	32	31	35	32	36	4D	41	52	47	49	4E	32	31

4LEAD20663LED206  
A4LEFT206E3LEG20  
735LEGAL20774LEN  
D207C6LENGTH2081  
4LESS20863LET208  
A6LETTER208E5LEV  
EL20934LIFE20995  
LIGHT209E4LIKE20  
A34LIMA20A85LIMI  
T20AD4LINE20B26L  
INEAR20B74LINK20  
BE3LIP20C36LIQUI  
D20C74LIST20CD6L  
ISTEN20D26LITTLE  
20D84LOAD20DE4LO  
AN20E35LOCAL20E8  
4LOCK20EE3LOG20F  
24LONG20F54LOOK2  
OF84LOSS20FC4LOS  
T20FF3LOT21033LO  
W21075LARGE20550  
0000000000000000  
0000000000000000  
0000000000000000  
0000000000000000  
01M210A7MACHINE2  
10D4MAIL2123;MAI  
NTENANCE21134MAK  
E211E4MALE21233M  
AN21296MANAGE212  
D6MANUAL2134;MAN  
UFACTURE213C4MAN  
Y21493MAP214E5MA  
RCH21526MARGIN21

D200-35	37	34	4D	41	52	4B	32	31	35	46	36	4D	41	52	4B
D210-45	54	32	31	36	33	35	4D	41	54	43	48	32	31	36	39
D220-36	4D	41	54	55	52	45	32	31	36	45	37	4D	41	58	49
D230-4D	55	4D	32	31	37	34	33	4D	41	59	32	31	37	45	32
D240-4D	45	32	31	38	32	37	4D	45	41	53	55	52	45	32	31
D250-38	35	34	4D	45	41	54	32	31	38	41	3A	4D	45	43	48
D260-41	4E	49	43	41	4C	32	31	38	45	35	4D	45	44	49	41
D270-32	31	39	38	38	4D	45	44	49	43	49	4E	45	32	31	39
D280-45	36	4D	45	44	49	55	4D	32	31	41	36	34	4D	45	45
D290-54	32	31	38	41	34	4D	45	47	41	32	31	41	43	36	4D
D2A0-45	4D	42	45	52	32	31	42	32	36	4D	45	4D	4F	52	59
D2B0-32	31	42	38	33	4D	45	4E	32	31	42	45	3B	4D	45	52
D2C0-43	48	41	4E	44	49	53	45	32	31	43	32	35	4D	45	52
D2D0-47	45	32	31	43	44	37	4D	45	53	53	41	47	45	32	31
D2E0-44	32	35	4D	45	54	41	4C	32	31	44	39	35	4D	45	54
D2F0-45	52	32	31	44	46	35	4D	49	43	52	4F	32	31	45	34
D300-36	4D	49	44	44	4C	45	32	31	45	43	34	4D	49	4B	45
D310-32	31	46	32	34	4D	49	4C	45	32	31	46	37	34	4D	49
D320-4C	4C	32	31	46	44	35	4D	49	4C	4C	49	32	32	30	31
D330-37	4D	49	4C	4C	49	4F	4E	32	32	30	36	34	4D	49	4E
D340-49	32	32	30	44	35	4D	49	4E	55	53	32	32	31	32	36
D350-4D	49	4E	55	54	45	32	32	31	38	3D	4D	49	53	43	45
D360-4C	4C	41	4E	45	4F	55	53	32	32	31	44	34	4D	49	53
D370-53	32	32	32	38	37	4D	49	53	54	41	4B	45	32	32	32
D380-43	34	4D	4F	44	45	32	32	33	35	36	4D	4F	44	55	4C
D390-45	32	32	33	46	36	4D	4F	4E	44	41	59	32	32	34	38
D3A0-35	4D	4F	4E	45	59	32	32	35	30	35	4D	4F	4E	54	48
D3B0-32	32	35	36	34	4D	4F	52	45	32	32	35	42	37	4D	4F
D3C0-52	4E	49	4E	47	32	32	35	46	34	4D	4F	53	54	32	32
D3D0-36	37	35	4D	4F	54	4F	52	32	32	36	43	35	4D	4F	55
D3E0-4E	54	32	32	37	31	34	4D	4F	56	45	32	32	37	37	32
D3F0-4D	52	32	32	37	42	33	4D	52	53	32	32	38	30	32	4D
D400-53	32	32	38	35	34	4D	55	43	48	32	32	38	39	35	4D
D410-55	4C	54	49	32	32	38	45	38	4D	55	4C	54	49	50	4C

574MARK215F6MARK  
ET21635MATCH2169  
6MATURE216E7MAXI  
MUM21743MAY217E2  
ME21827MEASURE21  
854MEAT218A:MECH  
ANICAL218E5MEDIA  
21988MEDICINE219  
E6MEDIUM21A64MEE  
T218A4MEGA21AC6M  
EMBER21B26MEMORY  
21B83MEN21BE;MER  
CHANDISE21C25MER  
GE21CD7MESSAGE21  
D25METAL21D95MET  
ER21DF5MICRO21E4  
6MIDDLE21EC4MIKE  
21F24MILE21F74MI  
LL21FD5MILLI2201  
7MILLION22064MIN  
I220D5MINUS22126  
MINUTE2218-MISCE  
LLANEOUS221D4MIS  
S22287MISTAKE222  
C4MODE22356MODUL  
E223F6MONDAY2248  
5MONEY22505MONTH  
22564MORE225B7MO  
RNING225F4MOST22  
675MOTOR226C5MOU  
NT22714MOVE22772  
MR227B3MRS22802M  
S22854MUCH22895M  
ULTI228E8MULTIPL

D420=45	32	32	39	34	38	4D	55	4C	54	49	50	4C	59	32	32	32
D430=39	43	35	4D	4F	44	45	4C	32	32	33	39	30	30	30	30	30
D440=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D450=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D460=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D470=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D480=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D490=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D4A0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D4B0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	31
D4C0=4E	32	32	41	35	34	4E	41	4D	45	32	32	41	38	34	4E	4E
D4D0=41	4E	4F	32	32	41	44	38	4E	41	54	49	4F	4E	41	4C	4C
D4E0=32	42	33	36	4E	41	54	49	56	45	32	32	42	42	42	34	34
D4F0=4E	45	41	52	32	43	31	34	4E	45	41	54	32	32	32	43	43
D500=35	34	4E	45	43	4B	32	32	43	39	34	4E	45	45	44	44	32
D510=32	43	44	38	4E	45	47	41	54	49	56	45	32	32	44	44	31
D520=33	4E	45	54	32	44	38	37	4E	45	55	54	52	41	41	4C	4C
D530=32	32	44	43	33	4E	45	57	32	32	45	33	34	4E	45	58	58
D540=54	32	32	45	37	34	4E	49	43	45	32	32	45	45	36	4E	4E
D550=49	43	4B	45	4C	32	32	46	33	35	4E	49	47	48	54	32	32
D560=32	46	39	34	4E	49	4E	45	32	32	46	45	36	4E	49	4E	4E
D570=45	54	48	32	33	30	33	36	4E	49	4E	45	54	59	32	33	33
D580=30	39	32	4E	4F	32	33	31	30	35	4E	4F	49	53	45	32	32
D590=33	31	34	34	4E	4F	4E	45	32	33	31	41	34	4E	4F	4F	4F
D5A0=4E	32	33	31	45	36	4E	4F	52	4D	41	4C	32	33	32	33	33
D5B0=35	4E	4F	52	54	48	32	33	32	41	33	4E	4F	54	32	33	33
D5C0=32	46	34	4E	4F	54	45	32	33	33	33	37	4E	4F	54	46	46
D5D0=49	4E	47	32	33	33	37	36	4E	4F	54	49	43	45	32	33	33
D5E0=33	44	36	4E	4F	54	49	46	59	32	33	34	33	38	4E	4F	4F
D5F0=56	45	4D	42	45	52	32	33	34	43	33	4E	4F	57	32	33	33
D600=35	35	36	4E	55	4D	42	45	52	32	33	35	39	35	4E	55	55
D610=52	53	45	32	33	35	46	33	4E	55	54	32	33	36	33	30	30
D620=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
D630=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
E22948MULTIPLY22																
9C5MODEL22390000																
0000000000000000																
0000000000000000																
0000000000000000																
0000000000000000																
0000000000000000																
0000000000000000																
0000000000000000																
0000000000000000																
0000000000000000																
0000000000000001																
N22A54NAME22A84N																
ANO22AD8NATIONAL																
22B36NATIVE22BB4																
NEAR22C14NEAT22C																
54NECK22C94NEED2																
2CD8NEGATIVE22D1																
3NET22D87NEUTRAL																
22DC3NEW22E34NEX																
T22E74NICE22EE6N																
ICKEL22F35NIGHT2																
2F94NINE22FE6NIN																
ETH23036NINETY23																
092N023105NOISE2																
3144NONE231A4N00																
N231E6NORMAL2323																
5NORTH232A3NOT23																
2F4NOTE23337N0TH																
ING23376NOTICE23																
3D6NOTIFY23438NO																
VEMBER234C3NOW23																
556NUMBER23595NU																
RSE235F3NUT23630																
0000000000000000																
0000000000000000																





D860=43	4B	32	34	33	44	37	50	41	43	4B	41	47	45	32	34
D870=34	31	34	50	41	47	45	32	34	34	38	34	50	41	49	44
D880=32	34	34	45	34	50	41	49	4E	32	34	35	33	34	50	41
D890=4E	45	32	34	35	33	35	50	41	4E	45	4C	32	34	35	38
D8A0=34	50	41	50	41	32	34	35	45	35	50	41	50	45	52	32
D8B0=34	36	34	36	50	41	52	43	45	4C	32	34	36	39	35	50
D8C0=41	52	45	4E	32	34	36	46	34	50	41	52	54	32	34	37
D8D0=35	37	50	41	52	54	49	41	4C	32	34	37	39	34	50	41
D8E0=53	53	32	34	37	46	36	50	41	53	53	45	44	32	34	38
D8F0=33	34	50	41	53	54	32	34	38	33	33	50	41	54	32	34
D900=38	38	37	50	41	54	54	45	52	4E	32	34	38	43	35	50
D910=41	55	53	45	32	34	39	32	33	50	41	59	32	34	39	35
D920=33	50	45	41	32	34	33	41	35	50	45	41	43	45	32	34
D930=44	44	34	50	45	41	4B	32	34	39	41	34	50	45	45	4B
D940=32	34	39	41	37	50	45	52	43	45	4E	54	32	34	39	45
D950=36	50	45	52	49	4F	44	32	34	41	35	39	50	45	52	4D
D960=41	4E	45	4E	54	32	34	41	42	36	50	45	52	53	4F	4E
D970=32	34	42	33	38	50	45	52	53	4F	4E	41	4C	32	34	42
D980=38	3B	50	45	52	53	4F	4E	41	4C	49	54	59	32	34	42
D990=46	35	50	48	41	53	45	32	34	43	41	35	50	48	4F	4E
D9A0=45	32	34	43	46	34	50	49	43	4B	32	34	44	33	34	50
D9B0=49	43	4F	32	34	44	37	35	50	49	45	43	45	32	34	44
D9C0=44	34	50	49	4E	54	32	34	45	31	34	50	49	50	45	32
D9D0=34	45	36	35	50	4C	41	43	45	32	34	45	42	35	50	4C
D9E0=41	49	4E	32	34	46	36	34	50	4C	41	4E	32	34	46	31
D9F0=35	50	4C	41	4E	45	32	34	46	36	35	50	4C	41	4E	54
DA00=32	34	46	43	34	50	4C	41	59	32	35	30	32	36	50	4C
DA10=45	41	53	45	32	35	30	37	34	50	4C	4F	54	32	35	30
DA20=43	34	50	4C	55	53	32	35	31	31	36	50	4F	43	4B	45
DA30=54	32	35	31	36	35	50	4F	49	4E	54	32	35	31	43	34
DA40=50	4F	4B	45	32	35	32	33	36	50	4F	4C	49	43	45	32
DA50=35	32	37	36	50	4F	4C	49	43	59	32	35	32	44	34	50
DA60=4F	4F	52	32	35	36	39	33	50	4F	50	32	35	33	34	34
DA70=50	4F	52	54	32	35	33	38	38	50	4F	53	49	54	49	4F

CK243D7PACKAGE24  
 414PAGE24484PAID  
 244E4PAIN24534PA  
 NE24535PANEL2458  
 4PAPA245E5PAPER2  
 4646PARCEL24695P  
 AREN246F4PART247  
 57PARTIAL24794PA  
 SS247F6PASSED248  
 34PAST24833PAT24  
 887PATTERN248C5P  
 AUSE24923PAY2495  
 3PEA243A5PEACE24  
 DD4PEAK249A4PEEK  
 249A7PERCENT249E  
 6PERIOD24A59PERM  
 ANENT24AB6PERSON  
 24B38PERSONAL24B  
 8;PERSONALITY24B  
 F5PHASE24CA5PHON  
 E24CF4PICK24D34P  
 ICO24D75PIECE24D  
 D4PINT24E14PIPE2  
 4E65PLACE24EB5PL  
 AIN24F64PLAN24F1  
 5PLANE24F65PLANT  
 24FC4PLAY25026PL  
 EASE25074PLOT250  
 C4PLUS25116POCKE  
 T25165POINT251C4  
 POKE25236POLICE2  
 5276POLICY252D4P  
 OOR25693POP25344  
 PORT25388POSITIO

DA80=4E	32	35	33	44	38	50	4F	53	49	54	49	56	45	32	35	N253D8POSITIVE25
DA90=34	34	38	50	4F	53	53	49	42	4C	45	32	35	34	43	34	448POSSIBLE254C4
DAA0=50	4F	53	54	32	35	35	34	39	50	4F	54	45	4E	54	49	POST25549POTENTI
DAB0=41	4C	32	35	35	39	35	50	4F	55	4E	44	32	35	36	33	AL25595POUND2563
DAC0=34	50	4F	55	52	32	35	36	39	35	50	4F	57	45	52	32	4POUR25695POWER2
DAD0=35	36	44	38	50	52	41	43	54	49	43	45	32	35	37	32	56D8PRACTICE2572
DAE0=37	50	52	45	4D	49	55	4D	32	35	37	41	37	50	52	45	7PREMIUM257A7PRE
DAF0=50	41	52	45	32	35	38	32	35	50	52	45	53	53	32	35	PARE25825PRESS25
DB00=38	39	38	50	52	45	53	53	55	52	45	32	35	38	45	37	898PRESSURE258E7
DB10=50	52	45	56	45	4E	54	32	35	39	33	38	50	52	45	56	PREVENT25938PREV
DB20=49	4F	55	53	32	35	39	42	35	50	52	49	43	45	32	35	IOUS259B5PRICE25
DB30=41	32	39	50	52	49	4E	43	49	50	41	4C	32	35	41	38	A29PRINCIPAL25A8
DB40=39	50	52	49	4E	43	49	50	4C	45	32	35	41	38	35	50	9PRINCIPLE25A85P
DB50=52	49	4E	54	32	35	42	32	35	50	52	49	4F	52	32	35	RINT25B25PRIOR25
DB60=42	38	38	50	52	49	4F	52	49	54	59	32	35	42	44	37	B88PRIORITY25BD7
DB70=50	52	49	56	41	54	45	32	35	43	36	35	50	52	4F	42	PRIVATE25C65PROB
DB80=45	32	35	43	45	37	50	52	4F	42	4C	45	4D	32	35	44	E25CE7PROBLEM25D
DB90=33	39	50	52	4F	43	45	44	55	52	45	32	35	44	42	37	39PROCEDURE25DB7
DBA0=50	52	4F	43	45	45	44	32	35	45	33	37	50	52	4F	43	PROCEED25E37PROC
DBB0=45	53	53	32	35	45	41	37	50	52	4F	44	55	43	45	32	ESS25EA7PRODUCE2
DBC0=35	46	32	37	50	52	4F	44	55	43	54	32	35	46	41	3A	5F27PRODUCT25FA:
DBD0=50	52	4F	46	45	53	53	49	4F	4E	32	36	30	33	36	50	PROFESSION26036P
DBE0=52	4F	46	49	54	32	36	30	43	37	50	52	4F	47	52	41	ROFIT260C7PROGRA
DBF0=4D	32	36	31	33	38	50	52	4F	47	52	45	53	53	32	36	M26138PROGRESS26
DC00=31	38	37	50	52	4F	4A	45	43	54	32	36	32	33	34	50	187PROJECT26234P
DC10=52	4F	4D	32	36	32	44	37	50	52	4F	4D	4F	54	45	32	ROM262D7PROMOTE2
DC20=36	33	32	37	50	52	4F	54	45	43	54	32	36	34	30	36	6327PROTECT26406
DC30=50	55	42	4C	49	43	32	36	34	38	34	50	55	4C	4C	32	PUBLIC26484PULL2
DC40=36	34	46	35	50	55	4C	53	45	32	36	35	33	38	50	55	64F5PULSE26538PU
DC50=52	43	48	41	53	45	32	36	35	45	34	50	55	52	45	32	RCHASE265E4PURE2
DC60=36	36	35	37	50	55	52	50	4F	53	45	32	36	36	39	34	6657PURPOSE26694
DC70=50	55	53	48	32	36	36	46	33	50	55	54	32	36	37	33	PUSH266F3PUT2673
DC80=37	50	52	4F	50	4F	53	45	32	36	33	39	30	30	30	30	7PROPOSE26390000
DC90=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000



DECO=37	36	32	37	52	45	4C	45	41	53	45	32	37	36	38	36	7627RELEASE27686
DED0=52	45	4D	41	49	4E	32	37	36	45	36	52	45	4D	4F	56	REMAIN276E6REMOV
DEE0=45	32	37	37	35	36	52	45	50	41	49	52	32	37	37	42	E27756REPAIR277B
DEF0=36	52	45	50	45	41	54	32	37	38	31	37	52	45	50	4C	6REPEAT27817REPL
DF00=41	43	45	32	37	38	37	36	52	45	50	4F	52	54	32	37	ACE27876REPORT27
DF10=38	46	39	52	45	50	52	45	53	45	4E	54	32	37	39	36	8F9REPRESENT2796
DF20=37	52	45	51	55	45	53	54	32	37	41	30	37	52	45	51	7REQUEST27A07REQ
DF30=55	49	52	45	32	37	41	38	3B	52	45	51	55	49	53	49	UIRE27A8;REQUI SI
DF40=54	49	4F	4E	32	37	42	30	36	52	45	53	43	55	45	32	TION27B06RESCUE2
DF50=37	42	41	38	52	45	53	45	4D	42	4C	45	32	37	43	32	7BA8RESEMBLE27C2
DF60=35	52	45	53	45	54	32	37	43	42	38	52	45	53	49	53	5RESET27CB8RESIS
DF70=54	4F	52	32	37	44	31	37	52	45	53	50	45	43	54	32	TOR27D17RESPECT2
DF80=37	44	38	37	52	45	53	50	4F	4E	44	32	37	45	30	34	7D87RESPOND27E04
DF90=52	45	53	54	32	37	46	35	38	52	45	53	54	52	49	43	REST27F58RESTRIC
DFA0=54	32	37	46	41	36	52	45	53	55	4C	54	32	38	30	33	T27FA6RESULT2803
DFB0=36	52	45	53	55	4D	45	32	38	30	41	36	52	45	54	41	6RESUME280A6RETA
DFC0=49	4C	32	38	31	31	36	52	45	54	41	49	4E	32	38	31	IL28116RETAIN281
DFD0=41	36	52	45	54	55	52	4E	32	38	32	31	38	52	45	56	A6RETURN28218REV
DFE0=49	53	49	4F	4E	32	38	32	37	37	52	45	53	4F	4C	56	ISION28277RESOLV
DFFO=45	32	38	32	45	36	52	49	42	42	4F	4E	32	38	33	35	E282E6RIBBON2835
E000=35	52	49	47	48	54	32	38	33	42	35	52	4F	4D	45	4F	5RIGHT283B5ROME0
E010=32	38	34	30	34	52	4F	4F	4D	32	36	34	37	34	52	4F	28404ROOM26474RO
E020=4F	54	32	38	34	42	35	52	4F	55	4E	44	32	38	34	46	OT284B5ROUND284F
E030=35	52	4F	55	54	45	32	38	35	35	33	52	4F	57	32	38	5ROUTE28553ROW28
E040=35	41	33	52	55	4E	32	38	35	44	34	52	55	53	48	32	5A3RUN285D4RUSH2
E050=38	36	31	3B	52	45	53	50	4F	4E	53	49	42	4C	45	52	861;RESPONSIBLE2
E060=37	45	38	30	30	30	30	30	30	30	30	30	30	30	30	30	7E80000000000000
E070=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E080=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E090=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E0A0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E0B0=30	30	30	30	30	30	30	30	30	31	53	32	38	36	35	34	000000001S28654
E0C0=53	41	46	45	32	38	36	38	34	53	41	49	4C	32	38	37	SAFE28684SAIL287
E0D0=34	36	53	41	4C	41	52	59	32	38	36	44	34	53	41	4C	46SALARY286D4SAL

E0E0=45	32	38	37	34	34	53	41	4D	45	32	38	37	41	38	53
E0F0=41	54	55	52	44	41	59	32	38	37	46	34	53	41	56	45
E100=32	38	38	37	33	53	41	59	32	38	38	43	34	53	43	41
E110=4E	32	38	39	30	35	53	43	45	4E	54	31	34	37	31	38
E120=53	43	48	45	44	55	4C	45	32	38	39	35	36	53	43	48
E130=4F	4F	4C	32	38	39	45	37	53	43	49	45	4E	43	45	32
E140=38	41	33	35	53	43	4F	52	45	32	38	41	42	35	53	43
E150=52	41	50	32	38	42	30	35	53	43	52	45	57	32	38	42
E160=36	33	53	45	41	31	33	44	34	36	53	45	41	52	43	48
E170=32	38	42	43	34	53	45	41	54	32	38	43	31	36	53	45
E180=43	4F	4E	44	32	38	43	35	36	53	45	43	52	45	54	32
E190=38	43	43	37	53	45	43	54	49	4E	4E	32	38	44	32	38
E1A0=53	45	43	55	52	49	54	59	32	38	44	39	33	53	45	45
E1B0=31	33	44	34	35	53	45	49	5A	45	32	38	45	32	36	53
E1C0=45	4C	45	43	54	32	38	45	36	34	53	45	4C	4C	32	38
E1D0=45	44	34	53	45	4D	49	32	38	46	31	34	53	45	4E	44
E1E0=32	38	46	36	34	53	45	4E	54	31	34	37	31	38	53	45
E1F0=4E	54	45	4E	43	45	32	38	46	38	38	53	45	50	41	52
E200=41	54	45	32	39	30	33	39	53	45	50	54	45	4D	42	45
E210=52	32	39	31	33	38	53	45	51	55	45	4E	43	45	32	39
E220=31	44	36	53	45	52	49	41	4C	32	39	32	35	36	53	45
E230=52	49	45	53	32	39	32	42	37	53	45	52	56	49	43	45
E240=32	39	33	30	33	53	45	54	32	39	33	35	35	53	45	56
E250=45	4E	32	39	33	39	37	53	45	56	45	4E	54	48	32	39
E260=33	46	37	53	45	56	45	4E	54	59	32	39	34	37	37	53
E270=45	56	45	52	41	4C	32	39	34	45	33	53	45	57	32	39
E280=46	33	35	53	48	41	52	50	32	39	35	38	35	53	48	49
E290=46	54	32	39	35	43	34	53	48	49	50	32	39	36	31	34
E2A0=53	48	4F	50	32	39	36	35	35	53	48	4F	52	54	32	39
E2B0=36	39	36	53	48	4F	55	4C	44	32	39	36	45	35	53	48
E2C0=55	4E	54	32	39	37	33	34	53	48	55	54	32	39	37	38
E2D0=34	53	49	44	45	32	39	37	43	36	53	49	45	52	52	41
E2E0=32	39	38	31	36	53	49	47	4E	41	4C	32	39	38	37	36
E2F0=53	49	4C	56	45	52	32	39	38	45	36	53	49	4E	47	4C
E28744	SAME287A8S														
ATURDAY	287F4SAVE														
28873	SAY288C4SCA														
N2890	5SCENT14718														
SCHEDULE	28956SCH														
00L289E	7SCIENCE2														
8A35	SCORE28AB5SC														
RAP28B	05SCREW28B														
63SEA	13D46SEARCH														
28BC4	SEAT28C16SE														
COND28	C56SECRET2														
8CC7	SECTION28D28														
SECURITY	28D93SME														
13D45	SEIZE28E26S														
ELECT	28E64SELL28														
ED4SEMI	28F14SEND														
28F64	SENT14718SE														
NTECE	28F88SEPAR														
ATE290	39SEPTEMBE														
R291	38SEQUENCE29														
1D6	SERIAL29256SE														
RIES	292B7SERVICE														
29303	SET29355SEV														
EN293	97SEVENTH29														
3F7	SEVENTY29477S														
EVERAL	294E3SEW29														
F35	SHARP29585SHI														
FT295	C4SHIP29614														
SHOP	29655SHORT29														
696	SHOULD296E5SH														
UNT	29734SHUT2978														
4SIDE	297C6SIERRA														
29816	SIGNAL29876														
SILVER	298E6SINGL														

E300=45	32	39	39	34	33	53	49	58	32	39	39	42	35	53	49
E310=58	54	48	32	39	41	31	35	53	49	58	54	59	32	39	41
E320=38	34	53	49	5A	45	32	39	42	30	34	53	4B	49	4E	32
E330=39	42	35	33	53	4B	59	32	39	42	41	35	53	4C	41	4E
E340=47	32	39	43	30	35	53	4C	41	53	48	32	39	43	35	35
E350=53	4C	41	56	45	32	39	43	41	34	53	4C	49	50	32	39
E360=44	30	34	53	4C	4F	57	32	39	44	35	35	53	4D	41	4C
E370=4C	32	39	44	39	35	53	4D	45	4C	4C	32	39	44	44	35
E380=53	4D	49	4C	45	32	39	45	32	35	53	4D	4F	4B	45	32
E390=39	45	39	34	53	4E	4F	57	32	39	45	45	32	53	4F	32
E3A0=39	46	33	34	53	4F	46	54	32	39	46	37	35	53	4F	4C
E3B0=49	44	32	41	30	31	34	53	4F	4D	45	32	42	31	39	33
E3C0=53	4F	4E	32	42	32	38	35	53	4F	52	52	59	32	41	30
E3D0=37	34	53	4F	52	54	32	41	30	42	35	53	4F	55	4E	44
E3E0=32	41	31	30	36	53	4F	55	52	43	45	32	41	31	36	35
E3F0=53	4F	55	54	48	32	41	31	42	35	53	50	41	43	45	32
E400=41	32	30	35	53	50	41	52	4B	32	41	32	36	35	53	50
E410=45	41	4B	32	41	32	42	37	53	50	45	43	49	41	4C	32
E420=41	33	30	36	53	50	45	45	43	48	32	41	33	43	35	53
E430=50	45	45	44	32	41	33	37	35	53	50	45	4C	4C	32	41
E440=34	32	35	53	50	45	4E	44	32	41	34	37	35	53	50	4C
E450=49	54	32	41	34	44	35	53	50	4F	4E	32	41	35	33	33
E460=36	53	50	52	49	4E	47	32	41	35	38	36	53	51	55	41
E470=52	45	32	41	35	45	35	53	54	41	43	4B	32	41	36	33
E480=35	53	54	41	49	52	32	41	37	42	35	53	54	41	4E	44
E490=32	41	36	38	38	53	54	41	4E	44	41	52	44	32	41	36
E4A0=45	34	53	54	41	52	32	41	37	36	35	53	54	41	52	45
E4B0=32	41	37	42	35	53	54	41	52	54	32	41	38	30	35	53
E4C0=54	41	54	45	32	41	38	35	37	53	54	41	54	49	4F	4E
E4D0=32	41	38	42	36	53	54	41	54	55	53	32	41	39	32	35
E4E0=53	54	45	41	4C	32	41	39	39	35	53	54	45	45	4C	32
E4F0=41	39	39	39	34	53	54	45	50	32	41	39	45	35	53	54
E500=43	4B	32	41	41	33	35	53	54	4F	43	4B	32	41	41	38
E510=34	53	54	4F	50	32	41	41	44	35	53	54	4F	52	45	32

E29943SIX299B5SI  
 XTH29A15SIXTY29A  
 84SIZE29B04SKIN2  
 9B53SKY29BA5SLAN  
 G29C05SLASH29C55  
 SLAVE29CA4SLIP29  
 D04SLOW29D55SMAL  
 L29D95SMELL29DD5  
 SMILE29E25SMOKE2  
 9E94SNOW29EE2S02  
 9F34SOFT29F75SOL  
 ID2A014SOME2B193  
 SON2B285SORRY2A0  
 74SORT2A0B5SOUND  
 2A106SOURCE2A165  
 SOUTH2A1B5SPACE2  
 A205SPARK2A265SP  
 EAK2A2B7SPECIAL2  
 A306SPEECH2A3C5S  
 PEED2A375PELL2A  
 425SPEND2A475SPL  
 IT2A4D5SPOON2A53  
 6SPRING2A586SQUA  
 RE2A5E5STACK2A63  
 5STAIR2A7B5STAND  
 2A688STANDARD2A6  
 E4STAR2A765STARE  
 2A7B5START2A805S  
 TATE2A857STATION  
 2A8B6STATUS2A925  
 STEAL2A995STEEL2  
 A994STEP2A9E5STI  
 CK2AA35STOCK2AA8  
 4STOP2AAD5STORE2

E520=41	42	32	38	53	54	54	52	41	49	47	48	54	32	41	42	37	AB28STRAIGHT2AB7
E530=36	53	54	52	41	49	54	54	32	41	42	37	36	53	54	52	45	6STRAIT2AB76STRE
E540=45	54	32	41	42	45	36	53	54	52	45	53	53	53	32	41	43	ET2ABE6STRESS2AC
E550=34	36	53	54	52	49	4E	47	32	41	43	41	39	53	54	52	46	46STRING2ACA9STR
E560=55	43	54	55	52	45	32	41	44	30	35	53	54	59	4C	45	52	UCTURE2AD05STYLE
E570=32	41	44	38	37	53	55	42	4A	45	43	54	32	41	44	46	46	2AD87SUBJECT2ADF
E580=3A	53	55	42	53	54	49	54	55	54	45	32	41	45	39	38	46	:SUBSTITUTE2AE98
E590=53	55	42	54	52	41	43	54	32	41	46	34	3A	53	55	46	46	SUBTRACT2AF4:SUF
E5A0=46	49	43	49	45	4E	54	32	41	46	45	37	53	55	47	47	47	FICIENT2AFE7SUGG
E5B0=45	53	54	32	42	30	36	34	53	55	49	54	32	42	31	30	30	EST2B064SUIT2B10
E5C0=35	53	55	49	54	45	32	42	31	34	33	53	55	4D	32	42	42	5SUIE2B143SUM2B
E5D0=31	39	37	53	55	4D	4D	41	52	59	32	42	31	44	36	53	53	197SUMMARY2B1D6S
E5E0=55	4D	4D	45	52	32	42	32	33	33	53	55	4E	32	42	32	32	UMMER2B233SUN2B2
E5F0=38	36	53	55	4E	44	41	59	32	42	32	43	35	53	55	50	50	86SUNDAY2B2C5SUP
E600=45	52	32	42	33	34	36	53	55	50	50	4C	59	32	42	33	33	ER2B346SUPPLY2B3
E610=39	37	53	55	52	46	41	43	45	32	42	33	46	35	53	55	55	97SURFACE2B3F5SU
E620=52	47	45	32	42	34	34	37	53	55	52	47	45	52	59	32	32	RGE2B447SURGERY2
E630=42	34	39	38	53	55	52	47	49	43	41	4C	32	42	34	46	46	B498SURGICAL2B4F
E640=37	53	55	52	50	4C	55	53	32	42	35	37	37	53	55	53	53	7SURPLUS2B577SUS
E650=50	45	4E	44	32	42	35	44	35	54	53	57	45	45	50	42	42	PEND2B5D5SWEEP2B
E660=36	35	35	53	57	45	45	54	32	42	31	34	36	53	57	49	49	655SWEET2B146SWI
E670=54	43	48	32	42	36	41	36	53	59	4E	54	41	58	32	42	42	TCH2B6A6SYNTAX2B
E680=37	30	36	53	59	53	54	45	4D	32	42	37	39	35	53	48	48	706SYSTEM2B795SH
E690=41	52	45	32	39	35	34	30	30	30	30	30	30	30	30	30	30	ARE29540000000000
E6A0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E6B0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E6C0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E6D0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E6E0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E6F0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E700=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E710=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E720=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000
E730=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000





E960=38 54 52 41 4E 53 46 45 52 32 43 39 44 3A 54 52  
E970=41 4E 53 49 53 54 4F 52 32 43 38 35 38 54 52 41  
E980=4E 53 4D 49 54 32 43 38 45 39 54 52 41 4E 53 50  
E990=4F 52 54 32 43 39 38 3E 54 52 41 4E 53 50 4F 52  
E9A0=54 41 54 49 4F 4E 32 43 41 33 36 54 52 41 56 45  
E9B0=4C 32 43 42 30 38 54 52 49 41 4E 47 4C 45 32 43  
E9C0=42 37 37 54 52 4F 55 42 4C 45 32 43 43 31 35 54  
E9D0=52 55 43 48 32 43 43 38 34 54 52 55 45 32 43 43  
E9E0=44 35 54 52 55 53 54 32 43 44 32 33 54 52 59 32  
E9F0=43 44 38 37 54 55 45 53 44 41 59 32 43 44 45 34  
EA00=54 55 4E 45 32 43 45 36 34 54 55 52 4E 32 43 45  
EA10=42 36 54 57 45 4C 56 45 32 43 45 46 36 54 57 45  
EA20=4E 54 59 32 43 46 36 33 54 57 4F 32 43 46 44 34  
EA30=54 59 50 45 32 44 30 31 30 30 30 30 30 30 30  
EA40=30 30 30 30 30 30 30 30 30 30 30 30 30 30 30  
EA50=30 30 30 30 30 30 30 30 30 30 30 30 30 30 30  
EA60=30 30 30 30 30 30 30 30 30 30 30 30 30 30 30  
EA70=30 30 30 30 30 30 30 30 30 30 30 30 30 30 30  
EA80=30 30 30 30 30 30 30 30 30 30 30 30 30 30 30  
EA90=30 30 30 30 30 30 30 30 30 30 30 30 30 30 30  
EAA0=30 30 30 30 30 30 30 30 30 30 30 30 30 30 31  
EAB0=55 32 44 30 36 35 55 4C 54 52 41 32 44 30 41 35  
EAC0=55 4E 44 45 52 32 44 31 30 37 55 4E 49 46 4F 52  
EAD0=4D 32 44 31 35 35 55 4E 54 49 4C 32 44 31 45 32  
EAE0=55 50 32 44 32 35 36 55 52 47 45 4E 54 32 44 32  
EAF0=38 32 55 53 32 44 32 46 33 55 53 45 32 44 33 32  
EB00=30 30 30 30 30 30 30 30 30 30 30 30 30 30 30  
EB10=30 30 30 30 30 30 30 30 30 30 30 30 30 30 30  
EB20=30 30 31 56 32 44 33 42 36 56 41 43 41 4E 54 32  
EB30=44 33 46 35 56 41 4C 49 44 32 44 34 36 35 56 41  
EB40=4C 55 45 32 44 34 43 34 56 41 52 59 32 44 36 36  
EB50=36 56 45 4E 44 4F 52 32 44 35 33 34 56 45 4E 54  
EB60=32 44 35 39 36 56 45 52 49 46 59 32 44 35 45 34  
EB70=56 45 52 59 32 44 36 36 33 56 49 41 32 44 36 41

8TRANSFER2C9D:TR  
ANSISTOR2C858TRA  
NSMIT2C8E9TRANSP  
ORT2C98>TRANSPOR  
TATION2CA36TRAVE  
L2CB08TRIANGLE2C  
B77TROUBLE2CC15T  
RUCK2CC84TRUE2CC  
D5TRUST2CD23TRY2  
CD87TUESDAY2CDE4  
TUNE2CE64TURN2CE  
B6TWELVE2CEF6TWE  
NTY2CF63TWO2CFD4  
TYPE2D0100000000  
0000000000000000  
0000000000000000  
0000000000000000  
0000000000000000  
0000000000000000  
0000000000000000  
0000000000000000  
0000000000000000  
0000000000000000  
U2D065ULTRA2D0A5  
UNDER2D107UNIFOR  
M2D155UNTIL2D1E2  
UP2D256URGENT2D2  
82US2D2F3USE2D32  
0000000000000000  
0000000000000000  
001V2D3B6VACANT2  
D3F5VALID2D465VA  
LUE2D4C4VARY2D66  
6VENDOR2D534VENT  
2D596VERIFY2D5E4  
VERY2D6663VIA2D6A

EB80=36	56	49	43	54	4F	52	32	44	36	46	35	56	4F	49	43	6VICTOR2D6F5VOIC	
EB90=45	32	44	37	35	34	56	4F	49	44	32	44	37	42	34	56	E2D754VOID2D7B4V	
EBA0=4F	4C	54	32	44	38	31	36	56	4F	4C	55	4D	45	32	44	OLT2D816VOLUME2D	
EBB0=38	36	30	30	30	30	30	30	30	30	30	30	30	30	30	30	8600000000000000	
EBC0=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000	
EBD0=30	30	30	30	30	30	30	30	30	30	30	31	57	32	44	38	000000000001W2D8	
EBE0=45	34	57	41	47	45	32	44	39	36	34	57	41	49	54	32	E4WAGE2D964WAIT2	
EBF0=44	39	43	34	57	41	4E	54	32	44	41	31	33	57	41	53	D9C4WANT2DA13WAS	
EC00=32	44	41	36	34	57	41	53	48	32	44	41	41	35	57	41	2DA64WASH2DAA5WA	
EC10=54	45	52	32	44	41	44	34	57	41	54	54	32	44	42	32	TER2DAD4WATT2DB2	
EC20=34	57	41	56	45	32	44	42	36	33	57	41	59	32	44	44	4WAVE2DB63WAY2DD	
EC30=30	32	57	45	32	44	42	42	34	57	45	41	4B	32	44	43	02WE2DBB4WEAK2DC	
EC40=43	36	57	45	41	50	4F	4E	32	44	42	45	34	57	45	41	C6WEAPON2DBE4WEA	
EC50=52	32	44	45	45	39	57	45	44	4E	45	53	44	41	59	32	R2DEE9WEDNESDAY2	
EC60=44	43	34	34	57	45	45	4B	32	44	43	43	35	57	45	49	DC44WEEK2DCC5WEI	
EC70=47	48	32	44	44	44	30	36	57	45	49	47	48	54	32	44	39	GH2DD06WEIGHT2D9
EC80=43	34	57	45	4E	54	32	44	44	34	34	57	45	53	54	32	C4WENT2DD44WEST2	
EC90=44	44	39	33	57	45	54	32	44	44	45	34	57	48	41	54	DD93WET2DDE4WHAT	
ECA0=32	44	45	32	35	57	48	45	45	4C	32	44	45	36	34	57	2DE25WHEEL2DE64W	
ECB0=48	45	4E	32	44	45	41	35	57	48	45	52	45	32	44	45	HEN2DEA5WHERE2DE	
ECC0=45	35	57	48	49	43	48	32	44	46	33	35	57	48	49	4C	E5WHICH2DF35WHIL	
ECD0=45	32	44	46	38	37	57	48	49	53	4B	45	59	32	44	46	E2DF87WHISKEY2DF	
ECE0=45	35	57	48	49	54	45	32	45	30	35	33	57	48	4F	32	E5WHITE2E053WHO2	
ECF0=45	30	41	35	57	48	4F	4C	45	32	45	33	42	33	57	48	EOA5WHOLE2E3B3WH	
ED00=59	32	45	34	46	34	57	49	4C	4C	32	45	30	45	36	57	Y2E4F4WILL2EOE6W	
ED10=49	4E	44	4F	57	32	45	31	32	36	57	49	4E	54	45	52	INDOW2E126WINTER	
ED20=32	45	31	38	34	57	49	52	45	32	45	31	45	34	57	49	2E184WIRE2E1E4WI	
ED30=54	48	32	45	32	33	38	57	49	54	48	44	52	41	57	32	TH2E238WITHDRAW2	
ED40=45	32	37	37	57	49	54	48	4F	55	54	32	45	32	45	33	E277WITHTOUT2E2E3	
ED50=57	4F	4E	32	33	44	30	34	57	4F	52	44	32	45	33	36	WON23D04WORD2E36	
ED60=34	57	4F	52	4B	32	45	33	41	35	57	52	49	54	45	32	4WORK2E3A5WRITE2	
ED70=38	33	42	35	57	52	4F	4E	47	32	45	33	45	30	30	30	83B5WRONG2E3E000	
ED80=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000	
ED90=30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0000000000000000	



EFC0=32 44 31 35 32 44 36 46 32 44 46 45 32 45 34 36  
EFD0=32 45 35 34 32 45 39 30 32 45 38 36 32 33 44 30  
EFE0=32 43 46 44 32 43 30 30 31 43 35 37 31 42 43 42  
EFF0=32 39 39 42 32 39 33 39 31 39 38 33 32 32 46 45

2D152D6F2DFE2E46  
2E542E902E8623D0  
2CFD2C001C571BCB  
299B2939198322FE

APPENDIX H  
VOICE MESSAGE FORMATS

## H.1 TALK MODE FORMAT

The TALK Mode is the major voice mode of operation available with the voice system demonstration hardware. This mode actually produces spoken output from received message text. Figure H-1 summarizes the TALK Mode message preamble format. Figure H-2 highlights the use of the composition detail in the actual voiced message portion of the received text.

Refer to the preamble portion of the TALK Mode shown in figure H-1:

- a. The first four "\*" (asterisk) characters shown are only required when a TALK Mode message is inputted from the message processor unit (MPU) or RS-232 port of the microcomputer. In this case, the microcomputer will strip off these four characters and then handle the message in a "turn-around" fashion as if the message had actually been inputted from the AFSATCOM modem receive port. Normally, when a message is inputted either via the satellite link or by using the AFSATCOM test translator, the first four "\*" characters would not be sent.
- b. The next preamble character, "SOH" or "\*", initiates message processing (i.e., mode search) by the microcomputer on messages received in the modem input message buffer in the microcomputer.
- c. The next character, V or W, indicates the source of the voice mode message to the microprocessor: a "V" indicates the AFSATCOM modem; a "W" indicates the MPU/RS-232. Without either of these two characters, received messages would simply be passed through the microcomputer with no further processing.
- d. The next three ADR characters are the microcomputer address. When the computer is first turned on (or re-initialized), this address sequence is set to "ABC". It can be changed by communications supervisory (COMSUP) command.
- e. The "T" designates the TALK Mode.

[ \*\*\*\*\* ]  $\left( \begin{array}{c} \overline{\text{SOH}} \\ \text{OR} \\ * \end{array} \right) \left( \begin{array}{c} \text{V} \\ \text{OR} \\ \text{W} \end{array} \right)$  (ADR1) (ADR2) (ADR3) (T) (SP) [ VOICED MESSAGE ]

(a) (b) (c) (d) (e) (f) (g) - (r)

Figure H-1. TALK Mode: Preamble Detail

[ HELLO SP \$RONALD . SP SP SP THE SP NUMBER SP \$IA SP  
 (g) (h) (i) (j) (k) (l)

#9A 32 1D 0B 11 23 18 FF SP AIR/PLANE SP IS SP  
 (m) (n)

\*RE-FUEL-\*ING SP AS SP PREVIOUS/\*LY SP SCHEDULE-\*ED  $\overline{\text{ETX}}$  ]  
 (o) (p) (q) (r)

Figure H-2. TALK Mode: Voiced Message Composition Detail



- f. A mandatory American Standard Code for Information Interchange (ASCII) "space" ( $\overline{SP}$ ) character is used to delineate the voiced message portion of the text from the preamble.

Refer to the sample voiced message showing actual composition detail in figure H-2.

- g. The upper-case word "HELLO" is one of approximately 1300 prestored fixed words, prefixes, and suffixes available in the microcomputer's vocabulary which can be voiced directly. Words which are prestored but not fixed are also possible. Words not fitting either category are automatically spelled out in the SPELLING mode. Only upper-case characters are considered valid.
- h. The  $\overline{SP}$  character is one of several valid delimiters used in message composition. The  $\overline{SP}$  and "." (period) characters insert long pauses into spoken output when used as a delimiter while the "/" (slash), "-" (hyphen), and  $\overline{ETX}$  characters result in short pauses and are usually reserved for concatenation of words with other words, prefixes, and suffixes.
- i. The "\$" (dollar sign) character immediately preceding the upper-case word "RONALD" forces the microcomputer to enter a SPELLING mode whereby the word is voiced using the internationally-recognized International Civil Aviation Organization (ICAO) phonetic spell-out (e.g., ROMEO, OSCAR, NOVEMBER, ALPHA, LIMA, DELTA). This spell-out occurs regardless of whether or not the word is already prestored in the microcomputer's vocabulary when the SPELLING mode "\$" character precedes the actual word to be voiced.
- j. The "." (period) character is a valid delimiter indicating a long pause between the two words which it separates.
- k. Shown are three  $\overline{SP}$  characters used to delimit the next word from the previous one. Any number of  $\overline{SP}$  characters could have been used.
- l. Another SPELLING mode character precedes the word "1A". Note here that any numerals 0 to 9 or upper-case alphabetic characters could have been accommodated.

- m. The "#" (pound) character preceding the alphanumeric sequence denotes a DIRECT mode for this particular word. Thus, any alphanumeric sequence following "#" is passed directly to the microcomputer output without further modification.

In the case shown, the sequence "9A 32 1D 0B 11 23 18 FF" represents a phonetic mode command sequence to the VOTRAX computer for the word "OFFICIAL", which is represented by the phoneme sequence:

"UH1(32), F(1D), I1(0B), SH(11), UH3(23), L(18)".

The "9A" is a command to start a phoneme mode in the VOTRAX microcomputer, while the "FF" is a command to stop the phoneme mode. The "#" character can also be used for any function or capability available for direct use with the VOTRAX microcomputer, as described in reference 2, since any valid word following the "#" will be outputted directly without further processing.

- n. The "/" (slash) is used as a word concatenation symbol to produce a minimum pause state between the existing prestored words "AIR" and "PLANE" in order to voice a new word, AIRPLANE. Although the "-" (hyphen) could also have been used here for concatenation, it is usually employed (at the user's option) as a concatenation symbol with prefixes or suffixes as shown next. Like the "/", the "-" produces a minimum pause state.
- o. Prefix "\*RE" and suffix "\*ING" are concatenated with "FUEL" to produce the word REFUELING. The "\*" (asterisk) character is used to denote a special PREFIX/SUFFIX look-up mode to the microcomputer.
- p. The alternate concatenation symbol, "/" (slash), can be used for a word combined with a prefix or suffix. This could have also been entered as "PREVIOUS-\*LY" with no difference in voice output.
- q. The word SCHEDULED is shown as "SCHEDULE" (an existing prestored word), concatenated with the suffix "\*ED" (an existing prestored suffix). If the word "SCHEDULED" were presented to the microcomputer, it would be voiced in the SPFLING mode (unless it was first predefined in the WORD STORE Mode).

- r. ETX (End-of-Text) is a valid word delimiter normally reserved for use at the end of a message. Functionally, it is equivalent to the space, period, slash, and hyphen characters for identifying the end of a word. However, like the slash and hyphen, it will produce a minimum pause state.

## H.2 VERIFY MODE FORMAT

The VERIFY Mode of operation is used in conjunction with the TALK Mode by giving the voice system user an interactive ability to first verify his message content for direct recognition of the vocabulary by the microcomputer. Figure H-3 summarizes the VERIFY Mode preamble format. Figures H-4 and H-5 highlight the composition detail in both the input and output messages of this mode.

Refer to the preamble portion of the received text in figure H-3:

- a. Identical to TALK Mode preamble function.
- b. Identical to TALK Mode preamble function.
- c. Identical to TALK Mode preamble function.
- d. Identical to TALK Mode preamble function.
- e. The "V" character indicates the VERIFY Mode to the microcomputer. This mode character is the only basic formatting difference between the TALK and VERIFY modes.
- f. Identical to TALK Mode preamble function.
- g. This is the message to be verified. Figure H-4 shows the composition detail of a typical input message to be verified. Any message which obeys proper word formatting rules as explained in the TALK Mode message example above can qualify as such a message. Unlike the TALK Mode messages however, this message will not actually be voiced.

Refer to figure H-5, which shows the composition detail of an output message:

$$\underbrace{[ ***** ]}_{(a)} \left( \begin{array}{c} \overline{\text{SOH}} \\ \text{OR} \\ * \end{array} \right) \left( \begin{array}{c} \text{V} \\ \text{OR} \\ \text{M} \end{array} \right) \underbrace{(\overline{\text{ADR1}}) (\overline{\text{ADR2}}) (\overline{\text{ADR3}})}_{(d)} (V) (\overline{\text{SP}}) [ \text{VERIFY MESSAGE} ]$$

(b) (c) (e) (f) (g)

Figure H-3. VERIFY Mode: Preamble Detail

[ THIS  $\overline{\text{SP}}$  IS  $\overline{\text{SP}}$  EXAMPLE  $\overline{\text{SP}}$  OF  $\overline{\text{SP}}$  VERIFY  $\overline{\text{SP}}$  MESSAGE - \*ES. ]

Figure H-4. VERIFY Mode: Message Input Composition Detail

$$\underbrace{[ \text{THIS EXAMPLE} ]}_{(h)} [ \text{THIS } \overline{\text{SP}} \text{ IS } \overline{\text{SP}} \text{ EXAMPLE } \overline{\text{SP}} \text{ OF } \overline{\text{SP}} \text{ VERIFY } \overline{\text{SP}} \text{ MESSAGE - *ES.} ]_{(i)}$$

Figure H-5. VERIFY Mode: Message Output Composition Detail

- h. Undefined vocabulary contained in the text of the message to be verified is returned to the sending source, indicated by the operator designated source character (V or W). The words "THIS" and "EXAMPLE" are not currently defined in the microcomputer's vocabulary and the system so indicates to the sending source.
- i. After returning any undefined vocabulary, the system returns a replica of the VERIFY message as originally sent, so that the operator can compare any currently unrecognized vocabulary with entire message text as received. At this point the operator may choose to recompose and re-verify the message, or may simply send it as is. In any case, use of the VERIFY Mode is entirely optional since any properly formatted message can be voiced, regardless of whether the vocabulary is recognized or not. Any unrecognized words will be voiced in the SPELLING mode.

### H.3 WORD STORE MODE FORMAT

The format used to access the WORD STORE Mode of the microcomputer is shown in figure H-6. This mode enhances the prestored fixed word vocabulary of the microcomputer in near real-time by allowing individual users to define new prestored words which can be subsequently accessed by all users of the system in the TALK Mode or VERIFY Mode of operation.

Operationally, a user might first send a message in the VERIFY Mode in order to assess the system's current vocabulary. A user could then add to this vocabulary by defining to the system, in the WORD STORE Mode, any new word(s) which he deems useful or necessary. All users would then be able to use this enhanced vocabulary for TALK Mode message traffic.

Refer to figure H-6:

- a. Identical to TALK Mode and VERIFY Mode preamble function.
- b. Identical to TALK Mode and VERIFY Mode preamble function.
- c. Identical to TALK Mode and VERIFY Mode preamble function.
- d. Identical to TALK Mode and VERIFY Mode preamble function.
- e. The "W" character designates the WORD STORE Mode to the microcomputer which in turn utilizes the WORD STORE message following the preamble.

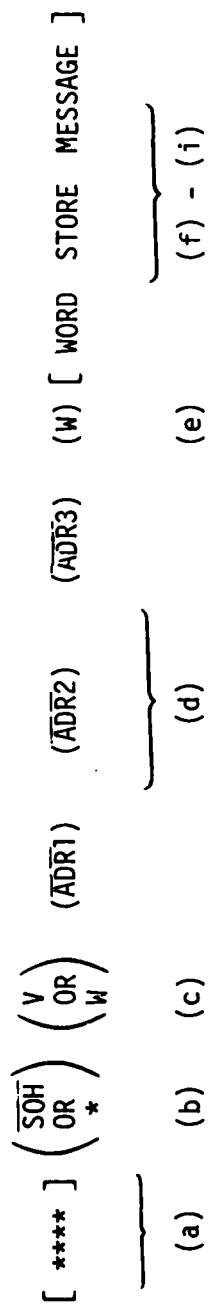


Figure H-6. WORD STORE Mode: Preamble Detail

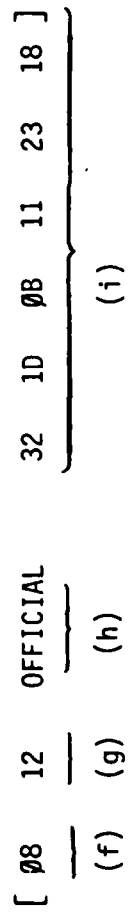


Figure H-7. WORD STORE Mode: Message Composition Detail

Refer to figure H-7:

- f. The required two-character numeric sequence, given by "08" in this sample WORD STORE message, represents the word-length parameter field for the word "OFFICIAL." Only word lengths to 15 are presently considered valid by the microcomputer's software.
- g. Following the word-length parameter, the required two-character numeric sequence, given by "12" in this sample message, represents the user-defined phoneme-length parameter field for the word "OFFICIAL." Only phoneme lengths to 30 are presently considered valid.
- h. The eight-character word "OFFICIAL" represents a typical word which might be stored.
- i. The typical sequence of 12 alphanumeric characters following the word to be stored represents the six phonemes required to voice the word "OFFICIAL" in the TALK Mode. These are given by:

32(UH1), 1D(F), 0B(I1), 11(SH), 23(UH3), 18(L).

## GLOSSARY

AFSATCOM	Air Force Satellite Communications
ASR	automatic send/receive
b/s	bits per second
CP	command post
EPROM	electronically programmable read-only memory
FLTSATCOM	Fleet Satellite Communications
FSK	frequency shift keying
I/O	input/output
KG	key generator
MPU	message processor unit
NB	narrowband
OW	orderwire
RAM	random access memory
RF	radio frequency
ROM	read-only memory
RX	receive
SBC	single board computer
TDM	time division multiplex
TSO	time sharing
TTY	teletype
UHF	ultra high frequency
VSM	versatile speech module
WB	wideband