

To the Graduate Council:

I am submitting herewith a thesis written by Jui-An Hsu entitled "Design of an Interface Between a Shorthand Machine and a Word Processing Microcomputer." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Electrical Engineering.

Donald W. Bouldin

Donald W. Bouldin, Major Professor

We have read this thesis
and recommend its acceptance:

Ara O. Bishop, Jr.

J. C. Huang

Accepted for the Council :

L. Evans

Vice Chancellor
Graduate Studies and Research

DESIGN OF AN INTERFACE BETWEEN A SHORTHAND MACHINE
AND A WORD PROCESSING MICROCOMPUTER

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Jui-An Hsu
December 1982

3065099

DEDICATION

DESIGN OF AN INTERFACE BETWEEN A SHORTHAND MACHINE AND
A WORD PROCESSING MICROCOMPUTER is dedicated to my parents,
Mr. & Mrs. Charles Y.F. Hsu, whose love and support has
made this work possible.

ACKNOWLEDGMENTS

The author is grateful for the guidance and patience of Dr. Donald W. Bouldin, chairman of this thesis committee. Appreciation is also expressed to the other members of the committee, Dr. A. O. Bishop and Dr. J. C. Hung.

Recognition must be given to Dr. Don Reese whose assistance in Hedman Stenotype Machine made this work possible.

Special thanks must be given to Mr. Stone Wong whose suggestions aided in the software package of the interpreter.

ABSTRACT

Machine shorthand is basically simplified phonetic spellings. It has long been a fast and efficient way to record as many messages of a speech as possible within a limited span of time. Since the machine shorthand can be executed at a much faster speed than pen writing, it provides a direct high speed interface between the stenographer and a word processing system.

The suggested automated system of machine shorthand consists of an Apple II Plus 48K microcomputer, a TV/CRT monitor, one or two floppy disk drivers, a printer, and an Electronic Stenotype Machine (ESM). The ESM has three main portions : (1)keyboard, (2)encoder circuit, and (3) interface card circuit. It was designed to interface between the stenotype machine and the microcomputer. A software package was created to translate the stenotype code into correctly spelled English. The strategy used was an one-to-one translation using a look-up table. A flexible and user-defined dictionary is included in the software package for efficient translation.

The realization of the ESM and the supporting software package makes machine shorthand a potential word processing instrument in business office applications.

TABLE OF CONTENTS

CHAPTER	PAGE
1. INTRODUCTION	1
2. MACHINE SHORTHAND	5
2.1 The Stenotype Machine	5
2.2 Rules of Stenography	9
3. HARDWARE OF THE ELECTRONIC STENOTYPE MACHINE .	17
3.1 The Keyboard	17
3.2 The Encoder Circuit	17
3.3 The Interface Card	23
4. INTERPRETER SOFTWARE	30
4.1 Hello Routine	32
4.2 Stenotype Routine	32
4.3 BT Prog Routine	32
4.4 Nametext Routine	34
4.5 Concat Code Routine	34
4.6 Translation Routine	34
4.7 Letterout Routine	34
4.8 Mkdict Routine	35
4.9 Min Sort Routine	35
4.10 Examine/update Dict Routine	35
4.11 Gettext Routine	35
5. TEST RESULTS AND CONCLUSIONS	36
REFERENCES	49
APPENDIX	51
VITA	87

LIST OF TABLES

TABLE	PAGE
2.1. Rule for Stenotyping Words which Have the Same Sounds but Different Spellings	10
2.2. Keyings for Consonants and Vowels	12
2.3. Punctuation	15
2.4. Special Keyings for Selected Word Endings .	15
2.5. Special Keyings for Final Consonant Diagrams	16
3.1. Hex Key Code Stored in EPROM 2716	24
3.2. Software to Define DDRA and CRA	28

LIST OF FIGURES

FIGURE	PAGE
1.1. A Modern Version of Stenotype Machine from Hedman Stenotype, Inc.	2
2.1. Symbols as Printed on a Stenotape	6
2.2. Keyboard Layout of the Hedman Stenotype Machine	8
2.3. Home Position of the Hedman Stenotype Machine	13
3.1. Suggested Automated System of Machine Shorthand	18
3.2. Keyboard Circuit of ESM	19
3.3. Encoder Circuit of ESM	20
3.4. Pin Layout in Auxiliary Slot of Apple II Plus Microcomputer	25
3.5. Interface Card Circuit of ESM	27
3.6. Timing Diagram of ESM	29
4.1. The Block Diagram of Procedure for Interpretation	31
4.2. "Menu" from Hello Routine	33
5.1. Copy of the Sample Letter	37
5.2. Raw Steno-Code of the Sample Letter	38
5.3. Steno-Word of the Sample Letter	43
5.4. Translated File of the Sample Letter	45
5.5. Printout of the Sample Letter	47
A.1. Hello Routine	52
A.2. Stenotype Routine	53

FIGURE	PAGE
A.3. BT Prog Routine	56
A.4. Nametext Routine	62
A.5. Gettext Routine	63
A.6. Concat Code Routine	64
A.7. Translation Routine	65
A.8. Mkdict Routine	67
A.9. Min Sort Routine	68
A.10. Examine/update Dict Routine	69
A.11. Steno-Dict Text File	73
A.12. Letterout Routine	85

CHAPTER 1

INTRODUCTION

Machine shorthand has long been a fast and efficient way to record accurately as many messages of a speech as possible within a limited span of time. The first simple, efficient machine shorthand recording device was perfected by an American stenographer and court reporter named Ward Stone Ireland in 1906 who called it the stenotype machine [1] . Figure 1.1 shows a modern version of his instrument. Since the machine shorthand can be executed at a much faster speed than pen writing, it provides a direct high speed interface between the stenographer and a word - processing system. But to translate shorthand notes into readable English is a very slow process and requires the skills of a person trained both in typing and in interpreting the notes. The development of automated translation by Andrew R. Rawson (1979) [2] makes an immediate translation possible and therefore saves both time and human resources. His research established the feasibility of using machine shorthand as a means of entering text to a microprocessor-based word processing system.

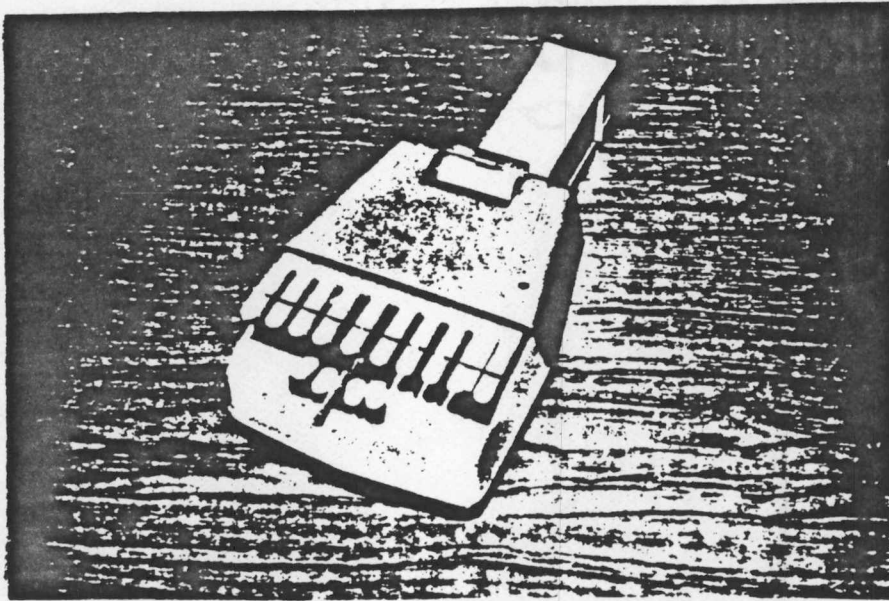


Figure 1.1 A Modern Version of Stenotype Machine
from Hedman Stenotype, Inc.

Today, machine shorthand is still used mainly in the courtroom as when it first appeared nearly seventy six years ago. Recently, however, the rapid development of microcomputers has initiated a movement in the business world which will greatly increase the usage of machine shorthand. This thesis describes the development of an interface to communicate between the shorthand machine and a word processing system which is applicable to the modern business office. The research is divided into three main steps:

1. Choose an adequate word processing system which is self-contained and affordable by small business people and can efficiently perform the necessary functions to translate the machine shorthand into readable English. The system should also be able to save the text onto floppy disks so that it is capable of handling a large amount of information at a time.
2. Design an interface which can encode the machine shorthand code into an eight-bit word, and then send it to the word processing system through the I/O port of the microcomputer.
3. Develop software to convert the encoded eight-bit words into ASCII codes (or this can be done

by a ROM or EPROM in the interface card) and then translate them into readable English. After the translation, the software should also be able to show the translated characters/words on the CRT (or TV) and then store them onto the floppy disk.

The following chapter briefly provides the background needed to understand the principles of machine shorthand. Chapter 3 discusses the hardware interface between the stenotype machine and the Apple II Plus* microcomputer. The software for encoding the input data and the strategy used to translate them are described in Chapter 4. Results and conclusions are discussed in Chapter 5. Suggestions are also given for further research.

*Apple is a trademark of Apple Computer Inc.

CHAPTER 2

MACHINE SHORTHAND

Machine shorthand is called keyboard shorthand or stenotypy to distinguish it from hand-written systems. Once mastered, it allows the stenotypist to maintain high speed and extreme accuracy for a long period of time. The whole concept of machine shorthand is basically simplified phonetic spellings. The stenotype machine was designed by utilizing the phonetic structure of English syllables.

2.1 The Stenotype Machine

The shorthand machine (Figure 1.1) is much smaller than a standard typewriter. The keyboard of the stenotype machine has twenty-three keys and a silent printing mechanism. Each sound, syllable or word is printed on a separate line. These are called strokes. A unique feature of writing on the stenotype, as contrasted to the standard typewriter, is that letters always print in exactly the same position on the stenotype tape and are not close together as in regular print (Figure 2.1). Another unique feature is that each sound in the English language is usually written on the keyboard in only one stroke. With each key stroke, the stenotape advances one line.

S T K P W H R A O * E U F R P B L G T S D Z

Alphabetic Symbols

1 2 3 4 5 6 7 8 9 0⁺

Numeric Symbols (Keyboard shifted)

+ 0 is encoded in this thesis.

D is printed on Hedman Stenotype Machine.

Figure 2.1 Symbols as Printed on a Stenotape.

Figure 2.2 shows the Hedman Stenotype keyboard layout. The symbols used are a subset of the Roman alphabet with the addition of the asterisk. The keyboard is divided into four basic parts as described below:

1. Initial Consonants. All consonant sounds that begin words or syllables are written by stroking one or more keys on the left side of the keyboard. These keys are always stroked with the fingers of the left hand.
2. Final Consonants. All consonant sounds that end words or syllables are written by stroking one or more keys on the right side of the keyboard. These keys are always stroked with the fingers of the right hand.
3. Vowels. ALL vowel sounds are written by stroking one or more keys on the bottom row of the keyboard. The two left vowel keys are struck with the thumb of the left hand and the two right vowel keys are struck with the thumb of the right hand.
4. Cardinal Key. This key is an extended asterisk key and is used to indicate long vowel sounds and other special designations. This key is stroked with the thumb opposite of the one used to strike the basic vowel key(s) which the stenotypist needs to key.

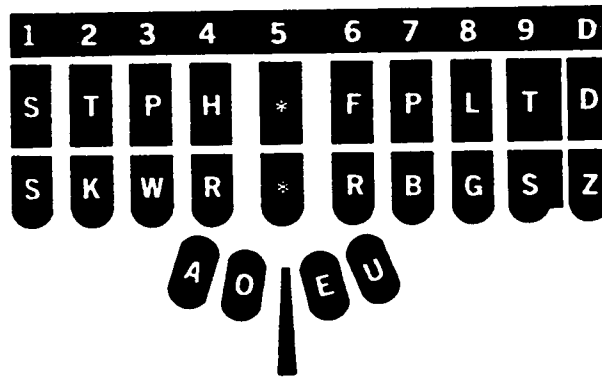


Figure 2.2 Keyboard Layout of the Hedman Stenotype Machine

While depressing the shift bar and key(s) of the top row simultaneously, numbers from zero to nine will be printed (Figure 2.1 and 2.2).

The stenotypist strikes several keys simultaneously rather than one key at a time as on the standard typewriter. Since both hands are used to operate the stenotype, as many keys as are usually necessary to write a syllable, word, or phrase may be stroked simultaneously. The tape is automatically spaced forward after each stroke so that the next stroke is printed in the proper space.

2.2 Rules of Stenography

Any symbol on a stenotape may represent either itself or, in combination with other symbols, some other sound which is not available on the keyboard. Each stroke may represent one character, one syllable, one word, or even one phrase. The stenotypist will type sound patterns based on writing rules in the same manner as a person writes words correctly in longhand. When stenotyping, each sound syllable is written in one stroke much as a pianist or organist plays a chord. However, for some words which have the same sounds but different spellings, they will be written in a form which closely resembles the spelled word. Table 2.1 gives some examples for the case just described above.

TABLE 2.1

RULE FOR STENOTYPING WORDS WHICH
HAVE THE SAME SOUNDS BUT DIFFERENT SPELLINGS

ware	WA*R	war	WAR	wear	WER
bare	BA*R	bar	BAR	bear	BER

People in various areas pronounce words differently. There are no absolute rules to follow. But for consistency in writing patterns for use in computer transcription, or for other persons to edit, it is beneficial to follow a widely adopted writing rule. Keyings for initial and final consonants and vowels for Hedman Stenotype machine are listed in Table 2.2. Some other writing rules are briefly described here as follows:

1. Home position(Figure 2.3). Home position will be on the upper row of keys with fingertips close to the space between the two rows of keys. The fingers of the left hand control the S, T, P, and H keys on the left side of the upper row of keys. The left thumb rests slightly over the A and O keys, the first two vowel keys at the left of the bottom row of keys. The fingers of the right hand control the F, P, L, and T keys on the right side of the upper row of keys. The right thumb controls the E and U keys, the vowel keys at the right of the bottom row of keys. Cardinal key is stroked with the thumb opposite of the one used to strike the basic vowel key(s) to indicate long vowel sounds or some other designations.

TABLE 2.2

KEYINGS FOR CONSONANTS AND VOWELS

Initial Consonants	Keyed As	Final Consonants	Keyed As	Vowels [@]	Keyed As
B	PW	B	B	A	A
C	K or S*	C	K or S*	E	E
D	TK	D	D	I	EU
F	TP	F	F	O	O
G	TKPW	G	G	U	U
H	H	H	- +	Y	EU(I)
J	SKWR	J	PBLG	OO	AO
K	K	K	BG	AI	AEU
L	HR	L	L	OI	OI
M	PH	M	PL	<u>ow</u>	OU
N	TPH	N	PB	<u>ah</u>	AU
P	P	P	P		
Q(U)	KW	Q	- +		
R	R	R	R		
S	S	S	S		
T	T	T	T		
V	SR	V	FPL		
W	W	W	- +		
X	STK(Z)	X	BGS(KS)		
Y	KWR	Y	EU(I)		
Z	STK	Z	Z		

*K for hard, S for soft

+not provided for

@long vowels are keyed with asterisk key

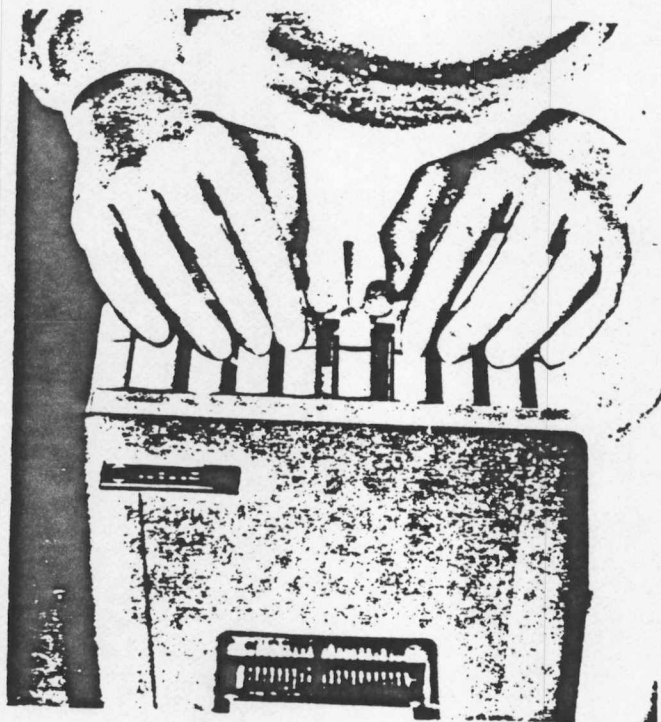


Figure 2.3 Home Positon of the Hedman Stenotype Machine

2. Punctuation. When taking dictation on the stenotype, punctuations are keyed as combinations of several symbols in one or two strokes. Table 2.3 gives codings for period, question mark, dash, comma, colon, semicolon, new paragraph, and correction.
3. Special Forms and Brief Forms. In order to take dictation quickly and easily, a shorthand writer should learn shortened forms for the most common words in the language or for the words that are difficult to write in full. Therefore, some special forms and brief forms are developed to make stenotyping easier. A listing of these forms with some derivatives from them may be found in [3] .
There are some special keyings for selected endings. They are listed in Table 2.4..
4. Final Diagraphs. Although the codings for initial diagraphs follow the English spelling, those for final diagraphs do not. Table 2.5. gives special keyings for these final diagraphs.

In addition to the many writing rules a stenotypist must learn, it is also a time-consuming task to decode stenotype into readable English. Therefore an interface between the stenotype machine and a microcomputer capable of translation was designed. The interfacing circuit is discussed in the next chapter.

TABLE 2.3
PUNCTUATION

Punctuation	Keyed As
. (period)	-FPLT
? (question mark)	STPH
- (dash)	OE
, (comma)	-RBGS
: (colon)	-FPLT/ -FPLT
; (semicolon)	-FPLT/ -RBGS
New Paragraph	*/*
Correction	*

TABLE 2.4
SPECIAL KEYINGS FOR SELECTED WORD ENDINGS

Ending	Keyed As
-FOR or -Fer	-FR
-ING	-G
-MENT	-PLT
-SELF	-SL
-"shun"	-GZ

TABLE 2.5
SPECIAL KEYINGS FOR FINAL CONSONANT DIAGRAPHS

Diagraph	Keyed As
-TH	-TSDZ
-SH	-RB

CHAPTER 3

HARDWARE OF THE ELECTRONIC STENOTYPE MACHINE

The suggested automated system of machine shorthand consists of an Apple II Plus 48K microcomputer, a TV/CRT monitor, one or two floppy disk drives, a printer, and an Electronic Stenotype Machine (ESM) (Figure 3.1). The ESM uses +5V single power supply and draws a current of 280mA. It can be divided into three basic portions: (1) keyboard, (2) encoder circuit, and (3) interface card circuit.

3.1 The Keyboard

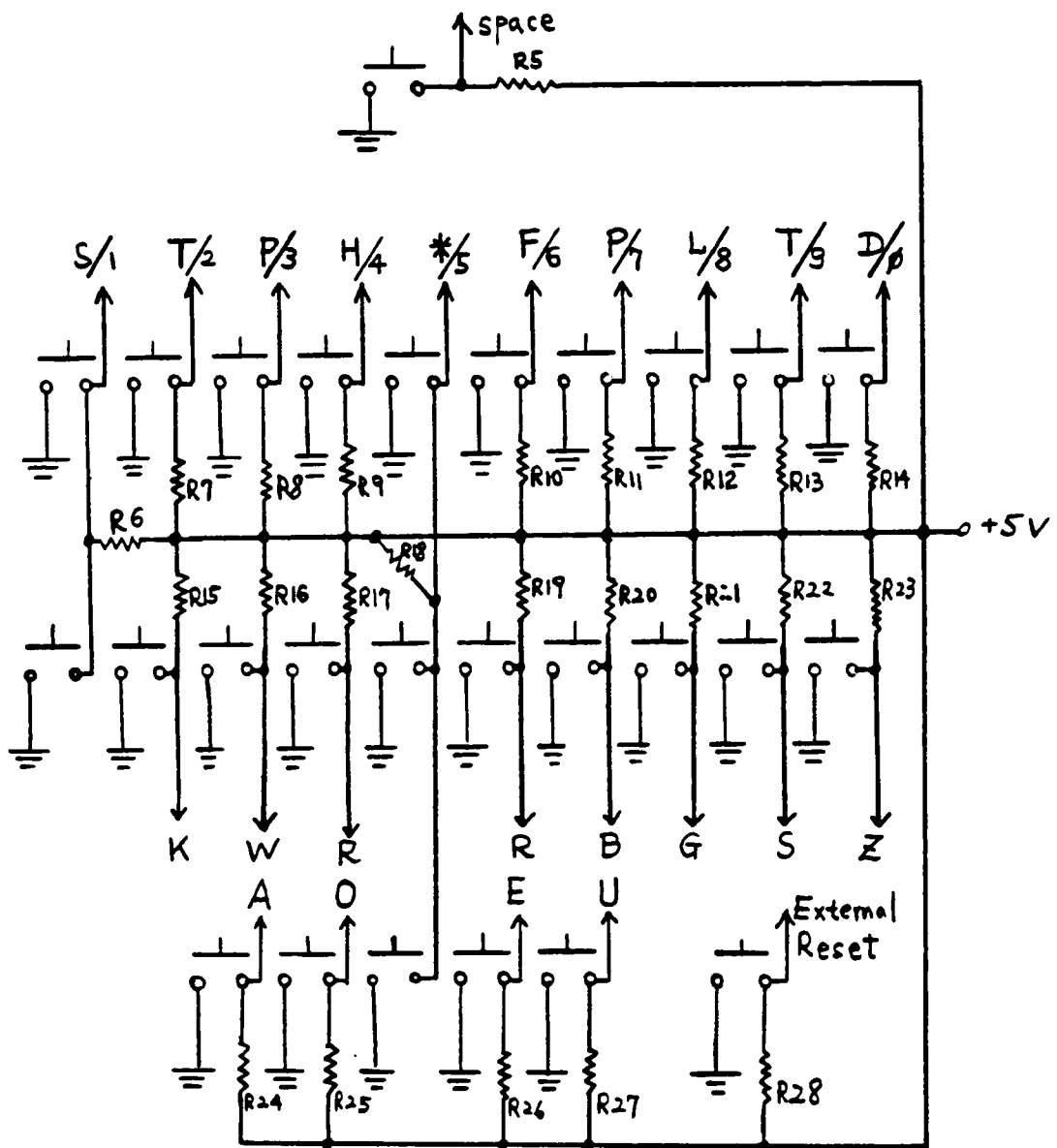
The keyboard of the ESM has twenty-three keys, each occupying exactly the same position as that in the Hedman stenotype machine. Each key is a mechanical, SPST, momentary, and normally open switch. The output of each switch is normally kept high; when a key is depressed, the output becomes low (Figure 3.2). This output is then sent to set a corresponding S-R flip flop which will be used to indicate which particular key has been depressed.

3.2 The Encoder Circuit

The encoder circuit (Figure 3.3-a,b,and c) is designed with a power-on reset circuit. When the last finger

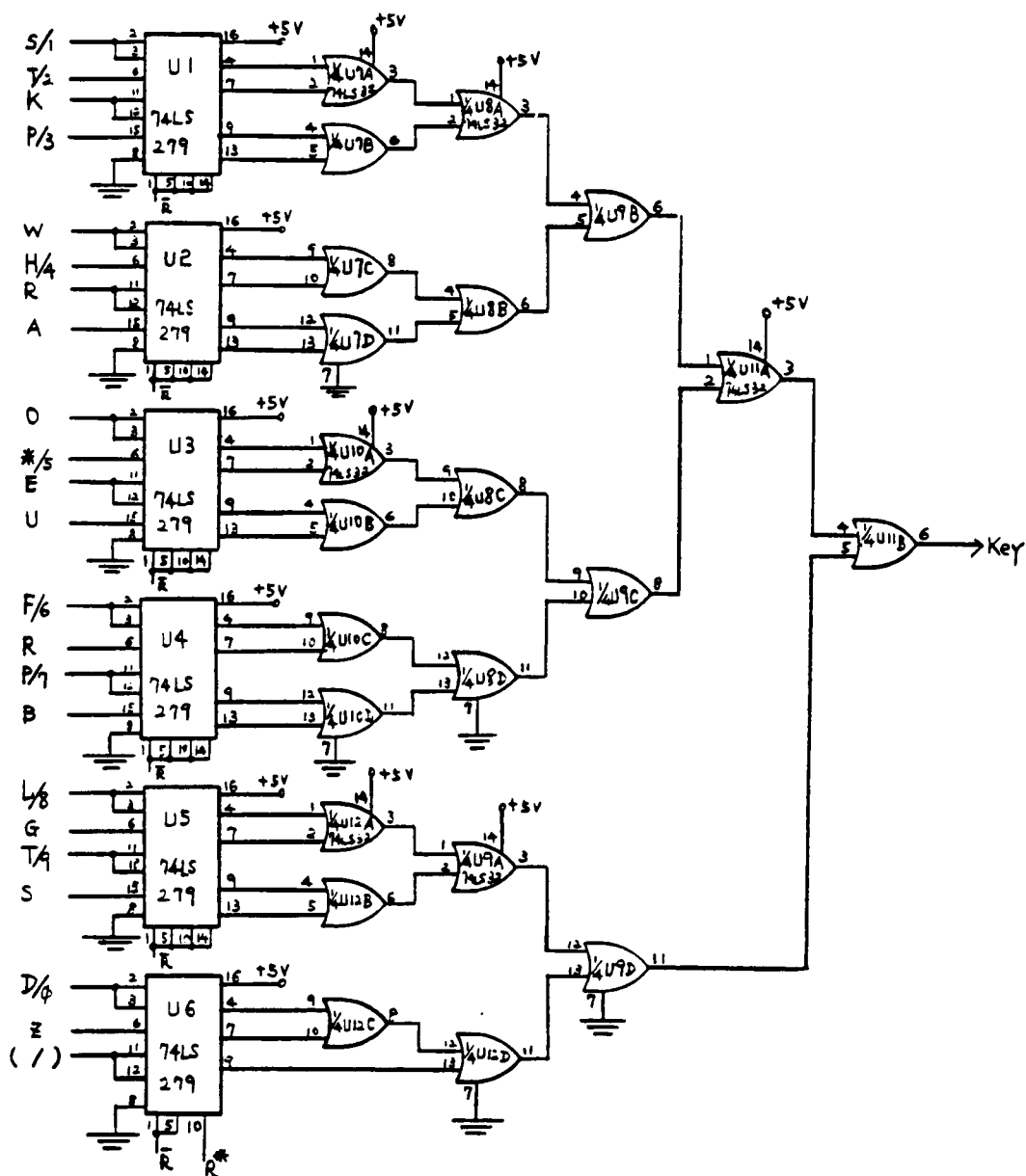


Figure 3.1. Suggested Automated System of Machine Shorthand.



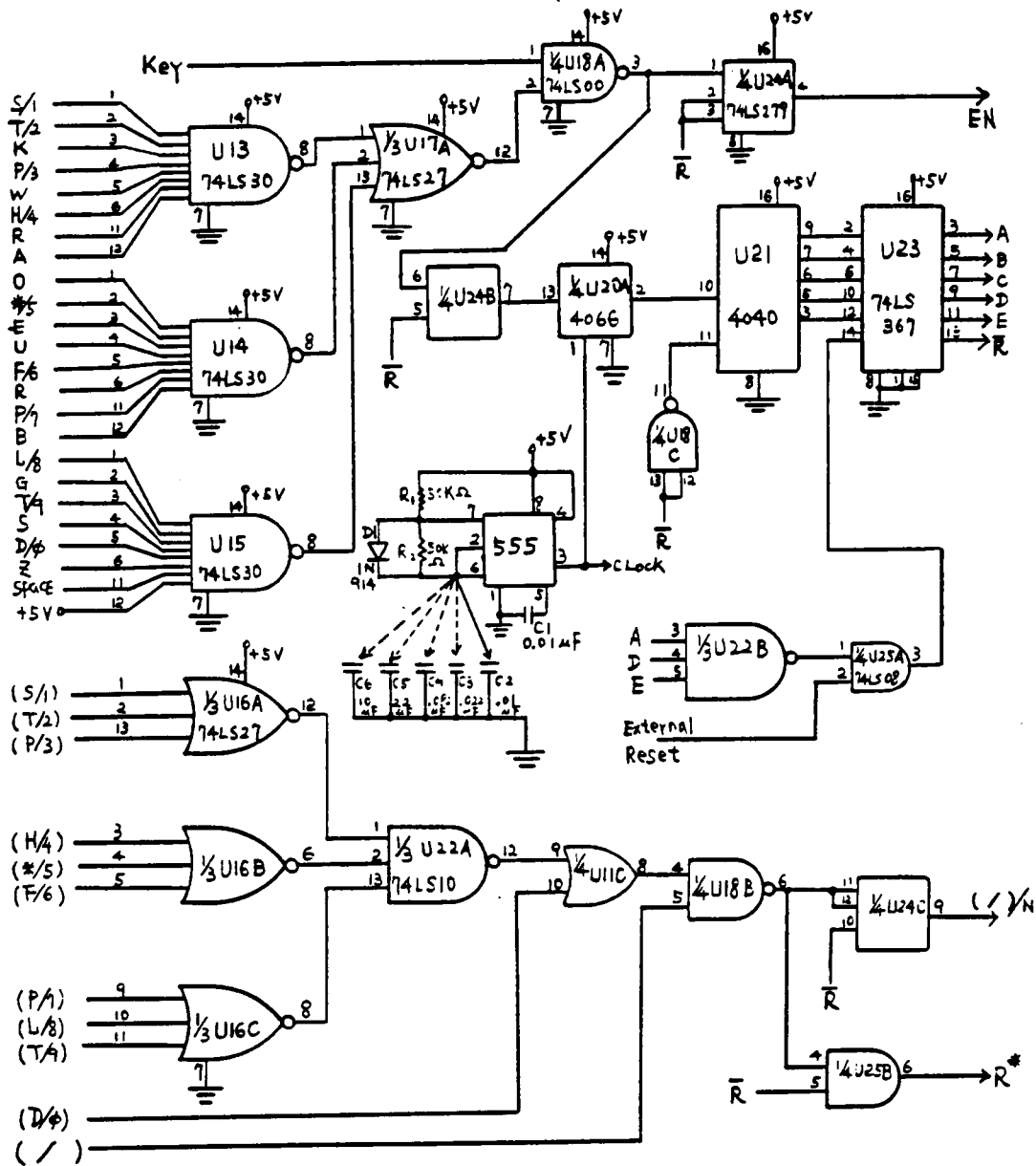
R5 - R28 : $1K\Omega$ Resistor, $\frac{1}{4}W$

Figure 3.2 Keyboard Circuit of ESM.



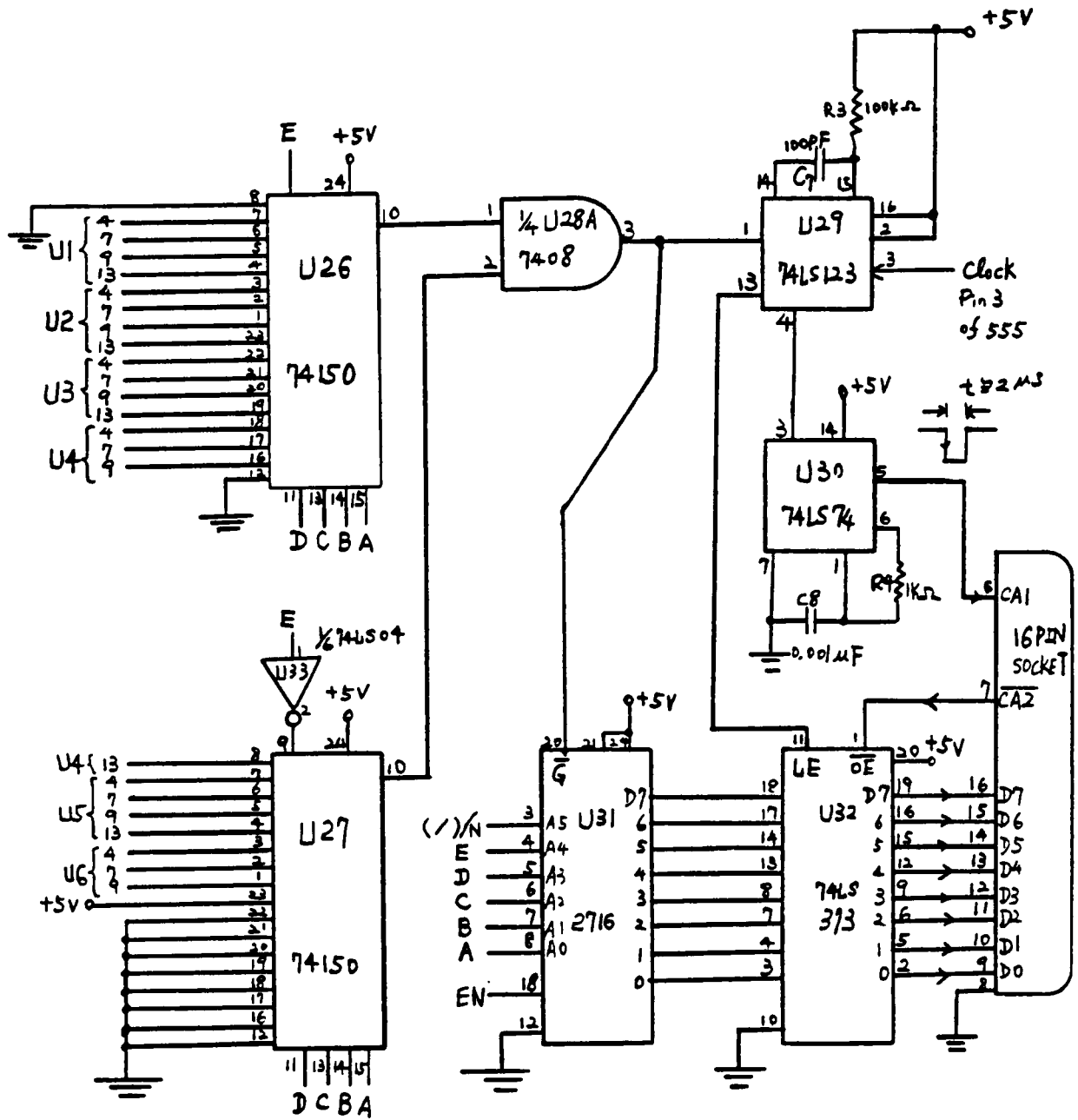
-a-

Figure 3.3 Encoder Circuit of ESM.



-b-

Figure 3.3 (Continued)



-C-

Figure 3.3 (Continued)

is removed from keyboard in each stroke, the circuit will set U24B (Figure 3.3b) which enables switch A of IC 4066, and then a clock pulse is fed to counter IC 4040. The multiplexers U26 and U27 are used to scan keyboard switches. The scanning rate is controlled by pin 3 of the 555 timer where a square wave, with a frequency of 1350 Hz (± 10 Hz, measured) and 50% duty cycle, is generated. If any key scanned has been depressed, pin 3 of U28A will become low and enable the corresponding code from the 2716 EPROM (Table 3.1) to be sent to U32-latched D flip flop with tri-state output. While pin 3 of U28A is low and the clock pulse changes from 0 to 1, pin 13 of U29 generates a pulse with a duration of about $7\mu\text{S}$ which latches the output from the 2716 into U32. At the same time, the signal at pin 4 of U29, the complementary pulse of pin 13 of U29, is sent to pin 3 of U30 (D-flip flop) where a delayed and negative going pulse with an interval of about $2\mu\text{S}$ is generated at pin 5 and is sent to the CA1 control of Peripheral Interface Adapter (PIA) MC6820 as an interrupt signal (Figure 3.3c).

3.3 The Interface Card

The Apple II Plus microcomputer has eight identical auxiliary slots available, slot 0 to slot 7, for external interfacing usage* (Figure 3.4). Slot 0 and 6 are reserved

*See reference 4.

TABLE 3.1

HEX KEY CODE STORED IN EPROM 2716

Address Decoded in Hex*			Address Decoded in Hex ⁺		
	Char	Hex		Char	Hex
001	S	D3	021	1	B1
002	T	D4	022	2	B2
003	K	CB	023	K	CB
004	P	D0	024	3	B3
005	W	D7	025	W	D7
006	H	C8	026	4	B4
007	R	D2	027	R	D2
008	A	C1	028	A	C1
009	O	CF	029	O	CF
00A	*	AA	02A	5	B5
00B	E	C5	02B	E	C5
00C	U	D5	02C	U	D5
00D	- F	C6	02D	6	B6
00E	- R	D2	02E	- R	D2
00F	- P	D0	02F	7	B7
010	- B	C2	030	- B	C2
011	- L	CC	031	8	B8
012	- G	C7	032	- G	C7
013	- T	D4	033	9	B9
014	- S	D3	034	- S	D3
015	- D	C4	035	0	B0
016	- Z	DA	036	- Z	DA
017 [@]	/	AF	037	-	--
018	CR	8D	038	CR	8D

*Address decoded when / key(017) is not depressed with other keys in one stroke.

+Address decoded when / key(017) is depressed with other key(s) simultaneously in one stroke.

@A Carriage Return (CR) is generated automatically at the end of each stroke.

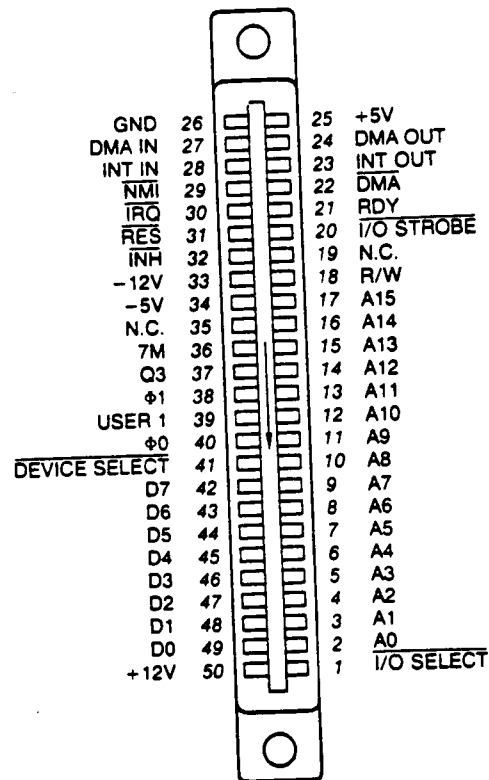


Figure 3.4. Pin Layout in Auxiliary Slot of Apple II Plus Microcomputer.

for the language card and the controller of floppy disks 1 and 2 separately. The interface card of the ESM is inserted into slot 2. A 40-pin MC6820 PIA(Figure 3.5)[5] is used as a means of interfacing the ESM with the MPU of the microcomputer. The PIA has two separate eight-bit bi-directional peripheral data buses for interfacing to the outside world. Since only one set of 8-bit data is read at a time by the microcomputer, only port A is used. The software to define the Data Direction Register A (DDRA) and the handshake mode operation of Control Register A (CRA) is listed in Table 3.2.. When that program is executed, if an interrupt signal is sent to CA1 (interrupt input line of port A, input only), the IRQA1 (bit 7) of CRA will be set and the $\overline{\text{IRQA}}$ line (MPU interrupt request, active low) goes low (processor interrupted). This initiates the interrupt subroutine program to read data from Data Register A (DRA). CA2 control line is programmed to function as a peripheral output line, and it is set in handshake mode. CA2 line is normally low. When the IRQA1 flag is set to "1", it goes high. After the MPU reads the contents of DRA (LDA from PIA), the CA2 line will go low; this signals the peripheral that the MPU took the data and is now ready to accept the next data (Figure 3.6). The software for encoding the input data and the strategy used to translate them are described in the next chapter.

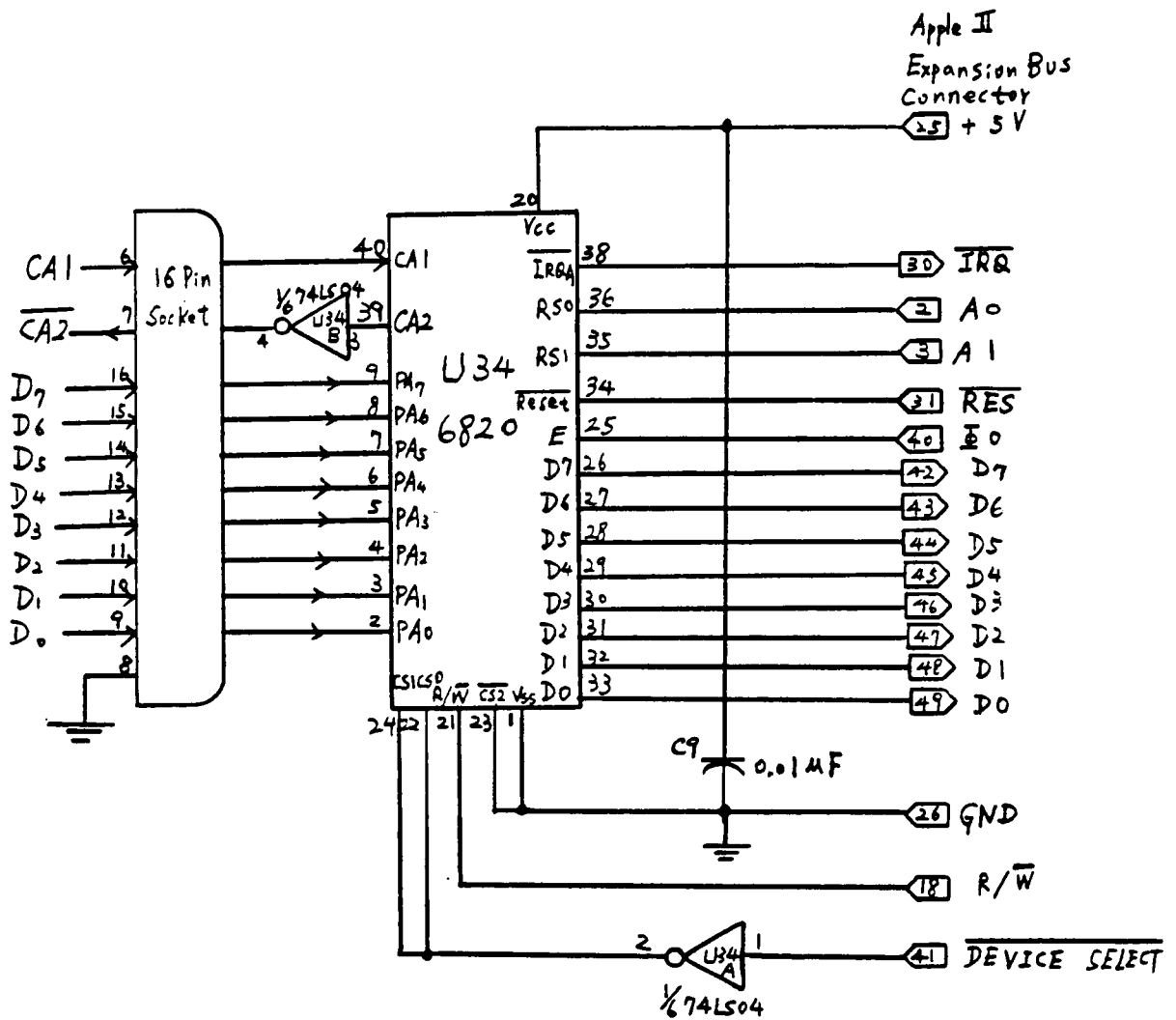


Figure 3.5 Interface Card Circuit of ESM.

TABLE 3.2
SOFTWARE TO DEFINE DDRA AND CRA

CONTROL REGISTER A (CRA)*						
Bit 7	6	5	4	3	2	1 0
IRQA1	IRQA2	CA2	Control	DDRA	CA1	Control

```

*REM $COA0 = DDRA/DRA ($ indicates Hexdecimal)
REM $COA1 = CRA
LDA #$ 00
STA $ COA0 Write to DDRA, set PA0-PA7 as inputs
LDA #$ 25
STA $ COA1 Write to CRA, enable DRA and define
           handshake mode.

```

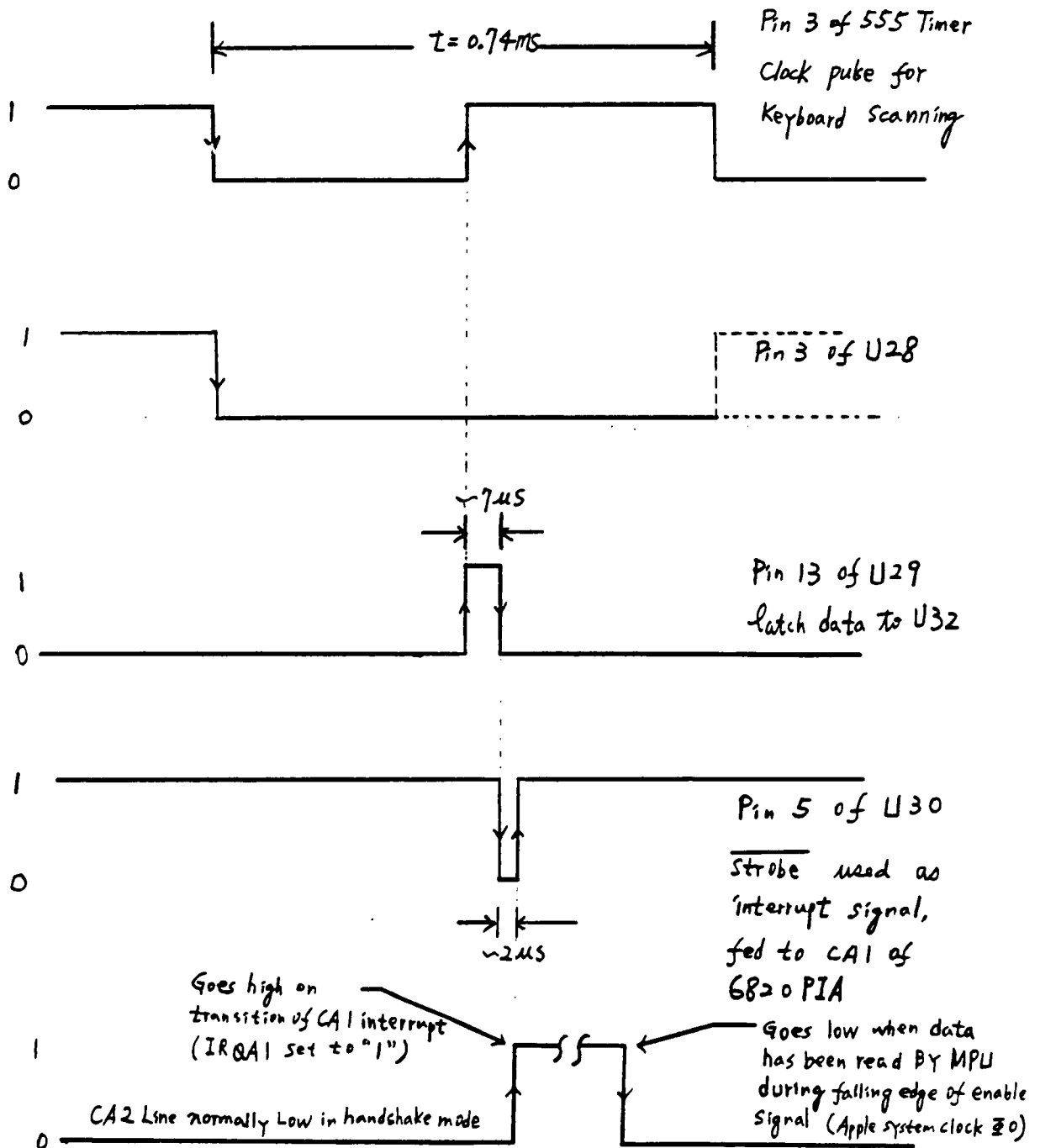


Figure 3.6 Timing Diagram of ESM.

CHAPTER 4

INTERPRETER SOFTWARE

Although the whole concept of machine shorthand is basically simplified phonetic spellings, to translate the stenotype code into correctly spelled English is not an easy task. The English language does not maintain a correspondence between how a word sounds and how it is spelled. People in various areas pronounce words differently. There are no absolute rules to follow. Therefore it is quite difficult to reconstruct the spelling of a word from its phonetic representation. For these reasons, this thesis uses a changable look-up table strategy. It is a straightforward one-to-one translation. A flexible user-defined dictionary is provided. The stenotypist can make his own dictionary according to his specific needs. Words stored in the dictionary can be easily replaced, deleted, or new words can be inserted. Figure 4.1 shows the block diagram of the procedure for interpretation. Stenotype code is first read by the microcomputer through the interrupt routine, and stored onto floppy disk as a raw code file (steno-code). A software routine called "Concat Code" is used to concatenate individual strokes together to form complete steno-words by using a "/" as a word delimiter.

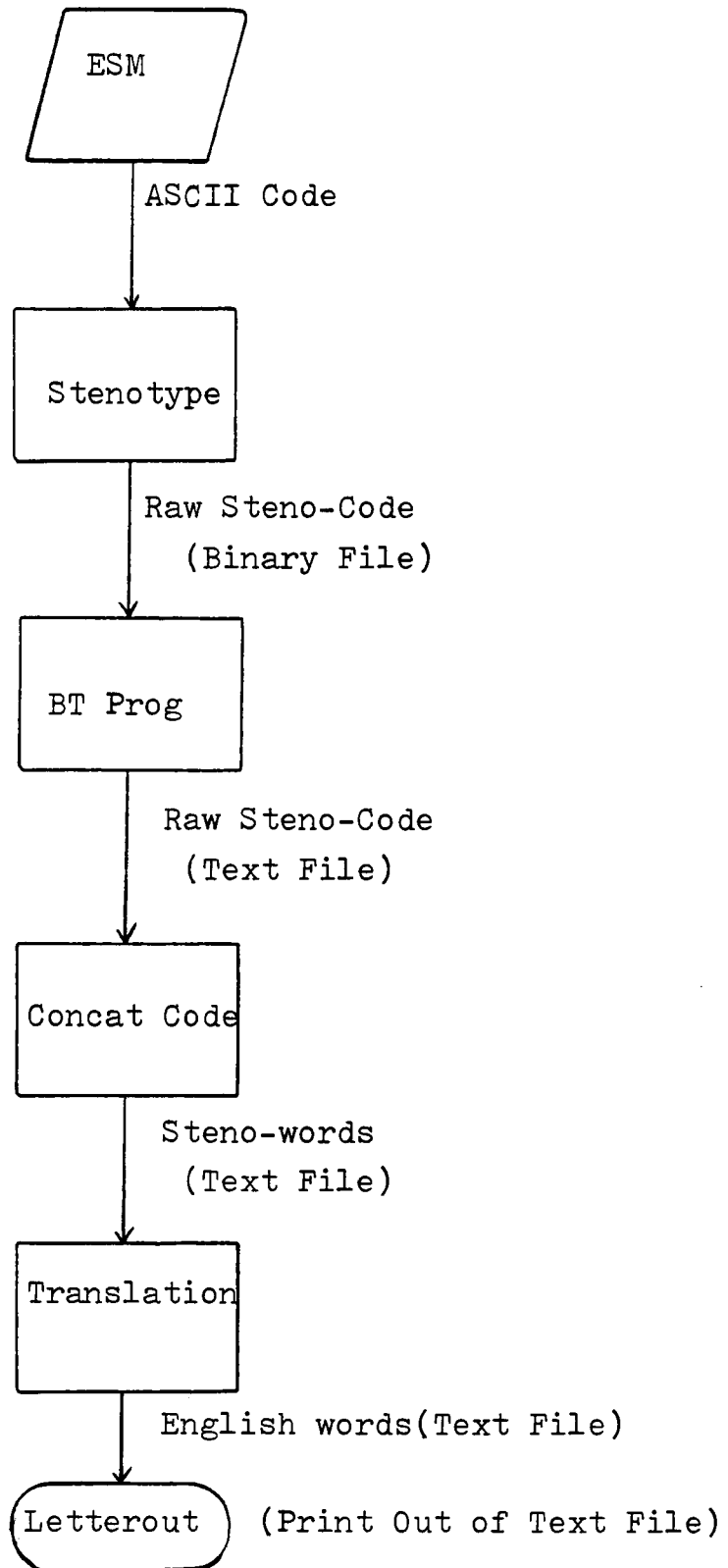


Figure 4.1. The Block Diagram of Procedure for Interpretation.

A translation program is then executed to interpret the steno-words into correctly spelled English words. The software package needed to complete translation consists of eleven modules. Their functions are described in the following sections.

4.1 Hello Routine

The "Hello" routine is the main menu of the software package. When it is executed, it gives the stenotypist six different choices: (1) to edit a new text, (2) to retrieve a text, (3) to examine/update a dictionary, (4) to continue creating a text, (5) to print out a text, or (6) to exit. Figure 4.2 shows the menu configuration.

4.2 Stenotype Routine

The "Stenotype" routine loads the interrupt routine into RAM in machine language. The interrupt routine will read the data from the ESM whenever an interrupt signal is received. The raw steno-code will be stored in the RAM between addresses $\$4000_{16}$ and $\$95FF_{16}$. A total of $\$5600_{16}$ (21.5K) characters can be stored for each individual file. When four consecutive "*" characters are detected by the routine, it indicates the end of the file. The raw steno-code is then saved onto floppy disk as a binary file with a fixed file name "Input".

4.3 BT Prog Routine

BT Prog[6] is a machine language routine. It converts

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X                               X
X  THIS IS MACHINE SHORTHAND  X
X                               X
X      TEXT  EDITOR           X
X                               X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

DO YOU WANT TO :

1. EDIT A NEW TEXT ?
2. RETRIEVE A TEXT ?
3. EXAMINE/UPDATE A
DICTIONARY ?
4. OR YOU ARE CREATING
A NEW TEXT FILE ?
5. PRINT OUT LETTER ?
6. EXIT

TYPE A NUMBER : 1/2/3/4/5/6 WHICH : 6

ARE YOU SURE ?

(Y/N ?)

WHICH : Y

!!!! EXIT !!!!

Figure 4.2. "Menu" from Hello Routine

the raw steno-code binary file "Input" into a text file with a fixed file name "Output".

4.4 Nametext Routine

This routine renames the "Output" text file according to user's preference. It also deletes the "Input" binary file.

4.5 Concat Code Routine

The "Concat Code" routine combines individual strokes into complete steno-words with the assistance of an end-of-word delimiter ("/"). Every time when the routine detects a "/", it combines strokes between the last slash and the present slash into a steno-word. A new file name is given by the stenotypist to distinguish it from the raw steno-code file.

4.6 Translation Routine

This routine uses a binary search strategy to match the steno-words with the look-up table. It converts the steno-word into correctly spelled English by referring to the user-defined dictionary.

4.7 Letterout Routine

This program prints out the completed text file using the printer. It reforms the text into traditional letter form.

4.8 Mkdickt Routine

Mkdickt routine lets the stenotypist make his own dictionary according to his specific needs. Words which are most often used can be stored into the dictionary accordingly. It makes time-saving and efficient translation possible.

4.9 Min Sort Routine

Since the translation routine uses a binary search strategy, the user-defined dictionary must be arranged in alphabetic order. This routine lets the user type in the words in random order; after it is executed, words in the dictionary will be rearranged according to their alphabetic order.

4.10 Examine/update Dict Routine

This routine can provide the user flexibility to change the content of the dictionary. The user can replace, delete, or insert words through executing this program.

4.11 Gettext Routine

Gettext routine enables the user to retrieve the text file for reference or correction purposes. If the translation process still leaves some words uninterpreted, the user can invoke this program to retrieve the raw steno-code or steno-word text file to make the necessary change.

CHAPTER 5

TEST RESULTS AND CONCLUSIONS

To test the performance of the automated system of machine shorthand, a sample letter (Figure 5.1) was typed into the microcomputer through the ESM. Each word entered was separated by a word delimiter, "/", which was generated by depressing the shift bar alone at the end of each word entry. Figure 5.2 shows the raw steno-code file of the sample letter. After the "Concat Code" routine was processed, strokes belonging to one word were concatenated to form a steno-word. Steno-words were then stored in a new text file for further treatment. Figure 5.3 shows the concatenated text file of the sample letter. The words stored in the dictionary are chosen from the short forms and special forms of reference 3 and modified by the author. The completed translation, after executing the "Translation" routine, yielded an exact duplicate of the sample letter. Printout of the sample letter after translation is presented in Figure 5.4. Figure 5.5 shows the result of using "Letterout" routine to reform the text into traditional letter form.

The one-to-one translation strategy and the concept of a user-defined dictionary proved to be a time saving process and a very efficient way for the automated system

Dear Mr. Able :

Does your secretary assist you in a professional manner? Does she and the members of your office staff have the knowledge to be a source of value when you need it ? If your answer to this point is no, then check our schools for training members of your staff. We have the best teachers available in the field of education, and you will receive many benefits from our service. Your top officers can study about up-to-date methods of handling your office activities within a matter of months.

Because we have been serving similar offices like yours in the past ten years, we believe you will find our services quite valuable. Look at the enclosed brochure covering the many benefits. Simply mail the reply card provided and a member of our firm will tell more about our training. For cents a day, your staff will receive valuable training through our schools. Each business listed on the attached page has been sold on our manner of staff training. Act today.

Sincerely Yours,

Figure 5.1. Copy of the Sample Letter.

** FILE NAME : TEST LETTER(STENO)

1	TKEU	51	QF
2	*R	52	EUS
3	/	53	/
4	PHR	54	STAF
5	/	55	/
6	A*BL	56	SRFPL
7	/	57	/
8	FPLT	58	T
9	FPLT	59	/
10	/	60	PBLG
11	*	61	/
12	*	62	TO
13	/	63	/
14	TKUZ	64	B
15	/	65	/
16	UR	66	A*
17	/	67	/
18	SKR	68	SO*RS
19	/	69	/
20	SEU	70	F
21	/	71	/
22	*U	72	SRAL
23	/	73	*U
24	TPH	74	/
25	/	75	WHEPB
26	A*	76	/
27	/	77	*U
28	PRO	78	/
29	TPEGZ	79	TPH*ED
30	AL	80	/
31	/	81	EUT
32	PHAPB	82	/
33	ER	83	STPH
34	/	84	/
35	STPH	85	TP
36	/	86	/
37	TKUZ	87	UR
38	/	88	/
39	SH*E	89	APBS
40	/	90	/
41	APB	91	TO
42	/	92	/
43	T	93	TH
44	/	94	/
45	PHEBS	95	POEUPBT
46	/	96	/
47	F	97	S
48	/	98	/
49	UR	99	TPHO*
50	/	100	/

Figure 5.2. Raw Steno-Code of the Sample Letter

101	RBGS	151	/
102	/	152	APB
103	THEPB	153	/
104	/	154	XU
105	KHEBG	155	/
106	/	156	HRXL
107	OUR	157	/
108	/	158	SEFPL
109	SKAOLS	159	/
110	/	160	PL
111	TPOR	161	/
112	/	162	PWEPB
113	TRAEPBG	163	TPEUTS
114	/	164	/
115	PHEBS	165	TPR
116	/	166	/
117	F	167	OUR
118	/	168	/
119	UR	169	SER
120	/	170	SREUS
121	STAF	171	/
122	/	172	FPLT
123	FPLT	173	/
124	/	174	UR
125	WXE	175	/
126	/	176	TOP
127	SRFPL	177	/
128	/	178	OF
129	T	179	SERS
130	/	180	/
131	PWES	181	K
132	T	182	/
133	/	183	STUD
134	TXEFP	184	EU
135	ERS	185	/
136	/	186	PW
137	SRAEUBL	187	/
138	/	188	UP
139	TPH	189	/
140	/	190	OE
141	T	191	/
142	/	192	TO
143	TPXELD	193	/
144	/	194	OE
145	F	195	/
146	/	196	TKAXT
147	ED	197	/
148	KAXGZ	198	PHETSDZ
149	/	199	ODZ
150	RBGS	200	/

Figure 5.2. (Continued)

201	F	251	/
202	/	252	TPH
203	HAPBD	253	/
204	LG	254	T
205	/	255	/
206	UR	256	PAS
207	/	257	T
208	OF	258	/
209	EUS	259	TEPB
210	/	260	/
211	ABGT	261	*EURS
212	EUFPLTS	262	/
213	/	263	RBGS
214	WEUPB	264	/
215	/	265	W*E
216	A*	266	/
217	/	267	PWE
218	PHAT	268	HR*EUFPL
219	ER	269	/
220	/	270	*U
221	F	271	/
222	/	272	HR*L
223	PHOS	273	/
224	/	274	TPAEUPBD
225	FPLT	275	/
226	/	276	OUR
227	*	277	/
228	*	278	SER
229	/	279	SREUSZ
230	PWE	280	/
231	KOS	281	KWAEUT
232	/	282	/
233	W*E	283	SRAL
234	/	284	*UBL
235	SRFPL	285	/
236	/	286	FPLT
237	PW*EUPB	287	/
238	/	288	HRAOBG
239	SERFPLG	289	/
240	/	290	AT
241	SEU	291	/
242	PHEU	292	T
243	HRER	293	/
244	/	294	KHROD
245	OF	295	/
246	EUSZ	296	PWRQ
247	/	297	FPOR
248	HRAEUBG	298	/
249	/	299	KO
250	URZ	300	SRERG

Figure 5.2. (Continued)

301	/	351	/
302	T	352	FPLT
303	/	353	/
304	PL	354	TPOR
305	/	355	/
306	PWEPB	356	SS
307	TPEUTS	357	/
308	/	358	AX
309	FPLT	359	/
310	/	360	TKAE
311	SEUPL	361	/
312	PHREU	362	RBGS
313	/	363	/
314	PHAEL	364	UR
315	/	365	/
316	T	366	STAF
317	/	367	/
318	PHREU	368	HRXL
319	/	369	/
320	KAURD	370	SEFPL
321	/	371	/
322	PROFPL	372	SRAL
323	AEUD	373	XUBL
324	EUD	374	/
325	/	375	TRAEPBG
326	APB	376	/
327	/	377	TSdz
328	AX	378	RAO
329	/	379	/
330	PHEB	380	OUR
331	/	381	/
332	F	382	SKAOLS
333	/	383	/
334	OUR	384	FPLT
335	/	385	/
336	TPERPL	386	XEUFP
337	/	387	/
338	HRXL	388	PWEUZ
339	/	389	/
340	TEL	390	HREUSTD
341	/	391	/
342	XU	392	O
343	/	393	/
344	PHOXR	394	T
345	/	395	/
346	PW	396	A
347	/	397	TAFPD
348	OUR	398	/
349	/	399	PA%G
350	TRAEPBG	400	/

Figure 5.2. (Continued)

```
401 HAS
402 /
403 PWXEUPB
404 /
405 SOLD
406 /
407 O
408 /
409 OUR
410 /
411 PHAPB
412 ER
413 /
414 F
415 /
416 STAF
417 /
418 TRAEPBG
419 /
420 FPLT
421 /
422 ABGT
423 /
424 TOD
425 /
426 FPLT
427 /
428 *
429 *
430 /
431 SEUPB
432 SEU
433 HREU
434 /
435 URZ
436 /
437 RBGS
438 /
439 ****
```

Figure 5.2. (Continued)

** FILE NAME : TEST LETTER(CONCAT)

1	TKEUXR	51	SKAOLS
2	PHR	52	TPOR
3	AXBL	53	TRAEPBG
4	FPLTFPLT	54	PHEBS
5	XX	55	F
6	TKUZ	56	UR
7	UR	57	STAF
8	SKR	58	FPLT
9	SEU	59	WxE
10	XU	60	SRFPL
11	TPH	61	T
12	AX	62	PWEST
13	PROTPEGZAL	63	TxEFPERS
14	PHAPBER	64	SRAEUBL
15	STPH	65	TPH
16	TKUZ	66	T
17	SHXE	67	TPXELD
18	APB	68	F
19	T	69	EDKAXGZ
20	PHEBS	70	RBGS
21	F	71	APB
22	UR	72	XU
23	OFEUS	73	HRXL
24	STAF	74	SEFPL
25	SRFPL	75	PL
26	T	76	PWEPBTPEUTS
27	PBLG	77	TPR
28	TO	78	OUR
29	B	79	SERSREUS
30	AX	80	FPLT
31	SOXRS	81	UR
32	F	82	TOP
33	SRALXU	83	OFSERS
34	WHEPB	84	K
35	XU	85	STUDEU
36	TPHXED	86	PW
37	EUT	87	UP
38	STPH	88	OE
39	TP	89	TO
40	UR	90	OE
41	APBS	91	TKAXT
42	TO	92	PHETSDZODZ
43	TH	93	F
44	POEUPBT	94	HAFBDLG
45	S	95	UR
46	TPHOX	96	OFEUS
47	RBGS	97	ABGTEUFPLTS
48	THEPB	98	WEUPB
49	KHEBG	99	AX
50	OUR	100	PHATER

Figure 5.3. Steno-Word of the Sample Letter.

101	F	151	TPERPL
102	PHOS	152	HRXL
103	FPLT	153	TEL
104	XX	154	XU
105	PWEKOS	155	PHOXR
106	WxE	156	PW
107	SRFPL	157	OUR
108	PWxEUPB	158	TRAEPBG
109	SERFPLG	159	FPLT
110	SEUPHEUHRER	160	TPOR
111	OFEUSZ	161	SS
112	HRAEUBG	162	AX
113	URZ	163	TKAE
114	TPH	164	RBGS
115	T	165	UR
116	FAST	166	STAF
117	TEPB	167	HRXL
118	XEURS	168	SEFPL
119	RBGS	169	SRALXUBL
120	WxE	170	TRAEPBG
121	PWEHRXEUFPL	171	TSDZRAO
122	XU	172	OUR
123	HRXL	173	SKAOLS
124	TPAEUPBD	174	FPLT
125	OUR	175	XEUPF
126	SERSREUSZ	176	PWEUZ
127	KWAEUT	177	HREUSTD
128	SRALXUBL	178	O
129	FPLT	179	T
130	HRAOBG	180	ATAFPD
131	AT	181	PAXG
132	T	182	HAS
133	KHROD	183	PWxEUPB
134	PWROFFOR	184	SOLD
135	KOSRERG	185	O
136	T	186	OUR
137	PL	187	PHAPBER
138	PWEPBTPEUTS	188	F
139	FPLT	189	STAF
140	SEUPLPHREU	190	TRAEPBG
141	PHAEL	191	FPLT
142	T	192	ABGT
143	PHREU	193	TOD
144	KAURD	194	FPLT
145	PROFPLAEUDEUD	195	XX
146	APB	196	SEUPBSEUHREU
147	AX	197	URZ
148	PHEB	198	RBGS
149	F	199	***X
150	OUR	200	

Figure 5.3. (Continued)

** FILE NAME : TEST LETTER(OUT)

1	DEAR	51	SCHOOLS
2	MR.	52	FOR
3	ABLE	53	TRAINING
4	CHR\$(58)	54	MEMBERS
5	**	55	OF
6	DOES	56	YOUR
7	YOUR	57	STAFF
8	SECRETARY	58	.
9	ASSIST	59	WE
10	YOU	60	HAVE
11	IN	61	THE
12	A	62	BEST
13	PROFESSIONAL	63	TEACHERS
14	MANNER	64	AVAILABLE
15	?	65	IN
16	DOES	66	THE
17	SHE	67	FIELD
18	AND	68	OF
19	THE	69	EDUCATION
20	MEMBERS	70	CHR\$(44)
21	OF	71	AND
22	YOUR	72	YOU
23	OFFICE	73	WILL
24	STAFF	74	RECEIVE
25	HAVE	75	MANY
26	THE	76	BENEFITS
27	KNOWLEDGE	77	FROM
28	TO	78	OUR
29	BE	79	SERVICE
30	A	80	.
31	SOURCE	81	YOUR
32	OF	82	TOP
33	VALUE	83	OFFICERS
34	WHEN	84	CAN
35	YOU	85	STUDY
36	NEED	86	ABOUT
37	IT	87	UP
38	?	88	-
39	IF	89	TO
40	YOUR	90	-
41	ANSWER	91	DATE
42	TO	92	METHODS
43	THIS	93	OF
44	POINT	94	HANDLING
45	IS	95	YOUR
46	NO	96	OFFICE
47	CHR\$(44)	97	ACTIVITIES
48	THEN	98	WITHIN
49	CHECK	99	A
50	OUR	100	MATTER

Figure 5.4. Translated File of the Sample Letter.

101	OF	151	FIRM
102	MONTHS	152	WILL
103	.	153	TELL
104	XX	154	YOU
105	BECAUSE	155	MORE
106	WE	156	ABOUT
107	HAVE	157	OUR
108	BEEN	158	TRAINING
109	SERVING	159	.
110	SIMILAR	160	FOR
111	OFFICES	161	CENTS
112	LIKE	162	A
113	YOURS	163	DAY
114	IN	164	CHR\$(44)
115	THE	165	YOUR
116	PAST	166	STAFF
117	TEN	167	WILL
118	YEARS	168	RECEIVE
119	CHR\$(44)	169	VALUABLE
120	WE	170	TRAINING
121	BELIEVE	171	THROUGH
122	YOU	172	OUR
123	WILL	173	SCHOOLS
124	FIND	174	.
125	OUR	175	EACH
126	SERVICES	176	BUSINESS
127	QUITE	177	LISTED
128	VALUABLE	178	ON
129	.	179	THE
130	LOOK	180	ATTACHED
131	AT	181	PAGE
132	THE	182	HAS
133	ENCLOSED	183	BEEN
134	BROCHURE	184	SOLD
135	COVERING	185	ON
136	THE	186	OUR
137	MANY	187	MANNER
138	BENEFITS	188	OF
139	.	189	STAFF
140	SIMPLY	190	TRAINING
141	MAIL	191	.
142	THE	192	ACT
143	REPLY	193	TODAY
144	CARD	194	.
145	PROVIDED	195	XX
146	AND	196	SINCERELY
147	A	197	YOURS
148	MEMBER	198	CHR\$(44)
149	OF	199	XXXX
150	OUR	200	

Figure 5.4. (Continued)

** FILE NAME : TEST LETTER(OUT)

DEAR MR. ABLE :

DOES YOUR SECRETARY ASSIST YOU IN A PROFESSIONAL MANNER ?
DOES SHE AND THE MEMBERS OF YOUR OFFICE STAFF HAVE THE
KNOWLEDGE TO BE A SOURCE OF VALUE WHEN YOU NEED IT ? IF YOUR
ANSWER TO THIS POINT IS NO , THEN CHECK OUR SCHOOLS FOR
TRAINING MEMBERS OF YOUR STAFF . WE HAVE THE BEST TEACHERS
AVAILABLE IN THE FIELD OF EDUCATION , AND YOU WILL RECEIVE
MANY BENEFITS FROM OUR SERVICE . YOUR TOP OFFICERS CAN STUDY
ABOUT UP - TO - DATE METHODS OF HANDLING YOUR OFFICE
ACTIVITIES WITHIN A MATTER OF MONTHS .

BECAUSE WE HAVE BEEN SERVING SIMILAR OFFICES LIKE YOURS IN
THE PAST TEN YEARS , WE BELIEVE YOU WILL FIND OUR SERVICES
QUITE VALUABLE . LOOK AT THE ENCLOSED BROCHURE COVERING THE
MANY BENEFITS . SIMPLY MAIL THE REPLY CARD PROVIDED AND A
MEMBER OF OUR FIRM WILL TELL YOU MORE ABOUT OUR TRAINING
. FOR CENTS A DAY , YOUR STAFF WILL RECEIVE VALUABLE TRAINING
THROUGH OUR SCHOOLS . EACH BUSINESS LISTED ON THE ATTACHED
PAGE HAS BEEN SOLD ON OUR MANNER OF STAFF TRAINING . ACT
TODAY .

SINCERELY YOURS ,

Figure 5.5. Printout of the Sample Letter.

of machine shorthand. The software package needed to provide more services can be further furnished for commercial application. This thesis proves that the ESM and the supporting software package is a potential word processing instrument for business office application.

REFERENCES

REFERENCES

1. Encyclopedia Britannica, vol. 16, page 710, Chicago, Ill.: Encyclopedia Britannica Inc., 1974.
2. Andrew R. Rawson, Machine Shorthand as an Interface to a Microprocessor-Based Wordprocessing System, M.S. Thesis 1979, University of Tennessee.
3. C. R. Hopkins and M. A. Morton, Stenotype System, Theory and Skill Building--Book I, Chicago, Ill.: Hedman Stenotype, Inc., 1977.
4. Christopher Espinosa, Apple II Reference Manual, Cupertino, CA, Apple Computer Inc., 1979.
5. Ron Bishop, Basic Microprocessors and the 6800, Rochelle Park, New Jersey, Hayden Book Company, Inc., 1979.
6. Don Worth and Pieter Lechuer, Beneath Apple DOS, Reseda CA., Quality Software, 1981.

APPENDIX

```

JLOAD    HELLO
JLIST

5  HOME
10 D$ = "": REM  CTRL-D
15  PRINT
20  PRINT ; TAB( 9); "*****"
25  PRINT ; TAB( 9); "%                %"
30  PRINT ; TAB( 9); "%  THIS IS MACHINE SHORTHAND  %"
35  PRINT ; TAB( 9); "%                %"
40  PRINT ; TAB( 9); "%                TEXT  EDITOR      %"
45  PRINT ; TAB( 9); "%                %"
50  PRINT ; TAB( 9); "*****"
55  PRINT
60  PRINT "DO YOU WANT TO : "
65  PRINT ; "1. EDIT A NEW TEXT ?": PRINT
70  PRINT ; "2. RETRIEVE A TEXT ?": PRINT
75  PRINT ; "3. EXAMINE/UPDATE A "
80  PRINT ; "   DICTIONARY ?": PRINT
85  PRINT ; "4. OR YOU ARE CREATING"
90  PRINT ; "   A NEW TEXT FILE ?"
95  PRINT ; PRINT ; "5. PRINT OUT LETTER ?": PRINT
100 PRINT ; "6. EXIT": PRINT
105 INPUT "  TYPE A NUMBER : 1/2/3/4/5/6  WHICH : "; X
110 PRINT ; PRINT : PRINT "ARE YOU SURE ?"
115 PRINT ; PRINT : PRINT " ( Y/N ? )": PRINT : PRINT
120 INPUT "WHICH : "; L$
125 IF L$ = "Y" THEN 135
130 GOTO 5
135 IF X = 1 THEN 170
140 IF X = 2 THEN 175
145 IF X = 3 THEN 180
150 IF X = 4 THEN 185
155 IF X = 5 THEN 190
160 IF X = 6 THEN 195
165 GOTO 5
170 PRINT D$; "RUN STENOTYPE"
175 PRINT D$; "RUN GETEXT"
180 PRINT D$; "RUN EXAMINE/UPDATE DICT"
185 PRINT D$; "RUN NAMETEXT"
190 PRINT D$; "RUN LETTEROUT"
195 HOME : END

]

```

Figure A.1. Hello Routine

LOAD STENOtype
JLIST

```

5 D$ = "": REM CTRL-D
10 POKE 768,20: POKE 769,4: POKE
   770,4: POKE 771,224: POKE 77
   2,72: POKE 773,173: POKE 774
   ,129: POKE 775,192: POKE 776
   ,104:
15 POKE 777,72: POKE 778,205: POKE
   779,0: POKE 780,224: POKE 78
   1,208: POKE 782,35: POKE 783
   ,173: POKE 784,88: POKE 785,
   169:
20 POKE 786,0: POKE 787,141: POKE
   788,161: POKE 789,192: POKE
   790,141: POKE 791,160: POKE
   792,192: POKE 793,169: POKE
   794,37:
25 POKE 795,141: POKE 796,161: POKE
   797,192: POKE 798,169: POKE
   799,128: POKE 800,141: POKE
   801,254: POKE 802,3: POKE 80
   3,169:
30 POKE 804,3: POKE 805,141: POKE
   806,255: POKE 807,3: POKE 80
   8,169: POKE 809,64: POKE 810
   ,141: POKE 811,147: POKE 812
   ,3:
35 POKE 813,169: POKE 814,0: POKE
   815,141: POKE 816,0: POKE 81
   7,3: POKE 818,141: POKE 819,
   1: POKE 820,3: POKE 821,141:

40 POKE 822,2: POKE 823,3: POKE
   824,173: POKE 825,1: POKE 82
   6,3: POKE 827,201: POKE 828,
   4: POKE 829,240: POKE 830,18
   :
45 POKE 831,173: POKE 832,0: POKE
   833,3: POKE 834,201: POKE 83
   5,255: POKE 836,208: POKE 83
   7,242: POKE 838,169: POKE 83
   9,0:
50 POKE 840,141: POKE 841,0: POKE
   842,3: POKE 843,238: POKE 84
   4,147: POKE 845,3: POKE 846,
   76: POKE 847,56: POKE 848,3:

```

Figure A.2. Stenotype Routine

55 POKE 849,173: POKE 850,147: POKE
 851,3: POKE 852,24: POKE 853
 ,41: POKE 854,176: POKE 855,
 106: POKE 856,106: POKE 857,
 106:
 60 POKE 858,106: POKE 859,9: POKE
 860,176: POKE 861,32: POKE 8
 62,237: POKE 863,253: POKE 8
 64,173: POKE 865,147: POKE 8
 66,3:
 65 POKE 867,41: POKE 868,15: POKE
 869,201: POKE 870,10: POKE 8
 71,16: POKE 872,5: POKE 873,
 105: POKE 874,176: POKE 875,
 76:
 70 POKE 876,112: POKE 877,3: POKE
 878,105: POKE 879,183: POKE
 880,32: POKE 881,237: POKE 8
 82,253: POKE 883,173: POKE 8
 84,147
 75 POKE 885,3: POKE 886,41: POKE
 887,191: POKE 888,141: POKE
 889,127: POKE 890,3: POKE 89
 1,120: POKE 892,96: POKE 893
 ,234: POKE 894,234
 80 POKE 894,234: POKE 895,234: POKE
 896,32: POKE 897,74: POKE 89
 8,255: POKE 899,120: POKE 90
 0,32: POKE 901,176: POKE 902
 ,3:
 85 POKE 903,201: POKE 904,170: POKE
 905,208: POKE 906,3: POKE 90
 7,238: POKE 908,2: POKE 909,
 3: POKE 910,172: POKE 911,0:

 90 POKE 912,3: POKE 913,153: POKE
 914,0: POKE 915,64: POKE 916
 ,238: POKE 917,0: POKE 918,3
 : POKE 919,32: POKE 920,237:

 95 POKE 921,253: POKE 922,172: POKE
 923,147: POKE 924,3: POKE 92
 5,192: POKE 926,150: POKE 92
 7,208: POKE 928,3: POKE 929,
 32:
 100 POKE 930,221: POKE 931,251: POKE
 932,32: POKE 933,63: POKE 93
 4,255: POKE 935,88: POKE 936
 ,64: POKE 937,234: POKE 938,
 234:

Figure A.2. (Continued)

```

105 POKE 939,234: POKE 940,234: POKE
    941,234: POKE 942,234: POKE
    943,234: POKE 944,173: POKE
    945,160: POKE 946,192: POKE
    947,201:
110 POKE 948,170: POKE 949,208: POKE
    950,1: POKE 951,96: POKE 952
    ,201: POKE 953,141: POKE 954
    ,208: POKE 955,11: POKE 956,
    174:
115 POKE 957,2: POKE 958,3: POKE
    959,224: POKE 960,0: POKE 96
    1,240: POKE 962,4: POKE 963,
    238: POKE 964,1: POKE 965,3:

120 POKE 966,96: POKE 967,162: POKE
    968,0: POKE 969,142: POKE 97
    0,2: POKE 971,3: POKE 972,14
    2: POKE 973,1: POKE 974,3:
125 POKE 975,96: HOME
130 PRINT "START INPUT NEW TEXT
    FILE": PRINT : PRINT "TYPE X
    *** FROM ESM TO EXIT"
135 CALL 784
140 Y = PEEK (895)
145 X = PEEK (768)
150 J = Y * 256 + X + 2
155 PRINT : PRINT
160 D$ = " ": REM D$= "CTRL D"
165 PRINT D$;"BSAVE INPUT,A$4000
    ,L";J
170 PRINT : PRINT D$;"BRUN BT PR
    OG"
175 END

J

```

Figure A.2. (Continued)

XBLOAD BT PROG 00 01 EF D8 00
X800L

```

0800-    20 DC 03    JSR    $03DC
0803-    84 00      STY    $00
0805-    85 01      STA    $01
0807-    A0 08      LDY    #$08
0809-    A9 AC      LDA    #$AC
080B-    91 00      STA    ($00),Y
080D-    C8         INY
080E-    A9 09      LDA    #$09
0810-    91 00      STA    ($00),Y
0812-    A0 07      LDY    #$07
0814-    A9 04      LDA    #$04
0816-    91 00      STA    ($00),Y
0818-    A2 01      LDX    #$01
081A-    20 D3 08    JSR    $08D3
081D-    90 03      BCC    $0822
081F-    4C BC 08    JMP    $08BC
0822-    A5 02      LDA    $02
0824-    8D EA 09    STA    $09EA
0827-    A5 03      LDA    $03
0829-    8D EB 09    STA    $09EB
XL

```

```

082C-    20 5A 09    JSR    $095A
082F-    A0 08      LDY    #$08
0831-    A9 CA      LDA    #$CA
0833-    91 00      STA    ($00),Y
0835-    C8         INY
0836-    A9 09      LDA    #$09
0838-    91 00      STA    ($00),Y
083A-    A0 07      LDY    #$07
083C-    A9 00      LDA    #$00
083E-    91 00      STA    ($00),Y
0840-    A2 00      LDX    #$00
0842-    20 D3 08    JSR    $08D3
0845-    90 0B      BCC    $0852
0847-    A0 0A      LDY    #$0A
0849-    B1 00      LDA    ($00),Y
084B-    C9 06      CMP    #$06
084D-    F0 03      BEQ    $0852
084F-    4C BC 08    JMP    $08BC
0852-    A5 02      LDA    $02
0854-    8D E8 09    STA    $09E8
X

```

Figure A.3. BT Prog Routine.

```

L
0857-    A5 03      LDA    $03
0859-    8D E9 09   STA    $09E9
085C-    20 5A 09   JSR    $095A
085F-    A9 04      LDA    #$04
0861-    A0 06      LDY    #$06
0863-    91 00      STA    ($00),Y
0865-    A9 00      LDA    #$00
0867-    C8         INY
0868-    91 00      STA    ($00),Y
086A-    20 74 09   JSR    $0974
086D-    AD 02 10   LDA    $1002
0870-    A0 06      LDY    #$06
0872-    91 00      STA    ($00),Y
0874-    AD 03 10   LDA    $1003
0877-    C8         INY
0878-    91 00      STA    ($00),Y
087A-    18         CLC
087B-    AD 02 10   LDA    $1002
087E-    48         PHA
087F-    69 00      ADC    #$00
XL
0881-    85 04      STA    $04
0883-    AD 03 10   LDA    $1003
0886-    48         PHA
0887-    69 10      ADC    #$10
0889-    85 05      STA    $05
088B-    20 74 09   JSR    $0974
088E-    A0 00      LDY    #$00
0890-    98         TYA
0891-    91 04      STA    ($04),Y
0893-    68         PLA
0894-    A0 07      LDY    #$07
0896-    91 00      STA    ($00),Y
0898-    88         DEY
0899-    68         PLA
089A-    91 00      STA    ($00),Y
089C-    20 82 09   JSR    $0982
089F-    AD E8 09   LDA    $09E8
08A2-    85 02      STA    $02
08A4-    AD E9 09   LDA    $09E9
08A7-    85 03      STA    $03
*
```

Figure A.3. (Continued)

```

L
08A9-    20 46 09    JSR    $0946
08AC-    AD EA 09    LDA    $09EA
08AF-    85 02      STA    $02
08B1-    AD EB 09    LDA    $09EB
08B4-    85 03      STA    $03
08B6-    20 46 09    JSR    $0946
08B9-    4C 00 C6    JMP    $C600
08BC-    A0 0A      LDY    #$0A
08BE-    B1 00      LDA    ($00),Y
08C0-    48        PHA
08C1-    A9 C5      LDA    #$C5
08C3-    20 ED FD    JSR    $FDED
08C6-    A9 D2      LDA    #$D2
08C8-    20 ED FD    JSR    $FDED
08CB-    20 ED FD    JSR    $FDED
08CE-    68        PLA
08CF-    20 DA FD    JSR    $FDDA
08D2-    00        BRK
08D3-    AD D2 03    LDA    $03D2
08D6-    85 03      STA    $03
XL
08D8-    A0 00      LDY    #$00
08DA-    84 02      STY    $02
08DC-    B1 02      LDA    ($02),Y
08DE-    48        PHA
08DF-    C8        INY
08E0-    B1 02      LDA    ($02),Y
08E2-    85 03      STA    $03
08E4-    68        PLA
08E5-    85 02      STA    $02
08E7-    D0 0A      BNE    $08F3
08E9-    A5 03      LDA    $03
08EB-    D0 06      BNE    $08F3
08ED-    A9 0C      LDA    #$0C
08EF-    48        PHA
08F0-    4C C1 08    JMP    $08C1
08F3-    A0 00      LDY    #$00
08F5-    B1 02      LDA    ($02),Y
08F7-    F0 04      BEQ    $08FD
08F9-    A0 24      LDY    #$24
08FB-    D0 DF      BNE    $08DC
*
```

Figure A.3. (Continued)

```

      BFDL

08FD-   A9 01   LDA   #$01
08FF-   91 02   STA   ($02),Y
0901-   A0 00   LDY   #$00
0903-   A9 01   LDA   #$01
0905-   91 00   STA   ($00),Y
0907-   A9 00   LDA   #$00
0909-   A0 02   LDY   #$02
090B-   91 00   STA   ($00),Y
090D-   C8      INY
090E-   91 00   STA   ($00),Y
0910-   A0 04   LDY   #$04
0912-   91 00   STA   ($00),Y
0914-   20 E3 03 JSR   $03E3
0917-   84 3C   STY   $3C
0919-   85 3D   STA   $3D
091B-   A0 01   LDY   #$01
091D-   B1 3C   LDA   ($3C),Y
091F-   4A      LSR
0920-   4A      LSR
0921-   4A      LSR
XL

0922-   4A      LSR
0923-   A0 06   LDY   #$06
0925-   91 00   STA   ($00),Y
0927-   A0 02   LDY   #$02
0929-   B1 3C   LDA   ($3C),Y
092B-   A0 05   LDY   #$05
092D-   91 00   STA   ($00),Y
092F-   A0 1E   LDY   #$1E
0931-   B1 02   LDA   ($02),Y
0933-   48      PHA
0934-   C8      INY
0935-   C0 24   CPY   #$24
0937-   90 F8   BCC   $0931
0939-   A0 11   LDY   #$11
093B-   68      PLA
093C-   91 00   STA   ($00),Y
093E-   88      DEY
093F-   C0 0C   CPY   #$0C
0941-   B0 F8   BCS   $093B
0943-   4C D6 03 JMP   $03D6
*
```

Figure A.3. (Continued)

L

```

0946-    A0 00      LDY    #$00
0948-    A9 02      LDA    #$02
094A-    91 00      STA    ($00),Y
094C-    20 2F 09   JSR    $092F
094F-    90 03      BCC    $0954
0951-    4C BC 08   JMP    $08BC
0954-    A0 00      LDY    #$00
0956-    98        TYA
0957-    91 02      STA    ($02),Y
0959-    60        RTS
095A-    A0 02      LDY    #$02
095C-    A9 00      LDA    #$00
095E-    91 00      STA    ($00),Y
0960-    C8        INY
0961-    C0 06      CPY    #$06
0963-    90 F9      BCC    $095E
0965-    A0 00      LDY    #$00
0967-    A9 0A      LDA    #$0A
0969-    91 00      STA    ($00),Y
096B-    20 2F 09   JSR    $092F
XL

```

```

096E-    90 03      BCC    $0973
0970-    4C BC 08   JMP    $08BC
0973-    60        RTS
0974-    AD EA 09   LDA    $09EA
0977-    85 02      STA    $02
0979-    AD EB 09   LDA    $09EB
097C-    85 03      STA    $03
097E-    A9 03      LDA    #$03
0980-    D0 0C      BNE    $098E
0982-    AD E8 09   LDA    $09E8
0985-    85 02      STA    $02
0987-    AD E9 09   LDA    $09E9
098A-    85 03      STA    $03
098C-    A9 04      LDA    #$04
098E-    A0 00      LDY    #$00
0990-    91 00      STA    ($00),Y
0992-    A0 01      LDY    #$01
0994-    A9 02      LDA    #$02
0996-    91 00      STA    ($00),Y
0998-    A0 08      LDY    #$08
X

```

Figure A.3. (Continued)

*99AL

099A-	A9 00	LDA	##00
099C-	91 00	STA	(#00),Y
099E-	C8	INY	
099F-	A9 10	LDA	##10
09A1-	91 00	STA	(#00),Y
09A3-	20 2F 09	JSR	\$092F
09A6-	90 03	BCC	\$09AB
09A8-	4C BC 08	JMP	\$08BC
09AB-	60	RTS	
09AC-	C9 CE	CMP	##CE
09AE-	D0 D5	BNE	\$0985
09B0-	D4	???	
09B1-	A0 A0	LDY	##A0
09B3-	A0 A0	LDY	##A0
09B5-	A0 A0	LDY	##A0
09B7-	A0 A0	LDY	##A0
09B9-	A0 A0	LDY	##A0
09BB-	A0 A0	LDY	##A0
09BD-	A0 A0	LDY	##A0
09BF-	A0 A0	LDY	##A0
*			

Figure A.3. (Continued)

```

JLOAD  NAMETEXT
J
J
JLIST

5 D$ = " ": REM  CTRL-D
10  INPUT " >INPUT NEW FILE NAME<
    :";Y$
15  PRINT D$;"RENAME OUTPUT,";Y$
20  PRINT : PRINT : PRINT "END OF
    PROCEDURE": PRINT : PRINT
25  PRINT D$;"DELETE INPUT": HOME

30  PRINT D$;"RUN CONCAT CODE"
35  END

J

```

Figure A.4. Nametext Routine.

```

JLOAD  GETTEXT
JLIST

5  DIM A$(1000)
10 D$ = CHR$(4): REM CTRL D
15 HOME : PRINT : PRINT : PRINT
20 PRINT "          **TEXT FILE RETRIEVAL**"
25 PRINT : PRINT
30 INPUT ">ENTER FILE NAME : ";Z$
35 I = 0
40 PRINT D$;"OPEN ";Z$
45 PRINT D$;"READ ";Z$
50 I = I + 1
55 INPUT A$(I)
60 PRINT A$(I)
65 IF I < 4 THEN 100
70 IF A$(I) = "****" THEN 105
75 IF A$(I) < > "X" THEN 100
80 IF A$(I - 1) < > "X" THEN 100
85 IF A$(I - 2) < > "X" THEN 100
90 IF A$(I - 3) < > "X" THEN 100
95 GOTO 105
100 GOTO 50
105 PRINT D$;"CLOSE ";Z$
110 PRINT : PRINT : PRINT
115 PRINT "DO YOU WANT TO GET ANOTHER FILE ? Y/
N ?"
120 PRINT : PRINT : INPUT " WHICH : ";Q$
125 IF Q$ = "N" THEN 140
130 IF Q$ = "Y" THEN 15
135 GOTO 115
140 HOME : PRINT : PRINT : PRINT : PRINT "DO YO
U WANT TO GO BACK TO EDITOR PROGRAM ?": PRINT : PRINT
: PRINT " ( Y/N ? )": PRINT : PRINT : INPUT " WH
ICH : ";W$
145 PRINT : PRINT : PRINT " ARE YOU SURE ?": PRINT
: PRINT : PRINT " ( Y/N ? )": PRINT : PRINT : INPUT
" WHICH : ";R$
150 IF R$ = "N" THEN 140
155 IF W$ = "N" THEN 175
160 IF W$ = "Y" THEN 170
165 GOTO 140
170 PRINT D$;"RUN HELLO"
175 HOME : END

J

```

Figure A.5. Gettext Routine.

LOAD CONCAT CODE
 ILIST

```

5 D$ = CHR$ (4): REM CTRL D
10 HOME
15 PRINT
20 PRINT "%% MAKING WORDS BY LINKING ALPHABETS %"
25 PRINT
30 PRINT "WORD= ALPHABET GROUP SEPERATED BY SLASH"
35 PRINT
40 INPUT ">INPUT CODE FILE:";Z$
45 PRINT : PRINT : PRINT
50 INPUT ">OUTPUT WORD FILE:";Y$
55 PRINT : PRINT
60 PRINT D$;"OPEN";Z$
65 PRINT D$;"READ";Z$
70 DIM A$(1500)
75 I = 0
80 T$ = ""
85 INPUT B$
90 IF B$ < > CHR$ (47) THEN T$ = T$ + B$
95 IF B$ < > CHR$ (47) THEN PRINT B$,T$
100 IF T$ = "%%%" THEN 125
105 IF B$ < > CHR$ (47) THEN 85
110 I = I + 1
115 A$(I) = T$
120 GOTO 80
125 PRINT D$;"CLOSE";Z$
130 PRINT D$;"OPEN";Y$
135 PRINT D$;"DELETE";Y$
140 PRINT D$;"OPEN";Y$
145 PRINT D$;"WRITE";Y$
150 FOR J = 1 TO I
155 PRINT A$(J)
160 NEXT J
165 PRINT "%%%"
170 PRINT D$;"CLOSE";Y$
175 PRINT ">THERE ARE ";I;" WORDS IN THIS DOCUMENT"
180 PRINT D$;"RUN TRANSLATION"
185 END

]

```

Figure A.6. Concat Code Routine

J

JLOAD TRANSLATION
JLIST

```

5 D$ = CHR$(4)
10 HOME
15 PRINT : PRINT
20 PRINT TAB(13);"%% TEXT DECODER %"
25 PRINT : PRINT : PRINT
30 INPUT ">TYPE DICTIONARY NAME : ";Z$
35 PRINT D$;"OPEN";Z$
40 PRINT D$;"READ";Z$
45 INPUT I
50 DIM A$(I,2)
55 FOR J = 1 TO I
60 INPUT A$(J,1)
65 INPUT A$(J,2)
70 NEXT J
75 PRINT D$;"CLOSE";Z$
80 HOME : PRINT : PRINT : PRINT
85 PRINT TAB(14);"%% DECODE FILE %"
90 PRINT : PRINT : PRINT
95 INPUT ">ENTER INPUT FILE NAME : ";X$
100 PRINT : PRINT
105 INPUT ">ENTER OUTPUT FILE NAME : ";Y$
110 PRINT D$;"OPEN";Y$
115 PRINT D$;"DELETE";Y$
120 IX = 0:IC = 0:EN = 0:TC = 20
125 REM DECODE 10 WORDS EACH TIME(TC=10)
130 DIM FW$(TC)
135 PRINT D$;"OPEN";X$
140 PRINT D$;"READ ";X$
145 IC = IC + 1
150 INPUT FW$(IC)
155 IF FW$(IC) = "XXXX" THEN 170
160 IF IC < TC THEN 145
165 GOTO 175
170 EN = 5
175 FOR J = 1 TO IC
180 CW$ = FW$(J)

```

Figure A.7. Translation Routine.

```

185 GOSUB 285
190 IF P < > 999 THEN FW$(J) = A$(P,2)
195 NEXT J
200 IF IX = 0 THEN PRINT D$;"OPEN";Y$
205 IF IX > 0 THEN PRINT D$;"APPEND";Y$
210 PRINT D$;"WRITE";Y$
215 FOR J = 1 TO IC
220 PRINT FW$(J)
225 NEXT J
230 IF EN > 0 THEN 245
235 IX = IX + 1
240 IC = 0: GOTO 140
245 PRINT D$;"CLOSE";X$
250 PRINT D$;"CLOSE";Y$
255 PRINT : PRINT : PRINT
260 PRINT TAB( 14);"XX DECODING COMPLETED XX"
265 PRINT : PRINT : PRINT
270 PRINT "JRUN GETEXT, TO SEE DECODED FILE."
275 PRINT : PRINT
280 END
285 M = 1:N = 1: REM BINARY SEARCH
290 P = (M + N) / 2
295 P = INT (P)
300 IF CW$ > A$(P,1) THEN M = P + 1
305 IF CW$ < A$(P,1) THEN N = P - 1
310 IF CW$ = A$(P,1) THEN 325
315 IF M < = N GOTO 290
320 P = 999
325 RETURN
]

```

Figure A.7. (Continued)

```

JLOAD MKDICT
J

JLIST

5  HOME : PRINT : PRINT : PRINT
10  INPUT " INPUT # OF WORDS FOR DIMENSION : ";X
15  DIM A$(X,2)
20  D$ = CHR$ (4)
25  HOME
30  PRINT "%% PROGRAM TO MAKE DICTIONARY"
35  I = 0:J = 0
40  I = I + 1
45  PRINT : PRINT
50  PRINT ">ENTER CODE#";I;": ";
55  INPUT " ";A$(I,1)
60  IF A$(I,1) = "" GOTO 85
65  PRINT : PRINT
70  PRINT " - DECODE AS: ";
75  INPUT " ";A$(I,2)
80  GOTO 40
85  INPUT "NEW FILE NAME:";N$
90  PRINT D$;"OPEN ";N$
95  PRINT D$;"DELETE ";N$
100 PRINT D$;"OPEN ";N$
105 PRINT D$;"WRITE";N$
110 PRINT I - 1
115 FOR J = 1 TO I - 1
120 PRINT A$(J,1)
125 PRINT A$(J,2)
130 NEXT J
135 PRINT D$;"CLOSE";N$
140 HOME : PRINT : PRINT : PRINT : PRINT
145 PRINT ">NEXT STEP : "
150 PRINT : PRINT
155 PRINT " IRUN MIN SORT,TO SORT DICTIONARY."
160 PRINT : PRINT : PRINT
165 END

J

```

Figure A. 8. Mkdickt Routine.

```

JLOAD  MIN SORT
JLIST

```

```

5 D$ = CHR$ (4)
10 HOME
15 PRINT
20 PRINT "%% SORT & DISPLAY DICTIONARY %%"
25 PRINT : PRINT : PRINT
30 INPUT ">NAME OF DICTIONARY:";Z$
35 PRINT D$;"OPEN";Z$
40 PRINT D$;"READ";Z$
45 INPUT I
50 PRINT "THERE ARE ";I;" WORDS.": PRINT : PRINT
55 DIM A$(I,2)
60 FOR J = 1 TO I
65 INPUT A$(J,1)
70 INPUT A$(J,2)
75 NEXT J
80 PRINT ">SORTING IN PROGRESS :"
85 FOR K = 1 TO I - 1
90 PRINT ">KEY BEING PROCESSED : ";K
95 S = K
100 GOSUB 225
105 IF S < > K THEN GOSUB 190
110 NEXT K
115 PRINT
120 PRINT "%% THE SORTED DICTIONARY %%"
125 PRINT D$;"CLOSE";Z$
130 INPUT ">OUTPUT DICT NAME : ";Z$
135 PRINT D$;"OPEN";Z$
140 PRINT D$;"DELETE";Z$
145 PRINT D$;"OPEN";Z$
150 PRINT D$;"WRITE";Z$
155 PRINT I
160 FOR J = 1 TO I
165 PRINT A$(J,1)
170 PRINT A$(J,2)
175 NEXT
180 PRINT D$;"CLOSE";Z$
185 END
190 B$ = A$(K,1)
195 A$(K,1) = A$(S,1)
200 A$(S,1) = B$
205 B$ = A$(K,2)
210 A$(K,2) = A$(S,2)
215 A$(S,2) = B$
220 RETURN
225 FOR J = K + 1 TO I
230 IF A$(S,1) > A$(J,1) THEN S = J
235 NEXT J
240 RETURN

```

Figure A.9. Min Sort Routine.

LOAD EXAMINE/UPDATE DICT
LIST

```

5  DIM A$(1000,2): REM 1000 WORDS AVAILABLE
10 HOME
15 D$ = CHR$(4): REM D$=" CTRL D "
20 PRINT : PRINT
25 PRINT TAB(14);"XXXXXXXXXXXXXXXXX"
30 PRINT TAB(14);"X"
35 PRINT TAB(14);"X SUBMENU X"
40 PRINT TAB(14);"X"
45 PRINT TAB(14);"XXXXXXXXXXXXXXXXX"
50 PRINT : PRINT : PRINT
55 PRINT TAB(9);"1. TO EXAMINE A DICTIONARY.": PRINT
60 PRINT TAB(9);"2. TO UPDATE A DICTIONARY.": PRINT
65 PRINT ; TAB(9);"3. TO GO BACK TO EDITOR PROGRAM."
70 PRINT ; TAB(9);"4. TO EXIT.": PRINT : PRINT
75 INPUT " TYPE A #: 1/2/3/4. WHICH : ";AA
80 PRINT : PRINT : PRINT " ARE YOU SURE ?"
85 PRINT : PRINT : INPUT " TYPE ( Y/N ). WHICH : ";BB$
90 IF BB$ < > "Y" THEN 10
95 IF AA = 1 THEN 120
100 IF AA = 2 THEN 325
105 IF AA = 3 THEN 320
110 IF AA = 4 THEN 1005
115 GOTO 10
120 D$ = CHR$(4): REM D$=" CTRL D "
125 HOME : PRINT : PRINT : PRINT : PRINT : PRINT
130 PRINT ">TO GET DICTIONARY FILE"
135 PRINT : PRINT : PRINT
140 INPUT ">NAME OF DICTIONARY:";Z$
145 PRINT : PRINT : PRINT
150 PRINT D$;"OPEN";Z$
155 PRINT D$;"READ";Z$
160 REM "I" IS # OF WORDS IN DICTIONARY
165 INPUT I
170 FOR J = 1 TO I
175 INPUT A$(J,1)
180 INPUT A$(J,2)
185 NEXT J
190 PRINT D$;"CLOSE";Z$
195 HOME : PRINT : PRINT : PRINT : PRINT
200 PRINT " TOTAL OF ";I;" WORDS IN THE DICTIONARY."
205 PRINT : PRINT : PRINT
210 PRINT "X WHICH # OF WORD DO YOU WANT TO SEE ?"
215 PRINT : PRINT
220 INPUT " TYPE THE NUMBER : ";T
225 K = INT ((T - 1) / 15)
230 HOME
235 J = K * 15 + 1
240 Y = (K + 1) * 15
245 PRINT J; TAB(5);A$(J,1); TAB(22);A$(J,2)
250 IF J = Y THEN 265
255 IF J = I THEN 205

```

Figure A.10. Examine/Update Dict Routine.

```

260 J = J + 1: GOTO 245
265 PRINT
270 PRINT "TYPE C & C.R. TO CONTINUE WITH NEW #."
275 PRINT "TYPE A & C.R. TO GET NEXT 15 WORDS."
280 PRINT "TYPE U & C.R. TO UPDATE DICT."
285 INPUT "TYPE S & C.R. TO MAIN MENU. WHICH : ";P$
290 IF P$ = "C" THEN 195
295 IF P$ = "S" THEN 10
300 IF P$ = "U" THEN 410
305 IF P$ < > "A" THEN 315
310 K = K + 1: GOTO 230
315 GOTO 270
320 PRINT D$;"RUN HELLO"
325 D$ = CHR$(4): REM D$=" CTRL D "
330 HOME : PRINT : PRINT : PRINT : PRINT
335 PRINT ; TAB( 10);"XXXXXXXXXXXXXXXXXXXXX"
340 PRINT ; TAB( 10);"X"
345 PRINT ; TAB( 10);"X UPDATE DICTIONARY X"
350 PRINT ; TAB( 10);"X"
355 PRINT ; TAB( 10);"XXXXXXXXXXXXXXXXXXXXX"
360 PRINT : PRINT : PRINT
365 INPUT " INPUT NAME OF DICTIONARY : ";Z$
370 PRINT D$;"OPEN";Z$
375 PRINT D$;"READ";Z$
380 INPUT I
385 FOR J = 1 TO I
390 INPUT A$(J,1)
395 INPUT A$(J,2)
400 NEXT J
405 PRINT D$;"CLOSE";Z$
410 HOME : PRINT : PRINT : PRINT
415 PRINT " DO YOU WANT TO :"; PRINT
420 PRINT ; TAB( 15);"1.REPLACE WORDS.": PRINT
425 PRINT ; TAB( 15);"2.INSERT NEW WORDS.": PRINT
430 PRINT ; TAB( 15);"3.DELETE WORDS.": PRINT
435 INPUT " TYPE A #. WHICH : ";HH
440 PRINT : PRINT " ARE YOU SURE ? ( Y/N )"
445 PRINT : INPUT " WHICH : ";HH$
450 IF HH$ = "N" THEN 410
455 IF HH$ = "Y" THEN 465
460 GOTO 410
465 IF HH = 1 THEN 485
470 IF HH = 2 THEN 560
475 IF HH = 3 THEN 700
480 GOTO 410
485 HOME
490 PRINT : PRINT : PRINT
495 INPUT ">ENTRY # [ <1 TO QUIT ] : ";W
500 PRINT
505 IF W < 1 GOTO 815
510 PRINT W;" " ;A$(W,1),A$(W,2): PRINT

```

Figure A.10. (Continued)

```

515 INPUT ">NEW CODE [RET FOR NO CHANGE] : ";NC$
520 PRINT
525 IF NC$ = "" THEN NC$ = A$(W,1)
530 INPUT ">NEW DECODE [RET FOR NO CHANGE] : ";ND$
535 PRINT
540 IF ND$ = "" THEN ND$ = A$(W,2)
545 A$(W,1) = NC$
550 A$(W,2) = ND$
555 GOTO 490
560 HOME : PRINT : PRINT : PRINT
565 INPUT "TYPE # TO BE INSERTED : ";HA
570 HB = HA - 1:HC = HA + 1
575 PRINT
580 PRINT HB; TAB( 6);A$(HB,1); TAB( 23);A$(HB,2)
585 PRINT : PRINT
590 PRINT HA; TAB( 6);A$(HA,1); TAB( 23);A$(HA,2)
595 PRINT
600 PRINT " IS THE # CORRECT ? ( Y/N )": PRINT
605 INPUT " WHICH : ";HH2$
610 IF HH2$ = "N" THEN 560
615 IF HH2$ = "Y" THEN 625
620 GOTO 600
625 I = I + 1
630 FOR J = I TO HC STEP - 1
635 JW = J - 1
640 A$(J,1) = A$(JW,1):A$(J,2) = A$(JW,2)
645 NEXT J
650 PRINT : INPUT " INPUT STENOTYPE CODE : ";HX$
655 PRINT : INPUT " INPUT ENGLISH EQUIVALENT : ";HY$
660 A$(HA,1) = HX$:A$(HA,2) = HY$: PRINT
665 PRINT HA; TAB( 6);A$(HA,1); TAB( 23);A$(HA,2)
670 PRINT
675 PRINT "INSERT ANOTHER WORD ? ( Y/N )"
680 PRINT : INPUT " WHICH : ";HZ$
685 IF HZ$ = "Y" THEN 560
690 IF HZ$ = "N" THEN 815
695 GOTO 675
700 HOME : PRINT : PRINT : PRINT
705 INPUT "TYPE # TO BE DELETED : ";JA: PRINT
710 PRINT JA; TAB( 6);A$(JA,1); TAB( 23);A$(JA,2)
715 PRINT
720 PRINT " IS THE # CORRECT ? ( Y/N )": PRINT
725 INPUT " WHICH : ";JX$
730 IF JX$ = "N" THEN 700
735 IF JX$ = "Y" THEN 745
740 GOTO 720
745 I = I - 1
750 FOR J = JA TO I
755 JX = J + 1
760 A$(J,1) = A$(JX,1):A$(J,2) = A$(JX,2)
765 NEXT J

```

Figure A.10. (Continued)

```

770 IH = I + 1
775 A$(IH,1) = " ":A$(IH,2) = " "
780 PRINT : PRINT
785 PRINT " DELETE ANOTHER WORD? ( Y/N )"
790 PRINT : INPUT " WHICH : ";JY$
795 IF JY$ = "Y" THEN 700
800 IF JY$ = "N" THEN 810
805 GOTO 785
810 HOME : PRINT : PRINT : PRINT
815 INPUT "> UPDATE DICTIONARY ? ( Y/N ) : ";K$
820 PRINT : PRINT : PRINT " ARE YOU SURE ? "
825 PRINT : PRINT
830 INPUT " ( Y/N ? ) WHICH : ";AA$
835 IF AA$ < > "Y" THEN 810
840 IF K$ < > "Y" GOTO 885
845 PRINT D$;"OPEN";Z$
850 PRINT D$;"WRITE";Z$
855 PRINT I
860 FOR J = 1 TO I
865 PRINT A$(J,1)
870 PRINT A$(J,2)
875 NEXT
880 PRINT D$;"CLOSE";Z$
885 HOME : PRINT : PRINT : PRINT :
890 PRINT " DO YOU WANT TO : "
895 PRINT : PRINT : PRINT
900 PRINT ; TAB( 9 ); "1. MAKE ANOTHER CHANGE ?"
905 PRINT
910 PRINT ; TAB( 9 ); "2. UPDATE ANOTHER DICTIONARY ?"
915 PRINT
920 PRINT ; TAB( 9 ); "3. GO TO EXAMINE DICTIONARY"
925 PRINT ; TAB( 12 ); "PROGRAM ?": PRINT
930 PRINT ; TAB( 9 ); "4. GO TO EDITOR PROGRAM ?": PRINT
935 PRINT ; TAB( 9 ); "5. EXIT ?": PRINT : PRINT
940 PRINT ; TAB( 9 ); "TYPE A # : 1/2/3/4/5 ": PRINT
945 INPUT " WHICH : ";AX: PRINT : PRINT
950 PRINT " ARE YOU SURE ? ": PRINT : PRINT
955 INPUT " ( Y/N ? ) WHICH : ";XA$
960 IF XA$ < > "Y" THEN 885
965 D$ = CHR$( 4 ): REM D$= " CTRL D "
970 IF AX = 1 THEN 410
975 IF AX = 2 THEN 325
980 IF AX = 3 THEN 10
985 IF AX = 4 THEN 1000
990 IF AX = 5 THEN 1005
995 GOTO 885
1000 PRINT D$;"RUN HELLO"
1005 HOME : END

```

Figure A.10. (Continued)

FILE NAME : STENO-DICT

TOTAL OF 589 WORDS

IN THE DICTIONARY.

1	*E	HE
2	*EPB	EVEN
3	*EU	I
4	*EUF	EACH
5	*EUR	YEAR
6	*EURS	YEARS
7	*U	YOU
8	A	AN
9	A*	A
10	A*BL	ABLE
11	ABGPBLG	ACKNOWLEDGE
12	ABGPBLGD	ACKNOWLEDGED
13	ABGPBLGPLT	ACKNOWLEDGEMENT
14	ABGT	ACT
15	ABGTEUFPLT	ACTIVITY
16	ABGTEUFPLTS	ACTIVITIES
17	AFPLTHRFPLT	ALABAMA
18	AFPLTKFPLT	ALASKA
19	AFPLTRFPLT	ARKANSAS
20	AFPLTSTKFPLT	ARIZONA
21	AKOE	ACCOMPANY
22	AKOED	ACCOMPANIED
23	AKOEG	ACCOMPANYING
24	AKOES	ACCOMPANIES
25	ALS	ALWAYS
26	AOT	ANOTHER
27	AP	APRIL
28	APB	AND
29	APBS	ANSWER
30	APBSD	ANSWERED
31	APBSG	ANSWERING
32	APBSZ	ANSWERS
33	APLT	AMOUNT
34	APLTD	AMOUNTED
35	APLTG	AMOUNTING
36	APLTS	AMOUNTS
37	ATAFP	ATTACH
38	ATAFPD	ATTACHED
39	AUG	AUGUST
40	B	BE
41	BG	BEING
42	D	DOLLARS
43	EDKA*GZ	EDUCATION
44	EFPL	EVERY
45	EUBG	INCORPORATE
46	EUBGD	INCORPORATED
47	EUBGS	INCORPORATES
48	EUBGZ	INCORPORATION
49	EUFPLTAFPLT	IOWA
50	EUFPLTHRFPLT	ILLINOIS

Figure A.11. Steno-Dict Text File.

51	EUFPLTTKFPLT	IDAHO
52	EUFPLTTPHFPLT	INDIANA
53	EUPBS	INSURE
54	EUPBSAPBS	INSURANCE
55	EUPBSD	INSURED
56	EUPBSDZ	INSUREDS
57	EUPBSG	INSURING
58	EUPBSREPB	INCONVENIENT
59	EUPBSREPBS	INCONVENIENCE
60	EUPBT	INTEREST
61	EUPBTD	INTERESTED
62	EUPBTG	INTERESTING
63	EUPBTS	INTERESTS
64	EUPLPBL	IMPOSSIBLE
65	EUPLPBLTEUZ	IMPOSSIBILITIES
66	EUT	IT
67	F	OF
68	FP	MUCH
69	FPLT	.
70	FPLTFPLT	CHR\$(58)
71	FPLTRBGS	CHR\$(59)
72	H	HAD
73	HAPBDL	HANDLE
74	HAPBDLG	HANDLING
75	HE	HELP
76	HED	HELPED
77	HEG	HELPING
78	HES	HELPS
79	HFPLTEUFPLT	HAWAII
80	HOS	HOSPITAL
81	HOSSTKAXGZ	HOSPITALIZATION
82	HOSZ	HOSPITALS
83	HRXL	WILL
84	HRAEUBG	LIKE
85	HRAOBG	LOOK
86	HREUST	LIST
87	HREUSTD	LISTED
88	HRFPLTAFPLT	LOUISIANA
89	HRGXLG	WILLING
90	HROP	ENVELOPE
91	HROPS	ENVELOPES
92	HRR	ALREADY
93	HUPB	HUNDRED
94	HUPBD	HUNDRED DOLLARS
95	K	CAN
96	KAURD	CARD
97	KFPLTKWRFPLT	KENTUCKY
98	KFPLTSFPLT	KANSAS
99	KHEBG	CHECK
100	KHRO	ENCLOSE

Figure A.11. (Continued)

101	KHROD	ENCLOSED
102	KHROG	ENCLOSING
103	KHROUR	ENCLOSURE
104	KO	COULD
105	KOE	COMPANY
106	KOES	COMPANIES
107	KOPBT	CONTINUE
108	KOPBTD	CONTINUED
109	KOPBTG	CONTINUING
110	KOR	CORRESPOND
111	KOREPBS	CORRESPONDENCE
112	KOREPBT	CORRESPONDENT
113	KORG	CORRESPONDING
114	KOSRER	COVER
115	KOSRERG	COVERING
116	KPHRE	COMPLETE
117	KPHRED	COMPLETED
118	KPHREG	COMPLETING
119	KPHREGZ	COMPLETION
120	KPHREHREU	COMPLETELY
121	KR	CONSIDER
122	KRXAGZ	CONSIDERATION
123	KRA	COOPERATE
124	KRAD	COOPERATED
125	KRAEUFPL	COOPERATIVE
126	KRAEUFPLS	COOPERATIVES
127	KRAG	COOPERATING
128	KRAGZ	COOPERATION
129	KRBL	CONSIDERABLE
130	KRBLEU	CONSIDERABLY
131	KRD	CONSIDERED
132	KRFPLTAFPLT	CALIFORNIA
133	KRFPLTOFPLT	COLORADO
134	KRFPLTTFPLT	CONNECTICUT
135	KRG	CONSIDERING
136	KRS	CONSIDERS
137	KT	ACCOUNT
138	KTD	ACCOUNTED
139	KTG	ACCOUNTING
140	KTS	ACCOUNTS
141	KU	CUSTOM
142	KUR	CUSTOMER
143	KUREU	CUSTOMARY
144	KURS	CUSTOMERS
145	KW	REQUEST
146	KWAEUT	QUITE
147	KWD	REQUESTED
148	KWE	QUESTION
149	KWEAEUR	QUESTIONNAIRE
150	KWES	QUESTIONS

Figure A.11. (Continued)

151	KWEU	EQUIP
152	KWEUD	EQUIPPED
153	KWEUPLT	EQUIPMENT
154	KWEUR	REQUIRE
155	KWEURD	REQUIRED
156	KWEURG	REQUIRING
157	KWEURPLT	REQUIREMENT
158	KWEURPLTS	REQUIREMENTS
159	KWEURS	REQUIRES
160	KWG	REQUESTING
161	KWR	WHY
162	KWRED	YESTERDAY
163	KWS	REQUESTS
164	O	ON
165	OBG	OCTOBER
166	OD	ORDER
167	ODD	ORDERED
168	ODG	ORDERING
169	ODHREU	ORDERLY
170	ODZ	ORDERS
171	OE	-
172	OFEUS	OFFICE
173	OFEUSZ	OFFICES
174	OFPLTHFPLT	OHIO
175	OFPLTKFPLT	OKLAHOMA
176	OFPLTRFPLT	OREGON
177	OFSEERS	OFFICERS
178	OP	OPEN
179	OPD	OPENED
180	OPG	OPENING
181	OPGS	OPENINGS
182	OPS	OPENS
183	ORG	ORGANIZE
184	ORGAXGZ	ORGANIZATION
185	ORGD	ORGANIZED
186	ORGG	ORGANIZING
187	ORGS	ORGANIZES
188	ORGZA*GZS	ORGANIZATIONS
189	P	APPROXIMATE
190	PAXG	PAGE
191	PBL	POSSIBLE
192	PBLEU	POSSIBLY
193	PBLG	KNOWLEDGE
194	PBLT	POSSIBILITY
195	PER	EXPERIENCE
196	PERD	EXPERIENCED
197	PERG	EXPERIENCING
198	PERS	PERCENT
199	PERSAPBLG	PERCENTAGE
200	PERSZ	PERCENTS

Figure A.11. (Continued)

201	PERZ	EXPERIENCES
202	PFPLTAFPLT	PENNSYLVANIA
203	PHXL	MILLION
204	PHXLD	MILLION DOLLARS
205	PHXPB	MONDAY
206	PHA	MAY
207	PHAE	MANAGE
208	PHAED	MANAGED
209	PHAEL	MAIL
210	PHAEPLT	MANAGEMENT
211	PHAER	MANAGER
212	PHAERS	MANAGERS
213	PHAPBER	MANNER
214	PHAR	MARCH
215	PHATER	MATTER
216	PHDZ	MERCHANDISE
217	PHDZG	MERCHANDISING
218	PHEB	MEMBER
219	PHEBS	MEMBERS
220	PHEBSHEUP	MEMBERSHIP
221	PHEBSHEUPS	MEMBERSHIPS
222	PHED	IMMEDIATE
223	PHEDHREU	IMMEDIATELY
224	PHETSDZOD	METHOD
225	PHETSDZODZ	METHODS
226	PHEUPB	MINUTE
227	PHEUPBS	MINUTES
228	PHFPLTAFPLT	MASSACHUSETTS
229	PHFPLTEFPLT	MAINE
230	PHFPLTEUFPLT	MICHIGAN
231	PHFPLTOFPLT	MISSOURI
232	PHFPLTSFPLT	MISSISSIPPI
233	PHFPLTTFPLT	MONTANA
234	PHFPLTTHFPLT	MARYLAND
235	PHFPLTTPHFPLT	MINNESOTA
236	PHFR	MANUFACTURE
237	PHFRD	MANUFACTURED
238	PHFRER	MANUFACTURER
239	PHFRERS	MANUFACTURERS
240	PHFRG	MANUFACTURING
241	PHFRS	MANUFACTURES
242	PHO	MONTH
243	PHOXR	MORE
244	PHOHREU	MONTHLY
245	PHOS	MONTHS
246	PHPB	ADMINISTER
247	PHPBD	ADMINISTERED
248	PHPBGZ	ADMINISTRATION
249	PHPBTEUFPL	ADMINISTRATIVE
250	PHPBTOR	ADMINISTRATOR

Figure A.11. (Continued)

251	PHPBTORS	ADMINISTRATORS
252	PHR	MR.
253	PHRBGZ	APPLICATION
254	PHRBGZS	APPLICATIONS
255	PHREU	REPLY
256	PHREU	APPROXIMATELY
257	PHREUG	REPLYING
258	PHREUS	REPLIES
259	PHROEU	EMPLOY
260	PHROEUXE	EMPLOYEE
261	PHROEUXEZ	EMPLOYEES
262	PHROEUD	EMPLOYED
263	PHROEUG	EMPLOYING
264	PHROEUPLT	EMPLOYMENT
265	PHROEUR	EMPLOYER
266	PHROEURZ	EMPLOYERS
267	PHRS	MRS.
268	PHRS	APPLICANTS
269	PHZ	MS.
270	PL	MANY
271	POEUPBT	POINT
272	POPB	UPON
273	POR	IMPORTANT
274	PORS	IMPORTANCE
275	PPB	OPINION
276	PPBS	OPINIONS
277	PRA	OPERATE
278	PRABG	PRATICAL
279	PRABGHREU	PRATICALLY
280	PRAD	OPERATED
281	PRAG	OPERATING
282	PRAGZ	OPERATION
283	PRAGZAL	OPERATIONAL
284	PRAR	OPERATOR
285	PRARS	OPERATORS
286	PRAS	OPERATES
287	PRERB	APPRECIATE
288	PRERBD	APPRECIATED
289	PRERBGZ	APPRECIATION
290	PRERBS	APPRECIATES
291	PRERBTEUFPL	APPRECIATIVE
292	PROFPLAEUDEUD	PROVIDED
293	PROTPEGZAL	PROFESSIONAL
294	PUR	PURCHASE
295	PURD	PURCHASED
296	PURER	PURCHASER
297	PURERS	PURCHASERS
298	PURG	PURCHASING
299	PURS	PURCHASES
300	PW	ABOUT

Figure A.11. (continued)

301	PW%EUPB	BEEN
302	PW%L	BILLION
303	PW%LD	BILLION DOLLARS
304	PWAL	BALANCE
305	PWALD	BALANCED
306	PWALG	BALANCING
307	PWALS	BALANCES
308	PWEHR%EUFPL	BELIEVE
309	PWEKOS	BECAUSE
310	PWEPBTPEUT	BENEFIT
311	PWEPBTPEUTS	BENEFITS
312	PWEST	BEST
313	PWEUZ	BUSINESS
314	PWEUZEZ	BUSINESSES
315	PWF	BEFORE
316	PWREU	BRING
317	PWREUG	BRINGING
318	PWREUS	BRINGS
319	PWROFPOR	BROCHURE
320	RAR	REGARD
321	RARG	REGARDING
322	RARHRES	REGARDLESS
323	RARS	REGARDS
324	RBGS	CHR\$(44)
325	REBG	RECOMMEND
326	REBGXGZ	RECOMMENDATION
327	REBGXGZS	RECOMMENDATIONS
328	REBGD	RECOMMENDED
329	REBGG	RECOMMENDING
330	REBGS	RECOMMENDS
331	REG	REGULAR
332	REPL	REMEMBER
333	REPLD	REMEMBERED
334	REPLT	REMIT
335	REPLTAPBS	REMITTANCE
336	REPLTD	REMITTED
337	REPT	REPRESENT
338	REPTTEUFPL	REPRESENTATIVE
339	REPTTEUFPLS	REPRESENTATIVES
340	RFPLTEUFPLT	RHODE ISLAND
341	RR	ARE
342	S	IS
343	SXPB	SUNDAY
344	SXT	SATURDAY
345	SAE	SATISFY
346	SAEBGZ	SATISFACTION
347	SAED	SATISFIED
348	SAEG	SATISFYING
349	SAES	SATISFIES
350	SAETORHREU	SATISFACTORILY

Figure A.11. (Continued)

351	SAETREU	SATISFACTORY
352	SEBG	SECOND
353	SEFPL	RECEIVE
354	SEFPLD	RECEIVED
355	SEFPLG	RECEIVING
356	SEFPLS	RECEIVES
357	SEP	ACCEPT
358	SEPABL	ACCEPTABLE
359	SEPAPBS	ACCEPTANCE
360	SEPD	ACCEPTED
361	SEPG	ACCEPTING
362	SEPT	SEPTEMBER
363	SER	CERTAIN
364	SERFPL	SERVE
365	SERFPLG	SERVING
366	SERHREU	CERTAINLY
367	SERSREUS	SERVICE
368	SERSREUSZ	SERVICES
369	SEU	ASSIST
370	SEUAPBS	ASSISTANCE
371	SEUAPBT	ASSISTANT
372	SEUAPBTS	ASSISTANTS
373	SEUD	ASSISTED
374	SEUG	ASSISTING
375	SEUPBSEUHREU	SINCERELY
376	SEUPHEUHRER	SIMILAR
377	SEUPLPHREU	SIMPLY
378	SEUPLPOL	SIMPLE
379	SEURBG	CIRCUMSTANCE
380	SEURBGS	CIRCUMSTANCES
381	SEURBGSHAL	CIRCUMSTANTIAL
382	SFPLTKRFPLT	SOUTH CAROLINA
383	SFPLTTKFPLT	SOUTH DAKOTA
384	SHXE	SHE
385	SHPLT	SHIPMENT
386	SHPLTS	SHIPMENTS
387	SK	ASK
388	SKAOLS	SCHOOLS
389	SKD	ASKED
390	SKG	ASKING
391	SKR	SECRETARY
392	SKRAL	SECRETARIAL
393	SKRS	SECRETARIES
394	SKS	ASKS
395	SKWRXUPB	JUNE
396	SKWRAPB	JANUARY
397	SKWRE	GENTLEMEN
398	SKWRUL	JULY
399	SO	SOME
400	SOXRS	SOURCE

Figure A.11. (Continued)

401	SORB	ASSOCIATE
402	SORBD	ASSOCIATED
403	SORBGZ	ASSOCIATION
404	SORBGZS	ASSOCIATIONS
405	SORBS	ASSOCIATES
406	SOWOPB	SOMEONE
407	SRAEU	AVAIL
408	SRAEUBL	AVAILABLE
409	SRAEUBLT	AVAILABILITY
410	SRALXU	VALUE
411	SRALXUBL	VALUABLE
412	SRE	VERY
413	SREP	DEVELOP
414	SREPB	CONVENIENT
415	SREPBS	CONVENIENCE
416	SREPD	DEVELOPED
417	SREPG	DEVELOPING
418	SREPLT	DEVELOPMENT
419	SREPLTS	DEVELOPMENTS
420	SREPS	DEVELOPS
421	SREUD	INDIVIDUAL
422	SREUDHREU	INDIVIDUALLY
423	SREUDZ	INDIVIDUALS
424	SRFPL	HAVE
425	SRFPLTAFPLT	VIRGINIA
426	SRFPLTTFPLT	VERMONT
427	SROEU	INVOICE
428	SROEUS	INVOICES
429	SRR	EVER
430	SS	CENTS
431	ST	STREET
432	STAF	STAFF
433	STAPB	STAND
434	STPH	?
435	STS	STREETS
436	STUDEU	STUDY
437	SUG	SUGGEST
438	SUGD	SUGGESTED
439	SUGGZ	SUGGESTION
440	SUGS	SUGGESTS
441	SUPT	SUPERINTENDENT
442	T	THE
443	TXEPPER	TEACHER
444	TXEFPERS	TEACHERS
445	TXS	TUESDAY
446	TA	TAKE
447	TAEPB	TAKEN
448	TAG	TAKING
449	TAS	TAKES
450	TEL	TELL

Figure A.11. (Continued)

451	TEPB	TEN
452	TEUBG	PARTICULAR
453	TEUBGHREU	PARTICULARLY
454	TEUBGS	PARTICULARS
455	TEUZ	ADVERTISE
456	TEUZD	ADVERTISED
457	TEUZEZ	ADVERTISES
458	TEUZG	ADVERTISING
459	TEUZPLT	ADVERTISEMENT
460	TFPLTKPFPLT	TEXAS
461	TFPLTTPHFPLT	TENNESSEE
462	TH	THIS
463	THXR	THURSDAY
464	THA	THANK
465	THAG	THANKING
466	THAS	THANKS
467	THE	THEY
468	THEPB	THEN
469	THEU	THINK
470	THEUG	THINKING
471	THOU	THOUSAND
472	THOUD	THOUSAND DOLLARS
473	THPOFPL	NOVEMBER
474	THR	THEIR
475	THU	ENTHUSIASM
476	THUZ	ENTHUSIASTIC
477	TK	DID
478	TKAXT	DATE
479	TKAE	DAY
480	TKAEZ	DAYS
481	TKEPT	DEPARTMENT
482	TKEPTS	DEPARTMENTS
483	TKES	DECEMBER
484	TKEUXR	DEAR
485	TKEUGZ	ADDITION
486	TKEUGZAL	ADDITIONAL
487	TKEUGZHREU	ADDITIONALLY
488	TKEUGZS	ADDITIONS
489	TKEUSKOPBT	DISCONTINUED
490	TKFPLTEFPLT	DELAWARE
491	TKHR	DELIVER
492	TKHRD	DELIVERED
493	TKHREU	DELIVERY
494	TKHREUZ	DELIVERIES
495	TKHRG	DELIVERING
496	TKPWEPB	AGAIN
497	TKPWEPBS	AGAINST
498	TKPWFPLTAFPLT	GEORGIA
499	TKPWO	GOVERN
500	TKPWOG	GOVERNING

Figure A.11. (Continued)

501	TKPWOPLT	GOVERNMENT
502	TKPWOPLTAL	GOVERNMENTAL
503	TKPWOPLTS	GOVERNMENTS
504	TKPWOR	GOVERNOR
505	TKPWORS	GOVERNORS
506	TKR	DOCTOR
507	TKU	INDUSTRY
508	TKUL	INDUSTRIAL
509	TKUS	INDUSTRIES
510	TKUZ	DOES
511	TOD	TODAY
512	TOG	TOGETHER
513	TOPL	TOMORROW
514	TP	IF
515	TPXELD	FIELD
516	TPAEUPBD	FIND
517	TPEB	FEBRUARY
518	TPEBG	EFFECT
519	TPEBGEUFPL	EFFECTIVE
520	TPEBGS	EFFECTS
521	TPERPL	FIRM
522	TPEUG	FIGURE
523	TPEUGD	FIGURED
524	TPEUGS	FIGURES
525	TPFPLTHRFPLT	FLORIDA
526	TPH	IN
527	TPHXED	NEED
528	TPHES	NECESSARY
529	TPHEU	ANY
530	TPHEUWOPB	ANYONE
531	TPHFPLTEFPLT	NEBRASKA
532	TPHFPLTHFPLT	NEW HAMPSHIRE
533	TPHFPLTKRFPLT	NORTH CAROLINA
534	TPHFPLTKWRFPLT	NEW YORK
535	TPHFPLTPHFPLT	NEW MEXICO
536	TPHFPLTSKWRFLT	NEW JERSEY
537	TPHFPLTSRFPLT	NEVADA
538	TPHFPLTTKFPLT	NORTH DAKOTA
539	TPHOX	NO
540	TPHUPL	NUMBER
541	TPHUPLD	NUMBERED
542	TPHUPLG	NUMBERING
543	TPHUPLS	NUMBERS
544	TPO	INFORM
545	TPOD	INFORMED
546	TPOGZ	INFORMATION
547	TPOL	FOLLOW
548	TPOLD	FOLLOWED
549	TPOLG	FOLLOWING
550	TPOLS	FOLLOWS

Figure A.11. (Continued)

551	TPOR	FOR
552	TPOTEUFPL	INFORMATIVE
553	TPPB	FINANCE
554	TPPBD	FINANCED
555	TPPBG	FINANCING
556	TPPBS	FINANCES
557	TPPBSHAL	FINANCIAL
558	TPR	FROM
559	TPRX	FRIDAY
560	TPURT	FURTHER
561	TRAEPBG	TRAINING
562	TSDZRAO	THROUGH
563	TUPBT	OPPORTUNITY
564	TUPBTEUZ	OPPORTUNITIES
565	UFPLTTFPLT	UTAH
566	UPBD	UNDER
567	UPBSRAEUBL	UNAVAILABLE
568	UR	YOUR
569	URB	USUAL
570	URZ	YOURS
571	W	WITH
572	W*D	WEDNESDAY
573	WXE	WE
574	WEU	WHICH
575	WEUPB	WITHIN
576	WFPLTAFPLT	WASHINGTON
577	WFPLTEUFPLT	WISCONSIN
578	WFPLTKWRFPLT	WYOMING
579	WFPLTSRFPLT	WEST VIRGINIA
580	WHEPB	WHEN
581	WHR	WHETHER
582	WO	WOULD
583	WR	WERE
584	WREU	WRITE
585	WREUG	WRITING
586	WREUPB	WRITTEN
587	WREUR	WRITER
588	WREURS	WRITERS
589	WREUS	WRITES
END OF DICTIONARY		

Figure A.11. (Continued)

```

LOAD LETTEROUT
LIST

5 HOME
10 D$ = CHR$(4): REM CTRL D
15 PRINT "          **TEXT FILE RETRIEVAL**"
20 DIM A$(1000)
25 PRINT
30 INPUT ">ENTER FILE NAME:";Z$
35 PRINT D$;"OPEN ";Z$
40 PRINT D$;"READ ";Z$
45 I = 0:L = 0:X = 0
50 I = I + 1
55 INPUT A$(I)
60 PRINT A$(I)
65 IF A$(I) = "****" THEN 75
70 GOTO 50
75 PRINT D$;"CLOSE ";Z$
80 PRINT D$;"PR#1"
85 PRINT CHR$(9);"14L"; CHR$(9);"80R"
90 PRINT CHR$(27); CHR$(84);"40"
95 PRINT CHR$(27);"!"
100 PRINT "** FILE NAME : ";Z$
105 PRINT CHR$(13)
110 I$ = ""
115 X = 0
120 FOR J = 1 TO I
125 IF A$(J) = "*" THEN 180
130 IF A$(J + 1) = "*" THEN 180
135 IF A$(J) = "CHR$(44)" THEN A$(J) = ","
140 IF A$(J) = "CHR$(58)" THEN A$(J) = ":"
145 IF A$(J) = "**" THEN GOSUB 205
150 IF A$(J) = "**" THEN 180

```

Figure A.12. Letterout Routine.

```

155 IF A$(J) < > "****" THEN 170
160 GOSUB 205
165 GOTO 180
170 I$ = I$ + A$(J) + " "
175 IF LEN (I$) > = 57 THEN GOSUB 230
180 NEXT J
185 PRINT CHR$ (27); CHR$ (65)
190 PRINT CHR$ (27); CHR$ (34)
195 PRINT D$;"PR#0"
200 END
205 PRINT I$
210 PRINT CHR$ (13)
215 I$ = ""
220 X = 0
225 RETURN
230 IF LEN (I$) < 63 THEN 255
235 K = LEN (I$) - LEN (A$(J)) - 1
240 PRINT LEFT$ (I$,K)
245 I$ = A$(J) + " "
250 GOTO 265
255 PRINT I$
260 I$ = ""
265 X = X + 1
270 RETURN

1

```

Figure A.12. (Continued)

VITA

Jui-An Hsu was born in Yun-Lin, Taiwan, The Republic of China on November 11, 1952. Attending public schools, he graduated from Cheng-Kung High School, Taipei, in June 1970. The following September he entered The National Taiwan University, Taipei, and in June 1974 he received a Bachelor of Science degree in Geology. In the Fall of 1976 he accepted a graduate assistantship at The University of Tennessee, Knoxville, majoring in geochemistry. In the Fall of 1978 he transferred to the Department of Electrical Engineering.

Mr. Hsu, who is a member of the Institute of Electrical and Electronic Engineers, has been employed as an instructor with the Denmark Technical College in Denmark, South Carolina since September 1980. He received the Master of Science degree in Electrical Engineering in December 1982.